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# 2010

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

Prepared by
Sandia National Laboratories
Albuquerque, New Mexico 87185

Sandia National Laboratories is a multi-program laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U. S. Department of Energy's National Nuclear Security Administration under Contract DE-AC04-94AL85000.



Sandia National Laboratories

National Nuclear Security Administration

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# Calendar Year 2010
# Annual Site Environmental Report
# Sandia National Laboratories, Albuquerque, New Mexico

**Produced By:**
Sandia National Laboratories
P.O. Box 5800
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**ABSTRACT**

Sandia National Laboratories, New Mexico (SNL/NM) is a government-owned/contractor-operated facility. Sandia Corporation (Sandia), a wholly owned subsidiary of Lockheed Martin Corporation (LMC), manages and operates the laboratory for the U.S. Department of Energy (DOE), National Nuclear Security Administration (NNSA). The DOE/NNSA, Sandia Site Office (SSO) administers the contract and oversees contractor operations at the site. This annual report summarizes data and the compliance status of Sandia Corporation's environmental protection and monitoring programs through December 31, 2010. Major environmental programs include air quality, water quality, groundwater protection, terrestrial surveillance, waste management, pollution prevention (P2), environmental restoration (ER), oil and chemical spill prevention, and implementation of the National Environmental Policy Act (NEPA). Environmental monitoring and surveillance programs are required by DOE Order 450.1A, *Environmental Protection Program* (DOE 2008a) and DOE Manual 231.1-1A, *Environment, Safety, and Health Reporting* (DOE 2007).

Calendar Year 2010 Annual Site Environmental Report
Sandia National Laboratories, Albuquerque, New Mexico
Final Approval date: August 2011

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**Prepared For:**
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**Prepared By:**
Sandia Corporation, Albuquerque, New Mexico
ES&H and Emergency Management Center

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## NOTE TO THE READER

The goal for SNL/NM Annual Site Environmental Report is to present summary environmental data regarding environmental performance, compliance with environmental standards and requirements, and to highlight significant facility programs. In addition, the U.S. Department of Energy (DOE) views this document as a valuable tool for maintaining a dialogue with our community about the environmental health of this site. We are striving to improve the quality of the contents as well as include information that is important to you. Please provide feedback, comments, questions, or requests for copies of this report and/or appendices to:

U.S. Department of Energy
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The SNL/NM Annual Site Environmental Report (ASER) can be found at the following website:
*http://www.sandia.gov/news/publications/environmental/index.html*

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**NOTE: "Groundwater Levels" (formerly Chapter 7 in previous year's ASERs) is now Appendix B. All appendices are located on attached CD on the back inside cover of this report.**



**FIGURES**

**TABLES**

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# Acronyms and Abbreviations

| | | |
|---|---|---|
| A | ABC/AQCB | Albuquerque-Bernalillo County/Air Quality Control Board |
| | ABCWUA | Albuquerque Bernalillo County Water Utility Authority |
| | ACE | U.S. Army Corps of Engineers |
| | ACRR | Annular Core Research Reactor |
| | ADA | Americans with Disabilities Act |
| | AEA | Atomic Energy Act |
| | AHCF | Auxiliary Hot Cell Facility |
| | AIRFA | American Indian Religious Freedom Act |
| | AIS | Albuquerque International Sunport |
| | ALARA | as low as reasonably achievable |
| | AML | Advanced Materials Laboratory |
| | AMPF | Advanced Manufacturing Prototype Facility |
| | AMPL | Advanced Manufacturing Process Laboratory |
| | AMWTP | Advance Mixed Waste Treatment Project |
| | ANOVA | Analysis of Variance |
| | AOC | area of concern |
| | APPRM | Advanced Pulsed Power Research Module |
| | AQC | Air Quality Compliance |
| | AQCB | Air Quality Control Board |
| | AQMD | Air Quality Management District |
| | ARCOC | Analysis Request and Chain-of-Custody |
| | ARPA | Archaeological Resources Protection Act |
| | ASER | Annual Site Environmental Report |
| | AST | above-ground storage tank |
| | ATC | authority-to-construct |
| | AWN | Acid Waste Neutralization |
| B | BGS | below ground surface |
| | BMP | Best Management Practice |
| | BSG | Burn Site Groundwater |
| | BWX | Babcock & Wilcox Technical Services Group, Inc |
| C | C&D | Construction and Demolition |
| | CA | Compliance Agreement |
| | CAA | Clean Air Act |
| | CAAA | Clean Air Act Amendment |
| | CAC | Corrective Action Complete |
| | CAMU | Corrective Action Management Unit |
| | CAN | Clean Air Network |
| | CAP | Consolidated Audit Program |
| | CAP88 | Clean Air Act Assessment Package-1988 |
| | CARA | Concrete and Asphalt Recycling Area |
| | CEARP | Comprehensive Environmental Assessment and Response Program |
| | CEP | Chemical Exchange Program |
| | CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| | CERR | Consolidated Emission Reporting Rule |
| | CFR | Code of Federal Regulations |
| | CFRC | Customer Funded Records Center |
| | CINT | Center for Integrated Nanotechnologies |

| | | |
|---|---|---|
| | CME | Corrective Measures Evaluation |
| | CMS | Corrective Measures Study |
| | CMI | Corrective Measures Implementation |
| | CMIP | Corrective Measures Implementation Plan |
| | COA | City of Albuquerque |
| | COC | contaminants of concern |
| | COD | Chemical Oxygen Demand |
| | COOC | Compliance Order on Consent |
| | CPA | Closure Plan Amendment |
| | CPG | Comprehensive Procurement Guidelines |
| | CPMS | Criteria Pollutant Monitoring Station |
| | CSS | CWL/sanitary sewer |
| | CTF | Coyote Test Field |
| | CWA | Clean Water Act |
| | CWL | Chemical Waste Landfill |
| | CWP | Corporate Work Process |
| | CY | Calendar Year |
| D | D&D | decontamination and demolition |
| | DCG | Derived Concentration Guide |
| | DETS | Dynamic Explosives Test Site |
| | DoD | U.S. Department of Defense |
| | DOE | U.S. Department of Energy |
| | DOECAP | DOE Consolidated Audit Program |
| | DQO | data quality objective |
| | DSS | Drain and Septic Systems |
| | DSSI | Diversified Scientific Services, Inc. |
| E | EA | Environmental Assessment |
| | EBOM | Existing Building Operations and Maintenance |
| | ECF | Explosive Components Facility |
| | EDE | effective dose equivalent |
| | EEANM | Environmental Education Association of New Mexico |
| | EHD | Environmental Health Division |
| | EIS | Environmental Impact Statement |
| | EM | Environmental Management |
| | EMS | Environmental Management System |
| | EO | Executive Order |
| | EPA | U.S. Environmental Protection Agency |
| | EPCRA | Emergency Planning and Community Right-to-Know Act |
| | EPEAT | Electronic Product Environmental Assessment Tool |
| | ER | Environmental Restoration |
| | ES&H | Environment, Safety, and Health |
| | ESA | Endangered Species Act |
| | ET | evapotranspirative |
| F | FCC | Facilities Command Center |
| | FEC | Federal Electronics Challenge |
| | FFCA | Federal Facilities Compliance Act |
| | FFCO | Federal Facility Compliance Order |
| | FIFRA | Federal Insecticide, Fungicide, and Rodenticide Act |
| | FLAME | Fire Laboratory used for the Authentication of Modeling and Experiments |

| | | |
|---|---|---|
| | FOP | field operating procedure |
| | FR | Federal Register |
| | FY | Fiscal Year |
| G | GCP | General Construction Permit |
| | GEL | General Engineering Laboratories |
| | GHG | greenhouse gas |
| | GIF | Gamma Irradiation Facility |
| | GP | guiding principles |
| | GSA | General Services Administration |
| | GSF | Gross Square Footage |
| | GWPP | Groundwater Protection Program |
| H | HAP | hazardous air pollutant |
| | HBWSF | High-Bay Waste Storage Facility |
| | HCF | Hot Cell Facility |
| | HDRV | Historical Disposal Requests Validation |
| | HE | high explosive |
| | HERMES-III | High Energy Radiation Megavolt Electron Source-III |
| | HLW | high-level radioactive waste |
| | HPML | High Power Microwave Laboratory |
| | HSM | Heating System Modernization |
| | HSWA | Hazardous and Solid Waste Amendment |
| | HWB | Hazardous Waste Bureau |
| | HWMF | Hazardous Waste Management Facility |
| I | I-40 | Interstate 40 |
| | IBL | Ion Beam Laboratory |
| | IC | institutional control |
| | ICM | Interim Corrective Measure |
| | ILMS | Integrated Laboratory Management System |
| | IPB | International Programs Building |
| | IPOC | Innovation Parkway Office Center |
| | ISDP | Internal Surface Discharge Program |
| | ISMS | Integrated Safety Management System |
| | ISO | International Organization for Standardization |
| | IT | Information Technology |
| J | JCEL | Joint Computational Engineering Laboratory |
| K | KAFB | Kirtland Air Force Base |
| | KTF | Kauai Test Facility |
| L | LANL | Los Alamos National Laboratory |
| | LDPE | low density polyethylene |
| | LDR | Land Disposal Restrictions |
| | LE | landfill excavation |
| | LECS | Liquid Effluent Control System |
| | LEED | Leadership in Energy and Environmental Design |
| | LLW | low-level waste |
| | LMC | Lockheed Martin Corporation |

| | | |
|---|---|---|
| | LTES | Long-Term Environmental Stewardship |
| | LTMMP | Long-Term Monitoring and Maintenance Plan |
| | LTS | Long-Term Stewardship |
| | LTTD | Low-Temperature Thermal Desorption |
| M | M&O | Management and Operating |
| | MAC | maximum allowable concentration |
| | MAPEP | Mixed Analyte Performance Evaluation Program |
| | MBTA | Migratory Bird Treaty Act |
| | MCL | maximum contaminant level (Chapter 2) |
| | MCL | Maximum Contaminant Limits (Chapter Exec Summary) |
| | MDL | Microelectronics Development Laboratory |
| | MEI | maximally exposed individual |
| | MESA | Microsystems and Engineering Sciences Application |
| | MLLW | mixed low-level waste |
| | MOCVD | Metalorganic Chemical Vapor Deposition |
| | MP | monitoring point |
| | MSB | Manzano Storage Bunker |
| | MSDS | Material Safety Data Sheet |
| | MSGP | Multi-Sector General Permit |
| | MTRU | mixed TRU |
| | MW | mixed waste |
| | MWL | Mixed Waste Landfill |
| N | N/A | not applicable |
| | NAAQS | National Ambient Air Quality Standards |
| | NASP | National Air Sampling Program |
| | NC | New Construction |
| | NEI | National Emissions Inventory |
| | NELAC | National Environmental Laboratory Accreditation Conference |
| | NEPA | National Environmental Policy Act |
| | NESHAP | National Emission Standards for Hazardous Air Pollutants |
| | NGF | Neutron Generator Facility |
| | NGPF | Neutron Generator Production Facility |
| | NHPA | National Historic Preservation Act |
| | NISAC | National Infrastructure Simulation and Analysis Center |
| | NMAAQS | New Mexico Ambient Air Quality Standards |
| | NMAC | New Mexico Administrative Code |
| | NMDOA | New Mexico Department of Agriculture |
| | NMED | New Mexico Environment Department |
| | NMHWA | New Mexico Hazardous Waste Act |
| | NMSA | New Mexico Statutes Annotated |
| | NMWQCC | New Mexico Water Quality Control Commission |
| | NNSA | National Nuclear Security Administration |
| | NOD | Notice of Disapproval |
| | NOI | Notice of Intent |
| | NON | Notice of Noncompliance |
| | NOV | Notice of Violation |
| | NPDES | National Pollutant Discharge Elimination System |
| | NPL | National Priorities List |
| | NPN | nitrate plus nitrite |
| | NRC | U.S. Nuclear Regulatory Commission |

| | | |
|---|---|---|
| | NSPS | New Source Performance Standard |
| | NSR | New Source Review |
| | NWS | National Weather Service |
| O | ODS | Ozone Depleting Substance |
| | ORPS | Occurrence Reporting Processing System |
| P | P2 | Pollution Prevention |
| | PA/SI | Preliminary Assessment/Site Inspection |
| | PCB | polychlorinated biphenyl |
| | PCCP | Post-Closure Care Permit (Chapter 1) |
| | PCCP | Post-Closure Care Plan (Chapter 2 & 3) |
| | PEP | Performance Evaluation Plan |
| | PER | Performance Evaluation Report |
| | PETL | Processing and Environmental Technology Laboratory |
| | PGWS | perched groundwater system |
| | pH | potential Hydrogen |
| | PM | particulate matter |
| | $PM_{10}$ | respirable particulate matter (diameter equal to or less than 10 microns) |
| | $PM_{2.5}$ | respirable particulate matter (diameter equal to or less than 2.5 microns) |
| | POTW | Publicly-Owned Treatment Works |
| | PPE | personnel protection equipment |
| | PRD | Process Research Development |
| | PSD | Prevention of Significant Deterioration |
| | PSL | Primary Subliner |
| Q | QA | quality assurance |
| | QAPP | Quality Assurance Project Plan |
| | QC | quality control |
| | QSAS | Quality Systems Analytical Services |
| R | R&D | research and development |
| | RAP | Remedial Action Plan |
| | RCRA | Resource Conservation and Recovery Act |
| | RFQ | Request for Quotation |
| | RHEPP 1 | Repetitive High Energy Pulsed Power 1 |
| | RITS | Radiographic Integrated Test Stand |
| | RMWMF | Radioactive and Mixed Waste Management Facility |
| | ROD | Record of Decision |
| | RPICL | Radiation Protection Instrument Calibration Laboratory |
| | RPSD | Radiation Protection Sample Diagnostics |
| | RQ | reportable quantity |
| | RSY | Reapplication Services Yard |
| S | S3 | Safe, Secure, and Sustainable |
| | SA | Sustainable Acquisition |
| | Sandia | Sandia Corporation |
| | SAP | Sampling and Analysis Plan |
| | SARA | Superfund Amendments and Reauthorization Act |
| | SDWA | Safe Drinking Water Act |
| | SHPO | State Historic Preservation Office |
| | SIC | Standard Industrial Classification |

| | | |
|---|---|---|
| | SMO | Sample Management Office |
| | SNL/CA | Sandia National Laboratories, California |
| | SNL/NM | Sandia National Laboratories, New Mexico |
| | SOP | Standard Operating Procedure |
| | SOW | statement of work |
| | SPCC | Spill Prevention Control and Countermeasures (plan) |
| | SPHINX | Short Pulse High Intensity Nanosecond X-Radiator (an accelerator facility) |
| | SSL | soil screening level |
| | SSO | Sandia Site Office |
| | SSP | Site Sustainability Plan |
| | SSPP | Strategic Sustainability Performance Plan |
| | ST | stabilization treatment |
| | START | Sandia Tomography and Radionuclide Transport |
| | STP | Site Treatment Plan |
| | SUWCO | Sewer Use and Wastewater Control Ordinance |
| | SVE | soil vapor extraction |
| | SVOC | Semi Volatile Organic Compound |
| | SWEIS | Site-Wide Environmental Impact Statement |
| | SWMU | Solid Waste Management Unit |
| | SWP3 | Storm Water Pollution Prevention Plan |
| | SWRI | Southwest Research Institute |
| | SWTF | Solid Waste Transfer Facility |
| T | TA | Technical Area |
| | TAG | Tijeras Arroyo Groundwater |
| | TAI | Tijeras Arroyo Intercept |
| | TAL | Target Analyte List |
| | TCE | trichloroethylene |
| | TCLP | toxicity characteristic leaching procedure |
| | TDS | total dissolved solids |
| | TG | treatability groups |
| | TLD | Thermoluminescent Dosimeter |
| | TLV | threshold limit value |
| | TNMHC | total non-methane hydrocarbon |
| | TOC | Total Organic Carbon |
| | TOMP | Toxic Organic Management Plans |
| | TOP | Technology and Operations Prototype |
| | TOX | total halogenated organics |
| | TPO | Thermoplastic Polyolefin |
| | TRI | Toxic Release Inventory |
| | TRU | transuranic (radioactive waste) |
| | TSCA | Toxic Substances Control Act |
| | TSD | treatment, storage, and disposal |
| | TSDF | treatment, storage, and disposal facility |
| | TSP | total suspended particulate |
| | TTC | Thermal Test Complex |
| | TTF | Thermal Treatment Facility |
| | TTR | Tonopah Test Range |
| U | UNM | University of New Mexico |
| | U.S. | United States |
| | USAF | U.S. Air Force |

| | | |
|---|---|---|
| | USFS | U.S. Forest Service |
| | USGS | U.S. Geological Survey |
| | UST | underground storage tank |
| V | VCM | Voluntary Corrective Measure |
| | VOC | volatile organic compound |
| | VSA | Vertical Sensor Array |
| | VZMS | Vadose Zone Monitoring System |
| W | WIF | Weapons Integration Facility |
| | WQG | Water Quality Group |
| Z | Z-Machine | Z Accelerator |

## UNITS OF MEASURE / RADIOACTIVITY MEASUREMENTS

| | | | |
|---|---|---|---|
| bgs | below ground surface | °C | degree Celsius |
| °F | degree Fahrenheit | ft | feet |
| $ft^3$ | cubic feet | gal | gallon |
| kg | kilogram | km | kilometer |
| L | liter | lb | pound |
| mb | millibar | mph | miles per hour |
| mg | milligram | mi | mile |
| MMBtu | Million British Thermal Units | min | minutes |
| ppbv | parts per billion by volume | sq ft | square feet |
| tpy | tons per year | $yd^3$ | cubic yard |
| yr | year | $mi^2$ | square mile |
| rem | roentgen equivalent man | Sv | Sievert |
| mrem | millirem (unit of radiation dose) | Ci | curie |
| person-Sv | person-Sievert (unit of radiation dosage) | pCi | picocurie |
| person-rem | radiation dose to population (also man-rem) | µg | microgram |
| mSv | millisievert (unit of radiation dosage) | mR | milliroentgen |
| µR/hr | microroentgen per hour | cm | centimeter |

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# Executive Summary

Sandia National Laboratories, New Mexico (SNL/NM) is one of the nation's premier multi-program national security laboratories. Sandia Corporation (Sandia), a wholly owned subsidiary of Lockheed Martin Corporation (LMC), manages and operates the laboratory for the U.S. Department of Energy (DOE), National Nuclear Security Administration (NNSA). The DOE/NNSA, Sandia Site Office (SSO) administers the contract and oversees contractor operations at the site. This Annual Site Environmental Report (ASER) was prepared in accordance with and as required by DOE Order 450.1A, *Environmental Protection Program* (DOE 2008a) and DOE Manual 231.1-1A, *Environment, Safety, and Health Reporting Manual* (DOE 2007). This ASER summarizes the environmental protection, restoration, and monitoring programs in place at SNL/NM for Calendar Year (CY) 2010. It also discusses Sandia's compliance with environmental statutes, regulations, and DOE directives and permit provisions; and it highlights significant environmental program efforts and accomplishments. This ASER is a key component of DOE's effort to keep the public informed about environmental conditions throughout the DOE/NNSA nuclear weapons complex.

**Environmental Programs**

Sandia's methodology for managing and implementing its Environment, Safety, and Health (ES&H) Program is outlined in the Integrated Safety Management System (ISMS). The ISMS is centered upon five safety management functions that provide processes to guide management in identifying and controlling hazards. Furthermore, Sandia implemented an Environmental Management System (EMS) to enhance the ISMS. The EMS is the component of ISMS that addresses the environmental aspects and impacts of SNL/NM's activities, products, and services. Sandia continued to improve environmental management and work processes and received International Organization for Standardization (ISO) 14001 Certification in 2009. For additional information about EMS and ISMS refer to Chapters 3 and 8 of this report.

While all 2010 program activities are performed continuously, they are reported in this ASER on a CY basis, unless otherwise noted (programs based on the Fiscal Year [FY] run from October 1st through September 30th, annually). A summary of the primary environmental programs in place at SNL/NM are summarized below.

***Waste Management***

Waste at SNL/NM is processed at nine facilities: the Hazardous Waste Management Facility (HWMF), the Thermal Treatment Facility (TTF), the Radioactive and Mixed Waste Management Facility (RMWMF), five Manzano Storage Bunkers (MSB), and the Solid Waste Transfer Facility (SWTF). In addition, the Reapplication Services Yard (RSY) processes material and equipment for recycling, after it is determined that it cannot be reapplied or sent for auction. For additional information about waste management programs and activities refer to Chapters 2 and 3 of this report.

***Pollution Prevention (P2)***

The P2 Program provides assessment, guidance, and assistance to the laboratories' workforce to implement measures that reduce resource use, generated waste, and to enhance the overall efficiency of processes and organizations within SNL/NM. Additionally, the P2 Program works with several facilities to continue or initiate new recycle avenues for waste. In 2010, Sandia received several awards for P2 accomplishments. For additional information about P2 refer to Chapter 3 of this report.

***Environmental Restoration (ER) Project***

The ER Project currently collects groundwater samples at five general project areas: the Chemical Waste Landfill (CWL), the Mixed Waste Landfill (MWL), Technical Area (TA)-V, Tijeras Arroyo Groundwater (TAG), and Burn Site Groundwater (BSG). Water quality results reported by the ER Project were consistent with past years' analytical results.

At the close of CY 2010, there were 33 regulated ER sites remaining to be completed at SNL/NM. Of the remaining 33 sites, 31 were submitted for Corrective Action Complete (CAC) determinations from the New Mexico Environment Department (NMED). In April 2010 the NMED issued a letter requesting additional corrective action at five of the 31 sites, including Solid Waste Management Units (SWMU) 8, 58, 68, 149, and 154. The remaining 26 sites are currently in the public comment process with a hearing anticipated in 2011 or 2012. The two remaining sites consist of the CWL, which is undergoing final closure activities, and the MWL where the final remedy (soil cover) was completed during 2009. In addition to the 33 sites, final remedies are pending for three groundwater areas of concern (AOC) (TA-V, TAG, and BSG), and three sites with potential soil contamination will be evaluated at the completion of their test operations. For additional information about the ER Project refer to Chapter 3 of this report.

***Long-Term Environmental Stewardship (LTES)***

The SNL/NM LTES Program provides environmental stewardship for past, present, and future activities at SNL/NM. LTES "promotes the long-term stewardship of a site's natural and cultural resources throughout its operational, closure, and post-closure life cycle" (DOE/SNL 2006). The environmental programs referred to in this document support that stewardship. For additional information about LTES refer to Chapter 3 of this report.

***Long-Term Stewardship (LTS)***

A major component of the LTES Program is LTS of legacy sites. Stewardship of legacy sites is defined as activities necessary to maintain long-term protection of human health, the environment, and natural and cultural resources from hazards associated with residual radioactive and hazardous contamination at former ER sites. Sandia's LTS activities are increasing as remedial activities required at ER sites are completed. The LTS Program conducts compliance oversight activities, including long-term monitoring, to comply with NMED requirements. A monitoring well network of more than 70 wells is sampled for the presence of contaminants of concern (COC) at various intervals during the year. The data from this sampling activity are evaluated on an ongoing basis and kept in a comprehensive database. The LTS Program also conducts institutional control (IC) and community outreach to keep the public informed of LTS Program activities. Compliance Oversight Activities, IC Activities, Community Liaison and Stakeholder Involvement Activities for 2010 are summarized in Chapter 3 of this report. Additional information is available at the LTES website:

*http://elm.sandia.gov*

***Terrestrial Surveillance***

The Terrestrial Surveillance Program conducts sampling activities at SNL/NM to detect any potential releases or migration of radiological or non-radiological contaminated material to off-site locations (community locations outside Kirtland Air Force Base [KAFB] boundaries). Soil, sediment, and vegetation are collected from on-site, perimeter, and off-site locations. In 2010, there were no terrestrial sample results that indicated concerns or that further investigation or corrective action was warranted. For additional information refer to Chapter 4 of this report.

***Air Quality***

Ambient Air Monitoring – Sandia measures ambient air quality at six locations throughout SNL/NM, and compares results with National Ambient Air Quality Standards (NAAQS) and local ambient air regulations. The network monitors criteria pollutants and volatile organic compounds (VOC).

Air Quality Compliance (AQC) – Air quality standards are implemented by regulations promulgated by local and federal governments in accordance with the Clean Air Act (CAA) and the CAA Amendments (CAAA) of 1990. The Albuquerque Bernalillo County/Air Quality Control Board (ABC/AQCB), the State of New Mexico and the U.S. Environmental Protection Agency (EPA) determine applicable air quality standards for non-radiological pollutants. The AQC program currently maintains 17 issued authority-to-construct (ATC) New Source Review (NSR) permits; and 26 issued NSR registrations from the City of Albuquerque (COA). Currently, there are no NSR source registrations pending issuance with the COA.

Radiological National Emission Standards Hazardous Air Pollutants (NESHAP) Compliance – Subpart H of NESHAP regulates radionuclide air emissions from DOE/NNSA facilities, with the exception of naturally occurring radon. In 2010, there were 13 SNL/NM facilities reporting NESHAP regulated emissions. The Radiological NESHAP Program evaluates facilities that have the potential to release emissions to the environment yearly. Two facilities ceased operations and one new facility started operations in CY 2010. In September of 2009, an evapotranspirative (ET) cover was installed at the MWL. Based upon past emissions studies and the new ET cover thickness, any potential release from the MWL is negligible (i.e., essentially zero) and will no longer be considered a radiological NESHAP source. The Hot Cell Facility's (HCF) process ventilation system stack was reduced by a height of 80 feet in 2009. Due to the modification the HCF will not be operated and is no longer considered a radiological NESHAP source. Operations at the Auxiliary Hot Cell Facility (AHCF) began in CY 2010. This facility characterizes, sorts, and repackages radioactive and mixed wastes exceeding the facility inventory limits of the RMWMF. In 2010, the primary radionuclides released were tritium and argon-41. In 2010, the on-site maximally exposed individual (MEI) was located on KAFB. The on-site MEI dose of 2.98E-02 millirems per year (mrem/yr) at the Honeywell Systems Support Site resulted primarily from conservatively calculated releases of americium-241 from the nearby Sandia Tomography and Radionuclide Transport Laboratory (START) Laboratory. In CY 2010 an americium-241 source for research was received at the START Laboratory with contamination on the outside of the vial. After numerous attempts at decontamination, the source was unable to be sufficiently decontaminated to permit use of the source for the desired application. Therefore, the source was returned to the vendor in the packing material received. The source was double bagged and no contamination existed on the outside of the bags when returned. Nevertheless, conservative release calculations arising from this activity were attributed to americium-241. The off-site MEI was located at the Eubank Gate Area. The MEI of 3.41E-03 mrem/yr at the Eubank Gate Area resulted also primarily from conservatively calculated releases of americium-241 from the nearby START Laboratory. Both doses are well below the 10 mrem/yr EPA standard. For additional information refer to Chapter 5 of this report.

***Water Quality***

Wastewater – Wastewater from SNL/NM 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 Publicly-Owned Treatment Works (POTW). During CY 2010, there was one reportable event. This event was discovered during a review of sampling data by ABCWUA and SNL/NM. During compliance sampling conducted on April 20, 2010, arsenic was detected at 0.132 milligrams per liter (mg/L) which exceeded the discharge limit of 0.051 mg/L. The result was reported by the ABCWUA and confirmed after a review of the SNL/NM split sample that was collected during the ABCWUA sampling event. The investigation and review of the arsenic sources within the Station WW007 (Permit 2069G) flow basin allowed SNL/NM to isolate the source and allowed corrective actions to be implemented. See Section 6.1.1 for details. All discharge parameters at the other permitted locations were met resulting in SNL/NM receiving five "Gold Pre-Treatment Awards" and one "Silver Pre-Treatment Award" from the ABCWUA for the 2009-2010 treatment year.

Surface Discharge – All water that will be discharged to the ground surface, either directly or to lined containments, must meet State of New Mexico surface discharge standards. All discharges in 2010 met NMED New Mexico Water Quality Control Commission (NMWQCC) standards and were approved by Sandia. Additionally, routine surface discharges are made to two evaporation lagoons that service the pulsed power facilities under an existing discharge permit. During CY 2010, all permit requirements were met for both NMED permitted lagoons. There was one surface release reported to NMED. For additional information on this release refer to Chapters 2 and 6 of this report.

Storm Water Runoff – Quarterly visual sampling and analytical sampling were conducted in 2010. All monitoring data collected was submitted to EPA and can be found in Appendix D of this report. Visual observations of storm water were performed when there was adequate runoff to collect a sample. The majority of the visual observations of storm water quality were done in the summer months and these assessments did not produce any indications of storm water pollution.

Oil Storage and Spill Control – Sandia's Spill Prevention Control and Countermeasures (SPCC) Plan (required under the Clean Water Act [CWA]) describes the oil storage facilities at SNL/NM and the mitigation controls in place to prevent inadvertent discharges of oil. The facilities at SNL/NM that are subject to regulations include oil storage tanks (aboveground storage tanks [AST] and underground storage tanks [UST]), bulk storage areas (multiple containers), and temporary or portable tanks. Sandia currently operates 46 ASTs and five USTs at SNL/NM. For additional information refer to Chapter 6 of this report.

***Groundwater Protection***

The Groundwater Protection Program (GWPP) includes general surveillance of water quality from a network of wells not directly associated with ER Project sites. Annual samples were collected from 16 wells and one spring. Analyses were conducted for metals, VOC, inorganics (including nitrate, anions, and cyanide), phenolics, alkalinity, total halogenated organics (TOX), gross alpha, gross beta, and selected radionuclides. Groundwater samples from six wells were analyzed for high explosives (HE). The six designated wells are used to establish background concentrations of HE at the Dynamic Explosives Test Site (DETS) east and south of TA-III and to monitor potential groundwater impacts from explosive testing. No VOCs or HEs were detected at concentrations above EPA Safe Drinking Water Regulations Maximum Contaminant Limits (MCL) or New Mexico Water Quality Commission Maximum Allowable Concentrations (MAC). Fluoride was detected above the MAC in Coyote Springs and three groundwater wells. Arsenic concentrations in one well exceeded the MCL and beryllium concentrations in Coyote Springs exceeded the MCL. Combined radium-226 and radium-228 exceeded the MCL at one groundwater well. The exceedance for each of these elements is attributable to the elevated natural concentrations associated with bedrock groundwater systems at the sampling locations. Please refer to Appendix B (formerly ASER Chapter 7 Groundwater) of this report for detailed information and results of the analysis of collected groundwater samples.

Groundwater levels are measured in 78 wells on a quarterly or monthly basis. Wells that have stable trends are measured monthly; wells that have fluctuating water levels due to seasonal pumping at nearby extractive wells are measured on a monthly frequency. Water level data are used to generate a regional water table elevation contour map from which groundwater flow directions can be obtained. Groundwater elevation table, hydrographs, and contour maps derived from the data are provided in *SNL/NM's Calendar Year 2010 Annual Groundwater Monitoring Report* (Appendix B). The report also provides information on the overall objectives of the GWPP, the regulatory drivers, the DOE directives that govern the program, and the program related activities that occurred during CY 2010.

ER – The ER Project collects groundwater samples at five project areas—CWL, MWL, TA-V, TAG, and BSG. CY 2010 water quality results for these five areas were consistent with results from past years, and the groundwater analytical results are provided in *SNL/NM's Calendar Year 2010 Annual Groundwater Monitoring Report* (Appendix B). All analytical results were below applicable MCLs at the CWL and MWL. At TA-V, several analytical results exceeded the MCL for trichloroethene (TCE) and nitrate plus nitrite (NPN): TCE exceeded the MCL of 5 mg/L in three wells with a maximum concentration of 18.6 mg/L, and NPN exceeded the MCL of 10 mg/L in two wells with a maximum concentration of 13.7 mg/L. At TAG, several analytical results exceeded the MCL for TCE and NPN: TCE exceeded the MCL in one well with a maximum concentration of 8.94 mg/L, and NPN exceeded the MCL in five wells with a maximum concentration of 33.3 mg/L. At BSG, several analytical results exceeded the MCL for NPN: NPN exceeded the MCL in seven wells with a maximum concentration of 36.6 mg/L. All other analytical results for TA-V, TAG, and BSG groundwater samples were below established MCLs.

***National Environmental Policy Act (NEPA) Activities***

During CY 2010, Sandia began preparing for DOE's development of a new Site-Wide Environmental Impact Statement (SWEIS). Environmental Programs Department personnel met with representatives from 63 SNL/NM facilities to discuss and compile data on their current and anticipated future operations that could be relevant to their potential impacts on the environment. In addition, personnel compiled an array of environmental information and data including environmental, safety, and health policies and procedures; descriptions of the natural environment at SNL/NM; environmental stewardship programs; overall site operations; and agreements between DOE and other governmental entities. This information and data will help DOE in developing environmental analyses for the next SWEIS.

The NEPA Team participated in the review of the following environmental documents:

- *Draft Site-Wide Environmental Impact Statement for the Continued Operation of the Department of Energy/National Nuclear Security Administration Nevada Test Site and Off-Site Locations in the State of Nevada*,
- *Draft Classified Waste Landfill Excavation at Sandia National Laboratories/New Mexico,* and
- *Air Force Battlespace Environment Lab Antenna Farm.*

The NEPA Team reviewed a total of 1,266 proposed projects in the ISMS NEPA Module and other corporate applications. Sixty-eight DOE NEPA checklists were transmitted to the DOE/NNSA/SSO for review and determination in 2010.

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# 1.0 Introduction

This Annual Site Environmental Report (ASER) was prepared in accordance with and as required by U.S. Department of Energy (DOE) Order 450.1A, *Environmental Protection Program* (DOE 2008a) and DOE Manual 231.1-1A, *Environment, Safety, and Health Reporting Manual* (DOE 2007). This ASER describes the environmental protection programs currently in place at Sandia National Laboratories, New Mexico (SNL/NM). This report is made available to the general public in printed and electronic form.

## 1.1 Sandia Corporation's History and Mission

Sandia Corporation (Sandia), a Lockheed Martin Corporation (LMC) company, manages and operates the laboratory for the DOE, National Nuclear Security Administration (NNSA). The DOE/NNSA, Sandia Site Office (SSO) administers the contract and oversees contractor operations at the site. Sandia has developed technologies for nuclear weapons, non-proliferation, homeland security, energy and infrastructure, defense systems and assessments, and research and development (R&D) programs to support a wide variety of national security missions.

### 1.1.1 History

SNL/NM began operations in 1945 as Z Division, the ordnance design, testing, and assembly arm of Los Alamos Scientific Laboratory (now Los Alamos National Laboratory [LANL]). The division moved to Sandia Base (now merged into Kirtland Air Force Base [KAFB]) on the perimeter of the City of Albuquerque (COA), to be near an airfield and to work closely with the military. Due to its growth, Z Division became a separate branch of Los Alamos in 1948, and was renamed Sandia Laboratory. On November 1, 1949, Sandia, a wholly owned subsidiary of Western Electric, began managing SNL/NM. In 1979, Congress recognized the facility as a national laboratory. In 1993, Sandia became a wholly owned subsidiary of Martin Marietta, now LMC.

### 1.1.2 Mission

Sandia's enduring mission is to provide science and engineering support for the nation's nuclear weapons stockpile. Today, that mission has grown to include other critical aspects of national security, including the non-proliferation of weapons of mass destruction, developing technologies and strategies for responding to emerging threats, and protecting and preventing the disruption of critical infrastructures. Sandia also collaborates with representatives from the industrial sector, universities, and other government agencies to develop and commercialize new technologies. Information about recent technologies developed at SNL/NM can be found at the following web site:

*http://www.sandia.gov/LabNews*

### 1.1.3 Sandia's Operations Contract

Sandia, like all regulated industries, complies with specific environmental regulations established by local, state, and federal agencies. The Management and Operating (M&O) Contract between Sandia and the DOE defines the primary contractual obligations for operating SNL/NM. This contract also drives Sandia's Environment, Safety, and Health (ES&H) standards and requirements.

The M&O Contract states that Sandia must comply with DOE directives that establish specific requirements for environmental programs. The six primary DOE directives currently on the contract baseline that pertain to environmental protection and management, starting with the most recent, are listed below:

- DOE Order 450.1A, *Environmental Protection Program* (DOE 2008a),
- DOE Manual 231.1-1A, *Environment, Safety, and Health Reporting* (DOE 2007),
- DOE Manual 231.1-2, *Occurrence Reporting and Processing of Operations Information* (DOE 2003),
- DOE Order 435.1, Chg 1, *Radioactive Waste Management* (DOE 2001),
- DOE Order 5400.5, Chg 2, *Radiation Protection of the Public and the Environment* (DOE 1993). and
- DOE Order 430.2B, *Departmental Energy, Renewable Energy and Transportation Management (*DOE 2008)

## 1.2 SNL/NM's Site Location and Characteristics

### 1.2.1 General Site Characteristics

KAFB is a 51,559-acre military installation that includes 20,486 acres withdrawn from the Cibola National Forest through an agreement with the U.S. Forest Service (USFS). Located at the foot of the Manzanita Mountains, it has a mean elevation of 5,384 feet (ft) and a maximum elevation of 7,986 ft. KAFB is host to more than 150 tenant groups.

In 2010, Sandia conducted operations on 5,817 acres of Air Force property leased to DOE/NNSA, and 2,841 acres of property owned by DOE, yielding a total of 8,658 acres of landholdings for SNL/NM. The site housed a staff of 9,530, who operated in approximately 5.4 million square feet (sq ft) of on-site building space, and an additional 300,000 sq ft of off-site building space leased by DOE/NNSA for SNL/NM. Most operations are within five technical areas (TA), TA-I,-II,-III,-IV, and -V. An additional 9,000 acres serve as a buffer zone near the southwest boundary of KAFB. This buffer zone, leased from the State of New Mexico and Isleta Pueblo, provides margins of safety and sound buffers for SNL/NM testing activities (Figure 1-1).

***Borders***
KAFB and SNL/NM are located adjacent to the COA, which borders KAFB on its north, northeast, west, and southwest boundaries. The Albuquerque International Sunport (airport) and Mesa del Sol, an emerging 12,500-acre mixed-use urban development, are just beyond the base's western borders, as is the Rio Grande. The development's master plan projects that the community will ultimately reach 90,000 residents. To date, several business and industrial facilities have been completed; however, no residential development has begun.

Mountains on the east and plains on the west create a diverse range of geological, hydrological, climatic, and ecological settings, and are further detailed in this chapter.

***Areas within Borders***
SNL/NM consists of five secured TAs, buildings in non-secured areas, and several remote testing areas. These remote test areas are collectively known as the Coyote Test Field (CTF) and are located in the canyons on the west side of the Manzano Mountains. The Burn Site is located in the northeast region

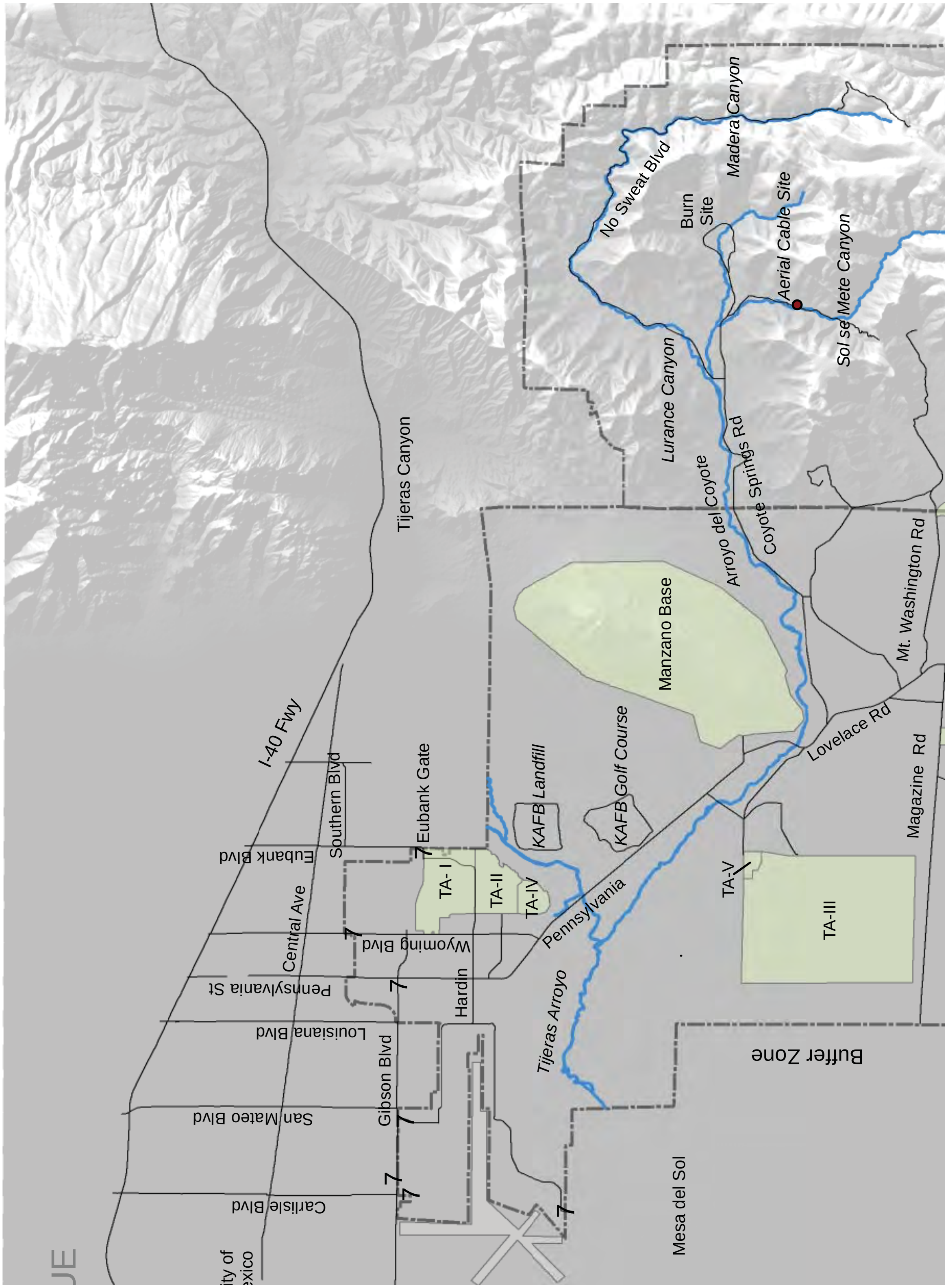


**FIGURE 1-1**. SNL/NM Technical Areas and the U.S. Forest Service Land Withdrawn Area

of KAFB and the Thermal Test Complex (TTC) is located within TA-III. The National Solar Thermal Test Facility is located southeast of TA-III. See Figure 1-1 for an illustration of the area.

### 1.2.2 Technical Areas

***TA-I***

TA-I is the focus of SNL/NM's operations, housing the main administrative center and a close grouping of laboratories and offices. A majority of activities performed in TA-I are dedicated to weapon design, R&D of weapon systems, limited production of weapon systems components, technology transfer, high-performance computing, and energy research programs. Facilities in TA-I include the new Ion Beam Laboratory (IBL), the main technical library, several assembly/manufacturing areas, and various laboratories, such as the Advanced Manufacturing Processes Laboratory (AMPL), the Neutron Generator Facility (NGF), the Processing and Environmental Technology Laboratory (PETL), the Joint Computational Engineering Laboratory (JCEL), Sandia Tomography and Radionuclide Transport (START) Laboratory, and the Microsystems and Engineering Sciences Applications (MESA) Complex. The MESA Complex provides the systems designers, component designers, processes, and equipment to design and prototype qualified microsystem-based components for maintaining a national nuclear deterrent.

***TA-II***

TA-II includes facilities and lands south of the TA-I boundary at Hardin Boulevard and extends to the northern boundary of TA-IV. The Explosive Components Facility (ECF), the Hazardous Waste Management Facility (HWMF), the Facilities Command Center (FCC), the Solid Waste Transfer Facility (SWTF), the Construction and Demolition (C&D) Recycle Center, and the National Infrastructure Simulation & Analysis Center (NISAC) are all within TA-II.

***TA-III***

TA-III is the largest and most remote of all the TAs, housing environmental test facilities separated by extensive undeveloped areas. TA-III is used to accommodate large-scale engineering test activities requiring large safety and/or security area buffers, such as collision testing sled tracks, centrifuges, and the TTC. Other facilities include the Radioactive and Mixed Waste Management Facility (RMWMF), the Chemical Waste Landfill (CWL), the Mixed Waste Landfill (MWL), the Classified Waste Landfill, and the Corrective Action Management Unit (CAMU).

***TA-IV***

TA-IV, located south of TA-II, houses facilities used to conduct R&D activities in inertial-confinement fusion, pulsed power, and nuclear particle acceleration. Accelerators located in TA-IV include the Z Accelerator (Z-Machine), the Advanced Pulsed Power Research Module (APPRM), the Radiographic Integrated Test Stand (RITS), the High Energy Radiation Megavolt Electron Source-III (HERMES-III), the Saturn Accelerator, the Repetitive High Energy Pulsed Power I (RHEPP I) Accelerator, the High Power Microwave Laboratory (HPML), and the Short-Pulse High Intensity Nanosecond X Radiator (SPHINX).

***TA-V***

TA-V, located adjacent to the northeast corner of TA-III, includes facilities that routinely handle radioactive materials used in experimental R&D programs. TA-V houses the Gamma Irradiation Facility (GIF), the Annular Core Research Reactor (ACRR), the Hot Cell Facility (HCF), and the Auxiliary Hot Cell Facility (AHCF).

### 1.2.3 Other Facilities

***Remote Test Areas***
Several remote test areas are located east and southeast of TA-III and within the canyons and foothills of the USFS withdrawn area (Arroyo del Coyote, and Lurance, Madera, and Sol se Mete Canyons). These areas are used for explosive ordnance testing, rocket firing experiments, and open burn thermal tests.

***Facilities Outside of KAFB's Boundaries***
Some of the facilities utilized by Sandia personnel are outside the boundaries of KAFB. The Center for Integrated Nanotechnologies (CINT), the MESA Technology and Operations Prototype (TOP), the International Programs Building (IPB), the Innovation Parkway Office Center (IPOC), and the new National Museum of Nuclear Science & History are all located on Eubank Boulevard Southeast within one mile of KAFB. There are many other small-scale, off-site SNL/NM projects, including the Advanced Materials Laboratory (AML) at the University of New Mexico (UNM).

## 1.3 ES&H at SNL/NM

Sandia's ES&H Program has grown and progressed, as detailed in the ES&H Corporate Policy System Documents, a dynamic online resource available to all Sandia personnel. These documents clearly describe ES&H requirements for conducting all levels of work at SNL/NM.

*http://www.sandia.gov/esh/*

Improved waste management practices have been implemented, and state-of-the-art waste handling facilities have been constructed to handle and properly dispose of hazardous, radioactive, and solid waste. Waste minimization and recycling practices have been very successful in reducing SNL/NM's environmental impact. Several audits have been conducted in recent years by the U.S. Environmental Protection Agency (EPA), various DOE/NNSA offices, the COA, the Albuquerque Bernalillo County Water Utility Authority (ABCWUA), and the State of New Mexico. The results of these audits, as well as SNL/NM internal audits, support Sandia's ongoing commitment to ES&H practices at SNL/NM.

***Implementing ES&H***
Sandia's strategy for managing and implementing its ES&H Program is described by the Integrated Safety Management System (ISMS) which is structured around five safety-based management functions:

(1) Plan the work,
(2) Analyze the work hazards,
(3) Control those hazards,
(4) Perform the work, and
(5) Get feedback and make improvements.

The ISMS provides processes that guide line management to identify and control hazards. For further information on audits and appraisals, refer to Section 2.3.

***Environmental Management Programs***
As part of its mission, Sandia addresses ES&H issues through its environmental management (EM) programs. EM programs include waste management, pollution prevention (P2), environmental restoration (ER), long-term environmental stewardship (LTES), water quality (surface discharge, groundwater, storm water, and waste water), oil storage, air quality, National Environmental Policy Act (NEPA), terrestrial and ecological surveillance, and quality assurance (QA).

***Environmental Management System (EMS)***

Sandia strives to be a leader in environmental stewardship through the implementation of an EMS. In 2009, Sandia upgraded the EMS Program to fully conform to the international standard for EMS, International Organization for Standardization (ISO)14001-2004 (IOS 2004) and received third-party certification to the standard. Sandia received ISO 14001 certification in 2009. The EMS is utilized to plan, review, execute, and improve work processes, with the intent of improving upon the environmental elements in the ISMS. ES&H considerations are incorporated into each element of all work processes conducted by Sandia. For additional information on the EMS, refer to Section 3.1.

### 1.3.1 Managing a Legacy of Contamination

SNL/NM was ranked as one of the least contaminated DOE facilities, and originally consisted of 268 ER sites. At the close of CY 2010, there were 33 regulated ER sites remaining to be completed at SNL/NM. Of the remaining 33 sites, 31 were submitted for Corrective Action Complete (CAC) determinations from the New Mexico Environment Department (NMED). In April 2010 the NMED issued a letter requesting additional corrective action at five of the 31 sites, including Solid Waste Management Units (SWMU) 8, 58, 68, 149, and 154. The remaining 26 sites are currently in the public comment process with a hearing anticipated in 2011 or 2012. The two remaining sites are the MWL and the CWL. In addition to the 33 sites, final remedies are pending for three groundwater areas of concern (TA-V, Tijeras Arroyo Groundwater [TAG] and Burn Site Groundwater [BSG]), and three sites with potential solid contamination will be evaluated at the end of their test operations. In December 2008, NMED granted approval of the Corrective Measures Implementation Plan (CMIP) for the MWL, and the final corrective action was completed in 2009. The remaining site is the CWL. The CWL Closure Plan Amendment (CPA), the CWL Post-Closure Care Permit (PCCP), and the CWL Final Remedy were approved by the NMED in October 2009. After NMED approval of the Final CWL Resource Conservation and Recovery Act (RCRA) Closure Report, monitoring at the CWL will be performed under the CWL PCCP.

Some sites require long-term monitoring to ensure that any residual contamination does not migrate from the site. Detailed information about EM cleanup efforts throughout DOE can be found at DOE's website, and at Sandia's LTES website:

*http://www.em.doe.gov/pages/emhome.aspx*
*http://www.sandia.gov/ltes*

## 1.4 Regional Characteristics

SNL/NM is set in a high desert region in central New Mexico. The adjacent land areas are the most densely populated area in New Mexico. Refer to Figures 1-1 and 1-2 for illustrations of the regions described below.

### 1.4.1 Regional Topography and Layout

KAFB has a widely varied topography, ranging from rugged mountains on the east to flat plains on the west. The maximum elevation of 7,986 ft occurs on the eastern edges of KAFB, which includes 20,486 acres withdrawn from the Cibola National Forest (through an agreement with the USFS).

The mean elevation of 5,384 ft is typical of the remainder of KAFB, which is situated on gently west-sloping foothills that grades into wide, flat areas; this topology is where the majority of SNL/NM facilities are situated.

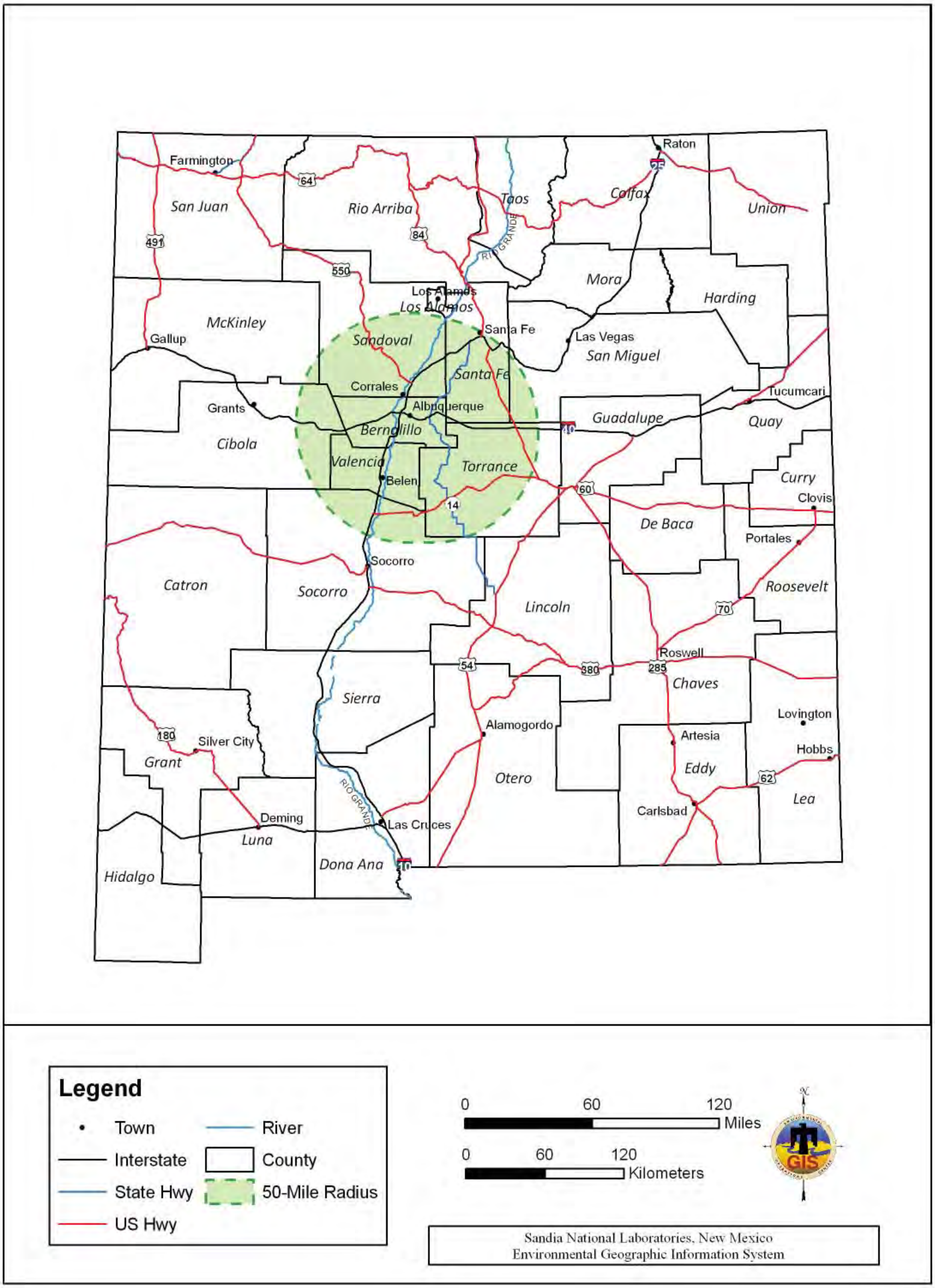


**FIGURE 1-2**. State of New Mexico Map

The overlay shows major roads, cities, and county lines.
The dashed circle encompasses the 50-mile radius from SNL/NM facilities.

***The Mountains***

The most spectacular topographic feature in the Albuquerque region is the Sandia Mountains, which form an impressive backdrop to the east of the COA and KAFB. 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 ft. At sunset, the Sandia Mountains are often bathed briefly in a pinkish glow, which is how they got their name ("sandia" is Spanish for "watermelon").

The Sandia Mountains are divided from the Manzanita and Manzano Mountains (to the south) by Tijeras Canyon, which is traversed by Interstate 40 (I-40). KAFB is located a few miles south of I-40 (Figure 1-1).

***Tijeras Arroyo***

At approximately ¾ of a mile wide, Tijeras Arroyo is a significant topographic feature that cuts diagonally northeast to southwest across 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, where it discharges to the Rio Grande about eight miles from the west boundary of KAFB.

***Rio Grande***

The Rio Grande flows to the west of the KAFB's boundaries. A new water treatment plant was recently completed which includes 40 miles of new pipeline. Water testing for the San Juan Chama Drinking Water Project was completed by the ABCWUA and water from the new water treatment plant began flowing to customers in December 2008 (for additional information refer to the ABCWUA website).

*http://www.abcwua.org*

### 1.4.2 Population

New Mexico is the fifth largest state in the U.S. comprising 121,000 square miles ($mi^2$). The population in 2010 for New Mexico is approximately 2,059,179 and is expected to be approximately over four million by 2020 according to the U.S. Census. The largest city in New Mexico is Albuquerque with about 545,852 metro-area residents; other neighboring metro areas, including the City of Rio Rancho of 87,521, raise that total to over 630,000 residents.

The population within an 80-kilometer/50-mile radius of SNL/NM is over 850,000 residents (DOC 2011); nine counties are contained or partially included in that radius (Figure 1-2).

*http://www.census.gov/population/projections/SummaryTabA1.pdf*

## 1.5 Regional Geologic Setting

The regional geologic setting in which SNL/NM and KAFB are situated 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 sediment deposits. The Rio Grande Rift extends for about 450 miles from Leadville, Colorado into New Mexico; Albuquerque and the KAFB are within a rift valley.

### 1.5.1 Albuquerque Basin

The Albuquerque Basin is one of several north south trending sediment-filled basins formed by the Rio Grande Rift. This major structural feature 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, the Rio Puerco Fault Belt, and the Nacimiento Uplift at its northern end. There is 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.

### 1.5.2 Regional Fault Systems

Several faults are located on KAFB (Figure 1-3). 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 where movement is horizontal 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 has been active as recent as the late Pleistocene epoch 12,000 before present. 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 bedrock geology on the east and the sediment-filled basin to the west. This geologic boundary also forms a boundary between the two major groundwater regimes at KAFB. For further information on hydrological settings, refer to Section 1.6.

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 Mountains. The conformal stratigraphy of the top of the mountain is buried under the sediments of the basin. The total offset is on the order of 7 kilometer (km) (4.3 miles). The eastern boundary of the basin south of KAFB is the Hubbell Spring Fault. Both the Sandia and Hubbell Spring Fault are north trending, down-to-the-west, en echelon normal faults, which are Tertiary in age (63 million to 1.8 million years ago). (Lozinsky et al. 1991; Woodward 1982; and 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.

## 1.6 Hydrological Settings

The hydrogeological system is divided into two areas separated by the Tijeras Fault Complex, which marks a distinct geological boundary (Figure 1-4). To the east of the Tijeras Fault Complex, the geology is characterized by fractured and faulted bedrock covered by a thin layer of alluvium and shallow groundwater 45 to 325 ft deep. On the west side of the Tijeras Fault Complex, within the basin groundwater is contained in alluvial sediments and water levels range from 295 ft to 570 ft below ground surface (bgs) at KAFB.

A perched groundwater system (PGWS) overlies the regional aquifer in the north portion of KAFB. The PGWS extends southward from TA-I to the KAFB Golf Course. The western extent of the PGWS is somewhere midway between Wyoming Boulevard and the Albuquerque 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 PGWS is to the southeast with the depth to water approximately 270 ft bgs in the western part and 420 ft bgs in the east.

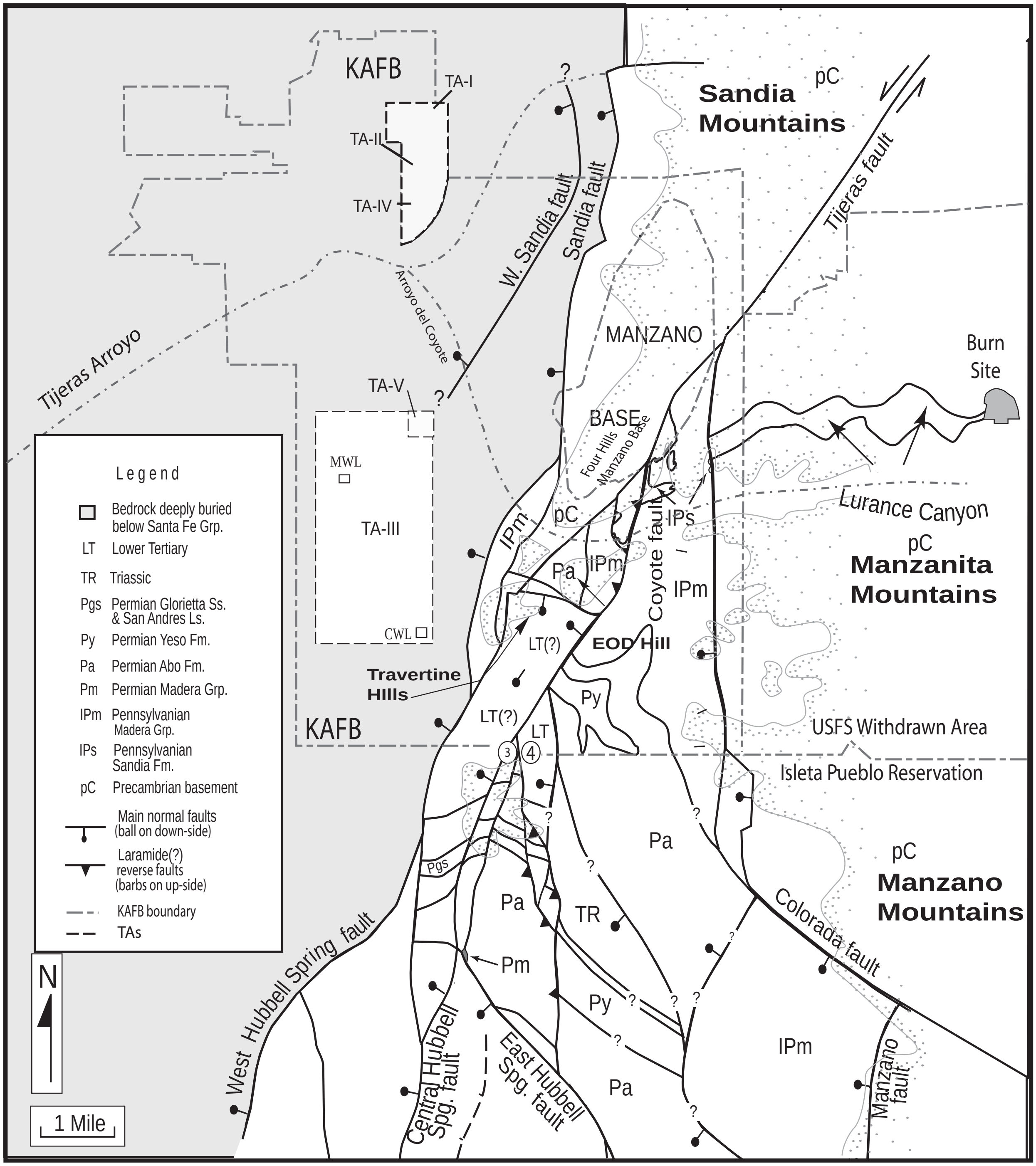


**FIGURE 1-3.** Generalized Geology in the Vicinity of SNL/NM and KAFB (Van Hart 2003)

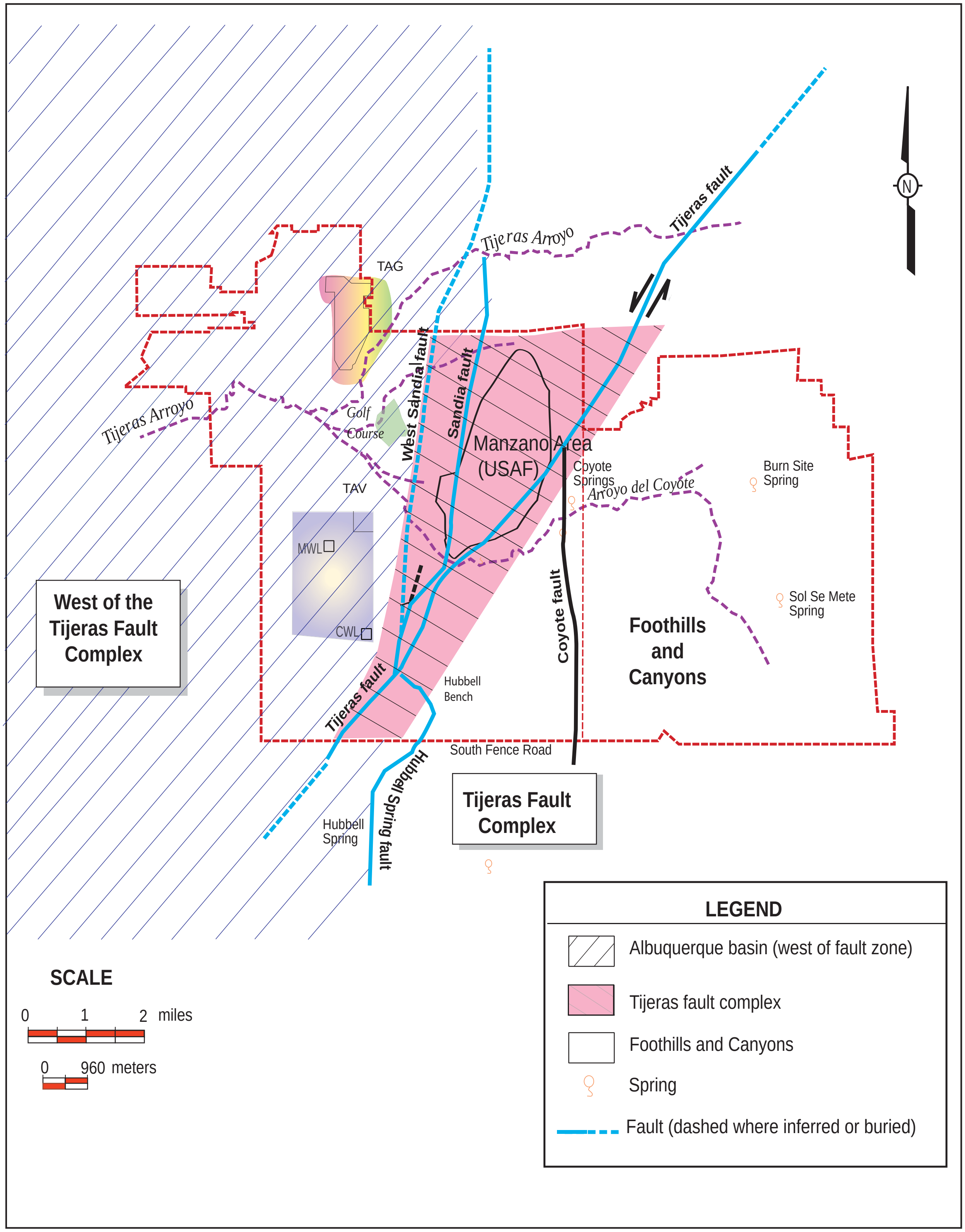


**FIGURE 1-4**. Hydrologically Distinct Areas Primarily Controlled by Faults (Modified from SNL 1995)

### 1.6.1 Natural Springs

Two perennial springs are located on KAFB (Coyote Springs and Sol se Mete Spring). Additionally, there is one perennial spring (Hubbell Spring) 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.

### 1.6.2 Groundwater Production

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. Most ABCWUA water supply wells are located on the east side of the Rio Grande, which is the most productive portion of the aquifer. The highest yield wells are screened in the sediments associated with the ancestral river channel. Prior to extensive urban development in the Albuquerque area beginning in the 1950s, the direction of regional groundwater flow in the area of KAFB was primarily to the southwest. As a result of groundwater withdrawal, the local water table has dropped by as much as 141 ft (Thorn et al. 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.

## 1.7 Regional 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.

### 1.7.1 Temperature

Temperatures are typical of mid-latitude dry continental climates with summer high temperatures in the basin around 90 degrees Fahrenheit (°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 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.

### 1.7.2 Precipitation

Precipitation varies across the region with many locations in the higher elevations of the mountains receiving twice the annual rainfall of locations in the Albuquerque Basin. Most precipitation falls between July and October mainly in the form of brief, heavy rain showers. Average annual precipitation, based on 15 years of data collected between 1995 and 2009, is approximately 9.0 inches at SNL/NM, with 10.9 inches in the lower foothills. Annual precipitation recorded at the National Weather Service (NWS) cooperative stations in mountain elevations varies between 10 and 23 inches. 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.

### 1.7.3 Climate

While the regional climate is described by the atmospheric state variables of temperature and humidity, site-specific meteorology at SNL/NM 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 an upslope/downslope diurnal pattern to wind flows. 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 towards the Rio Grande Valley. These topographically induced wind flows can be enhanced or negated by weather systems that move across the southwestern U.S. The strongest winds occur in the spring when monthly wind speeds average 10.3 miles per hour (mph). Wind gusts commonly reach 50 mph.

## 1.8 Regional Ecology

The SNL/NM facilities area is influenced by two major physiographic provinces - mesa and plains, and mountains. The various elevations in these provinces provide a varied range of life zones on KAFB.

### 1.8.1 Physiographic Provinces

***Mesa and Plains*** - A significant portion of central New Mexico, including the middle Rio Grande and much of SNL/NM, is comprised of this physiography. Major landforms include valleys, lowlands, outwash plains, and alluvial fans and terraces. Grama and galleta grasses, four-wing saltbush, and sand sage cover lower elevations, with piñon pine and juniper species characterizing the higher elevations. Riparian areas grow in strips along water courses and include cottonwood, willow and non-native salt cedar trees.

***Mountains*** - The Sandia and Manzano Mountains are south of (but not part of) the Rocky Mountains. The eastern portion of SNL/NM is located in, and bordered by, the Manzano Mountains. Vegetation in these steep, rugged mountains varies greatly on the basis of elevation and aspect. Forests tend to be patchy due to topography, weather, fire, insect outbreaks, and disease. The landscape is a complex mosaic of open meadows, composed of forest stands of varying ages and species.

These physiographic provinces each have an influence on the typical landforms, flora, and fauna predominant within the SNL/NM area. The topography at KAFB ranges from lowland grasslands to high elevation coniferous forests. With much of the area undeveloped, there is great diversity in plant and animal communities living on KAFB. At least 267 plant species and 195 animal species are found on KAFB (DOE 1999). Table 1-1 lists the most common species of birds, mammals, reptiles, amphibians, and plants that have been identified on-site.

### 1.8.2 Regional Life Zones Occurring on Kirtland Air Force Base (KAFB)

***Ponderosa Pine Forest or Transition Life Zone*** (7,000 to 8,000 ft) – a closed canopy of ponderosa pine, piñon-pine, juniper, scrub oak, grassy meadows, streams, marshes, and canyons are typical of this zone. The USFS withdrawn area in the eastern portion of KAFB reaches an elevation of just over 7,900 ft.

***Piñon-Juniper Woodland Zone (***6,000 to 7,000 ft) – a mostly open canopy of piñon-pine and juniper sparsely populate this zone of foothills and mesas. Animals typical of this woodland include the piñon mouse and piñon jay. Much of the rolling terrain in the withdrawn area is comprised of this zone.

***Upper Sonoran Life Zone*** (below 6,000 ft) – this short grass prairie zone occurs on alluvial fans, mesas, and gently rolling or sloping plains. Pioneer plants include tumbleweed, goat head, and spurge; intermediate plants include galleta and burro grass, cactus, and mixed weeds; climax vegetation is grama grass. Animals include prairie dogs, burrowing owls, and kangaroo rats. The non-withdrawn area of KAFB land falls within this zone (Figure 1-1).

**TABLE 1-1.** Common Plants and Animals Identified at KAFB

| | | | |
|---|---|---|---|
| **BIRDS** | | | |
| American robin | *Turdus migratorius* | Horned lark | *Eremophila alpestris* |
| American kestrel | *Falco sparverius* | Killdeer | *Charadrius vociferus* |
| Black-chinned hummingbird | *Archilochus alexandris* | Loggerhead shrike | *Lanius ludovicianus* |
| Black-headed grosbeak | *Pheucticus melanocephalus* | Mountain bluebird | *Sialia currucoides* |
| Broad-tailed hummingbird | *Selasphorus platycercus* | Red-tailed hawk | *Buteo jamaicensis* |
| Dark-eyed junco | *Junco hyemalis* | Rufous-sided towhee | *Pipiloerythro melanocephalus* |
| **MAMMALS** | | | |
| Black bear | *Ursus americanus* | Deer mouse | *Peromyscus maniculatus* |
| Bobcat | *Felis rufus* | Gunnison's prairie dog | *Cynomys gunnisoni* |
| Banner-tailed kangaroo rat | *Dipodomys spectabilis* | Gray fox | *Urocyon cinereoargenteus* |
| Black-tailed jackrabbit | *Lepus californicus* | Mule deer | *Odocoileus hemionus* |
| Desert cottontail | *Sylvilagus audubonii* | | |
| **REPTILES AND AMPHIBIANS** | | | |
| Collared lizard | *Crotaphytus collaris* | Great plains skink | *Eumeces obsoletus* |
| Chihuahuan spotted whiptail | *Aspidoscelis exsanguis* | Great plains toad | *Bufo cognatus* |
| Round-tailed horned lizard | *Phrynosoma modestum* | Western diamondback rattlesnake | *Crotalus atrox* |
| Prairie lizard | *Sceloporus consobrinus* | Side-blotched lizard | *Uta stansburiana* |
| Gopher snake | *Pituophis catenifer* | Short-horned lizard | *Phrynosoma hernandesi* |
| **PLANTS** | | | |
| Apache plume | *Fallugia paradoxa* | Goathead | *Tribulus terrestris* |
| One-seed juniper | *Juniperus monosperma* | India ricegrass | *Achnatherum hymenoides* |
| New Mexico needlegrass | *Hesperostipa neomexicana* | Ring muhly | *Muhlenbergia torreyi* |
| Purple three-awn | *Aristida purpurea* | Bush muhly | *Muhlenbergia porteri* |
| Shrub live oak | *Quercus turbinella* | Soapweed yucca | *Yucca glauca* |
| Spectacle pod | *Dithyrea wislizenii* | Black grama | *Bouteloua eriopoda* |

**NOTES:** KAFB = Kirtland Air Force Base

## 1.9 GreenGov Presidential Award

In 2010, SNL/NM received White House recognition as one of eight recipients of the 2010 GreenGov Presidential Awards for implementing photovoltaic (PV) powered carts. The awards honor federal agencies who develop methods to reduce greenhouse gas pollution and promote environmentally responsible products and techniques (see page 1-15).

# SNL/NM Photovoltaic Carts

In 2010, SNL/NM received a “GreenGov Presidential Award”, which recognized extraordinary achievement in the pursuit of President Obama’s Executive Order 13514 on Federal Leadership in Environmental, Energy, and Economic Performance. The awards honor exceptional federal, civilian, and military personnel, agency teams, agency projects and facilities, and agency programs that exemplify President Obama’s charge to lead by example in sustainability. Sandia earned the “Green Innovation Award” for developing and implementing photovoltaic (PV) powered carts.

SNL/NM personnel designed and modified electric-powered Global Electric Motorcar (GEM®) carts by mounting a polycrystalline panel solar-collector system on its roof that continuously charges the batteries and runs the electric motor. A charge controller safety feature turns the system off when the battery is fully charged, thus increasing the life span of the GEM cart battery. The solar technology allows for a GEM cart battery to have a life span of longer than three years and is recyclable.

The GEM carts do not need to be grid-tied to electricity eliminating the need for SNL/NM to purchase power for their operation. On cloudy days, the cart can be plugged into an electrical outlet and bypass the photovoltaic (PV) system. Using an off-the-shelf PV panel and mounting kit, cart modifications can be made in about 30 days at a cost of $2,100 for materials and installation. The retrofit includes a gauge that indicates when power is getting low and how many hours have elapsed since the cart was last charged. Charging stations for these carts cost about $10,000 each for materials (outlets, circuits, cords, and cord reels), and installation. With a PV panel modification fewer of these charging stations are needed.

SNL/NM’s fleet of 300 vehicles contains 156 electric carts. An average electric GEM cart uses 375 kWh of electricity annually. It takes 2.1 pounds of coal to create 1 kWh of energy, requiring 787 pounds of coal to be burned each year to power one cart. Expand this number to the 300 carts on site, and 236,100 pounds of coal are expended every year to power GEM carts, enough coal to fill a train car. In addition, each kWh of energy created by coal releases 1.408 pounds of carbon dioxide and 0.0053 pounds of sulfur dioxide. It would take 3,850 mature trees (over the age of 15) to eradicate all of the carbon dioxide emitted by the electric carts (each mature tree sequesters about 48 pounds of carbon dioxide per year).

Solar powered carts reduce the need for charging stations, thus reducing the expense for their construction, repairs, and maintenance. Converting electric carts to solar technology reduces energy costs, lowers pollution rates, and increases sustainability. SNL/NM personnel plan on converting the remaining electric carts in the fleet to PV power. This would save substantial amounts of money, reduce grid-tied energy use, increase the use of renewable energy, and reduce greenhouse gas emissions.

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# 2.0 Compliance Summary

Sandia Corporation (Sandia) conducts operations based on environmental regulations, statutes, and U.S. Department of Energy (DOE) directives through a variety of programs at Sandia National Laboratories, New Mexico (SNL/NM) that work together to pursue complete compliance with applicable regulations. As a part of these federal, state, and local mandates, Sandia adheres to strict reporting and permitting requirements.

This chapter summarizes Sandia's compliance status with major environmental regulations, statutes, and DOE directives that are applicable to operations conducted at SNL/NM (Table 2-1 and Section 2.1.16). Compliance issues, corrective actions, environmental occurrences, and environmental audits and appraisals are also discussed in this chapter.

Current permits held by Sandia, DOE, the National Nuclear Security Administration (NNSA), and the Sandia Site Office (SSO) are listed in Chapter 8.

***Compliance Order on Consent (COOC)***

On April 29, 2004, the New Mexico Environment Department (NMED), DOE, and Sandia entered into the COOC. The COOC provides requirements and establishes schedules and deliverables for corrective action pursuant to the New Mexico Hazardous Waste Act (NMHWA) and the New Mexico Solid Waste Act (NMSWA).

***Compliance Agreement (CA)***

This CA was in place for City of Albuquerque (COA) Permit #1705-M2. During Calendar Year (CY) 2009, this permit was terminated with the COA. The building which housed the sources has since been demolished. Therefore the CA that was in place no longer applies or is needed.

***Federal Facilities Compliance Order (FFCO)***

On October 4, 1995, NMED issued the FFCO to DOE and Sandia, which was developed pursuant to the Federal Facilities Compliance Act. The FFCO provides requirements for achieving compliance with the requirements of Title 40 of the Code of Federal Regulations (CFR), Part 268.50 for mixed hazardous/radioactive waste at SNL/NM.

## 2.1 Compliance Status with Federal Regulations

Most environmental regulations and statutes applicable to SNL/NM are shown in Table 2-1 including links to associated web sites. The following subsections detail the regulations.

### 2.1.1 Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)

The CERCLA, commonly referred to as the "Superfund," provides cleanup funds and/or assessment requirements for inactive waste sites at all federal facilities. A Preliminary Assessment/Site Inspection (PA/SI), as required by CERCLA, was performed at SNL/NM in 1988. This inspection confirmed that Sandia does not own any sites that would qualify for the National Priorities List (NPL), which lists the

**TABLE 2-1**. Major Environmental Regulations & Statutes Applicable to SNL/NM

| Regulation/Statute | Description | Where to go for more information |
|---|---|---|
| Atomic Energy Act (AEA) | Directs U.S. Department of Energy (DOE) and the U.S. Nuclear Regulatory Commission (NRC) in the management of nuclear materials and radioactive waste | *http://www.hss.doe.gov/sesa/environment/policy/aea.html* |
| Clean Air Act (CAA) and CAA Amendments (CAAA) | Provides standards to protect the nation's air quality | *http://www.epa.gov/air/caa/* |
| Clean Water Act (CWA) | Provides general water quality standards to protect the nation's water sources and byways | *http://www.epa.gov/region6/water/* |
| Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) | Provides federal funding for cleanup of inactive waste sites on the National Priorities List (NPL) and mandates requirements for reportable releases of hazardous substances | *http://www.epa.gov/lawsregs/laws/cercla.html* |
| Cultural Resources Acts | Includes various acts that protect archeological, historical, religious sites, and resources | *http://recreation.usgs.gov/laws_regs.html* |
| Endangered Species Act (ESA) | Provides special protection status for federally listed endangered or threatened species | *http://www.epa.gov/lawsregs/laws/esa.html* |
| Executive Orders (EOs) | Several EOs provide specific protection for wetlands, floodplains, environmental justice in minority and low-income populations, and encourages greening the government through leadership in EM | *http://www.archives.gov/federal-register/executive-orders/disposition.html* |
| Federal Facility Compliance Act (FFCA) | Directs federal agencies regarding environmental compliance | *http://www.hss.doe.gov/sesa/environment/policy/ffca.html* |
| Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) | Controls the distribution and use of various pesticides | *http://www.epa.gov/lawsregs/laws/fifra.html* |
| Migratory Bird Treaty Act (MBTA) of 1918 | Prevents the taking, killing, possession, transportation and importation of migratory birds, their eggs, parts, and nests | *http://www.fws.gov/migratorybirds/RegulationsPolicies/treatlaw.html#mbta* |
| National Emission Standards for Hazardous Air Pollutants (NESHAP) | Specifies standards for radionuclide air emissions and other hazardous air releases under the CAA | *http://www.epa.gov/radiation/neshaps/* |
| National Environmental Policy Act (NEPA) | Requires federal agencies to review all proposed activities so as to include environmental aspects in agency decision-making | *http://nepa.energy.gov/* |
| Resource Conservation and Recovery Act (RCRA) | Mandates the management of solid and hazardous waste and certain materials stored in underground storage tanks (USTs). | *http://www.epa.gov/lawsregs/laws/rcra.html* |
| Safe Drinking Water Act (SDWA) | Enacts specific health standards for drinking water sources | *http://water.epa.gov/lawsregs/rulesregs/sdwa/index.cfm* |
| Superfund Amendments and Reauthorization Act (SARA) | SARA, Title III, also known as the Emergency Planning and Community-Right-to-Know Act (EPCRA), mandates communication standards for hazardous materials over a threshold amount that are stored or used in a community | *http://www.epa.gov/lawsregs/laws/epcra.html* |
| Toxic Substance Control Act (TSCA) | Specifies rules for the manufacture, distribution, and disposal of specific toxic materials such as asbestos and polychlorinated biphenyls (PCBs) | *http://www.epa.gov/compliance/civil/tsca/index.html* |

**NOTES:** EM = Environmental Management
SNL/NM = Sandia National Laboratories, New Mexico

nation's high priority cleanup or "Superfund" sites. Therefore, with respect to inactive hazardous waste sites, Sandia has no CERCLA reporting requirements. Amendments under the Superfund Amendments and Reauthorization Act (SARA) require additional reporting in the event of a reportable quantity (RQ) release. Sandia was in full compliance with CERCLA/SARA in 2010, as illustrated in this chapter.

### *2.1.2 Emergency Planning and Community Right-to-Know Act (EPCRA)*

The EPCRA, also known as SARA Title III, establishes emergency planning requirements for federal, state, and local governments and industry.

EPCRA ensures that communities have the right to know about and be informed of potential hazards including the type and location of large quantities of toxic chemicals used and stored by facilities in or near the community. EPCRA specifically mandates that chemical information be made available to local emergency response organizations, such as fire departments and hospitals. Any inadvertent release must be reported to appropriate state and local authorities. All subsequent reports must be made accessible to the public. The four major reporting requirements designated by specific sections of EPCRA are shown in Table 2-2.

**TABLE 2-2.** 2010 SARA Title III (or EPCRA) Reporting Requirements Applicable to SNL/NM

| Section | SARA Title III Section Title | Requires Reporting? | | Description |
|---|---|---|---|---|
| | | Yes | No | |
| 302 - 303 | Emergency Planning | Yes | | Sandia submits an annual report listing chemical inventories above the reportable Threshold Planning Quantities listed in 40 CFR Part 355 Appendix B, the location of the chemicals, and emergency contacts. The report is prepared for the DOE/NNSA/SSO, which distributes it to the required entities. |
| 304 | Emergency Notification | | No | There was no reportable RQ release in 2010. |
| 311-312 | Hazardous Chemical Storage Reporting Requirements | Yes | | There are two "Community Right-to-Know" reporting requirements: (a) Sandia completes the EPA Tier II forms for all hazardous chemicals present at the facility at any one time in amounts equal to or greater than 10,000 lb and for all extremely hazardous substances present at the facility in an amount greater than or equal to 500 lb or the Threshold Planning Quantity, whichever is lower; (b) Sandia provides MSDSs for each chemical entry on a Tier II form unless it decides to comply with the EPA's alternative MSDS reporting, which is detailed in 40 CFR Part 370.21. |
| 313 | Toxic Chemical Release Forms | Yes | | Sandia was above the reporting thresholds for CY 2010 for submitting a TRI Report for lead. A majority of the lead was from the use of lead-containing solders for laboratory benchmark solders. |

**NOTES:** CFR = Code of Federal Regulations
CY = Calendar Year
DOE = U.S. Department of Energy
EPA = U.S. Environmental Protection Agency
EPCRA = Emergency Planning and Community Right-to-Know Act
lb = pounds
MSDS = Material Safety Data Sheets (gives relevant chemical information)
NNSA = National Nuclear Security Administration
RQ = reportable quantity
Sandia = Sandia Corporation
SARA = Superfund Amendments and Reauthorization Act
SSO = Sandia Site Office
SNL/NM = Sandia National Laboratories, New Mexico
TRI = Toxic Release Inventory

Information on EPCRA can be found at the following U.S. Environmental Protection Agency (EPA) website:

*http://www.epa.gov/emergencies/content/epcra*

***Toxic Release Inventory (TRI) Reporting***

EPCRA regulations require that facilities with activities described in the Standard Industrial Classification (SIC) Codes 20 through 39 that use toxic chemicals listed in SARA Title III over a threshold value must submit a TRI report. The threshold value for listed chemicals requiring a TRI report is 10,000 pounds per year (lb/yr), unless otherwise specified.

Each year, nearly 23,000 facilities report to the EPA under the TRI Program. The proposed TRI Reporting Forms Modification Rule (1674 Federal Register/Vol. 70, No. 6/ Monday, January 10, 2005) sought comment on eliminating certain information from the reports, simplifying other reporting data, and, in some cases, reducing duplicate data collection efforts. The options being proposed reduce the cost of compiling and submitting TRI reports, while maintaining the quality and practical utility of the TRI data. This rule became effective on September 12, 2005.

In 2010, chemical use at SNL/NM was above the reporting threshold for submitting a TRI report for lead. Sandia continues to document its toxic chemical use in the *Chemical Inventory Report Calendar Year (CY) 2010* (SNL 2011b), which documents all purchases of chemicals at SNL/NM, Tonopah Test Range (TTR), and Kauai Test Facility (KTF) for CY 2010. This chemical inventory supports compliance with SARA Title III, as well as reporting for COA inventory requirements.

### 2.1.3 Resource Conservation and Recovery Act (RCRA)

RCRA regulates the generation, transportation, treatment, storage, and disposal (TSD) of hazardous chemical waste and non-hazardous solid wastes, and the storage of hazardous or petroleum products in underground storage tanks (UST). Under the authority of the NMHWA, and with delegated authority from the EPA under RCRA, the NMED administers hazardous and solid waste regulatory programs in New Mexico. Hazardous and solid waste management activities at SNL/NM are conducted under NMED regulations. Some additional RCRA requirements and EPA regulations also apply. Applicable regulations are listed in Chapter 8.

The hazardous component of hazardous/radioactive mixed waste (MW) is regulated as hazardous waste and subject to the requirements of state and federal regulations. The radioactive component of MW is regulated under the Atomic Energy Act (AEA) of 1946.

Sandia generates hazardous waste and MW through normal operations and through its ongoing environmental restoration (ER) project, which is responsible for the cleanup of sites that were formerly used for operations such as testing and disposal. Sandia currently implements an active and successful program to minimize hazardous waste and MW through product substitutions, process changes, material re-use, and recycling. For a summary of Sandia's hazardous waste management activities during 2010 see Chapter 3.

***Operating Permits*** – Sandia operates hazardous waste management units at SNL/NM under the following permits issued by NMED:

- Hazardous Waste Management Facility (HWMF), Permit NM5890110518-1,
- Thermal Treatment Facility (TTF), Permit NM5890110518-2, and
- Corrective Action Management Unit (CAMU), Permit NM5890110518-1, Module IV.

On February 6, 2002, Sandia and DOE/NNSA/SSO submitted a comprehensive RCRA Part B request to renew the operating permits for these units. The request included updated permit applications for nine MW management units: the Radioactive and Mixed Waste Management Facility (RMWMF), the High Bay Waste Storage Facility (HBWSF), and seven Manzano Storage Bunkers (MSB); and a new application for operation of the Auxiliary Hot Cell Facility (AHCF). Sandia continues to operate under the existing permits and under interim status during the permit application and renewal process. The HBWSF and two of the seven MSB were withdrawn from the permit application in 2003, and closure of those units was completed in 2006. Treatment operations were completed at the CAMU in 2003. Closure of the unit was completed later that year, and DOE/NNSA/SSO and Sandia currently conducts post-closure care and maintenance, as detailed in Section 3.2.2.

On August 20, 2007, NMED issued a draft operating permit to DOE/NNSA/SSO and Sandia and invited public comments. DOE/NNSA/SSO, Sandia, and several citizens submitted comments to NMED. During 2009, NMED met with interested commenters to discuss their comments and propose modifications to the draft permit.

***Classified Waste Landfill*** – The Classified Waste Landfill was used to store non-hazardous classified media (e.g. floppy disks) and components. Sandia and DOE/NNSA/SSO, instead of seeking permit coverage, plan to excavate the contents of the landfill and revegetate the area. A draft excavation plan was approved by NMED on April 6, 2010.

***Post-Closure Care Permit, Chemical Waste Landfill (CWL)*** – The CWL was used for hazardous waste disposal under interim status until 1985. From 1981 to 1989, the CWL was also used for storage of hazardous wastes in drums. Waste management operations ceased and closure activities began in 1989. Closure included two voluntary corrective measures (VCM): extraction of solvent vapors (primarily trichloroethylene) and excavation of the entire landfill. Sandia and DOE/NNSA/SSO submitted a Post-Closure Care Plan (PCCP) in 2005, and submitted additional permit materials in March 2007. Details about closure and post-closure care activities are detailed in Section 3.2.2.

On October 15, 2009, NMED issued a final post-closure care permit and a notice of approval for the final remedy and closure plan amendment. The permit will become effective when the NMED issues written approval of DOE/NNSA/SSO and Sandia's certification of the closure of the CWL.

### *2.1.4 Federal Facility Compliance Act (FFCA)*

The FFCA 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. On October 4, 1995, NMED issued the FFCO to DOE and Sandia, which was developed pursuant to the FFCA. A general *Site Treatment Plan (STP)* (SNL 2010b) and a schedule for processing the waste were developed. In 2010, Sandia continued to characterize and treat MW and to package wastes for shipment to permitted off-site TSD facilities. In 2010, DOE/NNSA/SSO and Sandia negotiated an extension to one STP deadline and met all of the other deadlines outlined in the STP.

### *2.1.5 Atomic Energy Act (AEA)*

In 1946, the AEA was enacted to encourage the development and use of nuclear energy for general welfare, common defense, and security. The purpose of the AEA is to assure the proper management of nuclear materials and radioactive waste. The AEA, as amended, delegates control of nuclear energy and nuclear materials primarily to DOE/NNSA/SSO, the U.S. Nuclear Regulatory Commission (NRC) and the EPA. Federal regulations control radioactive emissions and the transportation of nuclear materials. The authority for controlling radioactive waste is retained by DOE/NNSA/SSO and governed by DOE directives.

### *2.1.6 Clean Air Act (CAA) and Clean Air Act Amendments (CAAA) of 1990*

The objectives of the CAA and the CAAA are to protect and enhance the nation's air quality. The EPA is responsible for describing and regulating air pollutants from stationary and mobile sources and for setting ambient air quality standards. The COA has direct delegation from EPA Region VI to locally administer these standards as well as specific air emission permits and registrations, as shown in Chapter 8, Table 8-1.

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

The EPA program for the attainment and maintenance of NAAQS requires local agencies to develop a comprehensive permitting program. The Air Quality Control Board (AQCB) has developed a set of regulations governing mobile and stationary sources of air pollution.

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

***Radiological NESHAP***
Subpart H of 40 CFR 61 specifically regulates radionuclide emissions (other than radon) from DOE facilities. As required by the regulation, Sandia calculates an annual dose from actual or calculated emissions to potentially exposed members of the public. The regulation requires that Sandia determine the maximum possible dose that could be delivered to an individual residing at a nearby location 24 hours-per-day. The result is the effective dose equivalent (EDE) to the maximally exposed individual (MEI). The dose is compared to the EPA standard of 10 millirem per year (mrem/yr) allowed from radioactive air emissions from a DOE facility.

The on-site MEI dose of 2.98E-02 millirems per year (mrem/yr) at the Honeywell Systems Support Site resulted primarily from conservatively calculated releases of americium-241 from the nearby Sandia Tomography and Radionuclide Transport Laboratory (START) Laboratory. In CY 2010 an americium-241 source for research was received at the START Laboratory with contamination on the outside of the vial. After numerous attempts at decontamination, the source was unable to be sufficiently decontaminated to permit use of the source for the desired application. Therefore, the source was returned to the vendor in the packing material received. The source was double bagged and no contamination existed on the outside of the bags when returned. Nevertheless, conservative release calculations arising from this activity were attributed to americium-241. The off-site MEI was located at the Eubank Gate Area. The MEI of 3.41E-03 mrem/yr at the Eubank Gate Area resulted also primarily from conservatively calculated releases of americium-241 from the nearby START Laboratory. Both doses are well below the 10 mrem/yr EPA standard. For perspective, the annual radiation dose from natural background radiation is approximately 311 mrem/yr (NCRP 2009). Sandia met all NESHAP compliance requirements in 2010.

***Fugitive Dust Permitting***
The COA enforces 20.11.20 New Mexico Administrative Code (NMAC) to ensure that all persons conducting active operations that result in disturbed surface areas, or that involve bulk material handling, use reasonably available control measures (or other effective measures) on an ongoing basis

to prevent or abate injury to human health, animal and plant life, and to prevent or abate unreasonable interference with public welfare, visibility, and the reasonable use of property.

***National Emissions Inventory (NEI)***
As required by the Consolidated Emission Reporting Rule (CERR), (EPA 2002), the emission inventory requests annual emissions of volatile organic compounds (VOC), nitrogen oxide, carbon monoxide, sulfur dioxide, lead, ammonia, particulate matter with a diameter of equal to or less than 10 microns ($PM_{10}$), particulate matter with a diameter of equal to or less than 2.5 microns ($PM_{2.5}$), and HAPs.

***New Source Review (NSR) Requirements***
The NSR permitting program was established as part of the 1977 CAAA.

NSR requirements provide assurance to the public that any large, new, or modified industrial source in their neighborhood will be protective of human health and the environment, and that advances in pollution control occur concurrently with industrial expansion.

***New Source Performance Standard (NSPS) Requirements***
As part of an effort to control pollution in the United States (U.S.), the EPA provides NSPS requirements that dictate the level of pollution that a new stationary source may produce. These standards are authorized by Section 111 of the CAA, and the regulations are published in 40 CFR Part 60. An NSPS has been established for a number of individual industrial or source categories, including boilers and generators.

***Open Burn Permitting***
The COA 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.

***Ozone Depleting Substances (ODS) Requirements***
Based on the requirements of the CAA, the EPA has established regulations that affect many aspects of the refrigeration industry.

***Title V Operating Permit***
The CAAA of 1990 contained provisions under Title V requiring all existing major air emission sources to obtain an operating permit. A major source is defined as the combined emissions from any facility with the potential to emit:

- 100 tons per year (tpy) or greater of any criteria pollutant,
- 100,000 carbon dioxide equivalent greenhouse gas (GHG) emissions,
- 10 tpy of any HAP, or
- 25 tpy of any combination of HAPs.

Details on the applicability of Title V to SNL/NM and activities are in Section 5.2.

### 2.1.7 Clean Water Act (CWA)

The CWA establishes guidelines to protect the “Waters of the U.S.” by regulating the discharge of pollutants. At SNL/NM, the CWA applies to sanitary and septic system wastewater effluents, storm water runoff, and surface water discharges.

The CWA is implemented through local, state, and federal water quality standards as follows:

(1) the Albuquerque Bernalillo County Water Utility Authority (ABCWUA) administers regulations for sanitary sewer discharges based on federal pretreatment standards,

(2) the EPA and the NMED administer regulations concerning oil storage and surface discharges, and

(3) the EPA has authority over National Pollutant Discharge Elimination System (NPDES) permits.

***New Mexico Stream Standards***
EPA Region VI is the permitting agency for discharges under the NPDES. NMED Surface Water Quality Bureau assists EPA in regulation of storm water discharges by performing inspections on behalf of EPA and by serving as a local point of contact for providing information to permit holders. New Mexico has enacted "Standards for Interstate and Intrastate Surface Waters" (20.6.4 NMAC) to protect the quality of surface waters in the state.

***ABCWUA Sewer Discharge Regulations***
There are six wastewater monitoring stations, or outfalls, operating under the ABCWUA permits at SNL/NM. During 2010, there was one reported event that exceeded permitted limits established by the ABCWUA. For additional information refer to Section 6.1.

***Surface Discharge***
All discharges made to the ground or to containment areas must be evaluated for compliance with regulations implemented through the New Mexico Water Quality Control Commission (NMWQCC) standards for the protection of ground waters and surface waters prior to discharge. Sandia reviewed and approved 25 one-time internal surface discharge permits in 2010. Sandia also investigated one reportable environmental release that met NMED reporting standards. Detailed information regarding these releases can be found in Section 2.2.2 and Section 6.2.2 of this report. Sandia maintains two evaporation lagoons in TA-IV which are permitted by NMED Discharge Permit-530 (DP-530). The TA-IV lagoons are used to contain and evaporate accumulated storm water pumped from the secondary containment areas around seven oil tanks that support the pulsed power accelerators. All permit conditions for the TA-IV permitted lagoons were met in 2010. The current permit for DP-530 was re-issued on September 12, 2007 and will expire on September 12, 2012.

***NPDES***
NPDES implements the requirements that are specific to all discharges made to "Waters of the U.S." as defined in the CWA and "Surface Waters of the State" and as defined in New Mexico's "Standards for Interstate and Intrastate Surface Waters" (20.6.4 NMAC). At SNL/NM, all point sources discharge to either state or federal waters and are evaluated for compliance with their respective regulations.

Historically, collecting visual and analytical samples at SNL/NM has been a challenge due to Albuquerque's climate. Analytical sampling and visual assessments are conducted, sufficient runoff permitting. For additional information refer to Section 6.3.4.

### 2.1.8 Safe Drinking Water Act (SDWA)

The SDWA authorizes the EPA to set national standards for drinking water sources, treatment systems, and water distribution. These standards are promulgated by the EPA as primary and secondary drinking water regulations. Specific drinking water quality criteria are established to protect human health, which limits the maximum contaminant level (MCL) of specific organic and inorganic chemical substances and biological organisms in potable water.

***Drinking Water Supply at SNL/NM***

Potable water for most facilities on Kirtland Air Force Base (KAFB) (including SNL/NM) is provided by the KAFB Water System. The system derives its water from deep groundwater wells (discussed in Section 7.3, Groundwater Levels). KAFB routinely samples its water and conducts analyses to establish that its water quality conforms to EPA standards. In support of KAFB compliance with NMED Drinking Water Standards, DOE/NNSA/SSO and Sandia operates the water distribution system on their property in conformance with the SDWA regulations. DOE/NNSA/SSO and Sandia provide KAFB with an annual certification that all backflow preventers installed in the potable water distribution system have been properly tested and maintained.

Information on the KAFB Water System is located on the EPA's SDWA website, which details the compliance status for all drinking water systems in the U.S.:

*http://www.epa.gov/safewater*

Specific water quality data and system performance are published by KAFB in the Annual Consumer Confidence Report on the Quality of Drinking Water.

### 2.1.9 Toxic Substances Control Act (TSCA)

TSCA provides regulations regarding the import, export, use, and disposal of specifically listed toxic chemicals. At SNL/NM, compliance with TSCA primarily involves the handling and disposal of polychlorinated biphenyls (PCB). Sandia was in full compliance with TSCA in 2010. Details related to TSCA are in Section 3.4.1.

### 2.1.10 Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)

FIFRA regulates pesticide use and is enforced under the New Mexico Pesticide Control Act. Sandia's Biological Control Activity compiles information on pesticide use at SNL/NM, as discussed in Section 3.5. Sandia was in full compliance with FIFRA in 2010.

### 2.1.11 National Environmental Policy Act (NEPA)

NEPA requires federal agencies (and other organizations that perform federally sponsored projects) to consider 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. Additionally, if a proposed action is not within a class of actions previously determined to have environmentally "insignificant" impacts, the agency must prepare an environmental assessment (EA) or an environmental impact statement (EIS) before making an irretrievable commitment of resources or funding. Although a major objective of NEPA is to preserve the environment for future generations, the law does not require an agency to choose a course of action with the least environmental impacts. Details are provided in Section 3.6.

### 2.1.12 Endangered Species Act (ESA)

The ESA ensures that any action authorized, funded, or carried out by a party will not jeopardize the continued existence of a "threatened or endangered species" or result in adverse modifications to its habitat. At SNL/NM, ESA compliance is coordinated through NEPA reviews and the Ecology Program. Table 2-3 lists the threatened and endangered species potentially occurring in Bernalillo County.

**TABLE 2-3.** Threatened and Endangered Species Potentially Occurring in Bernalillo County, NM

| Common Name | Scientific Name | Federal Status | State Status | Observed at KAFB |
|---|---|---|---|---|
| **Plants** | | | | |
| Wright's marsh thistle | *Cirsium wrightii* | Candidate | --- | |
| **Animals** | | | | |
| Spotted bat | *Euderma maculatum* | --- | Threatened | |
| Pale Townsend's big-eared bat | *Plecotus townsendii pallescens* | SOC | --- | |
| New Mexican jumping mouse | *Zapus hudsonius luteus* | Candidate | Endangered | |
| **Fish** | | | | |
| Rio Grande silvery minnow | *Hybognathus amarus* | Endangered | Endangered | |
| **Birds** | | | | |
| Baird's sparrow | *Ammodramus bairdii* | --- | Threatened | |
| Western burrowing owl | *Athene cunicularia hypugea* | SOC | --- | |
| Common black-hawk | *Buteogallus anthracinus anthracinus* | --- | Threatened | |
| Mountain plover | *Charadrius montanus* | Proposed Threatened | --- | |
| Yellow-billed cuckoo | *Coccyzus americanus* | Candidate | --- | |
| Broad-billed hummingbird | *Cynanthus latirostris magicus* | --- | Threatened | |
| Southwest willow flycatcher | *Empidonax traillii extimus* | Endangered | Endangered | |
| Aplomado falcon | *Falco femoralis septentrionalis* | Endangered | Endangered | |
| American peregrine falcon | *Falco peregrinus anatum* | --- | Threatened | X |
| Arctic peregrine falcon | *Falco peregrinus tundrius* | --- | Threatened | |
| Bald eagle | *Haliaeetus leucocephalus* | --- | Threatened | |
| White-eared hummingbird | *Hylocharis leucotis borealis* | --- | Threatened | |
| Brown pelican | *Pelecanus occidentalis carolinensis* | --- | Endangered | |
| Neotropic cormorant | *Phalacrocorax brasilianus* | --- | Threatened | |
| Mexican spotted owl | *Strix occidentalis lucida* | Threatened | --- | |
| Bell's vireo | *Vireo bellii* | --- | Threatened | X |
| Gray vireo | *Vireo vicinior* | --- | Threatened | X |
| **Reptiles** | | | | |
| Narrowhead garter snake | *Thamnophis rufipunctatus* | SOC | --- | |
| **Insects** | | | | |
| Slate millipede | *Toltecus chihuanus* | SOC | --- | |

**NOTE:** There are no listed endangered or threatened amphibian species in Bernalillo County for Calendar Year (CY) 2010.
KAFB = Kirtland Air Force Base
NM = New Mexico
SOC = species of concern

### 2.1.13 Migratory Bird Treaty Act (MBTA)

The MBTA of 1918 put the 1916 Convention for the Protection of Migratory Birds into effect. 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 the taking, possession, killing, transportation, or importation of migratory birds, their eggs, parts, or nests. At SNL/NM, the MBTA is coordinated through NEPA reviews and the Ecology Program.

### 2.1.14 Cultural Resources Acts

The three primary cultural resources acts applicable at SNL/NM are:

- National Historic Preservation Act (NHPA),
- Archaeological Resources Protection Act (ARPA), and
- American Indian Religious Freedom Act (AIRFA).

At SNL/NM, cultural resources compliance is coordinated through the NEPA Program. Actions that could adversely affect cultural resources are initially analyzed in a NEPA checklist. Historic properties, as defined by NHPA and other implementing regulations, include archaeological sites and historic buildings and structures. Historic buildings and structures may include those over 50 years of age that are historically significant or younger structures of exceptional significance. There are historic buildings on property owned by DOE/NNSA. Planning through the NEPA process identifies potential impacts to these sites, and appropriate historic documentation is undertaken to mitigate adverse effects when necessary.

There are no known archaeological sites located on DOE/NNSA-owned property. However, archaeological sites do exist on and in close proximity to DOE/NNSA-permitted property and ER sites. These areas are located on U.S. Air Force (USAF) property and on portions of the Cibola National Forest land withdrawn area. Sandia activities are planned to avoid potential impacts to these cultural resource sites. DOE/NNSA has a responsibility to ensure that impacts to cultural resources are assessed and appropriate actions are taken to mitigate any impact.

***Historic Building Assessment***
In 2010, Sandia, DOE/NNSA/SSO undertook consultation with the New Mexico State Historic Preservation Office (SHPO) on actions at 11 individual buildings. Actions at 9 of the buildings were found to have no adverse effect on cultural resources. The proposed addition of an Americans with Disabilities Act (ADA) compliant elevator to Building 860, however, requires additional consultation to ensure alterations will not undercut the building's historic design. Similarly, consultation continues regarding the proposed removal of the Old Centrifuge in TA-II.

In 2010, SNL undertook a site-wide survey and historic building assessment of the SNL/NM site. The final recommendation to SSO included eight historic districts and three individually eligible buildings. SSO has not yet completed consultation with SHPO on the recommendation. Also, documentation continues on buildings previously found eligible for the National Register of Historic Places.

## 2.1.15 Environmental Compliance Executive Orders (EO)

***Floodplain Management (EO 11988)***, as amended, as minimal impact for SNL/NM since all active SNL/NM facilities are located outside the 500 year floodplain as described by the U.S. Army Corps of Engineers (ACE) (USACE 1979). This applies to both major on-site drainages: Tijeras Arroyo and Arroyo del Coyote.

***Protection of Wetlands (EO 11990)***, as amended. Wetlands are areas inundated by surface or groundwater with a frequency sufficient to support a prevalence of aquatic plant and/or animal life. Wetlands generally include swamps, bogs, potholes, ponds, mud flats, and areas around natural springs. 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 USAF and the U.S. Forest Service (USFS). These springs provide an important source of drinking water for wildlife and create a unique biological niche in an otherwise arid habitat.

***Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (EO 12898),*** as amended. To the greatest extent practicable and permitted by law, consistent with the principles set forth in the Report on the National Performance Review (Gore 1993), each federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the U.S. and its territories and possessions. DOE/NNSA/SSO and Sandia perform a periodic analysis to assess whether their existing or proposed operations cause any disproportionate impacts on minority or low-income populations within the area of influence of Sandia operations.

***Strengthening Federal Environmental, Energy, and Transportation Management (EO 13423),*** was issued in January 2007. EO 13423 sets goals in the areas of energy efficiency, acquisition, renewable energy, toxin reductions, recycling, sustainable buildings, electronics stewardship, fleets, and water conservation. EO 13423 also requires more widespread use of Environmental Management Systems (EMS) as the framework in which to manage and continually improve these sustainable practices. EO 13423 incorporates the requirements of and cancels EOs 13101, 13123, 13134, 13148, and 13149, which were implemented through DOE Order 450.1 in January 2003. DOE revised Order 450.1 to include the requirements of EO 13423 in June 2008.

***Leadership in Environmental, Energy, and Economic Performance (EO 13514),*** was issued in October 2009. EO 13514 establishes an integrated strategy towards sustainability to safeguard the health of our environment and make greenhouse gas emissions a priority for all federal agencies. EO 13514 sets goals in the areas of promoting electronics stewardship, pollution prevention, increased renewable energy, waste reduction, recycling, and fossil fuel usage reduction.

## 2.1.16 DOE Directives

DOE directives on the contract baseline that pertain to environmental protection and management are discussed in Chapter 1, "Sandia's Operations Contract." In 2010, Sandia met all requirements stated in these DOE directives.

## 2.1.17 Summary of Radiological Releases

A summary of radiological releases and public doses resulting from Sandia operations is provided in Table 2-4. Additional detailed information is found in Sections 5.3 and 5.4 of this report.

**TABLE 2-4.** SNL/NM Radiological Dose Reporting for Calendar Year 2010

| Pathway | Dose to Off-Site MEI | | Dose to On-Site MEI | | Percent of DOE 100 mrem/yr Limit | Estimated Population Dose (80-km radius) | | Population within 80-km radius of site | Estimated Background Radiation Population Dose | |
|---|---|---|---|---|---|---|---|---|---|---|
| | mrem | mSv | mrem | mSv | | Person-rem | Person-Sv | | Person-rem | Person-Sv |
| Air | 2.43E-03 | 2.43E-05 | 2.87E-02 | 2.87 -04 | 0.002 percent | 1.24E-01 | 1.24E-03 | 882,187 | - | - |
| Water | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | - | - |
| Other Pathways | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | - | - |
| All Pathways | 2.43E-03 | 2.43E-05 | 2.87E-02 | 2.87E-04 | 0.002 percent | 1.24E-01 | 1.24E-03 | 882,187 | 5.03E+04 | 5.03E+02 |

| Radiological Atmospheric Releases for 2010 (in Curies) | | | | | | | |
|---|---|---|---|---|---|---|---|
| Tritium | Noble Gases ($t_{1/2}$ <40 days) | Fission and Activation Products ($t_{1/2}$ <3 hr) | Fission and Activation Products ($t_{1/2}$ >3 hr) | Total Radio-strontium | Total U | Other Actinides | Other |
| 2.21E+00 | 4.09E+00 | 6.80E-04 | 1.01E-07 | 3.55E-07 | 0 | 6.73E-05 | 0 |

| Liquid Effluent Releases of Radioactive Material for 2010 | | | | | | |
|---|---|---|---|---|---|---|
| Tritium | Fission and Activation Products ($t_{1/2}$ <3 hr) | Fission & Activation Products ($t_{1/2}$ >3 hr) | Total Radio-iodine | Total Radio-strontium | Total U | Pu |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 |

**NOTES:** DOE = U.S. Department of Energy
MEI = maximally exposed individual
km = kilometer
mrem = millirem
mSv = millisievert
Pu = Plutonium
U = Uranium

## 2.2 2010 Releases, Compliance Issues, and Environmental Occurrences

Under DOE Manual 231.1-2, an *occurrence* is defined as "one or more (i.e., recurring) events or conditions that adversely affect, or may adversely affect, DOE (including NNSA) or contractor personnel, the public, property, the environment, or the DOE mission." Events or conditions meeting criteria thresholds identified in DOE Manual 231.1-2, or determined to be recurring through performance analysis, are considered occurrences. There are environmental releases that may not meet DOE Manual 231.1-2 reporting thresholds; however, they are still reportable to outside agencies (see Chapters 2 and 6).

### 2.2.1 Occurrence Tracking

DOE Occurrence Reporting is tracked by the Integrated Safety Management and Assurance Department. All SNL/NM occurrences are entered into DOE's Occurrence Reporting Processing System (ORPS) database, which also tracks corrective actions and closure of occurrence reports.

For all categories, during 2010 there were 51 occurrences; five of these were environmentally-related at SNL/NM.

*DOE Manual 231.1-2 2010 Reportable Environmental Occurrences*

Table 2-5 lists the DOE Manual 231.1-2 environmental and environmentally-related occurrences for the five year period from 2006 to 2010. The table shows all occurrences for which the "reporting criteria" (post-August 25, 2003) included "environmental." As stated previously, there were five reportable environmental occurrences in 2010 — one was categorized as Significance Category 2, one was categorized as Significance Category 3 and three were categorized as Significance Category 4 (the lowest level occurrence). Table 2-6 summarizes DOE Manual 231.1-2 2010 Reportable Environmental Occurrences.

### 2.2.2 Environmental Release Tracking

Environmental releases include notifications that are not tracked through ORPS, as well as notifications to outside agencies.

*2010 Environmental Releases*

In 2010, there was one surface discharge release that was reportable to NMED and one release to the sanitary sewer system reported to ABCWUA. These releases are summarized in Section 6.2.2.

## 2.3 2010 Audits and Appraisals

Operations at SNL/NM and DOE/NNSA/SSO are routinely subjected to audits by external regulatory agencies. Sandia also conducts its own self-assessments and appraisals. Environmental audits and appraisals conducted by external agencies in 2010 are listed in Table 2-7. During 2010, the ABCWUA performed inspections of the wastewater discharges. No findings or observations resulted from these inspections.

## 2.4 Summary of Reporting Requirements

External reporting requirements (other than to DOE) are necessary for both routine and non-routine releases of pollutants or hazardous substances. Release information may be used to evaluate facility operation compliance, waste handling activities, and emergency response programs. Table 2-8 summarizes the primary reporting requirements for releases applicable to SNL/NM.

## 2.5 Summary of Environmental Permits

Table 8-1 in Chapter 8 lists all environmental permits and registrations that were in effect in 2010. It includes pending permit applications under review by various agencies.

## 2.6 Environmental Performance Measures

Environmental performance at SNL/NM is tracked through performance measures and indicators. It is reported through management reports and annual summaries (such as this report).

Table 2-8 lists the environmental performance measure results for Notices of Violations at SNL/NM.

Environmental performance and Sandia's performance measures are also assessed as part of the Performance Evaluation Plan (PEP) agreement between DOE/NNSA/SSO and Sandia. On the basis of the PEP, DOE/NNSA/SSO prepares an annual Performance Evaluation Report (PER) that assesses Sandia's performance for the fiscal year (FY). For FY 2010, the overall score for Sandia was listed as "Outstanding."

**TABLE 2-5.** Environmentally-Related Occurrences for Five Years (2006-2010)

| Nature of Occurrence or Reporting Criteria | | | | | |
|---|---|---|---|---|---|
| | **2006** | **2007** | **2008** | **2009** | **2010** |
| **Group 2 - Personnel Safety and Health** | | | | | |
| Personal exposure to chemical, biological, or physical hazards above limits - 2A(5) (Post-August 2003 Reporting Criteria). | 4 | 2 | 2 | 3 | 1 |
| **Group 5 - Environmental** | | | | | |
| Environmental releases above permitted levels and exceeds report quantities specified in 40 CFR 302 or 40 CFR 355 - 5A(1). | 1 | | | | |
| Any discharge that exceeds 100 gallons in any form - 5A(2). | | | | | |
| Release of Hazardous Substance, Material or Waste above permitted levels and exceeds percent of report quantities specified in 40 CFR 302 or 40 CFR 355 - 5A(3). | | | | | |
| Release of Hazardous Substance, Material, or Waste that must be reported to outside agencies in a format other then routine periodic reports (oil spills <10 gal need not be reported) - 5A(4). | 1 | 1 | 1 | 1 | 1 |
| **Group 9 - Noncompliance Notifications** | | | | | |
| Any enforcement action (other than associated with the PAAA) involving ten or more cited violations, and/or an assessed fine of $10,000 or more - 9(1). | 3 | | | | |
| Any written notification from an outside regulatory agency that a site/facility is considered to be in noncompliance with a schedule or requirement - 9(2). | 1 | 1 | | | 1 |
| **Group 10 - Management Concerns** | | | | | |
| Any 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 to other facilities or activities in the DOE complex - 10(2). | 1 | 6 | 4 | 1 | 2 |
| A near miss, where no barrier or only one barrier prevented an event from having a reportable consequence - 10(3). | 1 | 3 | 2 | | |
| An event that results in a significance concern by affected state, tribal, or local officials, press, or general population; that could damage the credibility of the Department or that may result in inquiries to Headquarters - 10(4). | | | | | |

**NOTES:** CFR = Code of Federal Regulations
DOE = U.S. Department of Energy
PAAA = Price Anderson Amendment Act

**TABLE 2-6.** DOE Manual 231.1-2 Reportable Environmental Occurrences, 2010

| Month | Occurrence Significance Category | Reporting Criteria | Description |
|---|---|---|---|
| May | 4 | 5A(4) | On May 20, 2010, an environmental sewage discharge of approximately 150 gallons (gal) of domestic waste occurred, which was caused by a backup in a sanitary sewer line. The discharge was stopped within a few minutes of being detected. The sanitary discharge traveled west approximately 150 feet (ft) along a paved roadway where approximately 10 gal entered a drop inlet of the storm drainage system. The remaining 140 gal traveled west about 150 ft along the paved roadway and then about 600 ft to the south along 14th Street Southeast. The material that travelled along the street was swept back into the sanitary sewer system using potable water. The roadway was neutralized with a 10 percent bleach solution. The release is not considered to be harmful to human health and safety, plant and animal life, and did not cause degradation to the environment. The release is being reported because it violates the terms of Sandia's Stormwater MSGP issued by the EPA. A critique/fact finding was conducted. |
| June | 4 | 9(2) | On June 21, 2010, a Notice of Violation (NOV) was received by Sandia National Laboratories (SNL) because analysis of environmental samples collected by the Albuquerque Bernalillo County Water Utility Authority (ABCWUA) and SNL on April 20, 2010 indicated an arsenic result of 0.131 mg/L, which exceeded the ABCWUA limit of 0.051 mg/L. On June 24, 2010 Center 1700 received the NOV. A critique/fact finding was performed. See Section 6.1.1 for details. |
| June | 4 | 10(2) | On June 24, 2010, analytical results for airborne beryllium sampling during a shot containing 400 mg of beryllium in Building 983-Z-Machine indicated that one member of the workforce (Center Section) exceeded the inhalable TLV (0.05 ug/m$^3$) with a result of 0.052 ug/m$^3$. The result for total beryllium for the same worker was .01 ug/m$^3$ and did not exceed the DOE action limit (AL). All other results were either below the reporting limit or below the TLV or the DOE AL. On June 4, 2010 five members of the workforce were sampled for airborne beryllium exposure associated with the shot. The monitoring was conducted as part of the annual Industrial Hygiene Exposure Assessment for Z- Operations. The worker with the exceedance performed unloading activities. Unloading activities are conducted without a respirator for Z-Machine shots with less than 500 mg of beryllium based on historical data. Unloading activities for Z-Machine shots with 500 mg of beryllium or greater require that a respirator be worn. For this shot with 400 mg of beryllium, a respirator was not required. A critique/fact finding was performed. |
| October | 3 | 2A(5) | On September 1, 2010, a subcontractor was exposed to styrene while conducting a lining operation of a sewer located in TA-III. The SNL oversight monitoring of a sewer relining project revealed an exposure above the established limits of the American Conference of Governmental Industrial Hygienists (ACGIH). The specific task being monitored was the positioning and securing of the uncured liner with anchors in the manhole. Styrene is primarily a synthetic chemical that is used extensively in the manufacture of plastics, rubber, and resins. Sampling was conducted for both the Time Weighted Average (TWA) and the Short Term Exposure Limit (STEL). The results of the monitoring were received on October 20, 2010. One of the nine total samples resulted in an airborne concentration above the ACGIH styrene STEL. The one elevated STEL result was 186 ppm and the established ACGIH standard limit is 40 ppm. Management notifications were made and an investigation was initiated. |

**TABLE 2-6.** DOE Manual 231.1-2 Reportable Environmental Occurrences, 2010 (Concluded)

| Month | Occurrence Significance Category | Reporting Criteria | Description |
|---|---|---|---|
| October | 2 | 10(2) | On October 7, 2010, the waste sorting team at the RMWMF became aware of significant beryllium surface contamination exceeding the 0.2 ug/100cm$^2$ release criteria in Room 102 of Building 6921. On the previous day, an operation had been conducted in Room 102 that involved a drum with a single bagged beryllium item (Campaign 10-28). A series of swipes had been taken as a normal part of the post-job survey. Because of the sealed condition of the packaging around the beryllium item, the high swipe results were not anticipated and did not make sense. The actual source of the beryllium contamination was later determined to be from another operation (Campaign 10-27) that was conducted in Room 102 on September 2, 2010, in which a drum was opened and the contents removed, inspected, and repackaged into a "macro" drum. The workers recalled that the items and the drum were contaminated with a significant amount of "dirt." The disposal request indicated that the waste did not contain beryllium, so normal work controls for handling beryllium contamination were not in place for the operation. Following the contamination discovery on October 7, 2010 additional samples were taken and sixteen samples showed levels of beryllium above 0.2 ug/100cm$^2$ on various surfaces inside Room 102 and on the original drum from Campaign 10-27. The workers involved were advised to go to Sandia Medical for a beryllium evaluation. |

**NOTES:** DOE = U.S. Department of Energy
EPA = U.S. Environmental Protection Agency
MSGP = Multi-Sector General Permit
mg = milligram
mg/L = milligram per liter
ppm = parts per million
RMWMF = Radioactive and Mixed Waste Management Facility
TA = Technical Area
TLV = threshold limit value
$\mu g/m^3$ = microgram per cubic meter
$\mu g/100cm^2$ = microgram per 100 square centimeter

**TABLE 2-7.** Environmental Program Audits and Appraisals Conducted In 2010

| Appraising Agency | Title | Date | Summary |
|---|---|---|---|
| **External Audits and Appraisals** | | | |
| ABCWUA | ABCWUA inspected facilities within Flow Basins 2069A, 2069F, 2069G, 2069I, 2069K and 2238A | Inspected facilities during March, August, September and November of 2010 | No findings or observations resulted from these inspections |
| NMED * | NMED site inspection of SNL/NM Holding and Septic Tanks | Inspection of active and removed systems April 1, 2010 | NMED required submittal of updated information of active and removed systems |
| BSI | ISO 14001 Assessment | April 27, 2010 | 3 Minor Findings (non-conformities) |
| BSI | ISO 14001 Assessment | October 22, 2010 | 1 Minor Finding (non-conformity) |
| **Internal Audits and Appraisals** | | | |
| 00857 Internal Audit: ES&H, S&S, and IT Operations Department | ISO 14001 Internal Independent Audit of Selected Explosives Operations in SNL/NM Environmental Management System, 2010-E-0003 | September 22, 2010 | 3 Findings<br>3 Observations<br>4 Noteworthy Practices |

**NOTES:** ABCWUA = Albuquerque Bernalillo County Water Utility Authority
BSI = British Standards Institute
ES&H = Environment, Safety, and Health
ISO = International Organization for Standardization
IT = Information Technology
NMED = New Mexico Environment Department
S&S = Safeguards and Security
SNL/NM = Sandia National Laboratories, New Mexico
*Refer to Section 2.3 for additional information.

**TABLE 2-8.** Summary of Sandia Reporting Requirements to Outside Agencies (Other than DOE) for Releases of Pollutants or Hazardous Substances

| Report Title | Description | Agency |
|---|---|---|
| Annual NESHAP Dose Assessment Report | A dose assessment of the calculated EDE to the MEI is 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 Section 5.4 of this report. | EPA<br>40 CFR 61, Subpart H |
| RQ Accidental Release Reporting – | RQ release reporting is required by CERCLA and SARA Title III, or EPCRA to the NRC. CERCLA and EPCRA are discussed in Section 2.1.1 and 2.1.2 of this report. There were no reportable releases in 2010. | NRC<br>40 CFR 302 |
| TRI Report – | EPCRA, Sections 302, 311, 312, and 313, requires a TRI report to be filed by facilities conducting specifically listed industrial activities and using listed toxic chemicals. As discussed in Section 2.1.2, Sandia is currently required to submit a TRI report because its chemical use is above the reporting threshold. | EPA<br>40 CFR 372, Subpart B |
| Notification of Discharge | NMED requires reporting of oil or other water contaminant, 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 shall make oral notification as soon as possible after learning of such a discharge, but in no event more than 24 hours thereafter to the NMED. Within one week, the owner and/or operator shall send written notification to the appropriate Bureau Chief verifying the prior oral notification. Within 15 days, the owner and/or operator shall send written notification to the appropriate Bureau Chief describing any corrective actions taken and/or to be taken relative to the discharge. One surface discharge release occurred in 2010. Details of this event is summarized in Section 6.2.2. | NMED<br>20.6.2.1203 NMAC |
| Accidental Slug Discharge Notification | The ABCWUA requires immediate notification to the Wastewater Utility Division of any accidental/slug discharge that may cause potential problems for the POTW. Within five days following such occurrence, the user is required to provide the Industrial Waste Engineer with a detailed written report describing the cause of the dangerous discharge and measures to be taken to prevent similar future occurrences. During CY 2010 there was one reportable event that exceeded permitted limits and notification was sent to the ABCWUA. | ABCWUA Sewer Use and Wastewater Control Ordinance |

**NOTES:**
ABCWUA = Albuquerque Bernalillo County Water Utility Authority
CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act
CFR = Code of Federal Regulations
CY = Calendar Year
EDE = Effective Dose Equivalent
EPA = U.S. Environmental Protection Agency
EPCRA = Emergency Planning and Community Right-to-Know Act
MEI = Maximally Exposed Individual
NESHAP = National Emission Standards for Hazardous Air Pollutants
NMAC = New Mexico Administrative Code
NMED= New Mexico Environment Department
NRC = U.S. Nuclear Regulatory Commission
POTW = Publicly-Owned Treatment Works
RQ = Reportable Quantity
Sandia = Sandia Corporation
SARA = Superfund Amendments and Reauthorization Act
TRI = Toxic Release Inventory

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# 3.0 Environmental Programs Information

Environmental programs carried out by Sandia Corporation (Sandia) are in place to protect the environment, safety, and health (ES&H) of its employees and the community. These environmental programs meet or exceed the requirements of federal, state, and local environmental regulations, as well as U.S. Department of Energy (DOE) directives in the Prime Contract between Sandia and DOE. Presidential Executive Orders (EO) and DOE guidance documents are also used to establish program criteria.

The environmental programs are part of Sandia's Environmental Management System (EMS). Sandia's EMS is its primary management approach for addressing environmental aspects of operations and activities, including energy and transportation functions.

***Environmental Monitoring History***

Environmental monitoring began at Sandia National Laboratories, New Mexico (SNL/NM) in 1959 when the principal objective was to monitor radioactive effluents and determine any associated environmental impacts. Since then, environmental programs, along with other ES&H activities, have greatly expanded at SNL/NM.

***ES&H Policy***

Sandia's ES&H policy is implemented to protect and preserve the environment and to ensure the safety and health of its employees, contractors, visitors, and the public while maintaining the corporate vision and mission. Sandia's corporate ES&H Program mandates compliance with all applicable laws, regulations, and DOE directives included in the Prime Contract between DOE and Sandia, internal Corporate Processes, and permit requirements. As such, Sandia has committed to the following:

- Plan work incorporating safety awareness, protective health practices, environmental management, pollution prevention (P2), and the long-term environmental stewardship (LTES) of resources;
- Identify hazards and evaluate, monitor, and manage risks with effective ES&H systems;
- Implement controls that prevent injury, exposure to hazardous materials, and the release of materials that could be hazardous to the environment;
- Perform quality work while protecting people, the environment, and our nation's security;
- Continually improve ES&H performance by establishing, meeting, and assessing measurable ES&H goals, objectives, targets, and milestones; and
- Regularly communicate ES&H issues to the Members of the Workforce, the community, regulators, and our stakeholders.

***Integrated Safety Management System (ISMS)***
Sandia's methodology for managing and implementing its ES&H Program is outlined in the ISMS. The ISMS is centered on five safety management functions, which provide processes to guide management in identifying and controlling hazards. These include:

(1) define the scope of work,
(2) analyze the hazards,
(3) develop and implement control hazards,
(4) perform work within controls, and
(5) provide feedback and continuous improvement.

## *3.1 Sandia Environmental Management System (EMS)*

In accordance with DOE Order 450.1A, *Environmental Protection Program* (DOE 2008a), Sandia implemented an EMS as part of the ISMS. The EMS is the framework by which SNL/NM manages, and continually improves, its environmental compliance and sustainability practices. The EMS identifies the environmental consequences of SNL/NM's activities, products, and services and develops objectives and measurable targets to mitigate potential impacts to the environment.

SNL/NM personnel implemented its EMS in December 2005 and received third-party International Organization for Standardization (ISO) 14001 Certification in 2009. Since that time, Sandia has worked to fully implement and establish the EMS in conjunction with ISMS in all site operations. Some major accomplishments of the EMS for Fiscal Year (FY) 2010 include:

- Corporate-and division-level EMS objectives and targets were established and tracked quarterly to survey progress;
- Internal and external outreach events were conducted to increase environmental awareness;
- Environmental program plans that detail requirements and roles and responsibilities were updated;
- Implementation of the Chemical Exchange Program (CEP) was continued, reapplying over 338 chemicals, reducing 998 kilograms (kg) of hazardous waste and avoiding approximately $17,595 and $90,120 in waste and new purchase costs, respectively;
- During Calendar Year (CY) 2010, two buildings were awarded Leadership in Energy and Environmental Design (LEED) certification. The new Ion Beam Laboratory (IBL) received a Gold level certification under the LEED for New Construction (NC) Green Building Rating System, and Building 750 received a Silver level certification under the LEED for Existing Building: Operations and Maintenance (EBOM) rating system;
- Site Sustainability Plan (SSP) that articulates performance status and planned actions for meeting DOE's Strategic Sustainability Performance Plan (SSPP) goals and broader sustainability program;
- Continued application of the successful Resource Management Audit process (developed by Sandia) for identifying sustainability opportunities and providing justification for implementing improvement projects;
- Additionally, for CY 2011, six buildings have been targeted for compliance with the guiding principles (GP). These newer buildings are already fully metered and equipped with advanced control systems, thus minimizing costs that would otherwise be associated with updating and/or renovations to incorporate high performance building; and

- During CY 2010, SNL/NM personnel replaced the existing antiquated roofs on Buildings 897 and 970 with new "Cool Roofs" for a total of approximately 54,348 gross square footage (GSF). Presently, 115 cool roofs have been installed, which represents approximately 79 percent of all SNL-NM roofs. These cool roofs enhance overall building thermal performance by ensuring a thermal resistance of at least R-30. Cool roofs are comprised of either a bright white membrane on newly installed roofs, or a bright white roof coating on existing roof membranes. Other required attributes for Sandia include Energy Star-compliant, 60-mil Thermoplastic Polyolefin (TPO) bright-white membrane, minimum R-30 polyisocyanurate insulation (with a nine percent minimum recycled content), wood nailers from preservative-treated lumber using non-chromated copper aroenate preservatives, and adhesives compliant with the volatile organic compound (VOC) limits. This specified reflective roofing system reduces the peak cooling demand of the building by an estimated ten percent.

The EMS is a continuous improvement system that includes all environmental programs in an integrated approach to effectively minimize the impact of SNL/NM's operations on the environment. Each year, Sandia's work processes are reviewed, and new environmental objectives and measurable targets are set to ensure continual improvement in our environmental performance. Additional information can be found on the external EMS website:

*http://environment.sandia.gov/new/index.shtml*

## 3.2 Environmental Restoration (ER) Project

Sandia's ER Project was created under the DOE Office of Environmental Management (EM) to identify, assess, and remediate sites potentially contaminated by past spill, release, or disposal activities in accordance with the Resource Conservation and Recovery Act (RCRA), as amended by the Hazardous and Solid Waste Amendments (HSWA) of 1984. HSWA requirements apply to ER sites which include Solid Waste Management Units (SWMU) or areas of concern (AOC). 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).

There are additional AOC at SNL/NM that are not regulated as SWMUs (primarily closed-out septic systems) that have also been investigated as a part of the ER Project. These AOC were not identified at the time of the issuance of Module IV of the RCRA Part B Operating Permit; however, they were identified by the New Mexico Environment Department (NMED) as requiring investigation. Consequently, they were investigated and addressed as if they had been SWMUs listed on the permit.

Sandia, DOE, and NMED negotiated a Compliance Order on Consent (COOC) that was signed in April 2004. The COOC governs corrective action for releases of hazardous waste or hazardous constituents at SNL/NM. The COOC will terminate upon the completion of its requirements and the Hazardous Waste Facility will remain as the enforceable document.

### 3.2.1 Waste Cleanup and Site Closures

***ER Project History***

The initial identification of ER sites at SNL/NM was completed in 1987. At that time, there were 117 identified sites under Sandia's jurisdiction in the initial *Comprehensive Environmental Assessment and Response Program (CEARP) Phase I: Installation Assessment* (DOE 1987).

Since then, a total of 500 individual sites, potential sites, or individual historical activities have been identified for investigation. Many of these sites were confirmed to contain little or no contaminants of concern (COC). In 1992, the ER Project at SNL/NM was officially initiated to implement assessment and remediation activities for sites that had been contaminated or potentially contaminated because of past SNL/NM operations. In addition to the SNL/NM site, other sites included in the original scope of Sandia's ER Project were Sandia National Laboratories, Livermore, California (SNL/CA), the Kauai Test Facility (KTF), and the Tonopah Test Range (TTR). There were also a number of miscellaneous sites located in other areas, nationwide and internationally.

***Corrective Action Complete (CAC) Status***

DOE and Sandia propose ER sites to NMED for CAC status when they meet NMED criteria, either before or after remediation; the criteria include acceptable levels of risk to human health and the environment presented by the contaminants at the site.

After NMED grants CAC status, DOE and Sandia submit a request for a Class III modification to the HSWA Module (Module IV) of Permit NM5890110518-1 (the Permit) requesting that the site be deleted from Table A.1 "*List of Solid Waste Management Units (SWMU) and Areas of Concern (AOC) Requiring Corrective Action*" of the permit and added to Table A.2 "*List of Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs) not currently requiring Corrective Action*" of the permit.

The majority of ER sites are granted CAC status under a risk-based scenario. Risks to human health and the environment are calculated for sites with residual contamination according to U.S. Environmental Protection Agency (EPA) and NMED guidelines. The level of contamination remaining, and the appropriate land-use category (i.e., industrial, residential, or recreational use) are used, together with the available information and conceptual model for each site, to determine the risk to human health and the environment.

Of the remaining 33 sites, 31 were submitted for CAC determinations from the NMED. In April 2010 the NMED issued a letter requesting additional corrective action at five of the 31 sites, including SWMUs 8, 58, 68, 149, and 154. The remaining 26 sites are currently in the public comment process with a hearing anticipated in 2011 or 2012. All CAC proposals and Class III Permit modifications are available for review at the University of New Mexico (UNM) Zimmerman Library.

### *3.2.2 Selected Units at SNL/NM*

***Chemical Waste Landfill (CWL)***

The CWL, an interim status landfill, is approximately 1.9 acres and is located in the southeast corner of Technical Area (TA)-III. From 1962 through 1985, the CWL was used for disposal of hazardous wastes, chemicals, and solid wastes generated by SNL/NM research activities. Liquid waste disposal ended in 1982. The CWL was also used as a hazardous waste drum storage facility from 1981 to 1989.

The permitting and closure processes for the CWL were initiated during the 1980s. NMED approved the CWL Closure Plan in 1993. Closure activities were conducted through the ER Project and included two voluntary corrective measures (VCM): soil vapor extraction (SVE) and landfill excavation (LE). Excavation of the landfill began September 30, 1998. Over 52,000 cubic yards ($yd^3$) of soil and debris were excavated from the landfill between 1998 and 2002. Except for the area around one verification sampling grid point that was excavated in January 2003, all excavation was completed in February 2002. The excavation process, waste management activities, final verification soil sampling analytical

**TABLE 3-1**. Summary of ER Project Status, 1992 - 2010

| | A | B | C | D[1] | E | F[2] |
|---|---|---|---|---|---|---|
| **Year** | **Total ER Sites Remaining at Start of FY** | **ER Sites Proposed for CAC** | **Sites Approved for CAC** | **Corrective Actions Completed by End of Year** | **New ER Sites Identified During Year** | **Total ER Sites Remaining at End of FY** |
| 2010 | 33 | 0 | 0 | 0 | 0 | 33 |
| 2009 | 33 | 0 | 0 | 0 | 0 | 33 |
| 2008 | 61 | 0 | 28 | 0 | 0 | 33 |
| 2007 | 61 | 1 | 0 | 0 | 0 | 61 |
| 2006 | 110 | 6 | 49 | 3 | 0 | 61 |
| 2005 | 126 | 21 | 18 | 51 | +2[3] | 110 |
| 2004 | 125 | 41 | 0 | 1 | +1[4] | 126 |
| 2003 | 126 | 15 | 0 | 5 | -1 | 125 |
| 2002 | 158 | 3 | 30 | 2 | -2 | 126 |
| 2001 | 87 | 7 | 0 | 4 | 71 | 158 |
| 2000 | 146 | 10 | 64 | 10 | 5 | 87 |
| 1999 | 146 | 4 | 0 | 20 | 0 | 146 |
| 1998 | 146 | 16 | 0 | 0 | 0 | 146 |
| 1997 | 153 | 30 | 7 | 4 | 0 | 146 |
| 1996 | 155 | 35 | 2 | 29 | 0 | 153 |
| 1995 | 191 | 61 | 36 | 34 | 0 | 155 |
| 1994 | 219[5] | 48 | 28 | 3 | 0 | 191 |
| 1993 | 219[5] | 0 | 0 | 0 | 0 | 219 |
| 1992 | 172 | 0 | 0 | 0 | 47 | 219 |

**NOTES:** CAC = Corrective Action Complete
ER = Environmental Restoration
FY = Fiscal Year
Column A = Total ER Sites remaining to be removed from the Resource Conservation and Recovery Act (RCRA) Permit
Column B = ER Sites submitted for CAC including reinvestigations per New Mexico Environment Department (NMED)
Column C = ER Sites receiving final regulatory approval (Class III Permit Mod) by NMED
Column D = fieldwork completed including reinvestigations
Column E = newly identified sites or sites reopened by NMED
Column F = Total Sites remaining on the RCRA Permit at the end of the FY
[1] Includes all final submittals of CAC documentation including RSEs and Notice of Disapproval (NODs)
[2] Column totals: F = A - C + E
[3] Two Drain and Septic Systems (DSS) sites determined inactive in FY 05 were submitted for CAC
[4] One DSS Area of Concern (AOC) was determined to be inactive in FY 04 and submitted for CAC
[5] Some of the original 219 sites included Tonopah Test Range (TTR), Kauai Test Facility (KTF), and other off-site areas

results, and final risk assessment were presented in the LE VCM Final Report (SNL 2003), which was approved by NMED on December 16, 2003 (Moats 2003). The primary COC at the CWL are VOC and metals.

The majority of the soils excavated from the CWL were managed at the Corrective Action Management Unit (CAMU), which is located adjacent to the CWL. The soils were treated as needed and placed into the CAMU containment cell for long-term management. Sampling and final cleanup of the CWL site was completed in February 2004 and documented in an addendum to the LE VCM Final Report approved by NMED in October 2005.

As part of the CWL closure process defined in the amended Closure Plan, DOE and Sandia submitted a compilation of documents to NMED on May 20, 2003 that included the CWL Corrective Measures Study (CMS) Report, Remedial Action Plan (RAP), and Post-Closure Care Plan (PCCP), with a request that NMED select the remedy through approval of the CMS Report and RAP, and approve the PCCP for post-closure care. A revised CMS Report was submitted in December 2004, as requested by NMED; the revised RAP was included as an annex. A revised PCCP was submitted to NMED as a permit application in September 2005. In May 2004, DOE and Sandia requested NMED approval of an Interim Corrective Measure (ICM) to allow construction of the at-grade evapotranspirative landfill cover; the design for this cover was originally presented in the May 2003 RAP. NMED approved the ICM in September 2004. Backfilling of CWL to four feet (ft) below ground surface (bgs) was completed in February 2004. The CWL cover installation began in March 2005 and was completed in September 2005.

On May 21, 2007, NMED issued a draft CWL Post-Closure Care Permit for public comment, together with a notice of intent to approve the CMS Report and the final remedy selected for the CWL (i.e., at-grade evapotranspirative cover) and a Closure Plan amendment. DOE and Sandia submitted comments on the draft permit to NMED and requested a public hearing. Several citizens also submitted comments and requested a public hearing. Informal negotiations were initiated by the NMED in August 2008 with all interested parties requesting a public hearing. These negotiations continued into CY 2009, and in October 2009 the CWL Closure Plan Amendment, as changed, the CWL Post-Closure Care Permit, and the CWL CMS Report/Final Remedy were approved by NMED. As part of these negotiations, DOE and Sandia agreed to decommission four groundwater monitoring wells and install four new monitoring wells.

In addition, during the negotiations DOE and Sandia submitted a revegetation plan for the at-grade cover because the initial seeding performed in 2005 was not successful (SNL 2009). NMED approved the plan on July 31, 2009 (Bearzi 2009).

Revegetation activities (i.e., weed removal, applying new seed and gravel mulch, and performing supplemental watering) were completed from August through October 2009, with additional weed removal performed in November 2009 and March 2010. Results included robust native grass growth with minimal weeds. From April through July 2010, the four new groundwater monitoring wells were installed and four existing wells were decommissioned in accordance with the approved Closure Plan Amendment.

All final closure activities are documented in the CWL Final RCRA Closure Report (SNL 2010) that was submitted to NMED on September 27, 2010. After NMED approval, monitoring and post-closure care at the CWL will be performed under the NMED-approved CWL Post-Closure Care Permit (NMED 2009a).

***CAMU***

The CAMU (located in TA-III near the CWL) is permitted under RCRA and Toxic Substances Control Act (TSCA) for the management of remediation waste (primarily contaminated soil) generated during the LE VCM at the CWL. Storage, treatment, and containment activities are authorized under the CAMU permit (EPA 1997). Two treatment processes, Low Temperature Thermal Desorption (LTTD) for organic compounds and stabilization treatment (ST) for metals, were used as needed to treat soil wastes before they were placed in the containment cell. LTTD treatment operations were completed in December 2002, and ST treatment activities were completed in January 2003.

The staging, treatment, and support areas at the CAMU were clean-closed under the RCRA and TSCA provisions outlined in the closure plan (SNL 2002). The CAMU containment cell cover was installed in July 2003, which encapsulated the CWL remediation waste in place. The CAMU was certified closed on October 15, 2003 in compliance with the closure requirements documented in the RCRA Closure Report (SNL 2003a). The CAMU containment cell, where the treated waste remains, will continue to be monitored and maintained in accordance with post-closure requirements.

The CAMU containment cell consists of engineered barriers, a final cover system, and incorporates a bottom liner system with a leachate collection system and a vadose zone monitoring system (VZMS). The VZMS provides information on soil conditions under the cell for early detection of leaks. The VZMS consists of three subsystems that include the primary subliner (PSL), a vertical sensor array (VSA), and the CWL/sanitary sewer (CSS) line monitoring subsystems. The PSL, VSA, and CSS monitoring subsystems are monitored quarterly for the composition of soil vapors and soil moisture content.

In 2010, 527 gallons (gal) of leachate were removed from the collection system; 587 gal of leachate were removed during 2009. The leachate is pumped from the containment cell leachate collection system on a weekly basis. The leachate is a listed hazardous waste (F039 - Leachate [liquids that have percolated through land disposed wastes] resulting from the disposal of more than one restricted waste classified as hazardous under Subpart D of this part). The pumped leachate is containerized in 55-gal poly drums and stored in a RCRA 90-Day Storage Area. The waste is characterized by drawing a composite sample which is sent to an off-site laboratory for analysis. The waste is transported to the SNL/NM Hazardous Waste Management Facility (HWMF). The waste is subsequently shipped to an off-site hazardous waste facility for treatment.

Baseline data for soil moisture and soil vapor were established between October 2003 and September 2004. Baseline is defined as data collected monthly for one year after the closure of the containment cell in October 2003. The soil moisture monitoring results indicate increases at two of the CSS monitoring subsystem locations when compared to the baseline data. Increasing soil moisture at location CSS-2 (12- and 16-ft depths) was first observed in September 2005, and the increasing soil moisture trend at location CSS-3 (12-ft depth) was first observed in March 2007. The monitoring results for 2010 indicate the soil moisture at CSS-2 (12- and 16-ft depths) has stabilized but continues to increase at the CSS-3 (12-depth). However, the PSL and VSA monitoring subsystem location soil moisture data have remained consistent with the baseline data indicating that the containment cell is not the source of the moisture.

The 2010 soil vapor monitoring results demonstrated a downward trend (with minor seasonal fluctuations) in VOC concentrations at the CSS and VSA monitoring subsystem locations. The VOC concentrations appear to follow the trend of the soil temperature. The VOC concentrations are attributed to the remnant soil vapor plume around the CWL, and are consistent with the conceptual model of the CWL residual soil vapor plume (SNL 2004). The VOC concentrations are not attributed to the material in the CAMU containment cell. VZMS monitoring results are compiled and reported on an annual basis; the most recent report was submitted in September 2010 (SNL 2010a). The annual VZMS monitoring reports are submitted to NMED as required by the CAMU permit (EPA also receives a copy).

***Groundwater Management Units***

In 2010, SNL/NM ER personnel performed groundwater monitoring at CWL, Mixed Waste Landfill (MWL), Burn Site Groundwater (BSG), Tijeras Arroyo Groundwater (TAG), and TA-V. SNL/NM personnel will continue groundwater monitoring as a part of Corrective Measures Implementation (CMI) and Long-Term Stewardship (LTS). The Corrective Measures Evaluation (CME) report for TA-V was submitted to NMED in July 2005 and Notices of Disapproval were received from NMED in July 2008, August 2009, and December 2009. The CME report for TAG was submitted in September 2005, but no comments have been received from NMED. After regulatory selection and public review of the preferred remedy, CMI Plans can be prepared for TAG and TA-V. Revised monitoring under the CMI plan for TAG and TA-V cannot begin until NMED reviews and approves the CME reports and CMI plans.

***MWL***

The MWL was established in 1959 as a disposal area for radioactive waste and mixed waste (MW) generated at SNL/NM research facilities. The landfill accepted approximately 100,000 cubic feet ($ft^3$) of low-level waste (LLW) and minor amounts of MW from March 1959 through December 1988. Tritium is the contaminant of primary concern at the MWL. It has been detected in surface and subsurface soils in and around the classified area of the landfill. However, there is no indication that tritium or other contaminants have migrated to groundwater, which is approximately 500 ft bgs at the MWL. Tritium is released from MWL soils to the atmosphere at low levels, which do not pose a threat to human health or the environment.

The monitoring network at the MWL consists of seven wells. In 2010, MWL groundwater samples were collected in January, April, and July. Analytical results for MWL groundwater monitoring are summarized in *SNL/NM's CY 2010 Annual Groundwater Monitoring Report* (Appendix B).

On October 11, 2001, NMED directed DOE and Sandia to conduct a CMS for the MWL. The MWL CMS Report (SNL 2003b) was submitted to NMED on May 21, 2003 and identified, developed, screened, and evaluated corrective measures alternatives and recommended the preferred final remedy for the MWL. Based upon detailed evaluation and risk assessment using EPA and NMED guidance, DOE and Sandia recommended a vegetative soil cover (i.e., evapotranspirative cover) with institutional controls (IC) as the preferred remedy for the MWL. ICs included long-term monitoring, maintenance, and land use restrictions.

As part of the NMED review and approval process for the CMS Report, a public comment period was established and public hearings were held on December 2-3 and 8-9, 2004. On May 26, 2005, the Secretary of NMED selected a vegetative soil cover with a bio-intrusion barrier as the remedy for the MWL, based upon the information in the administrative record and the hearing officer's report. The decision of the Secretary of NMED was documented in the NMED Final Order for the MWL (Final Order) (NMED 2005) that was incorporated into the Sandia Permit through a draft Class III modification issued by NMED. The Final Order also required two additional plans be submitted to NMED: a CMI Plan within 180 days of issuance of the Final Order, and a Long-Term Monitoring and Maintenance Plan (LTMMP) within 180 days following NMED approval of the CMI Report documenting installation of the remedy.

On November 9, 2005, DOE and Sandia submitted the MWL CMI Plan to NMED documenting the specifications and requirements for construction of the selected remedy (SNL 2005). The CMI Plan contains a description of the selected remedy, the objectives for the remedy, detailed engineering design drawings, cover performance modeling, construction specifications, a construction quality assurance plan, and a health and safety plan. The CMI Plan also included the results of a comprehensive fate and transport model that was used to assess the performance of the MWL and develop monitoring triggers (i.e., constituent-specific concentrations by media) for future monitoring under the LTMMP. The MWL CMI Plan was conditionally approved by the NMED in December 2008 (Bearzi 2008) after resolution of two NMED Notice of Disapprovals (NOD) that requested additional information regarding landfill construction plans and performance modeling, and required more extensive and conservative monitoring trigger levels. DOE and Sandia responses to the MWL NODs were submitted to NMED in December 2006 (Wagner 2006), January 2007 (Wagner 2007), and November 2008 (Davis 2008). All conditions related to construction of the MWL evapotranspirative (ET) Cover were addressed and incorporated into the CMI Plan through replacement pages (Davis 2009).

Deployment of the MWL ET cover with a bio-intrusion layer was conducted in two main phases. During the first phase in 2006, MWL Borrow Pit and Subgrade construction activities were performed in preparation for cover construction. Soil fill material was excavated, mechanically screened to 2-inch minus, and stockpiled at the MWL Borrow Pit from June through July 2006. Following NMED approval in September 2006, Subgrade construction was performed from October through December 2006, and protective measures were installed on the completed Subgrade surface in April 2007. After NMED conditional approval of the CMI Plan in December 2008, the MWL evapotranspirative cover with a bio-intrusion layer was constructed during the second phase, which took place from May through September 2009. The CMI Report documenting installation of the remedy was submitted to NMED in January 2010 and NMED held a public meeting on the CMI Report on December 14, 2010. The NMED public comment period for the CMI Report was held from November 29, 2010 through February 28, 2011, which included a 30-day extension to the original public comment period. Final NMED approval is pending.

In September 2007 at the request of NMED, DOE and Sandia submitted the MWL LTMMP in advance of the required submittal date in the Final Order. NMED posted the LTMMP (SNL 2007a) on their web site and solicited public comments, but did not initiate a formal public comment period or provide DOE and Sandia with written comments or an NOD. At the December 14, 2010 MWL CMI Report public meeting, NMED indicated that DOE and Sandia will be instructed to withdraw the September 2007 LTMMP and submit a revised LTMMP within 180 days when the NMED CMI Report is approved. The 2007 LTMMP will be revised to include the updated groundwater monitoring well network (four new monitoring wells were installed in 2008), the specifications of the 2009 evapotranspirative cover (installed in 2009), and final monitoring and trigger level requirements defined in the final NOD response (Davis 2008).

## 3.3 Long Term Environmental Stewardship (LTES) Activities

The SNL/NM LTES involves stewardship for past, present, and future activities at SNL/NM. The LTES program's purpose is to "promote the long-term stewardship of a site's natural and cultural resources throughout its operational, closure, and post-closure life cycle" (DOE/SNL 2006). The environmental programs mentioned in this document support that stewardship.

LTS of legacy sites is one component of the LTES program. Stewardship of legacy sites is defined as "activities necessary to maintain long-term protection of human health, the environment, and natural and cultural resources from hazards associated with residual radioactive and hazardous contamination at former ER sites." Sandia's LTS activities are increasing as remedial activities at ER sites are completed. The LTS Program conducts compliance oversight activities, including long-term monitoring to meet

NMED requirements, conducts institutional control activities, and outreach activities to keep the public apprised of stewardship of legacy sites.

***Compliance Oversight Activities***

Sixty groundwater monitoring wells associated with former ER sites are monitored to meet NMED requirements. An additional 16 wells are sampled to assess SNL/NM operations impacts on groundwater. Water level measurements were obtained from 78 wells. Water quality data and water levels are reported in detail in *SNL/NM's CY 2010 Annual Groundwater Monitoring Report* (Appendix B). Monitoring wells are maintained or replaced as necessary. The LTS Program also conducts the long-term monitoring of the CAMU. Leachate is pumped weekly, and is periodically sampled and disposed of as hazardous waste. Additional information on activities conducted including sampling results can be found in the *CAMU VZMS Annual Monitoring Results Report* (SNL 2010a). A comprehensive information management system is used to manage legally defensible monitoring data for current and past activities to ensure protection of human health and the environment.

***IC Activities***

Former ER sites that have not been cleaned up to residential risk standards are periodically inspected and maintained when necessary. An IC tracking system has been created to help manage site IC information. A total of 29 IC site inspections were completed in 2010.

***Community Liaison and Stakeholder Involvement Activities***

It is important that the public be made aware of the work being conducted to maintain long-term protection of human health, the environment, and natural and cultural resources from hazards associated with residual radioactive and hazardous contamination at former ER sites. Semi-annual newsletters and an Annual Site Environmental Report (ASER) summary pamphlet are published and distributed to the public. In addition, a LTES website was created for public access. It contains key environmental regulatory decision documents for former ER sites and a map with site locations. The LTES website is updated as new regulatory documents are submitted by DOE/NNSA/SSO and Sandia to the NMED. Stakeholders participate in semi-annual DOE, Department of Defense (DoD) meetings on environmental activities. The LTES/LTS Program has updated the Community Checklist, which was compiled by Sandia's Members of the Workforce and community members who have an interest in LTES/LTS at SNL/NM. The Community Checklist contains the community members' questions about LTES/LTS and is posted to the LTES website. The Community Checklist is updated annually with new concerns or questions from the community. Please visit the LTES website for more information:

*http://elm.sandia.gov*

Click on "Legacy" for information about LTS sites.

## 3.4 Waste Management

Sandia follows the Waste Management hierarchy dictated in the Pollution Prevention Act of 1990 and reinforced in amendments to the RCRA. SNL/NM's P2 and Waste Management Programs make every attempt to reduce, reuse, or recycle waste, as appropriate, before any treatment or disposal.

Waste at SNL/NM is received and processed at several facilities: the HWMF, the Thermal Treatment Facility (TTF), the RMWMF, five Manzano Storage Bunkers (MSB), the Auxiliary Hot Cell Facility (AHCF), and the Solid Waste Transfer Facility (SWTF). The primary waste types handled by these waste management facilities are described below (sections 3.4.1 through 3.4.4). Section 3.4.5 describes P2 support and activities at SNL/NM.

### 3.4.1 Hazardous and Chemical Waste

Various wastes generated at SNL/NM are packaged, segregated, and stored at the HWMF; these include hazardous wastes, chemical wastes, such as industrial solid waste and special wastes, and TSCA wastes. All wastes are tracked from the point of generation to final disposal through meticulous "cradle to grave" documentation at each waste handling step. Each waste item received at the HWMF is labeled with a unique bar code, linking the item to the original disposal request. An individually coded waste item typically is a bottle, plastic bag, or other small item that contains chemicals or other waste.

All waste is reviewed at the HWMF before being placed in temporary storage. After sufficient quantities of items have accumulated in the storage bays, the items are packed into larger containers suitable for shipment, which are also bar-coded. These containers are moved to an adjacent building to await shipment to a permitted Treatment, Storage, and Disposal Facility (TSDF), landfill, or recycling facility, as appropriate. Waste is usually processed and shipped off-site within 90 days of receipt.

Applicable regulations for hazardous and chemical waste handled by the HWMF are listed in Chapter 8.

***2010 Activities at the HWMF***

The HWMF began CY 2010 with 3,510 package items in storage from CY 2009. An additional 7,856 package items were received during 2010, for a total of 11,366 package items handled at the HWMF. Of these, 9,350 package items were shipped off-site; 7,951 items as waste for disposal and 1,399 items for recycle. At the end of 2010, 2,016 package items remained in storage at the HWMF.

Specific waste categories handled and shipped in 2010 are summarized in Table 3-2. Wastes recycled in 2010 are summarized in Table 3-3.

***Hazardous and Chemical Waste Minimization***

In accordance with the requirements of Module IV, Section B.1 of Permit NM5890110518-1, Sandia annually certifies 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. Waste minimization efforts promoted throughout SNL/NM are investigated and implemented by line organizations with the support and technical assistance of the P2 Program. These efforts are not limited to hazardous wastes.

***Hazardous and Chemical Recycling***

Sandia recycles many categories of hazardous and chemical waste, where feasible. RCRA recycled waste includes various batteries, silver compounds, mercury compounds, lamps, capacitors, and toxic metals. Miscellaneous categories of non-regulated wastes are also recycled through the HWMF. These include alkaline batteries, fluorescent lamps, oils, non-polychlorinated biphenyl (PCB) containing ballasts, and lead. Waste recycled at SNL/NM in 2010 is summarized in Table 3-3.

***Asbestos Waste Handling***

The abatement of asbestos-containing equipment and building materials is ongoing. Removal of asbestos material is only done 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 contained 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. Asbestos wastes are managed according to the New Mexico requirements for regulated asbestos waste. Table 3-2 summarizes the quantities of asbestos waste generated and shipped in 2010.

**TABLE 3-2.** Waste Shipped by SNL/NM Waste Management Facilities During Calendar Year 2010

| Waste Categories | 2010 Waste Shipped | |
|---|---|---|
| **Radioactive Waste** | **(kg)** | **(lbs)** |
| Low-Level Waste | 11,584 | 25,538 |
| Transuranic Waste | 614 | 1,354 |
| **Subtotal Waste Shipped** | **12,198** | **26,892** |
| **Mixed Radioactive/Hazardous Waste** | **(kg)** | **(lbs)** |
| Mixed Low-Level Waste | 3,585 | 7,904 |
| Mixed Low-Level Waste Treated On Site (includes wastes that were rendered non-hazardous through treatment) | 3,520 | 7,760 |
| Mixed Transuranic Waste | 111 | 245 |
| **Subtotal Waste Shipped** | **3,696** | **8,149** |
| **Resource Conservation and Recovery Act (RCRA)** | **(kg)** | **(lbs)** |
| Hazardous Waste | 51,181 | 112,598 |
| Hazardous (Explosive) Waste Treated On-Site | 174 | 383 |
| **Subtotal Waste Shipped** | **51,181** | **112,598** |
| **Toxic Substances Control Act (TSCA)** | **(kg)** | **(lbs)** |
| Polychlorinated Biphenyls (PCBs) | 132 | 290 |
| PCBs and hazardous waste mixture | 80 | 176 |
| **Subtotal Waste Shipped** | **212** | **466** |
| **Other Regulated Wastes** | **(kg)** | **(lbs)** |
| Infectious Waste | 391 | 861 |
| Asbestos | 300,308 | 660,677 |
| Chemical Waste (includes Special Waste and Industrial Solid Waste) | 242,826 | 534,217 |
| Used Oil (not recycled) | 346 | 762 |
| **Subtotal Waste Shipped** | **543,871** | **1,196,517** |
| **Commercial Solid Waste** | **(kg)** | **(lbs)** |
| Solid Waste Transfer Facility Dry Waste | 797,840 | 1,758,918 |
| Offsite Office Waste (Sandia Science & Technology Park) | 49,230 | 108,532 |
| Cafeteria Wet Waste | 31,950 | 70,437 |
| **Subtotal Waste Shipped** | **879,020** | **1,937,887** |
| **2010 Total Waste Shipped** | **1,490,178** | **3,282,509** |

**NOTES:** All wastes shipped off site for treatment and/or disposal unless noted otherwise. Wastes that are treated on site and shipped off site are included in the quantities of wastes shipped off-site.
kg = kilograms
lbs = pounds
SNL/NM = Sandia National Laboratories, New Mexico

In instances where laboratory equipment has asbestos-containing material in a non-friable form (which poses no inhalation risk), these items are allowed to remain in service or are redistributed through the property reapplication program.

### *Polychlorinated Biphenyl (PCB) Handling*

PCBs are a class of organic chemicals that were widely used in industrial applications due to their practical, physical and chemical properties. Use of PCBs included dielectric fluids (used in transformers, capacitors, etc.), 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. PCB waste is managed at the HWMF in accordance with TSCA requirements.

Sandia has identified and replaced most PCBs and PCB-containing equipment. Previously, the largest quantity of regulated PCB-containing equipment in use at SNL/NM was capacitors contained inside fluorescent light ballasts manufactured before July 2, 1979. These have been almost completely eliminated due to an aggressive fluorescent lighting fixture retrofit program instituted in 1998. This program has removed all known PCB-containing ballasts running T12 lamps, replacing them with

**TABLE 3-3.** Waste Recycled by SNL/NM During Calendar Year 2010

| Recycle Categories | Waste Recycled (kg) | (lbs) |
|---|---|---|
| **Regulated or Chemical Waste Recycled** | | |
| Antifreeze / Coolant | 73 | 160 |
| Batteries | 34,460 | 75,971 |
| Capacitors | 8,397 | 18,511 |
| Chemicals Exchange Program (CEP) | 996 | 2,195 |
| Lead | 1,686 | 3,718 |
| Light Ballasts* | 4,749 | 10,470 |
| Light Bulbs | 4,629 | 10,206 |
| Mercury containing items | 131 | 289 |
| Oil / Grease / Fuel | 16,339 | 36,022 |
| Polychlorinated Biphenyls (PCB) | 663 | 1,461 |
| **Subtotal** | **72,123** | **159,003** |
| **Commercial, Construction, and Demolition Solid Waste Recycled** | | |
| Asphalt | 158,200 | 348,768 |
| Batteries | 753 | 1,661 |
| Binder Exchange Program | 291 | 642 |
| Cardboard | 199,262 | 439,294 |
| Ceiling Tiles | 17,690 | 39,000 |
| Compost (Food & Paper) | 88,922 | 196,037 |
| Computer Electronics | 280,395 | 618,159 |
| Concrete | 903,874 | 1,992,681 |
| Dirt Fill | 362,878 | 800,000 |
| Fencing Materials | 454 | 1,000 |
| Food Grease | 21,047 | 46,400 |
| Gravel | 6,800 | 14,991 |
| Metals | 2,742,059 | 6,045,143 |
| Paper (White, Mixed and Newsprint) | 128,336 | 282,929 |
| Plastics | 22,959 | 50,616 |
| Tires | 36,138 | 79,670 |
| Toner / Ink Cartridges | 18,912 | 41,693 |
| Wood | 69,391 | 152,979 |
| **Subtotal** | **5,058,361** | **11,151,663** |
| **Total Waste Recycled** | **5,130,484** | **11,310,666** |

**NOTES:** *Non-PCB
kg = kilograms
lbs = pounds
SNL/NM = Sandia National Laboratories, New Mexico

energy efficient, electronic (non-PCB) ballasts and T8 lamp technology. Other than fluorescent light ballasts, six PCB regulated items remain in use at SNL/NM. There are also six discrete areas of existing PCB spill contamination on concrete floors (from old transformers that have since been removed from service) which are being actively managed in compliance with an EPA/TSCA use authorization. PCB waste generated and shipped in 2010 is summarized in Table 3-2.

### *Explosive Waste*

Explosive waste is a subset of hazardous waste that is generally managed at the point of generation until it is scheduled for shipment to a treatment facility.

Sandia also operates the TTF, a RCRA Part B permitted unit in TA-III, only for the on-site treatment of small quantities of unique explosive waste generated by research and test activities at an adjacent facility. With the following exception, Sandia's explosive waste is shipped to external facilities for required treatment and disposal.

### 3.4.2 Radioactive Waste and Mixed Waste

The RMWMF, AHCF, and MSB are used to manage LLW, MW, transuranic (TRU) waste, and mixed TRU (MTRU) waste. The waste processing functions at the RMWMF include waste characterization, segregation, treatment, packaging, storage, and shipment to permitted off-site facilities. Wastes are stored at the MSB.

No high-level radioactive waste (HLW) is generated at SNL/NM. Although Sandia operates several nuclear reactors, no spent fuel has ever been produced since the original fuel rods are still viable. Furthermore, because SNL/NM is not a power producing utility, any spent fuel that would eventually be removed from the research reactors would not be classified as HLW.

All LLW, TRU, MTRU, and MW generators must contact the Radioactive Waste Program to obtain prior approval before generating waste; this allows development of a pathway for waste treatment and disposal before the waste is generated. The LLW and MW managed at the RMWMF are generated through a variety of processes. During 2010, both LLW and MW consisted of legacy wastes (wastes originally generated between 1990 and 1998), newly generated wastes from production processes, wastes from ER activities, and wastes generated during waste management activities at the RMWMF. MW also included wastes that had been treated at the RMWMF. TRU and MTRU wastes consisted of legacy wastes.

Applicable requirements for LLW and MW management are listed in Chapter 8. Normally, radioactive waste is shipped off-site within a one-year time frame. This is similar to the requirements for hazardous waste and MW. Some LLW may remain on-site longer than one year. Generally, this is to achieve full utilization of transport vehicles by ensuring that vehicles are full prior to leaving the site.

LLW is primarily contaminated with isotopes of strontium, plutonium, cobalt, americium, thorium, cesium, tritium, and uranium (plutonium and americium in LLW are below the activity level designated for TRU waste). Sandia's LLW inventory generally consists of laboratory waste, Decontamination and Demolition (D&D) debris, and personnel protection equipment (PPE).

TRU waste may derive from sealed instrument sources, D&D waste, PPE, and laboratory waste. The radioactive component in TRU is generally americium, plutonium, neptunium, and curium.

MW and MTRU generally consist of the radioactive component (LLW or TRU waste) with the addition of one or more RCRA-hazardous components such as metals or solvents.

***2010 Activities at the RMWMF and MSB***

In 2010, all four types of waste (LLW, MW, TRU, and MTRU) were stored at five of the seven MSB. The remaining two MSB were used for storage of LLW and TRU.

Activities at the RMWMF consisted of processing mixed low-level waste (MLLW) and LLW through storage, repackaging, and on-site treatment, including chemical deactivation (including neutralization), stabilization and solidification, macro-encapsulation, and physical treatment (volume reduction). Some of the treated MLLW was rendered non-hazardous. Treated wastes were stored at the RMWMF or MSB awaiting shipment to permitted off-site facilities for further treatment (if needed) and/or disposal.

TRU wastes were repackaged at the AHCF. TRU and MTRU wastes were repackaged at the RMWMF. TRU and MTRU wastes were shipped off-site to the Advanced Mixed Waste Treatment Project (AMWTP) in Idaho for certification. The wastes will then be shipped to the Waste Isolation Pilot Plant for final disposal.

The quantities of LLW, MLLW, TRU, and MTRU are shown in Table 3-2. A six-year summary of radioactive waste shipped from SNL/NM is shown in Figure 3-1.

### 3.4.3 Mixed Waste Regulatory Status

As discussed in Section 2.1.4, Sandia manages MW that is subject to the Federal Facilities Compliance Order (FFCO) (NMED 2004). The requirements include:

- Deadlines for processing and/or disposing of various types of waste as specified in the Site Treatment Plan (STP), and
- Providing an annual update of activities and the current inventory of stored waste still on-site.

During 2010, DOE/NNSA/SSO and Sandia requested NMED approval for a revision to the STP to establish new deadlines for most categories of mixed waste (treatability groups TG-1 through TG-27) and extend the compliance deadline for TG MTRU. NMED, DOE/NNSA/SSO, and Sandia agreed to an extension of the compliance deadline for TG MTRU as specified in Amendment No. 5 to the FFCO. DOE/NNSA/SSO and Sandia met all deadlines; the compliance history regarding MW and the FFCO is shown in Chapter 8, Table 8-3.

***MW Treatment***
Chapter 8, Table 8-4 lists the MW categories in effect during 2010 (TG-1 to TG-27 and TG MTRU) with the preferred treatment options and the status for each category. Five of the treatment technologies listed in Table 8-4 are performed on-site at the RMWMF as described in the current RCRA Part B permit request (most recently updated in November 2010) and in the draft permit issued by NMED in August 2007.

***MW Inventory in 2010***
At the end of 2010, the majority of MW stored on-site consisted of inorganic debris and radioactive metallic objects with hazardous waste constituents and wastes that have been treated to meet hazardous waste treatment standards.

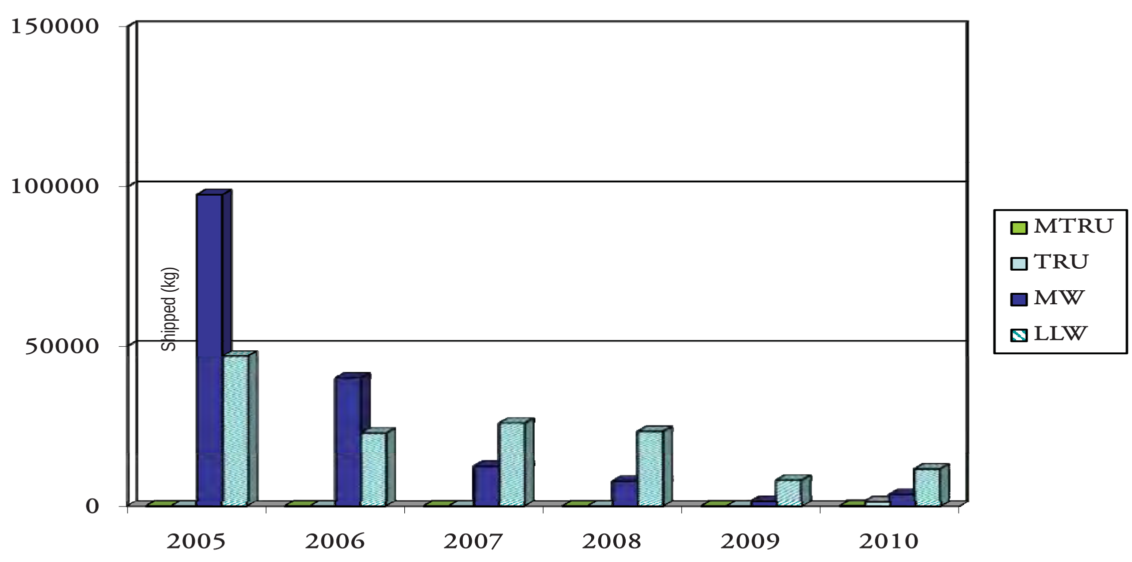


**FIGURE 3-1**. Six Year Summary of Total Radioactive Waste Shipped at SNL/NM

### 3.4.4 Solid Waste

The primary function of the SWTF is to collect, process, and ship for disposal solid waste from SNL/NM in compliance with all applicable regulations. It does not accept hazardous, radioactive, residential, or food service wastes.

***SWTF Operations***

Processing solid waste at the SWTF consists of screening 100 percent of the waste for prohibited materials, which are removed if identified. The waste is further screened when it is placed on a conveyor that passes under a radiation detection system. If radiation is detected above background levels, the conveyor is automatically shut down and the source is investigated. Note that screening 100 percent of the solid waste is not a requirement of any regulations, and is a good faith effort to prevent prohibited materials from inadvertently ending up in the landfill. The conveyor then feeds the waste into a baler where it is compressed into desk-sized bales. The bales are weighed, individually tracked, and loaded into a trailer for transport to a local landfill. The SWTF also processes and ships solid waste delivered from Kirtland Air Force Base (KAFB) and DOE/NNSA. Solid waste generated in 2010 by SNL/NM is summarized in Table 3-2.

***Recyclables***

The secondary function of the SWTF is to collect, process (screen, bale, and track), market, and ship the following recyclable materials from SNL/NM: cardboard, white paper, mixed paper, aluminum cans, scrap metals, printer consumables, and plastics. Proceeds from the sale of recyclable materials are used to reinvest in the recycling program. The SWTF also provides some recycling support for KAFB (on a cost-reimbursable basis) and DOE/NNSA Service Center and SSO.

In support of small SNL/NM construction and demolition projects, the Construction and Demolition (C&D) Recycle Center at the SWTF accepts small quantities of C&D waste (managed separately from the solid waste), as long as the contractor brings recyclables. The C&D Recycle Center provides contractors roll-offs and hoppers to recycle cardboard, wood, plastics, and various scrap metals. Materials recycled in 2010 are summarized in Table 3-3.

### 3.4.5 P2 Program

***Program Scope***

The P2 Program provides guidance and technical support to reduce waste generation and resource consumption and to help improve the overall efficiency of processes and organizations within SNL/NM. To achieve continuous improvement, the program annually sets targets and activities for recycling, waste reduction, sustainable acquisition (SA), and reduction of environmental releases. The P2 Program is directed and guided by federal requirements, including DOE directives.

The P2 Program partners with numerous organizations at SNL/NM, including ES&H, Facilities Engineering and Procurement. P2 Program staff researches waste reduction technologies and strategies applicable to SNL/NM work processes, seeks avenues to reuse and recycle waste streams currently landfilled or incinerated, and assists with cost-effective implementation for new waste reduction or recycling initiatives.

***Awareness and Outreach***

The P2 staff conducts awareness programs and outreach activities that promote and teach P2 strategies and technologies to waste generators. P2 staff also submit nominations for federal (DOE and EPA) and other award programs. Internal articles and notices are regularly created that showcase P2 activities and awards to Sandia for its P2 accomplishments. P2 information and its successes can be found at the following website:

*http://p2.sandia.gov*

The P2 Program supports two large awareness events each year: Earth Day and Earth, Wind, and Sun. Sandia's Earth Day event was held in April 2010 in conjunction with Take Your Daughters and Sons to Work Day. A booth was hosted showcasing everyday materials people can recycle, and used a matching game to encourage visitors to learn what their recycled materials can be made into as new products. The P2 booth was placed next to the catering and outdoor dining area to allow P2 staff to support the first ever "Zero Waste Event" in which composting was presented as an option besides normal bottle and can recycling. The catering service was provided with compostable plates and utensils for this event.

Sandia's Earth, Wind and Sun event was held in August 2010 and was combined with the annual Safety Fair to make the Safe, Secure and Sustainable (S3) Fair. P2 hosted a booth showcasing how visitors can find reuse and recycling opportunities in their home communities, signing up Members of the Workforce to initiate recycling of their used alkaline batteries from their office and laboratory areas, and presented a poster to raise awareness about a new power management feature soon to be implemented on most computers.

P2 staff routinely give presentations at conferences, professional society meetings, and other organized events to disseminate and share Sandia-specific P2 knowledge and experience. In 2010, P2 staff gave the following presentations:

- "Preparing for Zero Waste" at the 1st Annual GreenGov Symposium (October);
- "Recycling Packing Foam at SNL/NM" for the DOE Sustainability Assistance Network Monthly Conference Call (June);
- "Reinvesting Recycling Revenues for Remarkable Results" for the DOE Sustainability Assistance Network Monthly Conference Call (June) as well as the New Mexico Recycling Coalition biannual conference (June);
- "Striving for Zero Waste" at the New Mexico Recycling Coalition biannual conference (June);
- "P2 Striving for Environmental Sustainability" for the DOE Public Meeting, October; and
- "Update on SNL/NM's Ceiling Tile Recycling Efforts" for the DOE Sustainability Assistance Network Monthly Conference Call (November).

***P2 Awards***

The P2 group received two awards in 2010 on behalf of outstanding group efforts made in 2009:

- EPA Waste Wise Gold Achievement Award. Industrial Materials Waste Reduction category. "Diverting Concrete and Asphalt Debris from the Landfill For Recycling and On-site Use."
- DOE Environmental Sustainability (EStar) Award. Electronics Stewardship category. "EPEAT Gold by Default" (recognizing that the highest standard of environmentally preferable computing equipment was being purchased as part of normal business practice).

### 3.4.5.1 Sustainable Acquisition (SA) Program

Through the SA Program, P2 works to integrate products with reduced environmental impact into purchase agreements and ongoing operations and maintenance across SNL/NM. Products with high recycled content percentages, renewable biobased source materials, and those that have been labeled by widely recognized environmental certification systems are all part of the Sandia approach to sustainable acquisition. These types of products reduce demand for virgin materials, while increasing demand on recycled markets; reduce material sent to landfills; use less energy for harvesting, transport, and conversion of raw materials; rely less on petroleum ingredients; and require less energy and water resource use in manufacturing. By seeking out suppliers who share these goals and communicating with Sandia procurement, purchasers, and end users, Sandia is helping to pull many markets toward products that are better for human health and the environment.

P2 works continuously to write green purchasing requirements into all applicable contracts at Sandia. Construction specifications are another means of calling out green products and P2 works with Facilities groups to put in item specific language. The ultimate goal is to provide products with sustainable alternatives as a first choice to Sandia by contractual obligation. Increasingly, sustainable acquisition is being addressed as early as the Request for Quotation (RFQ) so that Sandia knows a company's environmental stance from the beginning, and becomes a component in the contract awarding process.

Sustainable acquisition was incorporated into the automotive, office, janitorial, carpet, and furniture supply chains at Sandia in 2010. Information technology products are also purchased with specific requirements for environmentally preferred attributes including those qualified by Electronic Product Environmental Assessment Tool (EPEAT) and Energy Star, or printers that are duplex capable and toner products that are remanufactured in a closed loop system of purchase and return. The list continues to grow as more green products become available on the market and are proven effective by pilot testing among various organizations at Sandia.

For over 50 product types in eight categories cited by the EPA's Comprehensive Procurement Guidelines (CPG), P2 collects quarterly purchase data to tabulate site progress with sustainable acquisition. The CPGs are designed as guidance for federal agencies and their facilities to use, in acquiring products with recycled content. Data provided by Sandia suppliers is categorized and summarized then provided to the DOE for inclusion in DOE-wide statistics. During 2010, Sandia procured recycled content products for 43 percent of the purchases (by dollar) made in applicable categories, nearing five million dollars. CPG information can be found at the following website:

*http://www.epa.gov/epawaste/conserve/tools/cpg/index.htm*

P2 will continue to work on biobased product implementation, including products used at Fleet Services, Facilities maintenance, and in offices across Sandia into 2012 and beyond. As more experience is gained with green products, lessons learned are shared with other DOE sites, as well as other agencies interested in making their procurement more sustainable.

### 3.4.5.2 Waste Reduction

In March of 2010, P2 established a six-month contract with a local composting company to divert food waste from the Thunderbird Café, Building 861, which serves up to 1,000 customers per day. Food preparation areas in the kitchen were provided with compost bins, and the dish return and washing position was set up to scrap plates of leftovers into a compost bin. All efforts were behind the scenes, and transparent to customers. During this time, the Thunderbird Café diverted 15,000 lbs of food waste, approximately 34 percent of its total waste. Efforts were made to correct for contamination issues, such as testing out compostable products. Due to the success of the six month pilot, a new annual contract was reestablished with the local composting company. In 2011, it is anticipated that composting will be expanded into customer areas, and to the satellite café in TA-IV that serves up to 300 people per day.

During the pilot period of the composting contract, P2 sponsored the first Zero Waste Event on Earth Day at the "Take Your Daughters and Sons to Work Day". P2 worked with the contract composting company and the catering vendor to set up full recycling and composting support at the outdoor barbeque grill and dining area on Hardin Field. While some trash did result, even some as contamination in the compost bins, it was still a great outreach and educational event as workers brought their families to Sandia.

In other waste reduction efforts, P2's analysis of disposal quantities and costs of five regulated wastes, completed and presented in the last quarter of 2010, resulted in recommendations for the HWMF to consider recycle pathways, or to possibly find more efficient ways of managing the materials. The ensuing discussion revealed more information on the HWMF's and end-vendors' processes, and some specific materials were identified for diversion or improved handling, such as ethylene/propylene glycols and rechargeable batteries. One success was to find out that soil contaminated with petroleum products is already going to an in-state permitted facility operating a soil remediation farm. Sandia continues to work on reducing and/or diverting from landfills the quantities of waste generated.

### *3.4.5.3 Electronics Stewardship*

Electronics Stewardship covers the lifecycle impacts of information technology equipment and is an area of expanding interest in the DOE and federal government as a whole. The impacts of electronics use are many but include a significant portion of an organization's energy use, toxics contributed to the waste stream, and the opportunity for "e-cycling" or capture of the high value materials for use in new equipment. Electronics life cycle management is divided into three stages: purchase, operations, and end of life management. Each of these stages has specific impacts; the purpose of Sandia electronics stewardship efforts is to address these individually. The SNL/NM P2 group is tasked with monitoring and facilitating improvements to Sandia performance at all three of these stages.

Sandia is a continuing partner in the Federal Electronics Challenge (FEC) Program. The FEC promotes a comprehensive approach to reducing the environmental impacts of electronics assets ownership. One part of that approach is use of the EPEAT in the purchase of electronic equipment. By integrating EPEAT into the Preferred Systems qualifications, Sandia has achieved exceptional compliance in recent years. In 2010, 95 percent of SNL/NM purchases of tower, laptops, and monitors were EPEAT Silver compliant, and for the next higher level of environmental attributes, over 80 percent of applicable Information Technology (IT) purchases were EPEAT Gold compliant. These numbers indicate computing equipment that is more recyclable, uses less toxins in production, and is more energy efficient.

Operations are currently an aspect of electronics stewardship that has a lot to do with people. All EPEAT certified equipment is Energy Star compliant but it is up to each user to take advantage of energy saving features. In 2010, Sandia purchased a comprehensive power management software suite that allows for precise power management and usage reporting of all networked equipment. This removes much of the user dependence from power savings, and brings network down time closer to a lowest power scenario. As of April 2010, the power management software is capturing baseline data on approximately 16,000 Sandia computers. Following the transition to Windows 7, an active power policy will be implemented on nearly all of these systems. Calculations show possible energy savings in the hundreds of thousands of dollars, and the issue of leaving computers on at night for remote access has been resolved.

With the size of the population and movement within SNL/NM, an end of life for computer equipment often means the beginning of life at a new desk. If a unit is not immediately reapplied to another individual it enters the Property Reapplication system. Property Reapplication offers a select amount of computers for reapplication if they meet the criteria of 2006 purchase date or later. Computer systems not reapplied are palletized and then stored in the P2 tent until sufficient quantity for a recycling shipment is reached. P2 then coordinates a shipment to an approved electronics recycler that dismantles and segregates the material for distribution back to the manufacturing industry or raw materials market. The recycling rate for excess IT equipment (e-scrap) continues to be 100 percent. Considering the nature of Sandia's work and the associated number of computing systems purchased annually, this practice represents a dramatic reduction of what would otherwise be hazardous waste if not recycled. A total of over 350,000 lbs of e-scrap was recycled by SNL/NM in 2010.

### *3.4.5.4 Recycling*

Sandia accounts for its recycling in two separate categories: routine, which is waste from recurring and/or typical office operations, and non-routine, which is from intermittent clean-up and construction activities. In 2010, 54 percent of Sandia's routine waste and 33 percent of non-routine waste was recycled. See Table 3-3 for the breakdown of recycling by waste stream.

While the majority of recycling operations are conducted at the SWTF and HWMF, the P2 group manages several other recycling functions. This year the major initiatives included continuing to expand mixed paper recycling, standardizing alkaline and carbon-zinc battery recycling, and launching a composting program at the Thunderbird Cafe.

Mixed paper recycling increased by 10,000 lbs over 2009 to more than 119,000 lbs in 2010. Volunteers continue to move all of the material out of buildings to distributed yellow dumpsters designated for mixed paper. Three new mixed paper dumpsters were deployed in 2010 bringing the total to 33 locations, with six more being purchased with recycling revenue for use in 2011. These dumpsters also became the new distributed drop-off locations for the collection of packing foams. After commissioning a new piece of recycling equipment for packing foams in late 2009, diversion of EPS #6 Styrofoam and low density polyethylene (LDPE) #4 foam has successfully continued throughout 2010.

The P2 Program did not conduct a crushing event at the Concrete and Asphalt Recycling Area (CARA) in 2010, as sufficient stock remained from the prior crushing. The CARA is an accumulation site for concrete and asphalt rubble generated by Sandia construction-like activities. The rubble is periodically crushed to meet specific aggregate material requirements, and becomes a valuable commodity for reuse at Sandia for applications such as base course beneath asphalt pavement, paving material for remote dirt roads, and as general surface cover. Projects using crushed aggregate material reimburse the P2 program based on the quantities used, thus providing a financially self-sustaining operation.

Noteworthy applications of crushed aggregate materials during 2010 include resurfacing of several access roads at SNL/NM. The Facilities Roads and Grounds Maintenance Department utilized P2's Conphalt, (a mixture of crushed concrete and asphalt), with approximately 1,400 tons of material applied to resurface an existing graded dirt access road. Additionally, nearly 300 tons of Conphalt was applied to SNL/NM Power Line Road, an unpaved road which receives heavy traffic. Resurfacing dirt roads using conphalt is a new application at Sandia with numerous environmental benefits. The conphalt material creates a more stable road surface that reduces fugitive dust emissions, water-based dust suppression requirements, and chemical dust suppression applications. As a result, the overall maintenance cost for conphalt-surfaced roads is reduced and fugitive dust is assuredly reduced.

As recycled aggregate awareness increases, project customers plan to implement its use into future projects. P2 has been making efforts to work with Facilities and Roads and Grounds Departments to promote recycled aggregates into future SNL/NM projects. P2 anticipates a crushing event in July 2011 which will increase its stockpile of readily available materials.

The diversion and recycle of plastics broadened in 2010. Through a process change at the SWTF, the bales of mixed #1 and #2 plastic bottles are now much cleaner. Bales of #2 containers are now a separate stream and kept clean of contamination. SNL/NM's first bale of shrink wrap #4 LDPE was marketed, and process improvements were put into place for future collection runs. Clear, rigid #5 polypropylene is now segregated into cubic yard boxes and stored in the P2 Tent at Reapplication. Other new miscellaneous plastics are also now staged in the P2 Tent such as acrylonitrile butadiene styrene, and many types of proprietary plastics such as Plexiglas, Teflon, Delran, and Lexan in large sheets and small chunks. When enough plastics are accumulated, a truckload will be shipped to a plastics recycling broker. One such shipment occurred in March, 2010 and is anticipated to be every 12-18 months in frequency.

In 2010, the P2 Program made further progress in its major focus areas of Waste Reduction, Electronics Stewardship, Sustainable Acquisition, Reuse/Recycling and Awareness programs, with the intent being to institutionalize these environmental sustainability approaches and actions into the daily work activities of Sandia mission-related and support programs. In striving for continuous improvement, the P2 Program has set new targets for 2011. The 2011 environmental sustainability targets include further improvements in waste segregation at the point of generation, continued use of on-site crushed recycled aggregates for roadway applications, developing a mercury awareness and reduction program, and standardizing on computer printers, to reduce the quantities of computer printers purchased annually and all of the various consumables required subsequently.

## 3.5 Biological Control Activities

The Biological Control Activity provides customer support related to animal control issues and compiles information on pesticide use at SNL/NM. Animal control support includes providing general information and resolving issues related to removing nuisance animals. Requests for assistance in resolving nuisance animal problems are relayed and documented through Sandia's Facilities Telecon Department. This effort may involve interacting, as necessary, with the U.S. Air Force (USAF) and State of New Mexico agencies to resolve animal control issues. The Biological Control Activity also involves providing support in addressing animal-borne disease concerns (e.g., Hantavirus) through activities including disinfecting, sanitizing, and cleaning up areas infested with rodents or pigeons.

Pesticide use at SNL/NM includes the use of herbicides for weed control, rodenticides for controlling mice, and insecticides for the control of insects in food service and work areas. Sandia uses EPA-registered pesticides that are applied by certified pest control agencies. Material Safety Data Sheets (MSDS) and product labels for pesticides used at SNL/NM are maintained under the program. Pesticide use (product names and amounts applied) are documented in quarterly reports. Documents related to the program are listed in Chapter 8.

## 3.6 National Environmental Policy Act (NEPA) Program

Sandia provides DOE/NNSA/SSO with technical assistance in support of compliance with NEPA and the National Historic Preservation Act (NHPA). The SNL/NM NEPA Team reviews projects for conformance to existing DOE NEPA documents and determinations. The use of the ISMS NEPA Module software facilitates SNL/NM NEPA reviews, citing existing NEPA documentation as appropriate. The ISMS NEPA Module also streamlines DOE/NNSA/SSO's review and determination of DOE NEPA checklists, when required, and supports quality assurance (QA) by providing a consistent framework that makes NEPA documentation and information readily available. A DOE NEPA checklist, or an Air Force Form 813, is prepared for DOE review and determination, if the proposed action:

- Does not fall within the analysis of an existing SNL/NM NEPA document, or
- Would occur on USAF property (permitted, or requested to be permitted, for SNL/NM use).
- NEPA program documents and regulations are listed in Chapter 8. NEPA reviews that were completed in 2010 are summarized in Table 3-4.

***SNL/NM Site-Wide Environmental Impact Statement (SWEIS)***
During CY 2010, Sandia began preparing for DOE's development of a new SWEIS. Environmental Programs Department personnel met with representatives from 63 SNL/NM facilities to discuss and compile data on their current and anticipated future operations that could be relevant to their potential impacts on the environment. In addition, personnel compiled an array of environmental information and data including environmental, safety, and health policies and procedures; descriptions of the natural environment at SNL/NM; environmental stewardship programs; overall site operations; and agreements between DOE and other governmental entities. This information and data will help DOE in developing environmental analyses for the next SWEIS.

***2010 NEPA Documentation***
The NEPA Team participated in the review of the following environmental documents:

(1) *Draft Site-Wide Environmental Impact Statement for the Continued Operation of the Department of Energy/National Nuclear Security Administration Nevada Test Site and Off-Site Locations in the State of Nevada*,

**TABLE 3-4.** Summary Data for SNL/NM NEPA Reviews Submitted to DOE/NNSA/SSO During Calendar Year 2010

| NEPA Reviews | Review Breakouts | | Quantity |
|---|---|---|---|
| Corporate NEPA Software System | Reviewed by SNL/NM NEPA Team | | 306 |
| | Reviews Completed by DOE/NNSA/SSO | | 68 |
| Other Corporate NEPA Reviews | Completed by SNL/NM NEPA Team | | 870 |
| DOE / U.S. Air Force NEPA Documents | New Land-Use Permit Reviews | 0 | |
| | Land-Use Permit Renewal Reviews | 18 | |
| | Land-Use Permit Termination Reviews | 0 | |
| | Project-Specific Reviews | 4 | |
| | Environmental Assessments Under AF Activities | 0 | |
| | Subtotal for USAF Reviews Completed | | 22 |
| **Grand Total of all NEPA Reviews** | | | **1,266** |
| Percentage of Total Reviews Requiring Submittal to DOE<br>*Total DOE Reviews* (68 + 22 = 90) *divided by Total NEPA Reviews* (1,266) = | | | 7 % |

**NOTES:** AF = Air Force
DOE = U.S. Department of Energy
NNSA = National Nuclear Security Administration
NEPA = National Environmental Policy Act
SNL/NM = Sandia National Laboratories, New Mexico
SSO = Sandia Site Office
USAF = United States Air Force
% = percent

(2) *Final Environmental Assessment for Removal Actions at the Technical Area III Classified Waste Landfill, Sandia National Laboratories/New Mexico* (DOE 2010), and

(3) *Air Force Battlespace Environment Lab Antenna Farm*

The NEPA Team reviewed a total of 1,266 proposed projects in the ISMS NEPA Module and other corporate applications. Sixty-eight DOE NEPA checklists were transmitted to the DOE/NNSA/SSO for review and determination in 2010.

Summary data for SNL/NM NEPA reviews performed in 2010 are detailed in Table 3-4.

## 3.7 Environmental Outreach Program

SNL/NM's Environmental Outreach Program reaches out to the community via various events, and provides environmental information to members of Sandia's workforce. The Outreach Program supports Sandia's EMS and LTES Programs. Sandia recognizes that in addition to complying with requirements, it is important to communicate with Sandia's workforce and the local community to help reduce environmental impacts at work and at home. Sandia has an integrated approach to communicate environmental awareness to its workforce via semi-annual EMS Newsletters, semi-annual LTES newsletters, awareness campaigns, and various outreach events. Sandia collaborates with numerous internal and external organizations such as Sandia's Energy Management Team, Sandia's Long-range Development Plan Team, the City of Albuquerque (COA), and the Environmental Education Association of New Mexico (EEANM).

Currently, Sandia participates in or holds several internal and external outreach and awareness events. Events conducted in 2010 include the Safe, Secure, and Sustainable Event, Youth Conference on the Environment; School to World, and the annual EMS Excellence Awards Ceremony. Sandia also coordinates the semi-annual DOE Public Meeting. At these events, the outreach team distributes fact sheets and newsletters; when working with children, the team often demonstrates environmental education models on topics including local air quality, landfills, and watershed education. The Outreach team also encourages the Members of the Workforce and the community to provide feedback and ask questions about Sandia's environmental programs.

The Annual Youth Conference on the Environment is a free, one-day conference offered to high school students as a means to educate them on various environmental issues. In 2010, the theme of the conference was reduce, reuse, and recycle and approximately 170 students attended. The event was co-sponsored by Sandia, the EEANM, and the COA.

The annual EMS Excellence Awards Program recognizes Members of the Workforce who demonstrate environmental excellence in five specific categories (energy reduction/water conservation, risk mitigation/environmental protection, environmentally preferable purchasing, waste minimization, and recycling). Since its inception in 2006, the EMS Team has received over 150 nominations from individuals and teams who are contributing to Sandia's vision of EMS. For additional information, please visit the following websites:

*http://elm.sandia.gov*
*http://environment.sandia.gov/new/index.shtml*

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# 4.0 Terrestrial and Ecological Surveillance

## 4.1 Terrestrial Surveillance Program

Terrestrial surveillance is conducted at Sandia National Laboratories, New Mexico (SNL/NM) to detect the possible deposition or migration of contaminants to off-site locations and to determine the impact, if any, of SNL/NM's operations on human health or the environment.

The Terrestrial Surveillance Program samples surface soils, arroyo and river sediments, and vegetation from various on-site, perimeter, and off-site locations. The samples are used to detect the presence of anomalous radiological and non-radiological constituents.

Various locations have been used for sample collection for one to 20 years. When some of the older sampling locations are no longer relevant to current operations these sampling locations may be relocated and placed in areas with greater potential environmental impact. However, the number of samples collected annually should remain approximately the same as in the past.

### 4.1.1 Program Objectives

The Terrestrial Surveillance Program is designed to meet the following U.S. Department of Energy (DOE) Order 450.1A, *Environmental Protection Program* (DOE 2008a) objectives:

- Collect and analyze samples in order to characterize environmental conditions and identify trends,
- Establish baseline (or background) levels of radiological and non-radiological constituents,
- Assess the effectiveness of Pollution Prevention (P2) and abatement programs,
- Identify new or existing environmental quality problems and their potential impacts on human health or the environment, and
- Verify compliance with applicable laws and regulations, as well as commitments made in official documents (such as Environmental Impact Statements [EIS], in accordance with the National Environmental Policy Act [NEPA]).

***Standards for Comparison***

No regulatory limits are available to directly compare concentrations of some radiological or non-radiological constituents in surface soils, vegetation, or sediments. SNL/NM personnel conduct statistical analyses to compare the results from on-site and perimeter samples to off-site results, and to establish trends in order to identify possible pollutants and their potential impact on human health or the environment. However, if anomalies are observed, there are various documents used for guidance with risk assessment, such as DOE Order 5400.5, *Radiation Protection of the Public and the Environment* (DOE 1993).

In addition, sample results for metals in surface soils are compared to U.S. surface soil average concentrations (Kabata-Pendias 2000), local and regional surface soil average concentrations (Dragun and Chekiri 2005), or site-specific surface soil concentrations (Dinwiddie 1997). A summary report of metals-in-soils at SNL/NM collected annually between 1993 and 2005 has been prepared and serves as another point of reference (SNL 2006).

In summary for 2010, the mean value of non-radiological constituents in soils is less than the residential level set by the State of New Mexico soil screening levels (SSL), with the exception of arsenic. However, the mean value for arsenic is less than the industrial level set by the State of New Mexico SSLs. For an added measure of sample verification, the DOE Oversight Bureau of the New Mexico Environment Department (NMED) splits samples with SNL/NM at several locations.

***Statistical Analysis***

Samples are generally collected from fixed locations to effectively enable statistical comparisons with results from previous years. Statistical analyses are performed to determine if a specific on-site or perimeter location differs from off-site values and to identify trends at a specific sampling location. Since multiple data points are necessary to provide an accurate view of a system, the Terrestrial Surveillance Program does not rely on the results from any single year's sampling event to characterize on-site environmental conditions. Results from a single sampling event may vary from year to year due to slight changes in sampling locations, differences in climatic conditions, and laboratory variations or errors. Therefore, as the amount of data increases, the accuracy of the characterization increases.

The results of the statistical analyses allow SNL/NM to prioritize sample locations for possible follow-up action. The prioritization process is a decision-making tool used to assist in the determination of the appropriate level of concern for each sample result. The Statistical Analysis Prioritization Methodology (Shyr, Herrera, and Haaker 1998) is based on two "yes or no" questions resulting in a matrix of four priority levels. The matrix is shown in Table 4-1.

In 2000, SNL/NM changed to analytical laboratories with lower detection capabilities for many of the metals. The analyses in 2010 utilized data from the same analytical laboratory since 2000.

In some instances, this qualitative inspection of the data is augmented by the graphical evaluation methodology described and documented in the *Chemical Analysis of Soil Samples Collected from the Sandia National Laboratories, New Mexico Environs, 1993-2005* (SNL 2006).

This enables the visual identification of anomalies in the data that stand out from the data population for the entire site, or just that location. This step is performed to ensure that anomalous data that would otherwise pass statistical scrutiny is flagged for further investigation. This is particularly useful where insufficient data exists for trending, but comparison of new data to "expected values" is desired.

**TABLE 4-1**. Decision Matrix for Determining Priority Action Levels

| Priority | Are results higher than off-site?* | Is there an increasing trend? | Priority for further investigation |
|---|---|---|---|
| 1 | Yes | Yes | Immediate attention needed. Specific investigation planned and/or notifications made to responsible parties. |
| 2 | Yes | No | Some concern based on the level of contaminant present. Further investigation and/or notifications as necessary. |
| 3 | No | Yes | A minor concern since contaminants present are not higher than off-site averages. Further investigation and/or notifications as necessary. |
| 4 | No | No | No concern. No investigation required. |

**NOTES**: Based on *Statistical Analysis Prioritization Methodology* (Shyr, Herrera, and Haaker 1998).
*Some sites may appear higher than off-site. However, there may not be a statistically significant difference.

### 4.1.2 Sample Media

Samples of surface soils, arroyo and river sediments and vegetation are collected as part of the Terrestrial Surveillance Program and analyzed for radiological and non-radiological constituents.

***Soil***
Soil samples are collected to ascertain the presence or buildup of pollutants that may have been transported by air or water and deposited on the ground surface. Approximately 1,500 grams (g) of sample is collected from the top two inches of soil in accordance with SNL/NM field operating procedures (FOP). In 2010, soil samples were collected from locations indicated in Tables 4-2, 4-3 and 4-4.

***Sediment***
Sediment samples are collected from arroyo beds and from the banks of rivers and creeks to ascertain the presence, or buildup, of pollutants deposited from surface waters. Approximately 1,500 g of sample is collected from the top two inches of soil in accordance with SNL/NM FOPs. Sediment samples were collected from locations listed in Tables 4-2, 4-3 and 4-4.

***Vegetation***
Vegetation is sampled to monitor for potential uptake of radioactive pollutants, which could provide an exposure pathway to foraging animals and to humans through the food chain. In actuality, human exposure to contaminants through the food chain is highly unlikely on Kirtland Air Force Base (KAFB) since there is no hunting, livestock, or commercial farming within the boundaries of KAFB. Approximately 500 g of sample is collected, preferably from perennial grass, by cutting back several inches of growth from the plant. If grass is not available, samples from small leafy plants may be collected. In 2010, minimal vegetation was collected due to the on-going drought. At the few locations where vegetation was collected, no noteworthy results were observed.

***Gamma Radiation Levels***
Gamma radiation levels are measured using thermoluminescent dosimeters (TLD) to determine the impact, if any, of SNL/NM's operations on ambient radiation levels. The TLDs are changed out on a quarterly basis and processed at an on-site laboratory. TLDs were collected from locations listed in Tables 4-2, 4-3 and 4-4.

### 4.1.3 Sampling Locations

Occasionally, sampling locations are added or dropped for different reasons, including the start-up of a new facility or operation, closure of an existing facility or operation, additional characterization of areas with elevated concentrations or increasing trends, or other technical or budgetary reasons. These locations are illustrated in Figure 4-1. Locations sampled are shown in Tables 4-2, 4-3 and 4-4.

In some instances, special radiological or non-radiological "sampling campaigns" near operations of interest, as described in Section 4.1.5, may be conducted in addition to, or in partial substitution for fixed locations.

***On-site***
On-site locations are selected within or near areas of past or current SNL/NM operations (Figure 4-1 and Table 4-2). Sample locations are chosen near sites with known contamination from past operations, or near facilities that have the potential to discharge radiological or non-radiological pollutants to the environment. Other considerations in the selection of sampling locations include local topography

**TABLE 4-2**. On-Site Terrestrial Surveillance Locations and Sample Types

| Location Number | Sampling Location | Soil | Sediment | Vegetation | TLD |
|---|---|---|---|---|---|
| 1 | †Pennsylvania Ave. | X | | | X |
| 2NE* | †Mixed Waste Landfill (MWL) (northeast) | X | | X | |
| 2NW | †MWL (northwest) | X | | X | X |
| 2SE | †MWL (southeast) | X | | | |
| 2SW | †MWL (southwest) | X | | | |
| 3 | †Coyote Canyon Control | X | | | X |
| 6 | †Technical Area (TA) III (east of water tower) | X | | X | X |
| 7 | †Unnamed Arroyo (north of TA-V) | X | | | X |
| 20 | TA-IV (southwest) (KAFB Skeet Range) | | | | X |
| 31 | TA-II Guard Gate | | | | X |
| 33* | †Coyote Springs | X | | X | |
| 34 | †Lurance Canyon Burn Site | X | | X | |
| 35 | Chemical Waste Landfill (CWL) | X | | X | |
| 41 | †TA-V (northeast fence) | X | | | X |
| 42 | †TA-V (east fence) | X | | X | X |
| 43 | †TA-V (southeast fence) | X | | X | X |
| 45 | †Radioactive and Mixed Waste Management Facility (RMWMF), TA-III (northwest corner) | X | | X | X |
| 46 | †TA-II (south corner) | X | | X | X |
| 47 | Tijeras Arroyo (east of TA-IV) | | | | X |
| 48 | Tijeras Arroyo (east of TA-II) | | | | X |
| 49 | †Near the Explosive Components Facility (ECF) | X | | X | |
| 51 | †TA-V (north of culvert) | X | | X | |
| 52 | †TA-III, northeast of Bldgs. 6716 and 6717 | X | | | |
| 53* | †TA-III south of long sled track | X | | | |
| 54 | †TA-III, Bldg. 6630 | X | | | |
| 55 | †Large Melt Facility (LMF), Bldg. 9939 | X | | X | |
| 56 | †TA-V, Bldg. 6588 (west corner) | X | | | |
| 57 | †TA-IV, Bldg. 970 (northeast corner) | X | | | |
| 66 | KAFB Facility | X | | | X |
| 72 | †Arroyo del Coyote (midstream) | | X | | |
| 74N* | †TA-IV, Tijeras Arroyo (midstream) | | X | | |
| 75 | †Arroyo del Coyote (down-gradient) | | X | | |
| 76 | †Thunder Range (north) | X | | | |
| 77 | †Thunder Range (south) | X | | | |
| 78 | †School House Mesa | X | | | |
| 79 | †Arroyo del Coyote (up-gradient) | | X | | |

**TABLE 4-2**. On-Site Terrestrial Surveillance Locations and Sample Types (concluded)

| Location Number | Sampling Location | Soil | Sediment | Vegetation | TLD |
|---|---|---|---|---|---|
| 83 | †Tijeras Arroyo Groundwater Well | | X | | |
| 84 | †Storm Water Monitoring Point (S-10) | | X | | |
| 85 | †Arroyo del Coyote Cable Site | | X | | |
| 86 | †Corner of Wyoming and S Street | X | | | |
| 90 | †TA-III Land Mine Test Site | X | | | |
| 91 | †Background Arroyo Near ER-87 | X | | | |
| 92 | †New Classified Waste Landfill | X | | | |
| 93 | ††Thunder Range Explosive Test Area | X | | | |
| 94 | †† Thunder Range, Southeast of R5 | X | | | |

**NOTES:** * = Replicate sampling locations: In addition to single samples taken for each medium, two replicate samples are collected for internal checks on comparability of sampling and analysis.
† These locations may be analyzed periodically for total analyte list (TAL) metals.
†† High Explosives HE assay in soil
Bldg = Building
ER = Environmental Restoration
KAFB = Kirtland Air Force Base
N = North
NE = Northeast
NW = Northwest
SE = Southeast
SW = Southwest
TLD = thermoluminescent dosimeter

and meteorology.

***Perimeter***
Perimeter locations (Figure 4-1 and Table 4-3) are selected to determine if contaminants are migrating from SNL/NM sites toward the off-site community. With a few exceptions, perimeter locations are typically situated off SNL/NM property, but within the boundaries of KAFB.

***Off-site***
Off-site locations are selected to establish concentrations of radiological and non-radiological constituents for comparison with on-site and perimeter results (Figure 4-2 and Table 4-4). Sample locations have been selected within a 25-mile radius of SNL/NM.

### 4.1.4 Radiological Parameters and Results

Radiological analyses are performed on all soil, sediment, and vegetation samples and are summarized in this section. The 2010 radiological parameters and analytical results can be found in Appendix C of this report. The detailed statistical analyses are documented in the *2010 Data Analysis in Support of the Annual Site Environmental Report* (SNL 2011).

***Radiological Results***
The results of the statistical analysis showed no on-site or perimeter soil or sediment locations that were Priority-1 (both higher than off-site and with an increasing trend). One location was identified as Priority-2 (higher than off-site) for cesium-137. The Priority-2 location and parameters are listed in Table 4-5. There were no Priority-3 (increasing trend) locations identified.

**TABLE 4-3**. Perimeter Terrestrial Surveillance Locations and Sample Types

| Location Number | Sampling Location | Soil | Sediment | Vegetation** | TLD |
|---|---|---|---|---|---|
| 4 | †Isleta Reservation Gate | X | | | X |
| 5 | †McCormick Gate | X | | | X |
| 12 | †Northeast Perimeter | X | | | |
| 16 | †Four Hills | X | | | X |
| 18 | North Perimeter Road | | | | X |
| 19 | †USGS Seismic Center Gate | X | | | X |
| 39 | Northwest DOE Complex | | | | X |
| 40 | Tech Area I, northeast (by Bldg. 852) | | | | X |
| 58 | †North KAFB Housing | X | | | |
| 59 | †Zia Park (southeast) | X | | | |
| 60 | †Tijeras Arroyo (down-gradient) | X | X | | |
| 61 | †Albuquerque International Sunport (west) | X | | | |
| 63 | †No Sweat Boulevard | X | | | |
| 64* | †North Manzano Base | X | | | |
| 73 | †Tijeras Arroyo (up-gradient) | | X | | |
| 80 | †Madera Canyon | X | | | |
| 81 | †KAFB West Fence | X | | | X |
| 82 | †Commissary | X | | | |
| 87 | †Mesa del Sol (north) | X | | | |
| 88 | †Mesa del Sol (middle) | X | | | |
| 89 | †Mesa del Sol (south) | X | | | |

**NOTES:** Bldg = Building
DOE = U.S. Department of Energy
KAFB = Kirtland Air Force Base
TLD = thermoluminescent dosimeter
USGS = U.S. Geological Survey
* = Replicate sampling locations: In addition to single samples taken for each medium, two replicate samples are collected for internal checks on comparability of sampling analysis.
** = No vegetation samples were collected due to the ongoing drought.
† These locations may be analyzed periodically for total analyte list (TAL) metals.

Cesium-137

One perimeter location (12) continues to be identified as Priority-2 for cesium-137 in surface soils. Location 12 is located on the U.S. Forest Service (USFS) land withdrawn area. This location is at a slightly higher elevation, which receives greater precipitation and results in slightly higher cesium-137 levels from fallout. Cesium-137 is prevalent in surface soils worldwide as a result of historical nuclear weapons testing. Over the past 10 years, the values for cesium-137 at this perimeter location ranged from 0.07 to 1.82 picocuries per gram (pCi/g). However, these levels are not cause for concern.

All sediment sample locations were identified as Priority-4 (consistent with off-site results and no increasing trend) for cesium-137.

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 was no unusual tritium concentrations noted for any of the soil or sediment samples collected.

Total Uranium

No sediment locations were identified as Priority-1, Priority-2 or Priority-3 for total uranium.

**TABLE 4-4.** Off-Site Terrestrial Surveillance Locations and Sample Types

| Location Number | Sampling Location | Soil | Sediment | Vegetation | TLD |
|---|---|---|---|---|---|
| 8 | † Rio Grande, Corrales Bridge (up-gradient) | | X | | |
| 9 | † Sedillo Hill, I-40 (east of Albuquerque) | X | | | |
| 10 | † Oak Flats | X | | | X |
| 11* | † Rio Grande, Isleta Pueblo (down-gradient) | X | X | | X |
| 21 | Bernalillo Fire Station 10, Tijeras | | | | X |
| 22 | Los Lunas Fire Station | | | | X |
| 23 | Rio Rancho Fire Station, 19th Avenue | | | | X |
| 24 | Corrales Fire Station | | | | X |
| 25 | † Placitas Fire Station | X | | X | X |
| 26 | Albuquerque Fire Station 9, Menaul NE | | | | X |
| 27 | Albuquerque Fire Station 11, Southern SE | | | | X |
| 28 | Albuquerque Fire Station 2, High SE | | | | X |
| 29 | Albuquerque Fire Station 7, 47th NW | | | | X |
| 30 | Albuquerque Fire Station 6, Griegos NW | | | | X |
| 62* | † East resident | X | | | |
| 68 | † Las Huertas Creek | | X | | |

**NOTES:** I-40 = Interstate 40
NE = Northeast
NW = Northwest
SE = Southeast
TLD = thermoluminescent dosimeter
* = Replicate sampling locations: In addition to single samples taken for each medium, two replicate samples are collected for internal checks on comparability of sampling analysis.
† These locations may be analyzed periodically for total analyte list (TAL) metals.

TLD

TLD exposure by quarter and the exposure rate for each location class (on-site, perimeter, or off-site) for 2010 can be found in Appendix C of this report (see attached CD). The exposure rate summary statistics for each location class can also be found in Appendix C. All TLDs were collected every quarter in 2010. If a TLD is not collected for a quarter, it is deleted from the statistical analysis.

Data for 2000 through 2010 were analyzed to determine if any statistical differences were observed for either location class or year. If a TLD was missing a quarter's sample in any year of interest, it was deleted from the statistical analysis. Operational locations are also excluded from the statistical analysis. In 2010, there was no statistical difference between on-site, perimeter, and off-site locations. Table 4-6 shows the overall exposure rate summary statistics for 2000 through 2010. Figure 4-3 shows the TLD exposure rates by year and location class.

### 4.1.5 Non-Radiological Parameters and Results

In May 2010, routine samples were collected in the spring for trending analysis. Baseline environmental monitoring data, collected from soil samples within the study areas, indicate that currently there is no unusual contamination of soils with target analyte list (TAL) metals or high explosive (HE)

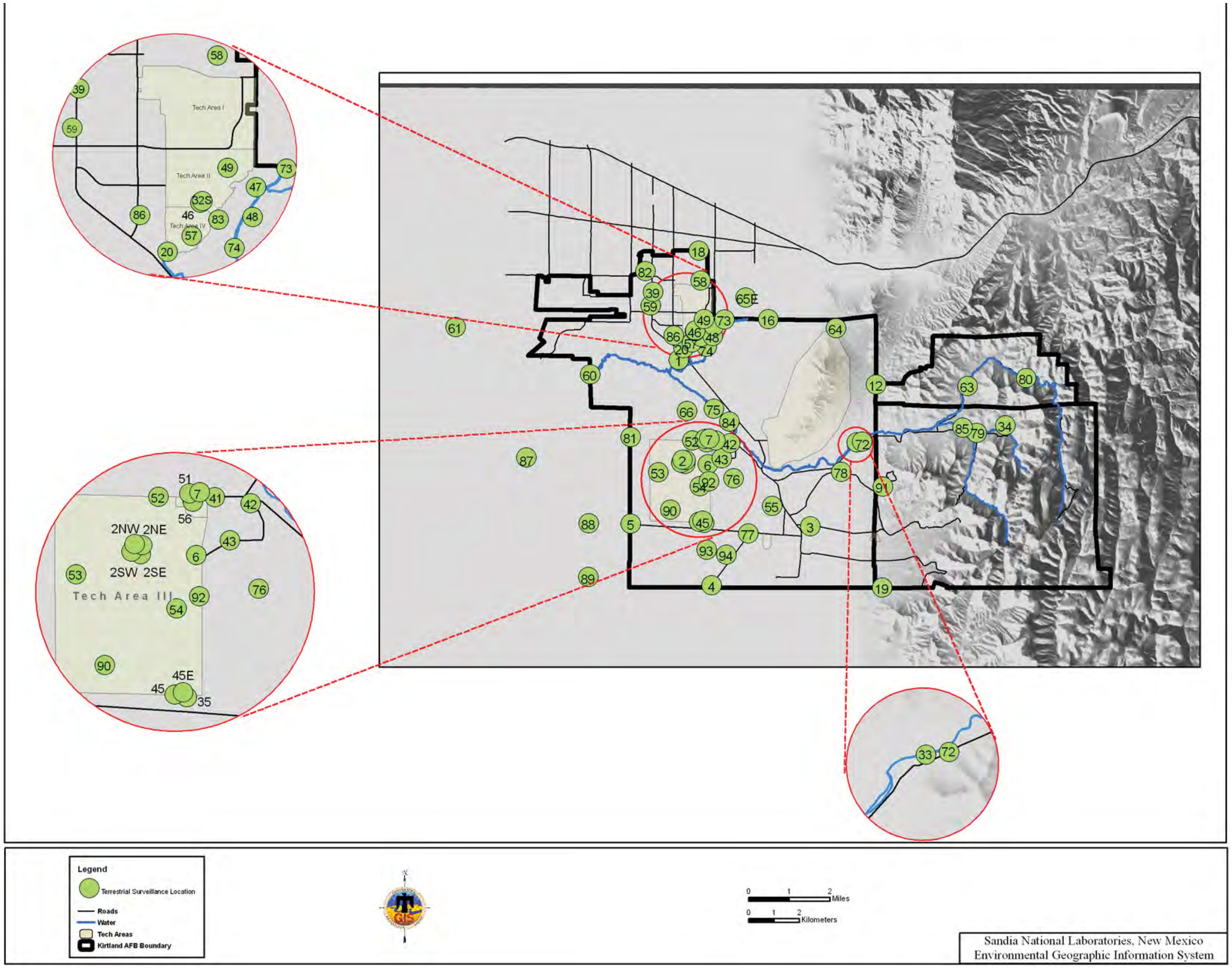


**FIGURE 4-1.** Terrestrial Surveillance Program On-site and Perimeter Sampling Locations. *On-site locations are within areas of SNL/NM operations. Perimeter locations are located both on and off KAFB property.*

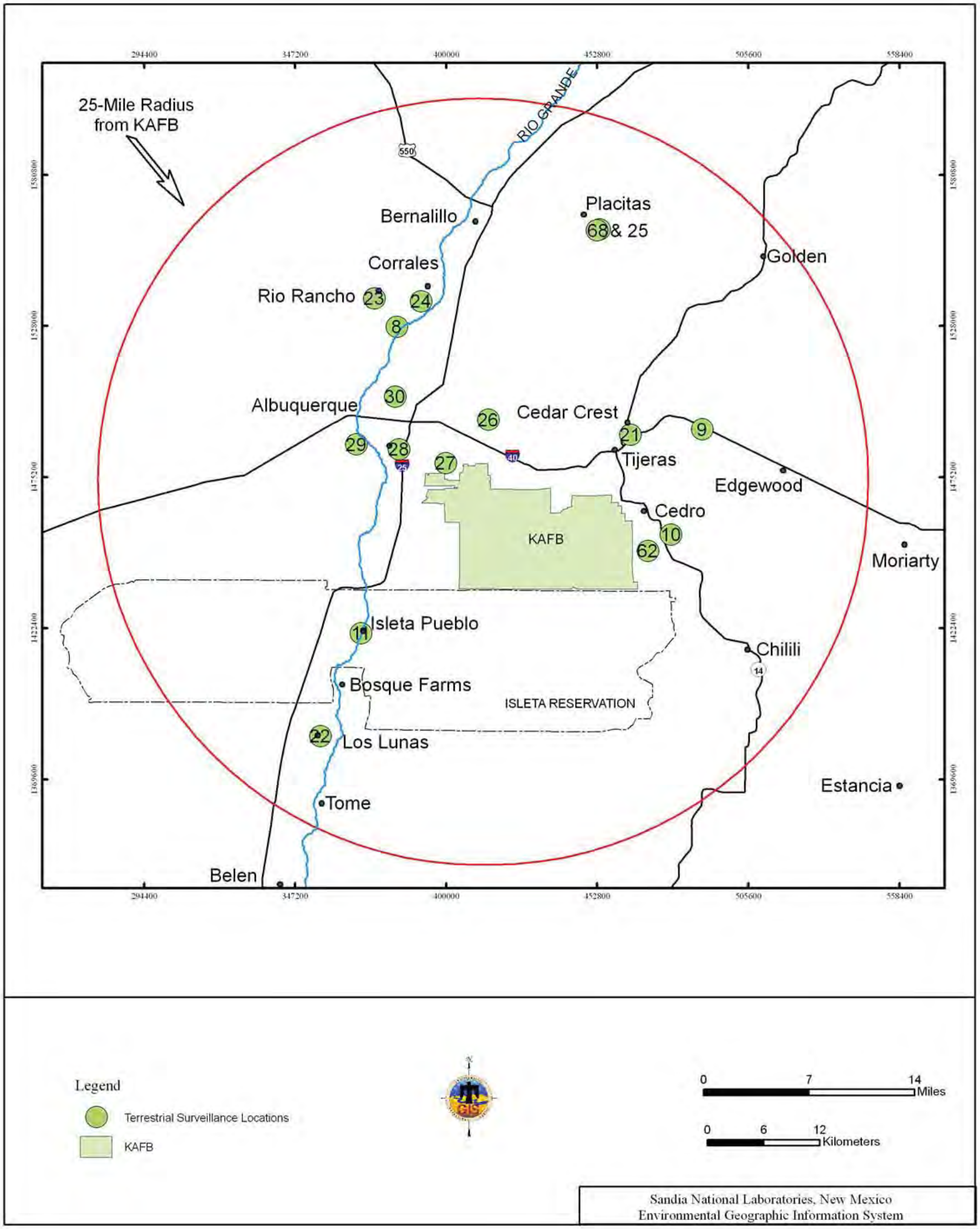


**FIGURE 4-2**. Terrestrial Surveillance Program Off-Site Sampling Locations

**TABLE 4-5**. Radiological Summary Statistics for Sample Locations Noted as Priority-2 During Calendar Year 2010

| Sample Media | Analyte | Units | Location | Number of Samples | Average | Std Dev | Minimum | Maximum |
|---|---|---|---|---|---|---|---|---|
| Soil | Cesium-137 | pCi/g | 12 | 11 | 1.04 | 0.53 | 0.07 | 1.82 |

**NOTES:** Data presented is for eleven years (2000-2010).
pCi/g = picocurie per gram
Std Dev = Standard Deviation

**TABLE 4-6.** Summary Statistics for TLD Exposure Rates, 2000 – 2010

| Location Class | No. of Obs | Units | Mean | Median | Std Dev | Minimum | Maximum |
|---|---|---|---|---|---|---|---|
| Community | 126 | mR/hr | 96.6 | 95.2 | 14.0 | 73.2 | 147.6 |
| Perimeter | 85 | mR/hr | 98.4 | 98.4 | 11.7 | 78.5 | 132.2 |
| On-Site | 149 | mR/hr | 97.5 | 97.0 | 9.4 | 80.9 | 119.7 |

**NOTES:** mR/hr = milliroentgen per hour ($10^{-3}$ roentgen per hour)
Obs = observations
Std Dev = Standard Deviation
TLD = Thermoluminescent Dosimeter

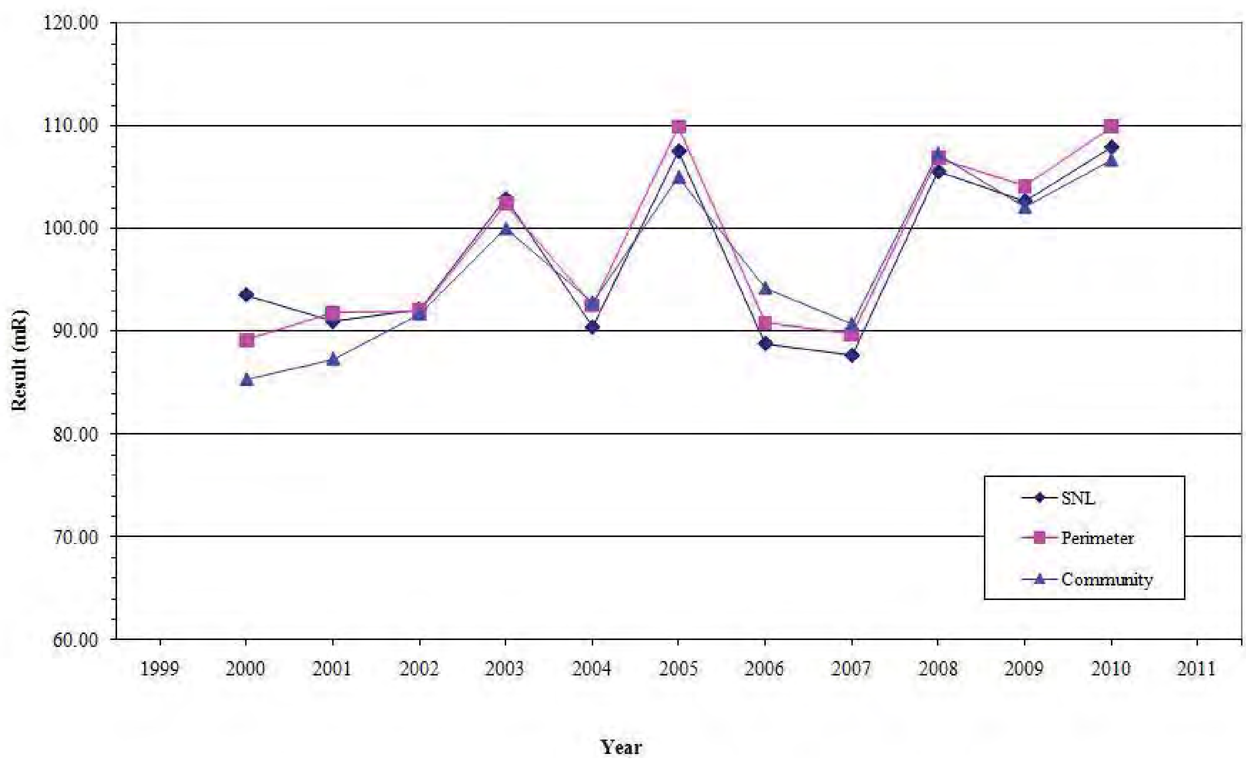


**FIGURE 4-3**. TLD Exposure Rates by Year and Location Class

compounds. With the exception of arsenic, none of the analyte concentrations detected in the site soils exceed NMED SSLs for industrial/occupational land use. In all but five out of 56 samples, the arsenic concentrations (0.45 to 6.1 milligrams per kilogram [mg/kg]) did not exceed NMED residential SSLs of 4mg/kg. Based on process knowledge of site activities, these arsenic concentrations are most likely naturally occurring.

The results are consistent with Table 4-7, and in no instance do they exceed NMED industrial/ occupational SSLs.

***Site-wide Non-Radiological Results***

One sampling location was noted to be Priority-1 (both higher than off-site and with an increasing trend). Six locations were identified as Priority-2 (higher than off-site). Nine locations were identified as Priority-3 (increasing trend). The Priority-1, Priority-2 and Priority-3 locations and parameters are listed in Tables 4-8, 4-9, and 4-10, respectively. It should be noted that beginning in 2008, all trending analyses include data from 2000 forward, rather than the previous five year window. This change makes the trending analyses more meaningful by including all comparable data since 2000. All results are orders of magnitude below NMED SSLs, levels that would trigger further investigation. All metals (except potassium at on-site location 83) were listed as Priority-4 for all sediment samples. Refer to Figure 4-1 for an illustration of the locations listed in the following descriptions.

<u>Aluminum</u>

Two on-site locations (1 and 55) and one perimeter location (61) were identified as Priority-3 (increasing trend) for aluminum in surface soils. These concentrations are well within the range of background identified for aluminum in New Mexico surface soils. All remaining soil and sediment samples were identified as Priority-4 (consistent with off-site results and no increasing trend) for aluminum.

<u>Arsenic</u>

One on-site location (58) was identified as Priority-3 (increasing trend) and one on-site location (33) was identified as Priority-2 (higher than off-site) for arsenic in surface soils. None of the 56 samples collected exceeded NMED SSLs for industrial/occupational land use. However, all concentrations are well within the range of background identified for arsenic in New Mexico surface soils, and are expected to be naturally occurring. All remaining soil and sediment samples were identified as Priority-4 (consistent with off-site results and no increasing trend) for arsenic.

<u>Beryllium</u>

One on-site location (33) was identified as Priority-2 (higher than off-site) for beryllium in surface soils. The concentration of beryllium at this location was well within the range of background identified for beryllium in New Mexico surface soils, and is expected to be naturally occurring. All remaining soil, sediment and vegetation samples were identified as Priority-4 (consistent with off-site results and no increasing trend) for beryllium.

<u>Chromium</u>

One on-site location (51) was identified as Priority-2 (higher than off-site) for chromium in surface soils. The concentration is consistent the range of background for chromium in New Mexico surface soils, and is expected to be naturally occurring. All remaining soil and sediment samples were identified as Priority-4 (consistent with off-site results and no increasing trend) for chromium.

<u>Cobalt</u>

One perimeter location (64) was identified as Priority-2 (higher than off-site) for cobalt in surface soils. The concentrations at all locations are well within the range of background for cobalt in New Mexico surface soils, and are expected to be naturally occurring. All remaining soil and sediment samples were identified as Priority-4 (consistent with off-site results and no increasing trend) for cobalt.

**TABLE 4-7.** Various Reference Values for Metals in Soil (all units in mg/kg)

| | NM Soil Concentrations[1] | | NMED Soil Screening Levels[2] | | U.S. Soil Concentrations[3] | |
|---|---|---|---|---|---|---|
| **Analyte** | **Lower Limit** | **Upper Limit** | **Residential** | **Industrial** | **Lower Limit** | **Upper Limit** |
| Aluminum | 5,000 | 100,000 | 74,000 | 100,000 | 4,500 | 100,000 |
| Antimony | 0.2 | 1.3 | 31 | 454 | 0.25 | 0.6 |
| Arsenic | 2.5 | 19 | 4 | 17 | 1 | 93 |
| Barium | 230 | 1,800 | 15,600 | 100,000 | 20 | 1,500 |
| Beryllium | 1 | 2.3 | 156 | 2,250 | 0.04 | 2.54 |
| Cadmium | ND | 11 | 39 | 564 | 0.41 | 0.57 |
| Calcium | 600 | 320,000 | N/A | N/A | N/A | N/A |
| Chromium | 7.6 | 42 | 100,000 | 100,000 | 7 | 1,500 |
| Cobalt | 2.1 | 11 | 1,520 | 20,500 | 3 | 50 |
| Copper | 2.1 | 30 | 3,130 | 45,400 | 3 | 300 |
| Iron | 1,000 | 100,000 | 23,500 | 100,000 | 5,000 | 50,000 |
| Lead | 7.8 | 21 | 400 | 800 | 10 | 70 |
| Magnesium | 300 | 100,000 | N/A | N/A | N/A | N/A |
| Manganese | 30 | 5,000 | 3,590 | 48,400 | 20 | 3,000 |
| Mercury | 0.01 | 0.06 | 100,000 | 100,000 | 0.02 | 1.5 |
| Nickel | 2.8 | 19 | 1,560 | 22,700 | 5 | 150 |
| Potassium | 1,900 | 63,000 | N/A | N/A | N/A | N/A |
| Selenium | 0.2 | 0.8 | 391 | 5,680 | 0.1 | 4 |
| Silica (Silicon) | 150,000 | 440,000 | N/A | N/A | 24,000 | 368,000 |
| Silver | 0.5 | 5 | 3,921 | 5,680 | 0.2 | 3.2 |
| Sodium | 500 | 100,000 | N/A | N/A | N/A | N/A |
| Thallium | N/A | N/A | 5.6 | 74.9 | 0.02 | 2.8 |
| Titanium | 910 | 4,000 | N/A | N/A | 20 | 1,000 |
| Vanadium | 15 | 94 | 78.2 | 1,140 | 0.7 | 98 |
| Zinc | 18 | 84 | 23,500 | 100,000 | 13 | 300 |

**NOTES:** mg/kg = milligram per kilogram
N/A = not applicable
ND = not detected
NM = New Mexico
NMED = New Mexico Environment Department
U.S. = United States
(1) Dragun and Chekiri, *Elements in North American Soils,* 2005, Hazardous Materials Control Resources Institute, (Used *San Juan Basin, A Horizon* to determine values).
(2) *Technical Background Document for Development of Soil Screening Levels,* Revision 5.0, New Mexico Environment Department, Hazardous Waste. Bureau and Ground Water Quality Bureau Voluntary Remediation Program, Santa Fe, New Mexico (NMED 2009).
(3) U.S. Soil Surface Concentrations, Kabata-Pendias, A., CRC, *Trace Elements in Soils and Plants,* 3rd Edition, 2000.

**TABLE 4-8.** Summary Statistics for All Locations Identified as Priority-1 for Metals in Soil During Calendar Year 2010 (all units in mg/kg)

| Analyte | Location Type | Location | Average | Std Dev | Minimum | Maximum | NMED Soil Screening Level (Residential) | NMED Soil Screening Level (Industrial) |
|---|---|---|---|---|---|---|---|---|
| Potassium | On-Site | 1 | 4,530 | 1,521 | 1,020 | 6,050 | N/A | N/A |

**NOTES:** Data presented is for eleven years (2000 – 2010).
mg/kg = milligram per kilogram
N/A = not applicable
NMED = New Mexico Environment Department
Std Dev = Standard Deviation

**TABLE 4-9.** Summary Statistics for All Locations Identified as Priority-2 for Metals in Soil During Calendar Year 2010 (all units in mg/kg)

| Analyte | Location Type | Location | Avg | Std Dev | Min | Max | NMED Soil Screening Level (Residential) | NMED Soil Screening Level (Industrial) |
|---|---|---|---|---|---|---|---|---|
| Arsenic | On-site | 33 | 11.8 | 9.0 | 4.5 | 32.7 | 4 | 17 |
| Beryllium | On-site | 33 | 1.2 | 0.30 | 0.79 | 1.59 | 156 | 2,250 |
| Chromium | On-site | 51 | 28.5 | 14.1 | 6.9 | 51.8 | 100,000 | 100,000 |
| Cobalt | Perimeter | 64 | 8.7 | 7.2 | 7.3 | 9.4 | 1,520 | 20,500 |
| Copper | On-site | 6 | 34.1 | 15.5 | 11.0 | 55.8 | 3,130 | 45,400 |
| Iron | Perimeter | 64 | 21,714 | 2,466 | 18,000 | 25,500 | 23,500 | 100,000 |
| Magnesium | Perimeter | 64 | 7.467 | 415 | 7,030 | 8,180 | n/a | n/a |
| Manganese | Perimeter | 64 | 605 | 32 | 558 | 638 | 3,590 | 48,400 |
| Potassium | On-site | 1 | 4,330 | 1,321 | 1,020 | 6,050 | N/A | N/A |
| | | 83 | 5,086 | 1,022 | 4,120 | 6,320 | | |
| Zinc | Perimeter | 64 | 80.4 | 8.7 | 68 | 96 | 23,500 | 100,000 |

**NOTES:** Avg = Average
Data presented is for eleven years (2000-2010).
Std Dev = Standard Deviation
Max = Maximum
mg/kg = milligram per kilogram
Min = Minimum
N/A = not applicable
NMED = New Mexico Environment Department

**TABLE 4-10.** Summary Statistics for All Locations Identified as Priority-3 for Metals in Soil During Calendar Year 2010 (all units in mg/kg)

| Analyte | Location Type | Location | Average | Std Dev | Minimum | Maximum | NMED Soil Screening Level (Residential) | NMED Soil Screening Level (Industrial) |
|---|---|---|---|---|---|---|---|---|
| Aluminum | On-Site | 1 | 12,348 | 3,745 | 4,380 | 17,100 | 74,000 | 100,000 |
| | | 55 | 9,868 | 2,413 | 6,140 | 12,700 | | |
| | Perimeter | 61 | 6,390 | 1,560 | 4,040 | 8,350 | | |
| Arsenic | Perimeter | 58 | 3.16 | 0.31 | 2.55 | 3.48 | 4 | 17 |
| Iron | On-Site | 6 | 11,730 | 1,583 | 9,910 | 14,500 | 23,500 | 100,000 |
| Magnesium | On-Site | 55 | 3,201 | 551 | 2,290 | 3,960 | N/A | N/A |
| | Perimeter | 58 | 4,537 | 801 | 3,740 | 6,200 | | |
| | Off-Site | 10 | 3,027 | 419 | 2,290 | 3,520 | | |
| Potassium | On-Site | 2NW | 1,821 | 373 | 1,190 | 2,310 | N/A | N/A |
| | | 55 | 2,679 | 599 | 1,650 | 3,340 | | |
| | | 78 | 2,060 | 359 | 1,380 | 2,370 | | |

**NOTES:** Data presented is for eleven years (2000-2010).
mg/kg = milligram per kilogram
N/A = not applicable
NMED = New Mexico Environment Department
NW = Northwest
Std Dev = Standard Deviation

Copper
One on-site location (6) was identified as Priority-2 (higher than off-site) for copper in surface soils. The concentrations were well within the range of background identified for copper in New Mexico surface soils, and are expected to be naturally occurring. All remaining soil and sediment samples were identified as Priority-4 (consistent with off-site results and no increasing trend) for copper.

Iron
One on-site location (6) was identified as Priority-3 (increasing trend) and one perimeter location (64) was identified as Priority-2 (higher than off-site) for iron in surface soils. The concentrations are well within the range of background for iron in Western U.S. surface soils, and are expected to be naturally occurring. All remaining soil and sediment samples were identified as Priority-4 (consistent with off-site results and no increasing trend) for iron.

Magnesium
One on-site location (55), one perimeter location (58) and one off-site location (10) were identified as Priority-3 (increasing trend) for magnesium in surface soils. One perimeter location (64) was identified as Priority-2 (higher than off-site) for magnesium in surface soils. The concentrations are well within the range of background identified for magnesium in New Mexico surface soils, and are expected to be naturally occurring. All remaining soil and sediment samples were identified as Priority-4 (consistent with off-site results and no increasing trend) for magnesium.

Manganese
One perimeter location (64) was identified as Priority-2 (higher than off-site) for manganese in surface soils. The concentrations are well within the range of background identified for manganese in New Mexico surface soils, and are expected to be naturally occurring. All remaining soil and sediment samples were identified as Priority-4 (consistent with off-site results and no increasing trend) for magnesium.

Potassium
Four on-site locations (1, 2NW, 55 and 78) were identified as Priority-3 (higher than off-site and increasing trend) for potassium in surface soils. One on-site location (1) for sediment was identified as Priority-2 (higher than off-site) for potassium in surface soils. These soil concentrations are well within soil concentrations identified for potassium in New Mexico surface soils, and are expected to be naturally occurring. All remaining soil and sediment samples were identified as Priority-4 (consistent with off-site results and no increasing trend) for potassium.

Zinc
One perimeter location (64) was identified as Priority-2 (higher than off-site) for zinc in surface soils. The soil concentrations are well within soil concentrations identified in the Western U.S. soils concentrations, and are expected to be naturally occurring. All remaining soil and sediment samples were identified as Priority-4 (consistent with off-site results and no increasing trend) for zinc.

## 4.2 Ecological Surveillance

Biota monitoring began in 1996 as an additional element of environmental monitoring within the Terrestrial Surveillance Program. The objectives of the Ecological Surveillance Program are to:

- Collect ecological resource inventory data to support site activities while preserving ecological resources and to maintain regulatory compliance,
- Collect information on plant and animal species present to further the understanding of ecological resources on-site,
- Collect biota contaminant data on an as needed basis in support of site projects and regulatory compliance,
- Assist SNL/NM organizations in complying with regulations and laws,
- Educate the SNL/NM community regarding ecological resource conservation, and
- Support line organizations with biological surveys in support of site activities.

The biota data collected are consistent with the requirements under DOE Order 450.1A (DOE 2008a). Data are collected on mammal, reptile, amphibian, bird, and plant species that currently inhabit SNL/NM. Data collected include information on presence, abundance, species diversity, and land use patterns. Since no significantly elevated levels of radionuclides or metals were observed in soil or vegetation samples, no contaminant analysis of radionuclides and metals on wildlife were performed in 2010. Table 1-1 in Chapter 1 represents common species identified at KAFB.

These data are primarily utilized to support NEPA documentation and land use decisions. Data also support wildlife communication campaigns to ensure safe work environments and sustainable decision-making strategies.

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# 5.0 Air Quality Compliance & Meteorological Monitoring

Personnel at Sandia National Laboratories, New Mexico (SNL/NM) conduct air quality monitoring and surveillance under the following three programs:

- Clean Air Network (CAN) Program conducts meteorological monitoring (Section 5.1) and ambient air surveillance (Section 5.2).
- National Emission Standards for Hazardous Air Pollutants (NESHAP) Program coordinates with facility owners to meet radiological air emission regulations (Sections 5.3 and 5.4).
- Air Quality Compliance (AQC) Program ensures that all non-radiological air emission sources at SNL/NM (such as generators, boilers, chemical users, and vehicles) meet applicable air quality standards and permitting requirements (Section 5.5).

## 5.1 Meteorological Monitoring Program

The Meteorological Monitoring Program is part of the CAN program. The main objective of the Meteorological Monitoring Program is to provide site-specific representative data for SNL/NM. Data is used for air dispersion and transport modeling, to support emergency response activities, and to support regulatory permitting and reporting processes. Additional uses of meteorological data include supporting various environmental activities and programs, and providing data to SNL/NM research and development (R&D) projects.

The U.S. Department of Energy (DOE) directives and regulations applicable to the Meteorological Monitoring Program are listed in Chapter 8.

***Tower and Network Instrumentation***
Sandia Corporation (Sandia) conducts meteorological monitoring through a network of eight meteorological towers located throughout Kirtland Air Force Base (KAFB). All towers are on or near SNL/NM property, and the network includes:

- Six 10-meter towers,
- One 30-meter tower, and
- One 60-meter tower.

Routine instrument calibrations and weekly tower site visits are performed as part of the Quality Assurance (QA) Program for the monitoring network. The CAN network of meteorological towers and ambient air monitoring locations are shown in Figure 5-1.

***Meteorological Monitoring Towers***
All meteorological towers are instrumented to measure temperature and wind velocity, including the standard deviation of horizontal wind direction (sigma theta), at 3- and 10-meter levels. Temperature and wind velocity are also measured at the top of the two tallest towers (30- and 60-meters).

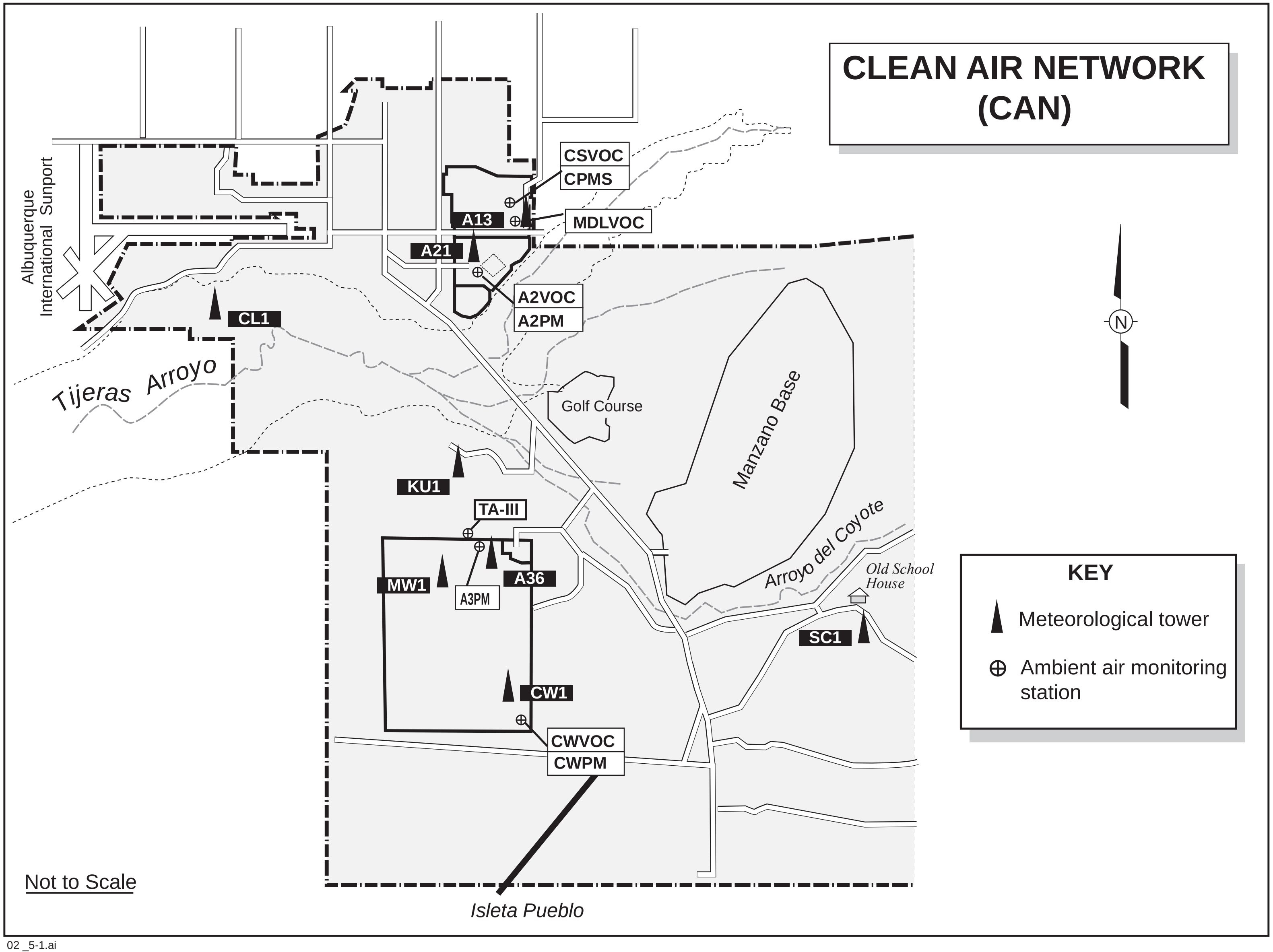



**FIGURE 5-1**. The Clean Air Network (CAN) of Meteorological Towers and Ambient Air Monitoring Stations

In addition, relative humidity is measured at the 3-meter level. Rainfall is measured at the 1-meter level at towers A36, A21, and SC1. Barometric pressure is measured at the 2-meter level at towers A36 and A21.

### 5.1.1 Meteorological Monitoring Results

The A36 60-meter tower is used to describe general meteorology at SNL/NM due to its central geographic position and the availability of data at all instrument levels. The 2010 annual climatic summary for tower A36 is shown in Table 5-1.

In general, the annual statistics for each of the 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. Figure 5-2 shows some of the variations and extremes found in meteorological measurements across SNL/NM.

Current weather information from the SNL/NM CAN meteorological network can be found at the following website:

*http://132.175.200.42/*

### 5.1.2 Wind Analysis

Annual wind roses for three locations across SNL/NM are illustrated in Figures 5-3 and 5-4. A wind rose is a graphical representation of wind speed and direction frequency distribution. Wind direction is the true bearing when facing the wind (the direction from which the wind is blowing). As shown in Figure 5-3, wind directions and speeds can vary significantly across SNL/NM. The annual wind frequency distribution for Technical Area (TA)-I, not shown, indicates yet another pattern, with the greatest direction frequency from the east and east-northeast, as winds blow from Tijeras Canyon. The predominant wind direction at most locations is produced by topographic influences that also create nocturnal drainage flows.

## 5.2 Ambient Air Surveillance Program

Ambient air surveillance is conducted under the CAN Program through a network of six air monitoring stations located on or near SNL/NM property (Figure 5-1). The primary objective of the Ambient Air Surveillance Program is to show compliance with the National Ambient Air Quality Standards (NAAQS) (40 Code of Federal Regulations [CFR] 50) and New Mexico Ambient Air Quality Standards (NMAAQS) (20.11.8 New Mexico Administrative Code [NMAC]). Ambient air surveillance is also important to establish background concentration levels for pollutants of concern and to evaluate the effects, if any, from SNL/NM operations on the public and the environment due to operations at SNL/NM. Applicable requirements are listed in Chapter 8.

### 5.2.1 Monitoring Stations

***Criteria Pollutant Monitoring Station (CPMS)*** – There is one CPMS in the CAN network. The CPMS is located in the northeast corner of TA-I. Criteria pollutants are the set of six common pollutants for which the U. S. Environmental Protection Agency (EPA) must set national ambient

**TABLE 5-1.** Annual Climatic Summary from Tower A36 During Calendar Year 2010

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Oct | Nov | Dec | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Temperature (°C)** | | | | | | | | | | | | | |
| Average Daily High | 7.16 | 8.37 | 13.97 | 19.91 | 25.03 | 32.45 | 31.63 | 30.75 | 29.28 | 21.37 | 12.82 | 10.54 | 20.27 |
| Average Daily Low | -3.90 | -1.99 | 0.39 | 5.16 | 9.92 | 16.85 | 18.40 | 16.93 | 15.63 | 8.60 | 0.41 | -0.25 | 7.18 |
| Monthly Mean | 1.87 | 3.34 | 7.30 | 12.76 | 17.67 | 24.93 | 24.59 | 23.85 | 22.62 | 15.31 | 6.83 | 5.67 | 13.90 |
| | | | | | | | | | | | | | |
| **Extremes (°C)** | | | | | | | | | | | | | |
| High | 11.57 | 14.39 | 26.69 | 25.19 | 31.72 | 36.97 | 37.28 | 34.83 | 32.00 | 29.12 | 20.35 | 16.68 | 37.28 |
| Low | -11.23 | -7.10 | -4.62 | -3.41 | -0.51 | 11.73 | 15.56 | 11.40 | 10.20 | 0.32 | -8.06 | -12.59 | -12.59 |
| | | | | | | | | | | | | | |
| **Relative Humidity (%)** | 55.58 | 58.44 | 45.69 | 33.72 | 25.55 | 22.56 | 43.98 | 43.92 | 36.13 | 42.83 | 36.58 | 54.45 | 41.62 |
| | | | | | | | | | | | | | |
| **Precipitation (cm)** | | | | | | | | | | | | | |
| Monthly | 2.34 | 0.69 | 1.65 | 1.45 | 0.23 | 2.69 | 2.49 | 3.68 | 4.80 | 1.91 | 0.03 | 2.62 | 24.56 |
| 24 Hour Max | 1.17 | 0.20 | 0.46 | 0.89 | 0.23 | 2.59 | 0.76 | 2.18 | 4.24 | 1.42 | 0.03 | 1.96 | 4.24 |
| | | | | | | | | | | | | | |
| **Wind (m/sec)** | | | | | | | | | | | | | |
| Monthly | 2.86 | 3.17 | 3.82 | 5.14 | 4.95 | 4.33 | 3.80 | 3.44 | 3.66 | 3.41 | 3.52 | 2.85 | 3.75 |
| 24 Hour Max | 7.75 | 5.44 | 7.63 | 10.41 | 10.34 | 8.01 | 6.74 | 10.35 | 8.61 | 6.58 | 6.19 | 6.20 | 10.41 |
| Maximum Gust | 27.02 | 17.30 | 24.38 | 27.06 | 25.86 | 30.81 | 19.26 | 24.82 | 24.18 | 21.38 | 20.38 | 23.30 | 30.81 |
| | | | | | | | | | | | | | |
| **Barometric Pressure (mb)** | 833.7 | 831.0 | 832.0 | 830.0 | 831.2 | 833.8 | 835.3 | 836.1 | 835.5 | 836.7 | 834.7 | 834.0 | 833.7 |

**NOTES:** °C = degree celsius
cm = centimeter
m/sec = meters per second
mb = millibar
% = percent

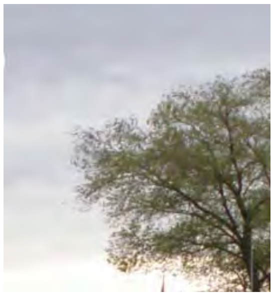
standards according to the Clean Air Act (CAA). For more information on air pollutants, visit the following website:

http://www.epa.gov/ebtpages/air.html

The CPMS is used to perform continuous monitoring for sulfur dioxide, carbon monoxide, nitrogen oxide, and ozone. Data are then compiled into hourly averages. A particulate matter (PM) monitor is a part of the CPMS. Lead, a criteria pollutant, is one of 23 metals analyzed from PM samples at this station.

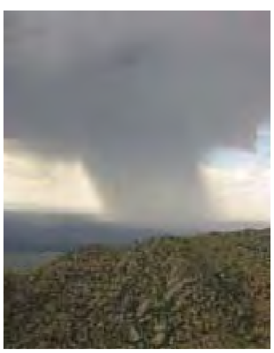
***$PM_{10}$* Stations** – PM with a diameter equal to or less than 10 microns are measured at four monitoring locations (CPMS, A2PM, A3PM, and CWPM). Samples are collected over a 24-hour period, starting and ending at midnight, every sixth day. This schedule is consistent with the National Air Sampling Program (NASP). Samples are analyzed for 23 metals and are radiologically screened using gross alpha, gross beta, and gamma spectroscopy.

***$PM_{2.5}$* Stations** – PM with a diameter equal to or less than 2.5 microns is measured at two locations (CPMS and TA-III) at SNL/NM. $PM_{2.5}$ is measured continuously and recorded in hourly concentrations 24-hours-a-day, 365-days-per-year. Filters are not manually weighed with this system. The mass is calculated with microprocessor measurements. $PM_{2.5}$ and $PM_{10}$ measurements at SNL/NM are done with different instruments and should not be quantitatively compared with each other due to differing instrument limitations and processing techniques. $PM_{2.5}$ filters are not sent to a laboratory for chemical analysis.



| Wind Speed | Minimum (m/sec) | Maximum (m/sec) | Spread (m/sec) |
|---|---|---|---|
| Average Annual Wind Speed | 3.65 (CL1) | 3.93 (SC1) | 0.28 |
| Greatest Difference in Average Speed over 24 hours | 2.82 (A36) | 7.82 (SC1) | 5.00 In January |
| Greatest Daily Difference in Maximum Wind Gust | 15.3 (SC1) | 35.7 (CL1) | 20.5 In June |
| Average Difference in Daily Wind Speed | 0.97 | | |

| Temperature | Minimum (°C) | Maximum (°C) | Spread (°C) |
|---|---|---|---|
| Average Annual Temperature | 13.62 (SC1) | 14.35 (A13) | 0.73 |
| Network Annual Temperature Extremes | -13.89 (SC1) | 38.11 (CL1) | 52.0 |
| Greatest Difference in Daily Minimum Temperature | 2.62 (MW1) | 8.10 (A13) | 5.48 In April |
| Greatest Difference in Daily Average Temperature | 0.68 (SC1) | 2.47 (CL1) | 1.79 In February |
| Greatest Difference in Daily Maximum Temperature | 8.76 (A36) | 11.72 (KU1) | 2.96 In December |



| Precipitation | Minimum (cm) | Maximum (cm) | Spread (cm) |
|---|---|---|---|
| Annual Precipitation (Extremes) | 24.05 (A21) | 28.37 (SC1) | 4.32 |
| Greatest Daily Rainfall Variation | 0.0 (A21&A36) | 2.62 (SC1) | 1.12 In July |
| Greatest Monthly Precipitation Difference | 2.49 (A36) | 6.93 (SC1) | 4.44 In July |
| Greatest in Monthly Rainfall | | 6.93 (SC1 in July) | |

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

**FIGURE 5-2**. Variations and Extremes in Meteorological Measurements Across the Meteorological Tower Network During CY 2010.

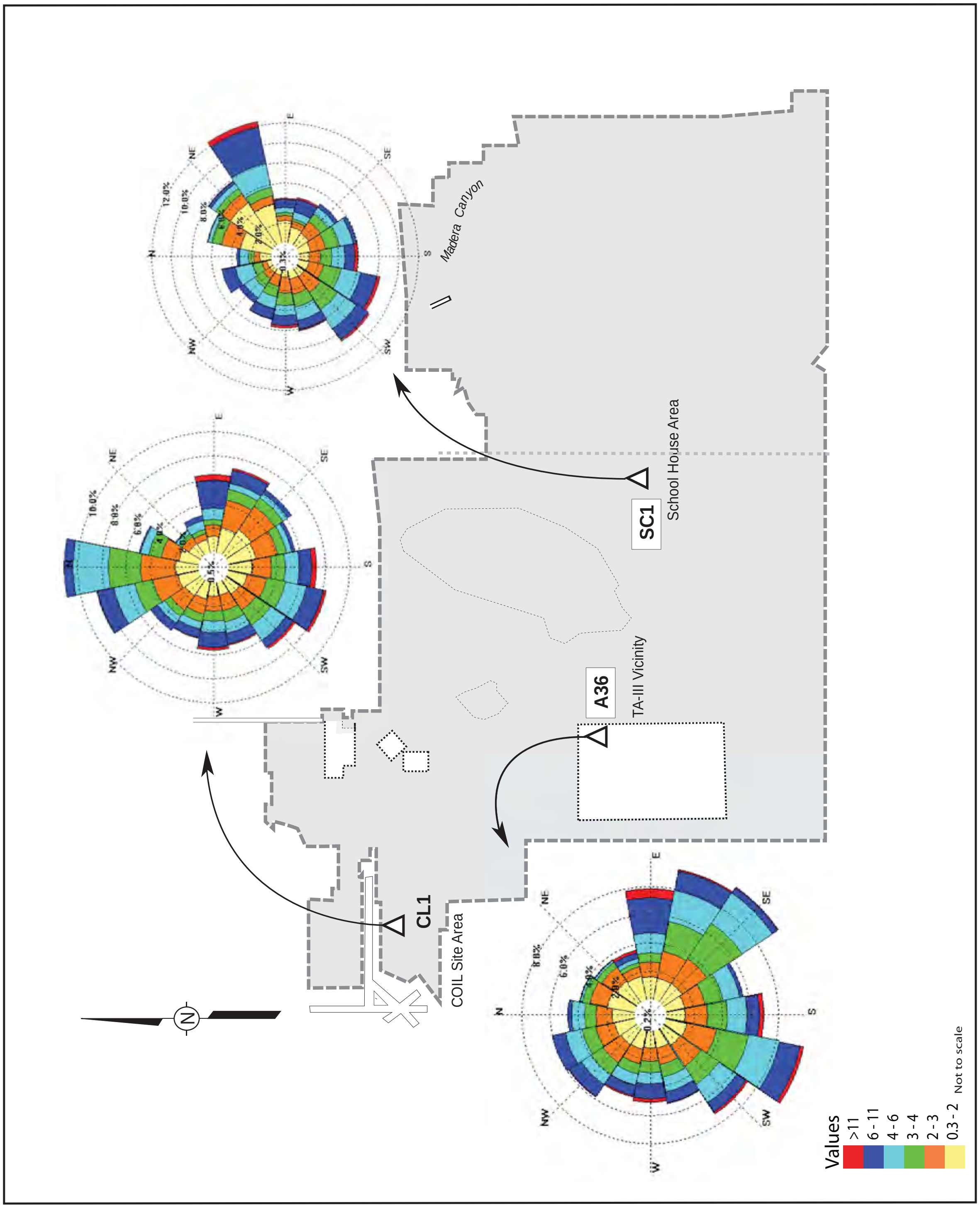



**FIGURE 5-3**. 2010 Annual Wind Roses for Towers CL1, A36, and SC1

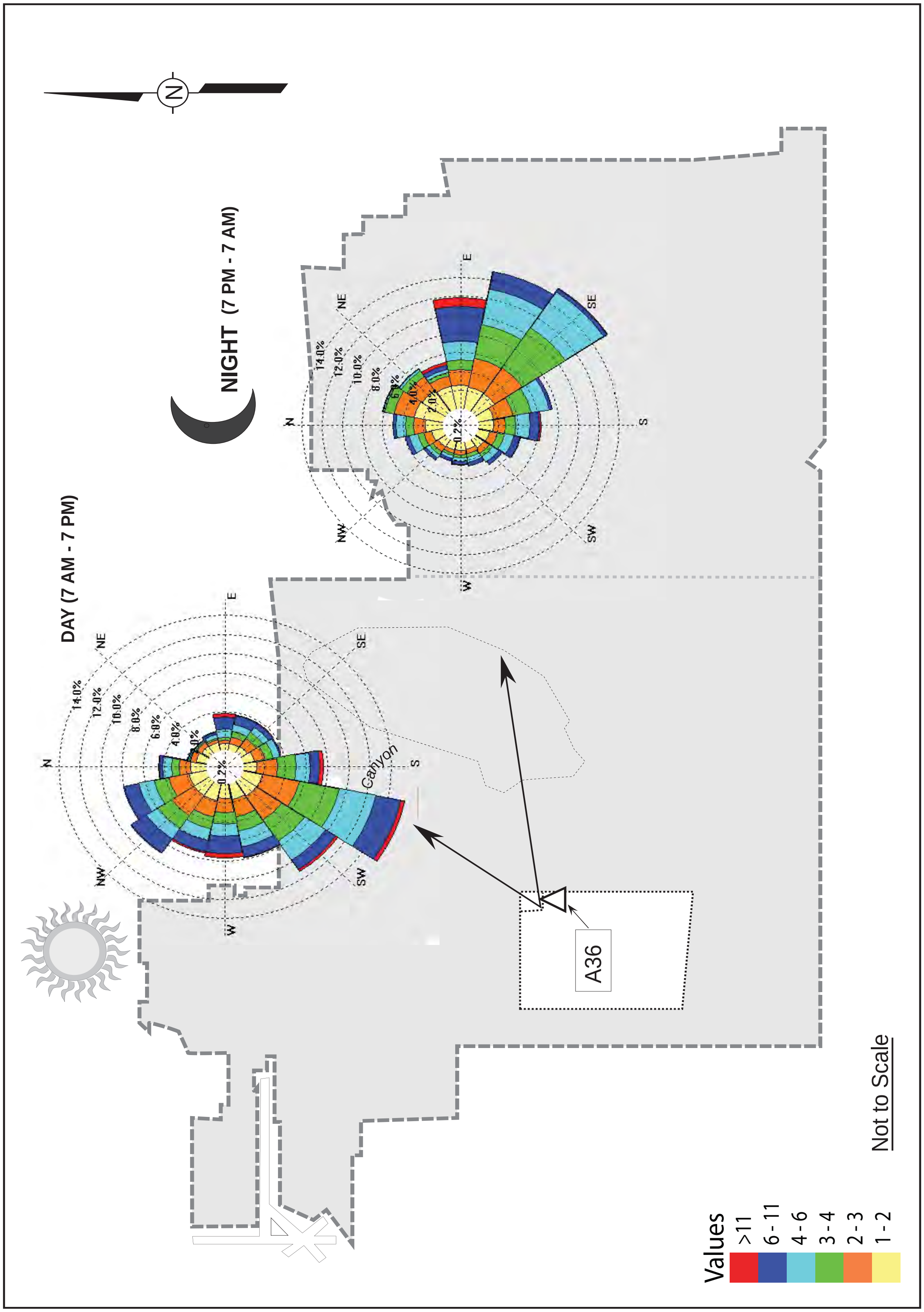



**FIGURE 5-4**. 2010 Annual Wind Roses for Daytime and Nighttime Wind Frequency at the A36 Tower

***Volatile Organic Compound (VOC) Stations*** – There are four VOC monitoring stations (CSVOC, MDLVOC, CWVOC, and A2VOC). VOC samples are collected once a month over a 24-hour period.

### *5.2.2 Ambient Air Monitoring Results*

***Criteria Pollutants***

The latest EPA standards for criteria pollutants can be found at the following website:

*http://www.epa.gov/air/criteria.html*

In 2010, the automated data recovery for criteria pollutants was approximately 99.6 percent. Table 5-2 lists the results from the CPMS, $PM_{10}$ and monitors and compares them to NAAQS and NMAAQS for criteria pollutants.

Although violations of annual federal standards for criteria pollutants are not allowed, exceedances for short-term standards are allowable once a year. State standards also allow short-term exceedances due to meteorological conditions for example, in the case of an atmospheric inversion where air mixing may be extremely restricted. There were no exceedances of the criteria pollutant standards in 2010.

**TABLE 5-2.** Criteria Pollutant Results as Compared to Regulatory Standards During Calendar Year 2010

| Criteria Pollutant | Averaging Time | Unit | NMAAQS Standard | NAAQS Standard | Maximum or Measured Concentrations |
|---|---|---|---|---|---|
| **Carbon Monoxide** | 1 hour | ppm | 13.1 | 35 | 12.2 |
| | 8 hours | ppm | 8.7 | 9 | 2.4 |
| **Nitrogen Dioxide** | 24 hours | ppm | 0.10 | - | 0.03 |
| | Annual | ppm | 0.05 | 0.053 | 0.01 |
| **Sulfur Dioxide**§ | 3 hours | ppm | - | 0.50 | 0.007 |
| | 24 hours | ppm | 0.10 | 0.14 | 0.009 |
| | Annual | ppm | 0.02 | 0.03 | 0.001 |
| **Ozone** | 1 hour | ppm | d | d | 0.2 |
| | 8 hour | ppm | - | 0.075 | 0.04[a] |
| **$PM_{10}$** | 24 hours | $\mu g/m^3$ | - | 150[b] | 29 |
| | Annual | $\mu g/m^3$ | - | 50 | 9.3 |
| **$PM_{2.5}$** | 24 hours | $\mu g/m^3$ | - | 35 | 16.1[c] |
| | Annual | $\mu g/m^3$ | - | 15.0 | 6.9 |
| **Lead** | Any quarter | $\mu g/m^3$ | 1.5 | 1.5 | 0.001 |

**NOTES:** ppm = parts per million
$\mu g/m^3$ = micrograms per cubic meter
NMAAQS = New Mexico Ambient Air Quality Standards
NAAQS = National Ambient Air Quality Standards
$PM_{10}$ = particulate matter (diameter equal to or less than 10 microns)
$PM_{2.5}$ = respirable particulate matter (diameter equal to or less than 2.5 microns)
§ Standards are defined in $\mu g/m^3$ and have been converted to ppm.
[a] Reported as the fourth highest average of the year – per regulatory standards.
[b] Not to be exceeded more than once per year - per updated regulatory standards
[c] Reported as the three year 98th percentile value - per regulatory standards
[d] As of June 15, 2005 EPA revoked the 1-hour ozone standard in all areas except the 8-hour ozone non-attainment Early Action Compact (EAC) Areas. Albuquerque, New Mexico is not an EAC Area.

### $PM_{10}$

Data recovery for $PM_{10}$ was 95.9 percent complete based on a sampling schedule occurring every sixth day. The highest daily particulate loading occurred at the CPMS site. A $PM_{10}$ concentration of 29 micrograms per cubic meter (µg/m$^3$) occurred at CPMS in June 2010. The monthly and annual averages for $PM_{10}$ are listed in Table 5-3 (Table 5-4 shows monthly and annual averages for $PM_{2.5}$). The annual PM concentrations for 2010 are slightly lower, though comparable to the results for 2009.

All filters collected from the $PM_{10}$ stations that have complete field data are analyzed for 23 metals plus the radiological analyses. Filters are collected every sixth day and are consolidated into monthly composites for analyses. In 2010, monthly composites varied from three to six filters per month, depending on the sampling schedule and sampler power problems. In an attempt to provide better analytical information, results are included in averages only when they are actually higher than the radiological decision levels or instrument detection limits. Table 5-5 lists the averaged results of the $PM_{10}$ analysis. It should be noted that most of the radionuclides are naturally occurring, or are short-lived decay daughter products found while the sample was in the counter, and are not emitted from SNL/NM sources. Many of the radionuclide averages in Table 5-5 are based on the results of one or two samples in the year identifying small concentrations of the constituent.

An Analysis of Variance (ANOVA) was performed to determine if statistical differences existed between stations. The results of the ANOVA indicated that the concentrations of antimony at the CWPM and CPMS stations were statistically different and slightly higher than the other sites. The area surrounding the CWPM and CPMS stations varies, with the CWPM fairly remote and the CPMS

**TABLE 5-3.** Monthly and Annual Averages for $PM_{10}$ (Air) During Calendar Year 2010 (all units in µg/m$^3$)

| Sample Location | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A2PM | 8.60 | 10.20 | 6.60 | 11.00 | 10.00 | 12.50 | 11.50 | 10.00 | 11.00 | 10.40 | 10.80 | 4.80 | 9.78 |
| CPMS | 5.40 | 8.60 | 4.67 | 6.40 | 10.80 | 9.80 | 10.83 | 8.80 | 9.00 | 8.20 | 5.75 | 4.60 | 7.74 |
| CWPM | 10.60 | 11.20 | 6.40 | 8.25 | 14.20 | 19.20 | 12.67 | 10.20 | 9.00 | 10.40 | 6.80 | 8.20 | 10.59 |
| A3PM | 4.80 | 8.40 | 5.00 | 7.00 | 13.80 | 12.25 | 11.33 | 12.20 | 12.60 | 8.00 | 8.20 | 4.20 | 8.98 |

**NOTES:** $PM_{10}$ = Particulate Matter (diameter equal to or less than 10 microns)
µg/m$^3$ = microgram per cubic meter

**TABLE 5-4.** Monthly and Annual Averages for $PM_{2.5}$ (Air) During Calendar Year 2010 (all units in µg/m$^3$)

| Location | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CPMS | 7.26 | 5.73 | 6.27 | 7.78 | 8.52 | 11.59 | 9.38 | 6.28 | 7.72 | 7.31 | 6.15 | 6.52 | **7.54** |
| TA3 | 5.50 | 5.31 | 5.41 | 5.96 | 6.85 | 8.03 | 6.96 | 5.62 | 6.72 | 6.68 | 5.23 | 5.70 | **6.16** |

**NOTES:** $PM_{2.5}$ = Particulate Matter (diameter equal to or less than 2.5 microns)
µg/m$^3$ = microgram per cubic meter

**TABLE 5-5.** Averaged Results of $PM_{10}$ Analysis (Air) During Calendar Year 2010

| Analyte | Units | A2PM | CPMS | CWPM | A3PM | TLV |
|---|---|---|---|---|---|---|
| Aluminum | µg/m³ | 6.93E-02 | 7.98E-02 | 5.47E-02 | 8.11E-02 | 2,000 |
| Antimony | µg/m³ | 8.33E-06 | 3.70E-04 | 1.37E-04 | 2.84E-05 | 500 |
| Arsenic | µg/m³ | 6.64E-04 | 1.13E-04 | 4.49E-04 | ND | 10 |
| Barium | µg/m³ | 3.42E-03 | 2.45E-03 | 3.60E-03 | 2.50E-03 | 50 |
| Cadmium | µg/m³ | 1.29E-05 | 1.47E-05 | 6.78E-05 | 2.42E-05 | 10 |
| Calcium | µg/m³ | 3.77E-01 | 3.10E-01 | 2.53E-01 | 2.90E-01 | 2,000 |
| Chromium | µg/m³ | 4.21E-04 | 4.76E-04 | 5.41E-04 | 3.74E-04 | 10 |
| Cobalt | µg/m³ | 2.13E-04 | 4.02E-04 | 8.13E-04 | 1.45E-04 | 20 |
| Copper | µg/m³ | 1.30E-02 | 1.01E-02 | 1.20E-02 | 5.86E-03 | 1,000 |
| Iron | µg/m³ | 1.01E-01 | 9.66E-02 | 8.72E-02 | 1.01E-01 | 5,000 |
| Lead | µg/m³ | 7.92E-04 | 6.78E-04 | 9.70E-04 | 8.21E-04 | 150 |
| Magnesium | µg/m³ | 4.38E-02 | 4.78E-02 | 3.59E-02 | 4.52E-02 | 10,000 |
| Manganese | µg/m³ | 2.59E-03 | 2.61E-03 | 2.17E-03 | 2.40E-03 | 200 |
| Nickel | µg/m³ | 2.21E-04 | 2.10E-04 | 2.81E-04 | 2.00E-04 | 50 |
| Potassium | µg/m³ | 4.39E-02 | 3.91E-02 | 3.61E-02 | 4.22E-02 | 2,000 |
| Selenium | µg/m³ | 3.90E-04 | 3.67E-04 | 4.51E-04 | ND | 200 |
| Silver | µg/m³ | 1.28E-04 | 6.51E-05 | 1.16E-04 | 4.82E-05 | 10 |
| Sodium | µg/m³ | 1.09E-01 | 1.04E-01 | 7.08E-02 | 1.14E-01 | 5,000 |
| Thallium | µg/m³ | ND | 2.22E-04 | 7.05E-04 | 6.86E-05 | 100 |
| Vanadium | µg/m³ | 2.60E-04 | 2.45E-04 | 2.03E-04 | 2.56E-04 | 50 |
| Zinc | µg/m³ | 3.67E-03 | 2.52E-03 | 5.47E-03 | 3.78E-03 | 10 |
| Uranium | µg/m³ | 6.03E-06 | 5.66E-06 | 9.31E-06 | 3.90E-06 | 200 |
| Actinium-228 | pCi/m³ | 4.80E-03 | 6.80E-03 | 5.39E-04 | 3.59E-03 | 100 |
| Gross-Alpha | pCi/m³ | 2.66E-03 | 2.10E-03 | 2.44E-03 | 3.44E-03 | 0 |
| Beryllium-7 | pCi/m³ | 1.53E-01 | 1.60E-01 | 1.30E-01 | 1.54E-01 | 40,000 |
| Gross-Beta | pCi/m³ | 1.53E-02 | 1.65E-02 | 1.52E-02 | 1.64E-02 | 0 |
| Bismuth-212 | pCi/m³ | 4.79E-03 | 4.86E-03 | 1.45E-03 | 1.07E-02 | 700 |
| Bismuth-214 | pCi/m³ | 1.94E-03 | 7.03E-04 | 1.54E-03 | 4.98E-03 | 2000 |
| Cesium-137 | pCi/m³ | 1.44E-03 | ND | 5.08E-04 | ND | 400 |
| Cobalt-60 | pCi/m³ | 2.92E-04 | ND | ND | 2.06E-03 | 80 |
| Lead-212 | pCi/m³ | ND | 9.13E-04 | 2.60E-04 | ND | 80 |
| Lead-214 | pCi/m³ | ND | 1.65E-03 | ND | ND | 2,000 |
| Potassium-40 | pCi/m³ | 1.02E-02 | 1.39E-02 | ND | 1.17E-02 | 900 |
| Radium-223 | pCi/m³ | 6.20E-03 | ND | ND | ND | 0 |
| Radium-224 | pCi/m³ | 1.08E-02 | 5.21E-02 | ND | ND | 4 |
| Radium-226 | pCi/m³ | 7.38E-03 | 2.14E-02 | ND | ND | 1 |
| Radium-228 | pCi/m³ | 4.80E-03 | 6.80E-03 | 5.39E-04 | 3.59E-03 | 3 |
| Thorium-231 | pCi/m³ | 3.25E-03 | ND | 1.18E-03 | 1.20E-02 | 0 |
| Thorium-234 | pCi/m³ | 7.78E-03 | ND | 1.51E-02 | ND | 400 |
| Uranium-235 | pCi/m³ | 2.10E-03 | ND | 3.38E-03 | ND | 0.1 |
| Uranium-238 | pCi/m³ | 7.78E-03 | ND | 1.51E-02 | ND | 0.1 |

**NOTES:** µg/m³ = micrograms per cubic meter
pCi/m³ = picocuries per cubic meter
TLV = threshold limit value (TLVs are guidelines and not legal standards. TLV guidelines assist in the control of health hazards) (ACGIH 2010). The TLVs listed for radionuclides are derived from DOE Order 5400.5 (DOE 1993) derived concentration guide values defined for 100 mrem.
ND = not detected
$PM_{10}$ = Particulate Matter (diameter equal to or less than 10 microns)

very high traffic. Antimony can be found naturally occurring and it is also used in soldering activities for microelectronics. Both of these could explain the slightly higher concentrations that are found at the CWPM and CPMS stations. The results of the ANOVA also indicated that the concentration of arsenic and cesium were statistically higher at the A2PM station. This area has desert landscape and these naturally occurring radionuclides could contribute to this.

***$PM_{2.5}$***

$PM_{2.5}$ is also known as "fine particulate". Fine particulates are thought to be a greater health hazard than $PM_{10}$ because the smaller-sized particles can lodge deep in the lungs. Most $PM_{2.5}$ is created either directly from the combustion of all types of fossil fuels, including wood burning, or by secondary reactions of gases created in the combustion process with other gases in the atmosphere. The data recovery for $PM_{2.5}$ measurements for 2010 was approximately 99 percent. The monthly and annual averages for $PM_{2.5}$ are listed in Table 5-4. In 2010, the highest concentrations were found in the beginning of the summer and were most likely the result of wildland fire smoke transported from areas outside of SNL/NM. Concentrations in the SNL/NM area dropped quickly with the onset of rains in late June to early July. Concentrations tend to be higher at the CPMS station due to the higher traffic counts in the area.

***VOCs***

The VOCs generally observed at SNL/NM are products or by-products of fossil fuels or from laboratory operations. In 2010, the data recovery for VOC monitoring was 99 percent. Monthly VOC samples were analyzed for 32 VOC species plus total non-methane hydrocarbon (TNMHC). Table 5-6 shows the compiled results for compounds detected at four stations.

The concentrations in Table 5-6 reveal that there is not one site with the highest concentration for all analytes, though the greatest numbers of contaminants are found at the MDLVOC site.

An ANOVA was performed to determine if statistical differences existed between locations for each VOC. The ANOVA indicated that the concentrations of benzene at the CPMSVOC and MDLVOC stations were statistically different and slightly higher than the other sites. There was also an indication that levels of isohexane were higher at the MDLVOC station. Due to the higher amount of vehicle traffic, and the laboratory operations around these stations, that could explain the slightly higher concentrations found at the CPMSVOC and MDLVOC stations.

## 5.3 Radiological Air Emissions

The 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*. The EPA has set a maximally exposed individual (MEI) radiological dose limit of 10 millirems per year (mrem/yr) resulting from all radiological air emissions produced from a DOE facility.

### 5.3.1 Compliance Reporting

Sandia prepares an annual NESHAP report that summarizes radionuclide air emission releases from SNL/NM facilities and presents the results of the annual dose assessment. The DOE National Nuclear Security Administration (NNSA), Sandia Site Office (SSO) submits the annual report to EPA and the City of Albuquerque (COA) Environmental Health Department (EHD). The NESHAP report for CY10 is prepared in 2011 and is entitled, *NESHAP Annual Report for Calendar Year (CY) 2010, SNL/NM* (SNL 2011a).

**TABLE 5-6.** VOC Average Concentrations Compiled from Monthly Results at Four Stations (Air) During Calendar Year 2010 (*Average was computed using only detected results**)

| Compound | CPMSVOC | CWVOC | MDLVOC | TA-II VOC | TLV |
|---|---|---|---|---|---|
| 1,1,1-Trichloroethane ** | ND | ND | ND | ND | 350,000 |
| 1,1,2-Trichlorotrifluoroethane ** | 0.35 | 0.31 | 0.40 | 0.31 | 1,000,000 |
| 1-Butene/Isobutene | 0.17 | 0.38 | 0.21 | 0.15 | NA |
| 2,2,4-Trimethylpentane | ND | ND | 0.55 | ND | NA |
| 2-Butanone (MEK) | 0.59 | 0.45 | 0.99 | 0.45 | 200,000 |
| 2-Methylbutane | 0.57 | 0.24 | 2.00 | 0.51 | 1,770,000 |
| 3-Methylpentane | ND | ND | ND | ND | 500,000 |
| Acetone | 5.30 | 4.68 | 8.94 | 3.97 | 500,000 |
| Benzene | 0.22 | 0.08 | 0.15 | 0.11 | 500 |
| Carbon tetrachloride ** | 0.12 | 0.10 | 0.13 | 0.11 | 5,000 |
| Chloromethane | 0.56 | 0.49 | 0.56 | 0.57 | 50,000 |
| Dichlorodifluoromethane ** | 0.49 | 0.49 | 0.50 | 0.48 | 1,000,000 |
| Ethylbenzene | ND | ND | ND | ND | 1,000,000 |
| Isohexane | 0.09 | ND | 0.26 | ND | 100,000 |
| Methylene chloride | 1.99 | 0.24 | 1.84 | 1.49 | 50,000 |
| n-Butane | 0.51 | 0.32 | 0.41 | 0.40 | 800,000 |
| n-Hexane | ND | ND | 0.46 | ND | 50,000 |
| n-Pentane | 0.28 | 0.16 | 0.40 | 0.44 | 600,000 |
| o-Xylene | ND | ND | 1.45 | ND | 100,000 |
| p-Xylene/m-Xylene | ND | ND | 4.03 | ND | NA |
| Tetrachloroethene | ND | ND | 0.57 | ND | 25,000 |
| Toluene | 0.37 | 0.14 | 12.05 | 0.53 | 50,000 |
| Trichloroethene | ND | ND | 2.86 | 0.44 | 50,000 |
| Trichlorofluoromethane ** | 0.27 | 0.27 | 0.29 | 0.27 | 1,000,000 |
| TNMHC | 14.96 | 11.96 | 39.99 | 11.50 | NA |

**NOTES:** ND = not detected
NA = not available
VOC = volatile organic compounds. VOCs may be shown as separate species as well as in combination with another analyte.
TLV= threshold limit value (TLVs are guidelines and not legal standards. TLV guidelines assist in the control of occupational health hazards) (ACGIH 2010)
* parts per billion by volume
** Ozone depleting compounds

### 5.3.2 SNL/NM NESHAP Facilities

Currently, there are 13 potential NESHAP facilities that may be defined as point emission sources at SNL/NM. Point sources are produced from an exhaust stack or vent. The Mixed Waste Landfill (MWL), located in TA-III, was the only diffuse source with the potential to release radionuclides to the environment. In September of 2009, an evapotranspirative (ET) cover was installed at the MWL. Based upon past emissions studies and the new ET cover thickness, any potential release from the MWL is negligible (i.e., essentially zero).

Table 5-7 lists the radionuclides and the total reported emissions (in curies [Ci]) from each SNL/NM NESHAP source in 2010. There were 13 were point sources.

The 13 SNL/NM NESHAP facilities are illustrated in Figure 5-5 and are described below.

***TA-I Sources***
Radiation Protection Instrument Calibration Laboratory (RPICL) – Calibration on radiation detection equipment resulted in small releases of tritium.

**TABLE 5 7.** Summary of Radionuclide Releases from the 13 NESHAP Sources During Calendar Year 2010

| Source Name, Location | Description | Source Type | Monitoring Method | Radionuclide Emitted | Reported Release (Ci/yr) |
|---|---|---|---|---|---|
| ACRR, TA-V | Reactor used to perform in-pile experiments for severe reactor accident research projects. | Point | Periodic | Argon-41 | 4.09 |
| AHCF, TA-V | The AHCF is used to identify, sort, characterize, and repackage legacy nuclear materials and transuranic waste (TRU) packages for permanent removal from the SNL/NM site. Legacy material may include accountable nuclear material, TRU waste, spent nuclear fuel, and radiological material. | Point | Periodic | Cobalt-60<br>Strontium-90<br>Cesium-134<br>Cesium-137<br>Promethium-147<br>Europium-154<br>Americium-241<br>Plutonium-238<br>Plutonium-239<br>Plutonium-240<br>Plutonium-241 | 2.54E-15<br>1.34E-10<br>5.16E-14<br>4.59E-10<br>3.26E-12<br>4.31E-13<br>5.56E-13<br>3.26E-12<br>1.94E-13<br>1.42E-13<br>1.12E-11 |
| ECF, TA-II | Facility used for testing neutron generator design and manufacturing. | Point | Calculation | Tritium | 1.10E-03 |
| HERMES-III, TA-IV | Gamma simulator used primarily for simulating the effects of prompt radiation from a nuclear burst on electronics and complete military systems. | Point | Periodic | Nitrogen-13<br>Oxygen-15 | 6.18E-04<br>6.18E-05 |
| IBL, TAI | Ion solid interaction and defect physics accelerator facility. | Point | Calculation | Tritium | 1.00E-05 |
| NGF, TA-I | Principal production facility for neutron generators – Tritium Envelope North Wing. | Point | Continuous | Tritium | 9.55E+00 |
| PRD Laboratory, TA-I | Research and Development on tritium. | Point | Calculation | NA | NA |
| Radiation Laboratory, TA-I | Laboratory that performs small-scale experiments. | Point | Calculation | Tritium<br>Nitrogen-13<br>Nitrogen-16<br>Argon-41 | 1.0E-05<br>2.0E-07<br>2.0E-07<br>1.0E-09 |
| RMWMF, TA-III | Facility that handles radioactive and mixed waste products. | Point | Continuous | Tritium oxide<br>Tritium<br>(elemental)<br>Americium-241<br>Strontium-90<br>Cesium-137 | 9.52E+00<br>3.06E+00<br>1.73E-05<br>3.55E-07<br>1.01E-07 |
| RPICL, TA-I | Laboratory that performs radiation detection equipment calibration. | Point | Calculation | Tritium | 1.70E-05 |
| RPSD TA-II | Small-scale laboratory analyses, as needed. | Point | Calculation | NA | NA |
| START, TA-I | Small-scale laboratory operation. | Point | Calculation | Americium-241 | 5.00E-05 |
| Z Facility, TA-IV | Experimental facility for research on light-ion inertial confinement fusion. Technology involves storing large amounts of electrical energy over a period of minutes and then releasing this energy in an intense, concentrated burst at a target. | Point | Calculation | Tritium | 1.00E-03 |

**NOTES:** *Monitoring Method: Periodic = Based on periodic measurements
Calculation = Calculated from known parameters
Continuous = Based on continuous air monitoring results

ACRR =Annular Core Research Reactor
Ci/yr = curies per year
HERMES-III = High Energy Radiation Megavolt Electron Source-III
NA = not available
NGF = Neutron Generator Facility
PRD = Process Research Development
RPICL = Radiation Protection Instrument Calibration Laboratory
RPSD = Radiation Protection Sample Diagnostics
START = Sandia Tomography and Radionuclide Transport Laboratory
AHCF = Auxilliary Hot Cell Facility
ECF = Explosive Components Facility
IBL = Ion Beam Laboratory
NESHAP = National Emission Standards for Hazardous Air Pollutants
RMWMF = Radioactive and Mixed Waste Management Facility
SNL/NM = Sandia National Laboratories, New Mexico
TA = Technical Area

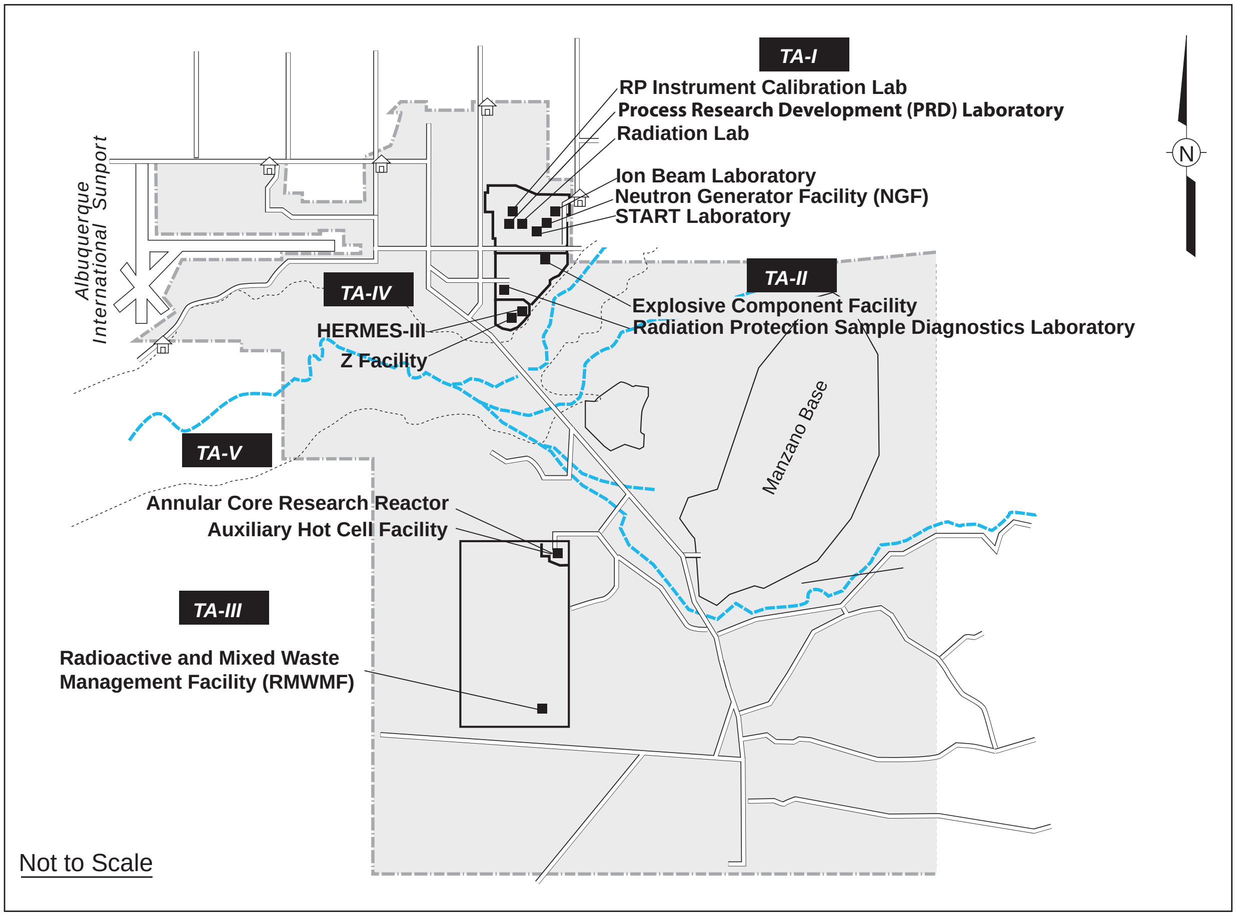



**FIGURE 5-5**. Locations of the 13 Facilities at SNL/NM that Provided Radionuclide Release Inventories in 2010

Neutron Generator Facility (NGF) – The NGF is the nation's principal production facility for neutron generators. This facility currently emits only tritium. The facility has two stacks, but only utilizes the main stack in the Tritium Envelope North Wing. In 2010, the NGF emitted 9.55 Ci of tritium, based on continuous stack monitoring. Although anticipated tritium releases do not exceed the regulatory threshold requiring continuous monitoring, it is performed voluntarily at NGF as a best management practice (BMP).

Process Research Development (PRD) Laboratory – This laboratory is capable of handling and conducting research on tritium materials. It is currently in standby mode and has yet to become operational; therefore, there were no emissions from the PRD laboratory in CY 2010.

Radiation Laboratory – Small-scale radiation experiments resulted in the release of air trace amounts activation products and tritium.

Radiation Protection Sample Diagnostics (RPSD) Laboratory – Small-scale radiometric sample analyses on an as-needed basis. In 2010 there were no reportable emissions.

Sandia Tomography and Radionuclide Transport (START) Laboratory – The START laboratory is used to perform small-scale experiments. In 2010, it received a source from a commercial vendor that was contaminated on the outside of the container. It was sealed, repackaged, and returned to the vendor. Conservative release calculations arising from this activity were attributed to americium-241.

TANDEM/IBL Accelerator – This is an ion solid interaction and defect physics accelerator facility. In 2010, the facility was moved to a newly constructed building and will hereafter be referred to as the Ion Beam Laboratory (IBL). Operations at IBL resulted in small amounts of tritium.

***TA-II Sources***
Explosive Components Facility (ECF) – The ECF conducts destructive testing on neutron generators. In 2010, the facility reported emissions of tritium.

***TA-III Sources***
Radioactive and Mixed Waste Management Facility (RMWMF) – The RMWMF primarily handles low-level waste (LLW), mixed waste (MW), and some transuranic (TRU) waste. In 2010, the RMWMF reported tritium releases, americium-241, strontium-90, and cesium-137 as determined by continuous stack monitoring. Although anticipated tritium releases do not exceed the regulatory threshold requiring continuous monitoring, it is performed voluntarily at the RMWMF as a BMP.

***TA-IV Sources***
High Energy Radiation Megavolt Electron Source-III (HERMES-III) – The HERMES-III accelerator is used to test the effects of prompt radiation on electronics and complete military systems. This facility produces air activation products, primarily nitrogen-13 and oxygen-15. In 2010, the facility reported releases of nitrogen-13 and oxygen-15.

Z Facility – The Z Facility is an accelerator 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. In 2010, the Z Facility reported small tritium releases.

***TA-V Sources***
Annular Core Research Reactor (ACRR) – This reactor is used primarily to support defense program projects. Argon-41, an air activation product, was the only reported release in 2010.

Auxiliary Hot Cell Facility (AHCF) – The AHCF, which became operational in 2010, is used to identify, sort, characterize, and repackage legacy nuclear materials and TRU packages for permanent removal from the SNL/NM site. Legacy material may include accountable nuclear material, TRU waste, spent nuclear fuel, and radiological material. In 2010, there were trace emissions reported for a variety of radionuclides encountered in the handled waste materials.

## 5.4 Assessment of Potential Dose to the Public

In general, the dose received by a person is dependent on the 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 SNL/NM have resulted in doses to the public that are several orders of magnitude below the EPA's standard of 10 mrem/yr. Radiation protection standards specific to DOE facilities are provided in Chapter 8.

### 5.4.1 NESHAP Dose Assessment

***Emission Sources***
To assess compliance, all NESHAP facilities at SNL/NM must submit annual facility emission data to the NESHAP Team Leader. The emissions from four "primary" sources (ACRR, Z Facility, NGF,

and the RMWMF ) are modeled using EPA's CAA Assessment Package-1988 (CAP88) (EPA 2006) to estimate the annual dose to each of 36 identified public receptors. Primary sources are those that determine their emissions by direct measurements or by calculations based on measured operational parameters.

The NESHAP regulation requires DOE to continuously monitor any radionuclide air emission source that has the potential to produce a dose of 0.1 mrem/yr to the MEI; however, there are no facilities at SNL/NM that exceed this criterion. As a BMP, some SNL/NM facilities perform continuous stack monitoring. Other facilities base their emission estimates on periodic confirmatory measurements or engineering calculations. In 2010, the highest emissions were from tritium. Historically, tritium and argon-41 have been the most significant contributor to the effective dose equivalent (EDE) of the MEI. Figure 5-6 shows the historical annual reported release (in Ci) of tritium and argon-41. The atmosphere contains 72 percent nitrogen, 21 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.

***Demographic Data***

Demographic data includes the resident population, the number of beef and dairy cattle, and the utilized food crop area fraction for a 50-mile (mi) 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). In 2010, the NESHAP calculation for resident population was based on the State's 2000 to 2001 estimated urban and county population data and U.S. Census Bureau data

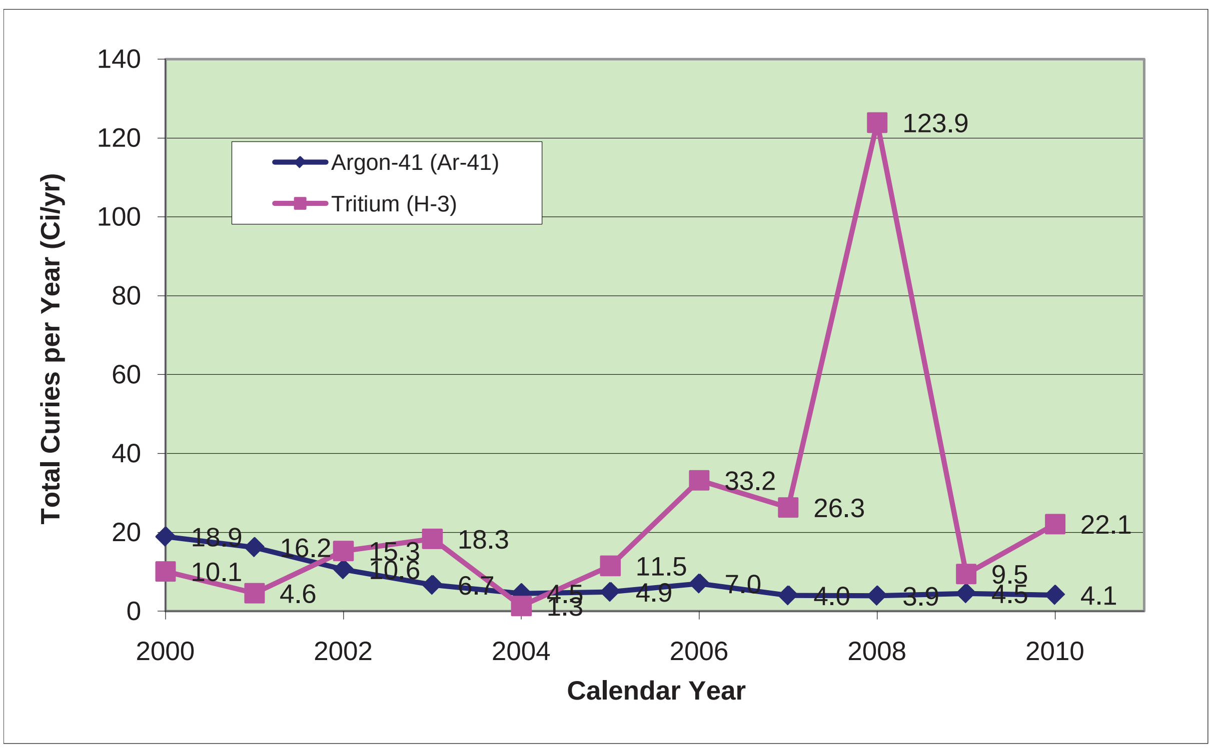



**FIGURE 5-6.** Summary of Atmospheric Releases of Argon-41 and Tritium from SNL/NM Facilities from 2000 to 2010
(Emissions vary from year to year based on the operations conducted at the various facilities.)

(DOC 2010). The beef and dairy cattle numbers and food crop area fraction were calculated using 1998 agricultural statistics. The statistics were supplied by the New Mexico Department of Agriculture (NMDOA) (NMDOA 2011). The following values were used in the 2010 CAP88 calculation:

- 0.93 Dairy cattle/kilometers ($km^2$)
- 0.58 Beef cattle/$km^2$
- 8.1E-04 Acres of food crops/square meters ($m^2$)
- 882,187 Population (within 50-mi radius)

***On-site and Off-site Public Receptors***
A total of 36 receptor locations in the vicinity of SNL/NM have been identified as potential locations of maximum exposure to a member of the public. Off-site receptor locations extend to the Isleta Pueblo Indian Reservation, the Four Hills subdivision north of KAFB, the Manzanita Mountains (with east mountain residents), and areas near the Albuquerque International Sunport (AIS) west of KAFB. On-site receptors include U.S. Air Force (USAF) facilities, offices, and housing areas, as well as other non-DOE and non-U.S. Department of Defense (DoD) facilities on KAFB.

***Meteorology***
Data from four meteorological towers (CW1, A36, A21, and MW1) in the proximity of NESHAP emission sources were used in 2010. 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 are compiled into a normalized distribution from which all wind and stability frequency-of-occurrence data were derived.

## 5.4.2 Dose Assessment Results

CAP88 utilizes a Gaussian plume equation that estimates air dispersion in both horizontal and vertical directions. Individual EDEs to off-site and on-site receptors are presented in Tables 5-8 and 5-9, respectively. Dose assessment results are summarized in Table 5-10.

**TABLE 5-8.** Annual Source-Specific Effective Dose Equivalent (EDE) from Primary Sources to Off-Site Receptors During Calendar Year 2010

| FACILITY | ACRR | NGF | RMWMF | Z FACILITY | TOTAL (mrem/yr) |
|---|---|---|---|---|---|
| | Emission (mrem/yr) | Emission (mrem/yr) | Emission (mrem/yr) | Emission (mrem/yr) | |
| Albuquerque City Offices | 1.40E-05 | 2.00E-04 | 8.50E-05 | 1.30E-08 | 2.99E-04 |
| East Resident | 9.90E-06 | 2.00E-04 | 7.90E-05 | 1.30E-08 | 2.89E-04 |
| Eubank Gate Area (Building 8895) | 8.80E-05 | 4.20E-04 | 1.20E-04 | 2.60E-08 | 6.28E-04 |
| Four Hills Resident | 1.10E-05 | 2.00E-04 | 7.90E-05 | 1.30E-08 | 2.90E-04 |
| Isleta | 1.20E-05 | 2.00E-04 | 8.10E-05 | 1.30E-08 | 2.93E-04 |
| La Luz Childcare | 4.50E-05 | 2.10E-04 | 1.00E-04 | 1.50E-08 | 3.55E-04 |
| Manzano Mesa Apartments | 1.80E-05 | 2.10E-04 | 8.50E-05 | 1.40E-08 | 3.13E-04 |
| Tijeras Arroyo (West) | 1.40E-05 | 2.00E-04 | 8.50E-05 | 1.30E-08 | 2.99E-04 |
| USGS | 3.50E-05 | 2.10E-04 | 1.20E-04 | 1.30E-08 | 3.65E-04 |
| VA Hospital | 2.70E-05 | 2.10E-04 | 9.60E-05 | 1.40E-08 | 3.33E-04 |
| Willow Wood | 1.90E-05 | 2.10E-04 | 8.60E-05 | 1.40E-08 | 3.15E-04 |
| **TOTAL** | 2.93E-04 | 2.47E-03 | 1.02E-03 | 1.61E-07 | 3.78E-03 |

**NOTES:** mrem/yr = millirem per year
ACRR = Annular Core Research Reactor
NGF = Neutron Generator Facility
RMWMF = Radioactive Mixed Waste Management Facility
USGS = U.S. Geological Survey
VA = Veterans Administration
*Only major sources are presented in this table which total to 2.46E-03.

**TABLE 5-9**. Annual Source-Specific Effective Dose Equivalent (EDE) to On-Site Receptors During Calendar Year 2010

| FACILITY | ACRR Emission (mrem/yr) | NGF Emission (mrem/yr) | RMWMF Emission (mrem/yr) | Z FACILITY Emission (mrem/yr) | TOTAL (mrem/yr) |
|---|---|---|---|---|---|
| Airport Bldg. 761 | 1.10E-04 | 1.00E-04 | 6.50E-05 | 1.20E-08 | 2.75E-04 |
| Air National Guard Communications Flight | 9.40E-05 | 9.70E-05 | 5.50E-05 | 1.00E-08 | 2.46E-04 |
| Bernalillo County Sheriff Training | 2.00E-04 | 1.90E-05 | 8.80E-05 | 2.10E-09 | 3.07E-04 |
| Chestnut Site | 1.90E-04 | 1.10E-05 | 8.60E-04 | 1.70E-09 | 1.06E-03 |
| Child Development Center | 2.00E-05 | 5.70E-06 | 1.60E-05 | 6.80E-10 | 4.17E-05 |
| Golf Course Club House | 4.50E-04 | 3.20E-05 | 1.10E-04 | 8.80E-09 | 5.92E-04 |
| Golf Course Maintenance Area | 2.60E-04 | 4.60E-05 | 9.40E-05 | 9.70E-09 | 4.00E-04 |
| Homeland Security Building (1008) | 1.10E-04 | 3.10E-04 | 5.70E-05 | 4.00E-08 | 4.77E-04 |
| Honeywell Systems\Support Site | 1.00E-04 | 5.20E-04 | 5.40E-05 | 2.80E-08 | 6.74E-04 |
| ITRI/Lovelace | 7.20E-05 | 7.80E-06 | 9.20E-05 | 1.10E-09 | 1.72E-04 |
| KAFB Fire Station | 9.50E-05 | 1.80E-04 | 4.60E-05 | 1.50E-08 | 3.21E-04 |
| KAFB Landfill | 6.60E-05 | 9.30E-06 | 3.70E-05 | 1.90E-09 | 1.12E-04 |
| KAFB New Building (across from TA-IV) | 1.60E-04 | 9.00E-05 | 6.70E-05 | 6.40E-08 | 3.17E-04 |
| Kirtland Elementary | 1.80E-05 | 5.20E-06 | 1.50E-05 | 6.30E-10 | 3.82E-05 |
| Kirtland Storage Site | 9.10E-04 | 3.10E-05 | 1.40E-04 | 8.50E-09 | 1.08E-03 |
| Manzano Offices (Fire Station) | 1.70E-04 | 1.90E-05 | 9.40E-05 | 2.00E-09 | 2.83E-04 |
| Maxwell Housing (Southeast Corner) | 2.00E-05 | 5.70E-06 | 1.60E-05 | 6.90E-10 | 4.17E-05 |
| Kirtland Family | 7.30E-05 | 1.10E-04 | 4.20E-05 | 6.40E-09 | 2.25E-04 |
| Pershing Park Housing | 7.70E-05 | 8.30E-05 | 4.00E-05 | 8.30E-09 | 2.00E-04 |
| Riding Club | 3.70E-04 | 2.30E-05 | 1.50E-04 | 2.90E-09 | 5.43E-04 |
| Sandia Area Federal Credit Union | 1.10E-04 | 3.50E-04 | 5.10E-05 | 2.20E-08 | 5.11E-04 |
| Sandia Elementary School | 7.10E-05 | 1.40E-04 | 4.10E-05 | 1.00E-08 | 2.52E-04 |
| TA-IV Cafeteria | 1.50E-04 | 9.50E-05 | 6.90E-05 | 1.30E-07 | 3.14E-04 |
| Vehicle Maintenance Flight | 9.40E-05 | 9.00E-05 | 5.60E-05 | 9.30E-09 | 2.40E-04 |
| Wherry Elementary | 3.90E-05 | 1.30E-05 | 3.30E-05 | 1.50E-09 | 8.50E-05 |
| **TOTAL** | **4.03E-03** | **2.39E-03** | **2.39E-03** | **3.97E-07** | **8.81E-03** |

**NOTES:** ACRR = Annular Core Research Reactor
RMWMF = Radioactive Mixed Waste Management Facility
mrem/yr = millirem per year
ANG = Air National Guard
KAFB = Kirtland Air Force Base
NGF = Neutron Generator Facility
ITRI = Inhalation Toxicology Research Institute
TA = Technical Area

**TABLE 5-10**. Calculated Dose Assessment Results for On-Site and Off-Site Receptors and for Collective Populations During Calendar Year 2010

| Dose to Receptor | Location | 2010 Calculated Dose | NESHAP Standard |
|---|---|---|---|
| ***Individual Dose*** | | | |
| On-site Receptor EDE to the MEI | Honeywell Systems Support Site | 2.98E-02 mrem/yr (2.98E-04 mSv/yr) | 10 mrem/yr (0.1 mSv/yr) |
| Off-site Receptor EDE to the MEI | Eubank Gate Area | 3.41E-03 mrem/yr (3.41E-05 mSv/yr) | 10 mrem/yr (0.1 mSv/yr) |
| ***Collective Dose*** | | | |
| Collective Regional Population | Residents within an 80-km (50 mi) radius | 1.24E-01 person-rem/yr[1] (1.24E-03 mSv/yr) | No Standard Available |
| Collective KAFB Population | KAFB Housing | 5.01E-03 person-rem/yr[2] (5.01E-05 mSv/yr) | No Standard Available |

**NOTES:** [1] Based on a population of 882,187 people estimated to be living within an 80-km (50-mi) radius.
[2] Based on a population of 4,204 people estimated to be living in permanent on-base housing.
NESHAP = National Emissions Standards for Hazardous Air Pollutants
mSv/yr = millisievert per year
person-Sv/yr = person-sievert per year
mrem/yr = millirem per year
km = kilometer
EDE = effective dose equivalent
MEI = maximally exposed individual
KAFB = Kirtland Air Force Base
mi = mile

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

The on-site MEI dose of 2.98E-02 millirems per year (mrem/yr) at the Honeywell Systems Support Site resulted primarily from conservatively calculated releases of americium-241 from the nearby Sandia Tomography and Radionuclide Transport Laboratory (START) Laboratory. In CY 2010 an americium-241 source for research was received at the START Laboratory with contamination on the outside of the vial. After numerous attempts at decontamination, the source was unable to be sufficiently decontaminated to permit use of the source for the desired application. Therefore, the source was returned to the vendor in the packing material received. The source was double bagged and no contamination existed on the outside of the bags when returned. Nevertheless, conservative release calculations arising from this activity were attributed to americium-241. The off-site MEI was located at the Eubank Gate Area. The MEI of 3.41E-03 mrem/yr at the Eubank Gate Area resulted also primarily from conservatively calculated releases of americium-241 from the nearby START Laboratory.

By comparison, the average person in the Albuquerque area receives 330 to 530 mrem/yr resulting primarily from radon emanating from earth materials, medical procedures, consumer products, and cosmic radiation (Brookins 1992).

***Collective Dose***

The collective population dose resulting from all SNL/NM radiological emissions was calculated for both KAFB and the regional area (Table 5-10). Collective dose calculations are not required by NESHAP regulations; however, it 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. Sandia calculates the collective population dose for both the KAFB housing areas and the general Albuquerque area population within an 50-mi radius.

***Regional***

The Albuquerque regional collective population dose in 2010 was 1.24E-01 person-mrem/yr. This is comparable with the average over the past five years of regional collective population dose data. For the purpose of calculating the collective dose, all releases are assumed to occur from a location centered in TA-V. The population dose was calculated by multiplying 882,187 residents by doses per sector.

***KAFB***

A collective population dose for KAFB residents was calculated based on three main housing areas (Maxwell, Pershing Park, and Kirtland Family). Housing demolition and new housing construction at KAFB resulted in fewer residential structures during 2010. However, the overall population increased as additional new housing was completed. The total population dose for KAFB was obtained by summing the three areas based upon a total residential population of 4,204. The CY 2010 calculation resulted in an estimated population dose of 5.01E-03 person-mrem/yr.

## 5.5 Air Compliance Requirements & Compliance Strategies

Air quality standards are implemented by regulations promulgated by local and federal governments in accordance with the CAA and the CAA Amendments (CAAA) of 1990. The Albuquerque Bernalillo County Air Quality Control Board (ABC/AQCB), the State of New Mexico, and the EPA determine applicable air quality standards for non-radiological pollutants. Radionuclide air emissions are currently regulated by the EPA under NESHAP, as discussed in Section 5.4.1. A complete list of air quality regulations applicable to SNL/NM is provided in Chapter 8.

### 5.5.1 SNL/NM Air Emission Sources

As discussed in Section 5.2.1, criteria pollutants include sulfur dioxide, nitrogen oxide, carbon monoxide, ozone, PM, and lead. For these criteria and other pollutants, the EPA:

- Sets ambient air quality standards – including those for motor vehicle emissions,
- Requires state implementation plans for protection and improvement of air quality,
- Institutes air quality programs to prevent the nation's air from deteriorating, and
- Establishes hazardous air pollutant (HAP) control programs.

EPA standards for criteria pollutants are given in 40 CFR 50, NAAQS and implemented in (20.11.8 NMAC). NMAAQS with criteria pollutant standards for ambient air is met through on-going applicability determinations on potential criteria pollutant emission sources that require the following: acquisition of the necessary permits and registrations for applicable sources from the appropriate regulatory agencies; fuel throughput tracking, monitoring, and reporting; ambient air surveillance; and periodic direct emission sampling. As discussed previously, ambient air measurements taken in the vicinity of SNL/NM facilities have been well below maximum threshold limit values (TLV) and standards for criteria pollutants.

The significant sources of criteria pollutants at SNL/NM are defined as sources that require a permit or registration from a regulatory agency.

A majority of the permits and registrations held by SNL/NM are multi-source (including a combination of criteria pollutant emission sources). The DOE NNSA Sandia Site Office (SSO) and the AQC program has started to work with the COA to assure that we have only one permit or registration for combustion sources per building. This is to better align with the current regulations and requirements. During CY 2010, there are several new boiler registrations that were issued as part of this effort. It is anticipated that this task will be completed by the end of CY 2011. Significant sources at SNL/NM are listed, below.

***Boilers***
During CY 2010, SNL/NM maintained 21 permits and registrations for applicable boilers site wide. Table 5-11 illustrates the annual fuel usage and associated emissions for CY 2010. The boilers associated with the permits and registrations are shown in Table 5-12.

During CY 2010, the Steam Plant was demolished during the spring of 2010. This completed the phase out of the steam plant boilers and the Heating System Modernization (HSM) project entirely.

***Emergency Generators***
During CY 2010, SNL/NM maintained 11 permits and registrations for applicable generators site wide. Table 5-13 illustrates the annual hours of operation and associated emissions for CY 2010. The generators associated with the permits and registrations are shown in Table 5-14.

***Chemical Usage***
During CY 2010, SNL/NM maintained ten permits and registrations for applicable HAPs chemical usage site wide. The HAP chemical usage associated with the permits and registrations is for general laboratory usage for R&D purposes. Table 5-15 illustrates the amount of chemicals purchased at the associated facility for CY 2010. The facilities that have permits or registrations for chemical usages are listed in Table 5-16.

**TABLE 5-11.** Boiler Usage and Emission Data During Calendar Year 2010

| Permit # | Fuel Usage (scf) | Emissions (tpy) | | | | |
|---|---|---|---|---|---|---|
| | | $NO_x$ | CO | $PM_{10}$ | $SO_2$ | VOC |
| 374-M2 | 9,381,119 | 0.23 | 0.39 | 0.04 | 0.008 | 0.03 |
| R#936-M1 | 14,100,782 | 0.71 | 0.59 | 0.05 | 0.01 | 0.04 |
| R#1406-M1 | 4,151,839 | 0.10 | 0.17 | 0.02 | 1.3E-03 | 1.1E-02 |
| #1725 | 7,719,428 | 0.39 | 0.32 | 0.03 | 0.0005 | 0.02 |
| #1820 | 32,702,800 | 0.82 | 1.37 | 0.12 | 0.03 | 0.09 |
| R#1823 | 9,808,562 | 0.49 | 0.41 | 0.04 | 0.003 | 0.03 |
| #1830 | 130,801,290 | 3.3 | 5.5 | 0.5 | 0.1 | 0.4 |
| R#2109 | 1,012,114 | 2.5E-02 | 4.3E-02 | 3.8E-03 | 9.1E-04 | 2.8E-03 |
| R#2110 | 1,566,092 | 3.9E-02 | 6.6E-02 | 6.0E-03 | 1.4E-03 | 4.3E-03 |
| R#2111 | 1,795,200 | 4.5E-02 | 7.5E-02 | 6.8E-03 | 1.6E-03 | 4.9E-03 |
| R#2112 | 1,123,472 | 2.8E-02 | 4.7E-02 | 4.3E-03 | 1.0E-03 | 3.1E-03 |
| R#2113 | 2,429,731 | 6.1E-02 | 1.0E-01 | 9.2E-03 | 2.2E-03 | 6.7E-03 |
| R#2114 | 553,281 | 1.4E-02 | 2.3E-02 | 2.1E-03 | 5.0E-04 | 1.5E-03 |
| R#2115 | 712,606 | 1.8E-02 | 3.0E-02 | 2.7E-03 | 6.4E-04 | 2.0E-03 |
| R#2116 | 1,815,017 | 4.5E-02 | 7.6E-02 | 6.9E-03 | 1.6E-03 | 5.0E-03 |
| R#2117 | 393,577 | 9.8E-03 | 1.7E-02 | 1.5E-03 | 3.5E-04 | 1.1E-03 |
| R#2118 | 451,491 | 1.1E-02 | 1.9E-02 | 1.7E-03 | 4.1E-04 | 1.2E-03 |
| R#2119 | 354,536 | 8.9E-03 | 1.5E-02 | 1.3E-03 | 3.2E-04 | 9.7E-04 |
| R#2120 | 1,055,825 | 2.6E-02 | 4.4E-02 | 4.0E-03 | 9.5E-04 | 2.9E-03 |
| R#2121 | 537,409 | 1.3E-02 | 2.3E-02 | 2.0E-03 | 4.8E-04 | 1.5E-03 |
| R#2122 | 731,151 | 1.8E-02 | 3.1E-02 | 2.8E-03 | 6.6E-04 | 2.0E-03 |

**NOTES:** tpy = tons per year
scf = standard cubic feet
$NO_x$ = nitrogen oxide
CO = carbon monoxide
$PM_{10}$ = Particulate Matter (diameter equal to or less than 10 microns)
$SO_2$ = sulfur dioxide
VOC = Volatile Organic Compound

### *Miscellaneous New Source Review (NSR) Permits*

The document disintegrator is an industrial-size, classified document shredder. There is one pollutant of concern with this permit, which is particulate emissions. The document disintegrator operated 363 hours in CY 2010 which calculated an estimated 2.2 tons of total suspended particulate (TSP). The process input rate of material was 62.5 percent below the permitted limit.

The Thermal Test Complex (TTC) is an enclosed R&D fire test complex and an important element in the revitalization of SNL/NM test capabilities needed for test article qualification, development, surveillance, investigation, and modeling. There were no operations at this facility during CY 2010 that contributed to any air emissions.

### *Open Burn Permits*

Open burn permits are required for:

- Disposal of Explosives by Burning (avoids the hazards of transport and handling),
- Aboveground Detonation of Explosives (over 20 pounds [lb]),
- Burning Liquid Fuel (2,000 gallons [gal] or more, or solid fuel of 5,000 lb in a single event, R&D activity), and
- Igniting Rocket Motors (with greater than 4,000 lb of fuel).

A list of 2010 permits can be found in Chapter 8, Table 8-1.

**TABLE 5-12.** Boilers Associated with Permits and Registrations During Calendar Year 2010

| Permit | Description | Size | Fuel Type |
|---|---|---|---|
| 374-M2 | Neutron Generator Production Facility (NGPF) Boilers used to heat the facility. | Six (6) 2 MMBtu/hr | Natural Gas |
| R#547 | Explosives Components Facility (ECF) Boilers used to heat the facility. | Two (2) 4.3437 MMBtu/hr | Natural Gas |
| R#936-M1 | Processing and Environmental Technology Laboratory (PETL) Boilers used to heat the facility. | Ten (10) 1.4 MMBtu/hr | Natural Gas |
| R#1406-M1 | Advanced Manufacturing Prototype Facility (AMPF) Boilers used to heat the facility. | Two (2) 1.8 MMBtu/hr | Natural Gas |
| 1725 | Center for Integrated Nanotechnologies (CINT) Boilers used to heat the facility. | Two (2) 6 MMBtu/hr | Natural Gas |
| 1820 | Microsystems and Engineering Sciences Applications (MESA) Complex Boilers used to heat the facility. | Two (2) 20.412 MMBtu/hr | Natural Gas |
| | | One (1) 10.206 MMBtu/hr | |
| 1823 | Weapons Integration Facility (WIF) Boilers used to heat the facility | Two (2) 8.17 MMBtu/hr | Natural Gas |
| | | One (1) 3.68 MMBtu/hr | |
| 1830 | HSM Boilers used to heat buildings in TA-I, and will eventually allow for the decommissioning of the Steam Plant Boilers. Starting in CY 2010, the Air Quality Compliance (AQC) Program has been working with the City of Albuquerque (COA) to break this permit apart into individual building registrations as applicable. The COA has indicated that the structure of this permit does not meet the foundation of the COA air quality regulations. Buildings that do not support one another cannot be grouped into one individual permit. This is not a violation, however the COA would like for this to be corrected. | Seventy-Two (72) 2.0 MMBtu/hr or less | Natural Gas |
| R#2109 | Building 802 boilers used to heat the facility | Three (3) 2 MMBtu/hr | Natural Gas |
| R#2110 | Building 804 boilers used to heat the facility | Four (4) 2 MMBtu/hr | Natural Gas |
| R#2111 | Building 810 boilers used to heat the facility | Three (3) 2 MMBtu/hr | Natural Gas |
| R#2112 | Building 823 boilers used to heat the facility | Three (3) 2 MMBtu/hr | Natural Gas |
| R#2113 | Building 840 boilers used to heat the facility | Four (4) 2 MMBtu/hr | Natural Gas |

TABLE 5-12. Boilers Associated with Permits and Registrations During Calendar Year 2010 (concluded)

| Permit | Description | Size | Fuel Type |
|---|---|---|---|
| R#2114 | Building 857 boilers used to heat the facility | Two (2) 1.3 MMBtu/hr | Natural Gas |
| | | Two (2) 1.1001 MMBtu/hr | |
| R#2115 | Building 860 boilers used to heat the facility | Two (2) 1.3 MMBtu/hr | Natural Gas |
| R#2116 | Building 880 boilers used to heat the facility | Four (4) 2 MMBtu/hr | Natural Gas |
| | | Two (2) 0.28 MMBtu/hr | |
| R#2117 | Building 890 boilers used to heat the facility | Three (3) 2 MMBtu/hr | Natural Gas |
| R#2118 | Building 887 boilers used to heat the facility | Three (3) 2 MMBtu/hr | Natural Gas |
| R#2119 | Building 891 boilers used to heat the facility | Three (3) 2 MMBtu/hr | Natural Gas |
| R#2120 | Building 892 boilers used to heat the facility | Three (3) 2 MMBtu/hr | Natural Gas |
| R#2121 | Building 894 boilers used to heat the facility | Three (3) 2 MMBtu/hr | Natural Gas |
| | | Two (2) 1.001 MMBtu/hr | |
| | | Two (2) 1.3 MMBtu/hr | |
| R#2122 | Building 897 boilers used to heat the facility | Three (3) 2 MMBtu/hr | Natural Gas |

**NOTES:** MMBtu/hr = Million British Thermal Units per hour
TA = technical area
CY = Calendar Year
HSM = Heating System Modernization

**TABLE 5-13.** Generator Hours and Emission Data During Calendar Year 2010

| Permit Number | Hours/ CY 2010 | Emissions (tpy) | | | | |
|---|---|---|---|---|---|---|
| | | $NO_x$ | CO | $PM_{10}$ | $SO_2$ | VOC |
| #374-M2 | 22 | 2.0E-01 | 4.2E-02 | 1.4E-02 | 1.3E-02 | 1.6E-02 |
| #402[a] | 9.5 | 3.9E-01 | 1.0E-01 | 7.0E-03 | 4.9E-02 | 1.1E-02 |
| | 10.8 | | | | | |
| | 10.9 | | | | | |
| | 12.2 | | | | | |
| #415-M2 | 7.1 | 2.1E-02 | 4.5E-03 | 1.5E-03 | 1.4E-03 | 1.7E-03 |
| #924 | 26 | 2.3E-01 | 6.2E-02 | 4.2E-03 | 3.0E-02 | 6.6E-03 |
| #925-M1 | 7 | 5.3E-02 | 1.4E-02 | 9.4E-04 | 4.8E-03 | 1.5E-03 |
| #1678-M1 | 14 | 1.6E-01 | 4.2 E-02 | 1.5E-02 | 1.4E-02 | 1.8E-02 |
| | 14 | 2.5E-01 | 6.7E-02 | 2.4E-02 | 3.8E-03 | 2.8E-02 |
| #1725 | 23 | 1.2E-01 | 2.7E-02 | 8.9E-03 | 8.3E-03 | 9.9E-03 |
| #1828 | 9.5 | 8.6E-02 | 2.0E-02 | 2.5E-03 | 2.9E-02 | 2.5E-03 |
| #1900[b] | 10.2 | 1.3E-02 | 1.1E-02 | 5.8E-04 | 4.1E-03 | N/A |
| #1930[b] | 1.9 | 1.16E-03 | 7.68E-04 | 6.23E-05 | 1.93E-04 | N/A |
| #2097[b] | 0 | 0 | 0 | 0 | 0 | 0 |

**NOTES:** [a] The emission limits stated in the permit are combined emissions, therefore they are calculated annually as a summed emission for all four units.

[b] City of Albuquerque has started issuing generator permits with combined $NO_x$ and VOC emissions. Permit #1900 is the first permit to have this combination for Sandia.

tpy = tons per year
CY = calendar year
N/A = not applicable
$NO_x$ = nitrogen oxide
CO = carbon monoxide
$PM_{10}$ = Particulate Matter (diameter equal to or less than 10 microns)
$SO_2$ = sulfur dioxide
VOC = Volatile Organic Compound

**TABLE 5-14**. Emergency Generators Associated with the Permits and Registrations During Calendar Year 2010

| Permit | Description | Size | Fuel Type |
|---|---|---|---|
| #374-M2 | NGF Emergency Generator provides emergency power during unplanned power outages. | One (1) 469 hp | Diesel |
| #402 | Emergency Generator Plant provides back-up power to various buildings in TA- I of SNL/NM. | Four (4) 805 hp | Diesel |
| #415-M2 | RMWMF Emergency Generator provides emergency power during unplanned power outage. | One (1) 192 hp | Diesel |
| #924 | TA- I East L Avenue Emergency Generator provides emergency power during unplanned power outages | One (1) 805 hp | Diesel |
| #925-M1 | PETL Emergency Generator provides emergency power during unplanned power outages. | One (1) 671 hp | Diesel |
| #1678-M1 | MESA Complex Emergency Generators provide emergency power during unplanned power outages. | One (1) 999 hp<br>One (1) 1609 hp | Diesel |
| #1725 | CINT Emergency Generator provides emergency power during unplanned power outages. | One (1) 469 hp | Diesel |
| #1828 | Southeast TA- I Back-up Generator provides backup power during unplanned power outages. | One (1) 750 hp | Diesel |
| #1900 | SDF backup generator provides backup power during unplanned power outages. | One (1) 380 hp | Diesel |
| #1930 | Building 962 backup generator provides backup power to the operations housed in Building 962. | One (1) 99 hp | Diesel |
| #2097 | Building 833 emergency generator will provide emergency power during unplanned power outages. This generator has not been ordered or installed yet. | One (1) 241 hp | Diesel |

**NOTES:** hp = horsepower
NGF = Neutron Generator Facility
TA = technical area
SNL/NM = Sandia National Laboratories, New Mexico
RMWMF = Radioactive Mixed Waste Management Facility
PETL = Processing Environmental Technologies Laboratory
MESA = Microsystems and Engineering Sciences Application
CINT = Center for Integrated Nanotechnologies
SDF = Strategic Defense Facility

**TABLE 5-15.** HAP Chemical Usage Reportable Data During Calendar Year 2010

| Permit # | Pounds/Year | Tons/Year |
|---|---|---|
| #374-M2 | 48 | 2.4E-02 |
| R#936 | 955 | 5.0E-01 |
| R#1406 | 2.5 | 1.3E-03 |
| R#1888 | 588 | 2.9E-01 |
| R#1901 | 110 | 2.2E-01 |
| R#1902 | 31 | 2.0E-02 |
| R#1903 | 0.05 | 3.0E-05 |
| R#1905 | 0.0 | 0.0 |
| R#1906 | 506 | 2.1E-01 |

**NOTES:** HAP = hazardous air pollutant

**TABLE 5-16.** Facilities with Permits or Registrations for Chemical Use During Calendar Year 2010

| Permit # | Description | Chemical Type |
|---|---|---|
| #374-M2 | NGPF general chemical exhaust from fume hoods | HAP, VOC |
| R#547 | ECF general chemical exhaust from fume hoods | HAP, VOC |
| R#936-M1 | PETL general chemical exhaust from fume hoods | HAP, VOC |
| R#1406 | AMPF general chemical exhaust from fume hoods | HAP, VOC |
| R#1888 | AMPL general chemical exhaust from fume hoods | HAP, VOC |
| R#1901 | Miscellaneous Buildings general chemical exhaust from fume hoods | HAP, VOC |
| R#1902 | TWT general chemical exhaust from fume hoods | HAP, VOC |
| R#1903 | Solar Tower general chemical exhaust from fume hoods | HAP, VOC |
| R#1905 | EHL general chemical exhaust from fume hoods | HAP, VOC |
| R#1906 | AML general chemical exhaust from fume hoods | HAP, VOC |

**NOTES:** NGPF = Neutron Generator Production Facility
ECF = Explosive Components Facility
PETL = Processing Environmental Technologies Laboratory
AMPF = Advanced Manufacturing Prototyping Facility
TWT = Trisonic Wind Tunnel
EHL = Environmental Health Laboratory
AMPL = Advanced Manufacturing Process Laboratory
AML = Advanced Materials Laboratory
HAP = hazardous air pollutant
VOC = Volatile Organic Compounds

***Fugitive Dust***
As required by 20.11.20 NMAC, *Fugitive Dust Control*, DOE obtains fugitive dust permits for each of Sandia's applicable projects that will disturb greater than ¾ acre of soil. For a list of 2010 permits refer to Chapter 8, Table 8-1 of this report.

***Vehicles***
The majority of government vehicles at SNL/NM are owned and managed by the General Services Administration (GSA). All GSA vehicles must comply with the same emission standards set for all personal and non-personal vehicles that are issued KAFB vehicle passes. As required by 20.11.100 NMAC, *Motor Vehicle Inspection Decentralized*, Sandia submits an annual vehicle inventory update and inspection plan to the COA for the applicable SNL/NM owned vehicles.

### 5.5.2 Title V

The CAAA of 1990 contained provisions under Title V requiring all existing major air emission sources to obtain an operating permit. A major source is defined as the combined emissions from any facility with the potential to emit:

- 100 tons per year (tpy) or greater of any criteria pollutant, 100,000 carbon dioxide equivalent greenhouse gas (GHG) emissions,
- 10 tpy of any single HAP, and
- 25 tpy of any combination of HAPs.

***Background***
The DOE/NNSA/SSO submitted Operating Permit application 515 (DOE 2002) on March 1, 1996, since potential emissions for SNL/NM were greater than 100 tpy of criteria pollutants. The COA has yet to issue the final permit. An updated application is currently being negotiated with the COA.

***Greenhouse Gas Emissions***
On May 13, 2010, the EPA issued a final rule that establishes a common sense approach to addressing greenhouse gas emissions from stationary sources under the CAA permitting programs. This final rule sets thresholds for GHG emissions that define when permits under the NSR Prevention of Significant Deterioration (PSD) and Title V Operating Permit programs are required for new and existing industrial facilities.

The CAA permitting program emissions thresholds for criteria pollutants such as lead, sulfur dioxide, and nitrogen oxide , are 100 and 250 tpy. While these thresholds are appropriate for criteria pollutants, they are not feasible for GHGs because GHGs are emitted in much higher volumes. EPA will phase in the CAA permitting requirements for GHGs in two initial steps. Operations at SNL/NM will become applicable in the second step, with deadline dates between July 1, 2011 and June 30, 2013. Operating permit requirements will, for the first time, apply to sources based on their GHG emissions even if they would not apply based on emissions of any other pollutant. Facilities that emit at least 100,000 tpy carbon dioxide equivalent will be subject to Title V permitting requirements.

SNL/NM personnel will have to update the current Title V Operating Permit application to include the GHG carbon dioxide equivalent emissions. During CY 2010, there was a calculated total of 194,020 tpy carbon dioxide equivalent (including fugitive GHG emissions) that would apply to the Title V permit. The application will be updated with submission planned for CY 2012.

***Permit Fee Structure***

The COA regulations require source owners to pay air emission fees, which are implemented under 20.11.2 NMAC, *Fees*. The sources included in the fee determination for SNL/NM include the COA NSR permitted and registered sources, as summarized in Chapter 8, Table 8-1. Total fees are based on the permitted emission limits that are requested in the NSR permit/registration applications, which are incorporated into the issued NSR permit/registration. In 2010, Sandia paid an annual fee of $11,296 based on a rate of $31 per ton of permitted emissions.

***Stratospheric Ozone Protection***

Title VI of the CAAA of 1990 required EPA to establish regulations to phase out the production and consumption of ozone depleting substances (ODS). ODSs 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 Part 82 that require the following: recycling of ODSs during servicing of equipment; establishment of requirements for recycling and recovery equipment, technicians, and reclaimers; repair of substantial leaks in refrigeration equipment containing greater than 50 lbs of refrigerant; and establishment of safe disposal standards.

At SNL/NM, ODSs 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 some fire extinguishers.

Sandia remains committed to the reduction of ODSs and has been working towards replacing Class I refrigerant chillers with a cooling capacity of 150 tons or greater—a secretarial goal set by the DOE. Replacement is part of a larger upgrade to improve the reliability and overall efficiency of the associated chilled water systems. There are currently 100 refrigerant chillers greater than 50 lbs that exist at SNL/NM. Of the existing chillers, two of those contain Class I refrigerants and are on the list for replacement.

### 5.5.3 Compliance Strategies

DOE/NNSA/SSO and Sandia have met the conditions of its permits and registrations.

# 6.0 Water Quality

Sandia National Laboratories, New Mexico (SNL/NM) conducts effluent monitoring through wastewater, surface water, storm water monitoring and surveillance programs. Sandia Corporation (Sandia) complies with water quality regulations established by local, state, and federal agencies. U.S. Environmental Protection Agency (EPA) standards are implemented at the state and local level by the New Mexico Environment Department (NMED) and the Albuquerque Bernalillo County Water Utility Authority (ABCWUA). Currently, EPA Region VI implements storm water regulations under the National Pollutant Discharge Elimination System (NPDES). Sandia also adheres to the water quality guidelines contained in U.S. Department of Energy (DOE) Orders 450.1A, *Environmental Protection Program* (DOE 2008a) and 5400.5, Chg 2, *Radiation Protection of the Public and the Environment* (DOE 1993).

## 6.1 Wastewater Discharge Program

Wastewater that is discharged to the public sewer system from SNL/NM facilities 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.

Sandia closely monitors its liquid effluent discharges to meet regulatory compliance. Sandia further reduces its toxic discharges by implementing Toxic Organic Management Plans (TOMP), general good housekeeping, and engineering practices. Pollution Prevention (P2) measures are implemented to reduce, substitute, or eliminate toxic chemicals, where feasible, as discussed in Chapter 3, Section 3.4 of this report.

### 6.1.1 SNL/NM and the ABCWUA

***ABCWUA Publicly-Owned Treatment Works (POTW)***

SNL/NM's sewer system connects to the ABCWUA's sanitary sewer system through six permitted outfalls (Figure 6-1). It should be noted that SNL/NM Station WW007 (Permit 2069G) for activities conducted at the Microelectronics Development Laboratory (MDL) is upstream of the final discharge location, Station WW001 (Permit 2069A). Wastewater effluent discharged from any of the six outfalls must meet the ABCWUA's Sewer Use and Wastewater Control Ordinance (SUWCO) requirements. Information on the ABCWUA SUWCO requirements can be found at the American Legal Publishing Corporation's website:

*www.amlegal.com/albuquerque_nm/*

During 2010 SNL/NM met effluent discharge standards established by ABCWUA's SUWCO at five of its six permitted outfalls. The discharge limit of 0.051 milligrams per liter (mg/L) for arsenic was exceeded (0.121 mg/L) at the ABCWUA permitted outfall 2069G on April 20, 2010. The source of the release was determined to be activities associated with the cleaning procedure of metalorganic chemical vapor deposition (MOCVD) tools that generate arsenic deposits. The MOCVD equipment process records indicated a cleaning procedure was performed on the stainless steel vacuum lines on

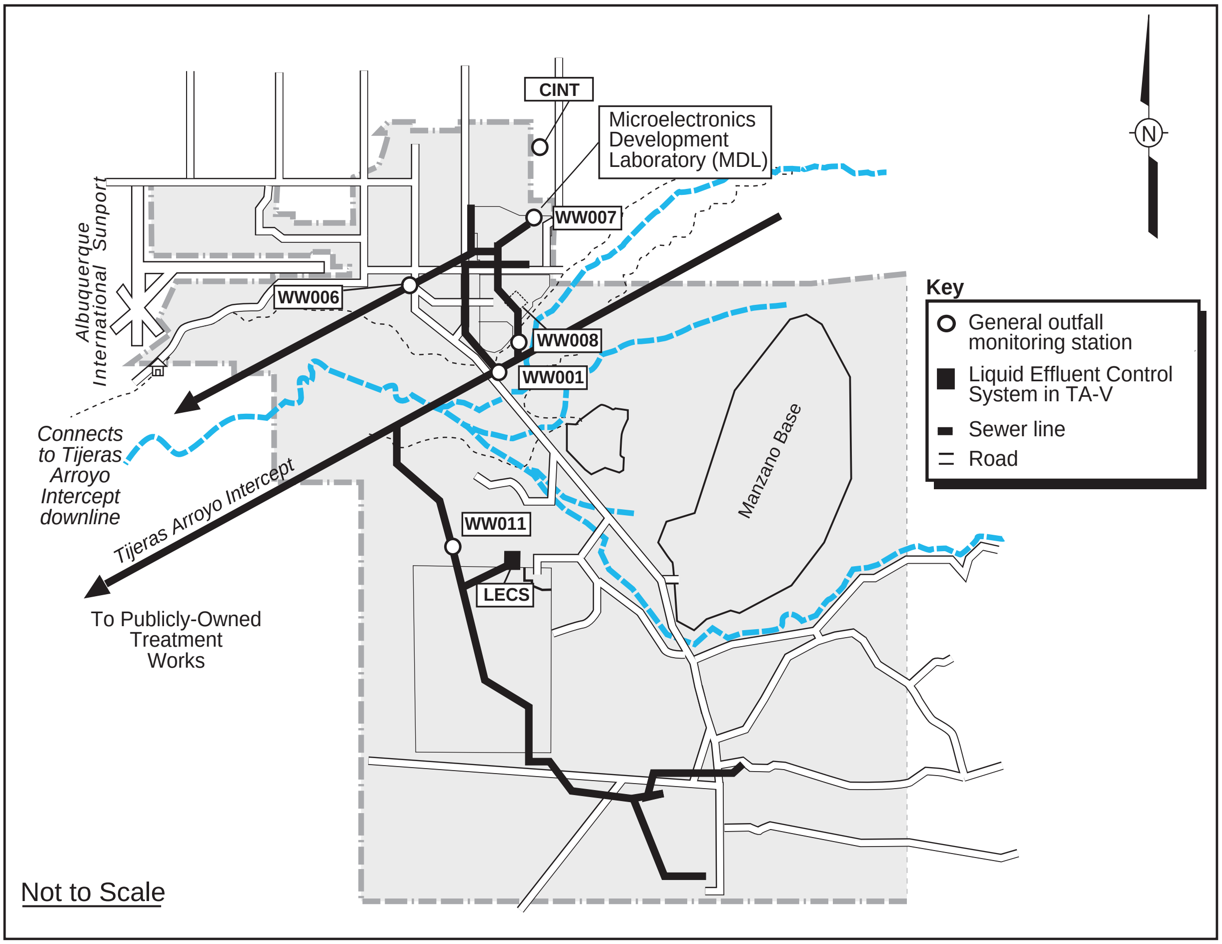



**FIGURE 6-1**. Wastewater Monitoring Station Locations

April 20, 2010. The cleaning solution uses a basic mixture of ammonium hydroxide and hydrogen peroxide to dissolve arsenic-containing deposits from stainless steel parts. The equipment process records suggest that when the cleaning was completed on April 20, 2010, approximately 11 liters of arsenic-contaminated cleaning solution was released to the sanitary sewer system that drains to the Acid Waste Neutralization (AWN) system under Station WW007 (Permit 2069G). The cleaning solution was adjusted for potential hydrogen (pH), but the arsenic concentration remained untreated. Future discharges will require neutralization after the cleaning process prior to discharge to the existing arsenic removal system. Until these modifications are installed all liquid effluent from MOCVD equipment cleaning activities that may contain arsenic compounds will be captured and disposed of as hazardous waste.

***Wastewater Compliance Awards***

The ABCWUA's reporting requirements are defined under its SUWCO. The SUWCO specifies the discharge quality and requirements that the ABCWUA will accept at its POTW. Sandia received five "Gold Pre-Treatment Awards and one Silver Pre-Treatment Award" from the ABCWUA for the 2009 to 2010 reporting year (November 2009 through November 2010). A "Gold Pre-treatment Award" is given based on a facility's 100 percent compliance with reporting requirements and discharge limits set in its permits, or exceptional source reduction and P2. A "Silver Pre-Treatment Award" is given based on a facility's 100 percent compliance with reporting requirements and 90 percent compliance with permit discharge limits.

## 6.1.2 Permitting and Reporting

The ABCWUA Water Utility Department, Water Reclamation Division, implements the EPA's water quality standards under the authority of the SUWCO. Sandia submits semi-annual wastewater reports to the ABCWUA. The primary regulatory drivers for the Wastewater Program and important program documents and reports are listed in Chapter 8.

***Discharge Control Program***

The Water Quality Group (WQG) at SNL/NM maintains a Discharge Control Program to track wastewater discharges resulting from ongoing chemical, manufacturing, and industrial processes conducted at SNL/NM facilities. Facility processes are reviewed for contaminants, concentrations, and discharge frequencies to determine if the effluent will meet regulatory criteria. Once approved, a facility is issued an internal SNL/NM permit, which is reviewed annually. Generally, processes are well characterized and any constituents that are detected over the limits at a wastewater monitoring station can usually 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. Buildings that only produce domestic sewage, such as from lavatories (restrooms and showers), sinks, and fountains are not required to obtain an internal permit.

## 6.1.3 Wastewater Monitoring Stations

SNL/NM has six on-site monitoring stations permitted by the ABCWUA (Figure 6-1). Wastewater permits are listed in Chapter 8, Table 8-1 of this report. All of the wastewater from SNL/NM's six permitted monitoring stations with the exception of Station WW007 (Permit 2069G) and the Center for Integrated Nanotechnologies (CINT) (Permit 2238A) contain a mixture of sanitary and industrial wastewater, which discharges into the ABCWUA sanitary sewer system through the Tijeras Arroyo Intercept (TAI).

The EPA has established categorical pre-treatment standards for specified classes of industrial discharges. Station WW007 (Permit 2069G) monitors the wastewater discharged from the AWN system within the MDL in Technical Area (TA) I. Laboratory discharges from the MDL and buildings which comprise the Microsystems and Engineering Sciences Applications (MESA) complex may also be configured to discharge to this AWN system. The CINT facility also utilizes an AWN system for pre-treatment of its process wastewater. SNL/NM discharges approximately 800,000 to 1,000,000 gallons (gal) of wastewater per day to the public sewer system.

***Wastewater Monitoring***

All outfall monitoring stations are equipped with flow meters which control automatic sampling units and pH sensors that continuously monitor wastewater 24-hours-a-day, 365-days-a-year. An auto-dialer notifies SNL/NM personnel when pH regulatory limits have been exceeded. SNL/NM personnel are required to notify DOE's, National Nuclear Security Administration (NNSA), Sandia Site Office (SSO) personnel of the exceeded limit. In addition, DOE/NNSA/SSO personnel are required to report the exceeded limit to the ABCWUA within 24 hours. Wastewater discharge permits and station characteristics are listed in Table 6-1.

Discharge monitoring Stations WW001 (Permit 2069A), WW006 (Permit 2069F), WW008 (Permit 2069I), and WW011 (Permit 2069K) are manhole-type installations with permanently installed continuous flow measuring and pH recording instrumentation. Wastewater monitoring Station WW007 (Permit 2069G) and the CINT (Permit 2238A) are located within buildings and are also equipped with installed continuous flow measuring and pH recording instrumentation.

**TABLE 6-1.** SNL/NM Wastewater Discharge Permits and Station Characteristics

| Permit | 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 |
| ***Categorical*** | |
| 2069G (WW007) | Laboratory industrial processes Acid waste from MDL activities |
| 2238A (CINT) | Laboratory industrial processes Acid waste from CINT activities |
| ***Not Permitted*** | |
| LECS | Radiological screening of TA-V process water |

**NOTES:** "All waste streams" include both domestic and industrial discharges.
CINT = Center for Integrated Nano-Technologies
LECS = Liquid Effluent Control System
MDL = Microelectronics Development Laboratory
SNL/NM – Sandia National Laboratories, New Mexico
TA-V = Technical Area V

Sandia splits wastewater samples taken from SNL/NM permitted outfalls with the ABCWUA to determine compliance with permit requirements. NMED is notified when sampling is scheduled to occur and is offered the opportunity to obtain samples for analysis. All samples are obtained as 24-hour flow proportional or time-weighted composites. Sandia sends all collected samples to an EPA-approved laboratory for analysis. Sampling results are compared with results obtained by the ABCWUA. Currently, the procedure is to sample randomly from a list of potential pollutants. The ABCWUA determines which parameters it plans to analyze. Monitoring parameters are listed below:

***Wastewater Analyte Parameters***

- Metals - aluminum, arsenic, cadmium, chromium, copper, lead, mercury, molybdenum, nickel, selenium, silver, and zinc.
- Radiological - gamma spectroscopy, gross alpha, gross beta, and tritium.
- General Chemistry - chemical oxygen demand (COD), cyanide, formaldehyde, oil and grease, phenolic compounds, semi-volatile organic compounds (SVOC), soluble fluoride, and volatile organic compounds (VOC).

***Septic Systems***

Sandia maintains three active septic tank systems and one holding tank in remote areas on Kirtland Air Force Base (KAFB), which 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. However, as a Best Management Practice (BMP), Sandia periodically obtains samples from these active septic tank systems prior to pumping and discharge. All septic holding tank records are sent to the State of New Mexico.

### *6.1.4 TA-V Radiological Screening*

SNL/NM maintains research and engineering reactors in TA-V. These reactors and support facilities have the potential to produce radioactive process wastewater that includes liquids from floor drains, lab 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 non-reactor wastewater. Non-reactor wastewater is water from restrooms and non-radioactive laboratory activities. Reactor process wastewater is water from areas that use, process, or store radioactive materials and is channeled to holding tanks where it can be screened for radiological contaminants within the Liquid Effluent Control System (LECS). The LECS was developed as a control system to maintain the integrity of the ABCWUA's sanitary sewer system by collecting, analyzing, and handling SNL/NM reactor process wastewater from TA-V reactor activities. Water samples are analyzed for tritium, gross alpha, gross beta, and gamma spectroscopy to ensure radiological levels meet regulatory standards before the water is released to the public sewer system. If radioactivity levels are detected above regulatory limits, the water will not be released to the sanitary sewer system and an alternative disposal path will be found or the radionuclides will be allowed to decay in place over a matter of days or weeks if the contamination is due to short-lived medical radioisotopes. Once the activity is at or below regulatory levels, the water can be safely discharged to the public sewer system. The LECS consists of three 5,000 gal holding tanks with liquid level and radioactive alarm systems, a control room, and an ion exchange/filtration unit (treatment processor). The LECS is an engineered facility operating within an established safety envelope. Discharges to the sanitary sewer from the LECS and other SNL/NM activities did not exceed standards for radionuclides at any of SNL/NM's wastewater monitoring stations in 2010.

### 6.1.5 Summary of Monitoring Results

During 2010, Sandia split wastewater samples with both the ABCWUA and the NMED. Laboratory analytical results for these split wastewater samples, based on the parameters shown in Section 6.1.3, confirmed that Sandia was in compliance with all NMED and ABCWUA regulations for Permits 2069A, 2069F, 2069I, 2069K and 2238A. As previously stated in Section 6.1.1, Permit 2069G exceeded arsenic limits on April 20, 2010. Compliance sampling of SNL/NM facilities was conducted at the ABCWUA permitted flow basin outfalls during the months of April, August and October during 2010 to ensure that Sandia was in compliance with ABCWUA's discharge requirements. The ABCWUA Industrial Waste Engineer also conducted inspections of individual laboratory operations within the permitted flow basins during the months of April, August and October of 2010. All water discharged from the LECS in 2010 also met federal regulatory standards and DOE orders for radiological levels in wastewater. All analytical results from sampling conducted in 2010 can be found in Appendix A of this report.

### 6.1.6 Sanitary Sewer System Releases in 2010

Reportable occurrences and environmental releases in 2010 are discussed in Chapter 2, Sections 2.2.1 and 2.2.2 of this report. There was one reportable release (ABCWUA permit violation [Permit 2069G]) in 2010.

## 6.2 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 (NMWQCC) regulations as implemented by the NMED Groundwater Bureau. These regulations are designed to protect the groundwater and surface water of the state for potential use as a domestic potable water source. The primary regulations and important program documents are listed in Chapter 8.

### 6.2.1 Surface Discharge Approval and Permitting

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 Internal Surface Discharge

Program (ISDP). Proposed discharges are evaluated for potential contaminants and concentration levels to determine if the discharge complies with strict water quality guidelines for surface releases. Uncontaminated water discharges must also be approved, since large volumes of water discharged in areas of prior contamination (such as Environmental Restoration [ER] sites) could increase infiltration rates and move contaminants deeper into the soil column. If any discharges do not meet surface water quality standards, alternative methods of disposal are found.

***2010 Surface Discharge Activities***

Surface discharge requests are generally 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 discharge requests include discharges made by the Groundwater Protection Program (GWPP) to dispose of well purge water from groundwater monitoring wells. Wells are purged before a representative groundwater sample can be taken. Other surface discharges are requested as a result of fire training activities, the need to flush eyewash stations, and the cleaning of building exteriors. In 2010, 25 individual surface discharge requests were made; all met State of New Mexico standards and were approved.

### 6.2.2 Surface Discharge Releases in 2010

The Surface Discharge Program must be contacted in the event of an accidental release or spill to the ground surface. In 2010, one release met the reporting requirements established by NMED. This release is discussed in Chapter 2, Section 2.2.2 and is summarized below:

1. A surface release to the environment was reported to NMED on May 20, 2010. The release occurred south of Building 887. The release was from a backup in a sanitary sewer line and consisted of domestic sanitary waste. The discharge was stopped within a few minutes of being detected. Based upon the information available, it is believed that a total discharge of approximately 150 gal occurred. The released sanitary discharge traveled west approximately 150 feet (ft) along the paved roadway where approximately 10 gal entered a drop inlet of the storm drainage system. The remaining 140 gal traveled west approximately 150 ft along the paved roadway and then traveled approximately 600 ft to the south along 14$^{th}$ Street Southeast. The material that traveled along the street was swept back into the sanitary sewer system utilizing potable water and the roadway was neutralized with a 10 percent bleach solution. Although this release following cleanup was not considered to be harmful to human health and safety, plant and animal life, and did not cause degradation to the environment it was reported because it constitutes a violation of the terms of SNL/NM's Storm water Multi-Sector General Permit (MSGP) issued by the EPA.

### 6.2.3 Pulsed Power Evaporation Lagoons

The Surface Discharge Program at SNL/NM reports water quality results from routine samples taken from two surface discharge lagoons in TA-IV. Both lagoons are permitted through NMED in Discharge Plan-530 (DP-530). The two surface discharge lagoons are primarily 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 is visually inspected for oil contamination and any oil present is skimmed off prior to discharge to the TA-IV lagoons.

The original DP-530 was issued to SNL/NM for discharges from the pulsed power facilities located in TA-IV to Lagoons #1 and #2 on March 8, 1988. The DP-530 was submitted pursuant to New Mexico Administrative Code (NMAC) 20.6.2.3106 of NMWQCC regulations, and was approved pursuant to 20.6.2.3109 NMAC. A permit renewal application for DP-530 was submitted to NMED and was approved on September 12, 2007 and will expire on September 12, 2012. The monitoring and reporting requirements are listed in Table 6-2.

On October 19, 2010, Lagoon #1 was sampled prior to being discharged to the ABCWUA sanitary sewer system. Laboratory analysis results indicated that all detected constitutes met ABCWUA discharge requirements. Lagoon #1 was cleaned, the liner was inspected and preventative maintenance measures were implemented. During CY 2010, monthly inspections were performed on both lagoons and were documented in checklists filed in Sandia's Customer Funded Records Center (CFRC) and with DOE/NNSA/SSO. In October of 2010, vegetation around Lagoon #2 was removed to protect the liner. No sampling of Lagoon #2 was conducted since only storm water falls into the lagoon from storm events. No surface discharges and no discharges from the pulsed power facilities to Lagoon #2 occurred during 2010.

## 6.3 Storm Water Program

### 6.3.1 Storm Drain System

Storm water runoff flowing over the ground surface has the potential to pick up and transport contaminants. The Storm Water Program works in coordination with the P2 Program, the Surface Discharge Program, Facilities Engineering, and the ER Project to implement measures and BMPs to prevent or reduce potential contaminants from being transported in storm water runoff. Potential contaminants may derive from:

- Oils and solvents from machine shops and manufacturing areas,
- Vehicle residues from streets and parking lots,
- Hazardous chemicals and metals from waste handling facilities,
- Residual radioactive and hazardous constituents from Solid Waste Management Units (SWMU),
- Building material contaminants from construction activities, and
- Pesticides and fertilizers from landscaped areas.

Sandia controls the potential contaminants that may be picked up by storm water runoff by routing all industrial waste water to the sanitary sewer and storing most chemicals indoors. Sandia also limits

**TABLE 6-2.** NMWQCC Monitoring and Reporting Requirements

| Action | Frequency | Reporting |
|---|---|---|
| Inspection of Lagoons | Monthly | Documented in checklists |
| Drain, clean and inspect lagoon and liner | Annually | Annually |
| Water-level readings | Monthly | Annually |
| Inspect sump stations and clean as needed | Quarterly | Annually |
| Major cations, anions, and TDS | Biennially | Biennially |
| Purgeable organics using EPA Method 8240 | Biennially | Biennially |
| Extractable organics using EPA Method 8270 | Biennially | Biennially |

**NOTES:** EPA = U.S. Environmental Protection Agency
NMWQCC = New Mexico Water Quality Control Commission
TDS = total dissolved solids

storm water contact with chemical storage containers and carefully controls runoff in areas where wastes, chemicals, and oils are stored or handled. Secondary containments for all outdoor oil storage tanks and chemical containers prevent potential pollutants from being transported in storm water runoff. Some facilities, such as the Hazardous Waste Management Facility (HWMF) and the Radioactive and Mixed Waste Management Facility (RMWMF) are designed to divert all runoff from the facility to a lined catchment basin. Water that accumulates in these basins evaporates. If evaporation is not adequate due to meteorological conditions, the accumulated water is evaluated and pumped to either the storm drain system or to the sanitary sewer for disposal. Per the Resource Conservation and Recovery Act (RCRA) Part B permit, discharge of the water is allowed if there have been no spills or releases or no visible sheen or excessive debris. If discharged to the sanitary sewer, approval must be obtained from the ABCWUA through DOE/NNSA/SSO.

***NPDES Regulations***

NPDES regulations, under the Clean Water Act (CWA), require any point source discharges to be permitted. Any runoff that flows into the Tijeras Arroyo through a channel, arroyo, conduit, or pipe is considered a discharge point. Overland surface flow or "sheet" flow that drains into Tijeras Arroyo is not considered a point source discharge.

The State of New Mexico has defined "Surface Waters of the State" to include "Waters of the U.S." and all other surface water in the State. In order to assist New Mexico in protecting its water resources, the EPA can apply NPDES regulations to discharges to New Mexico's surface waters, even if those waters are not "Waters of the U.S."

As shown in Figure 6-2, Tijeras Arroyo enters KAFB from the northeast, flows just south of TA-I, TA-II, and TA-IV, exits at KAFB's west boundary, and continues about eight miles to its discharge point at the Rio Grande River. The arroyo has created a significant topographic feature across KAFB where erosion of unconsolidated basin sediments has resulted in a channel over one half mile wide in some areas.

***Watersheds at SNL/NM***

NPDES permits are required if storm water runoff discharges to "Waters of the U.S." or "Surface Waters of the State." Sandia facilities in TA-I, TA-II, and TA-IV have storm drains, culverts, and channels that divert storm water runoff to discharge points on the north side of Tijeras Arroyo, which is classified as "Waters of the U.S." Sandia also conducts various activities in remote mountain and canyon areas in the Arroyo del Coyote watershed, which empties into Tijeras Arroyo northwest of the KAFB Golf Course. Activities in all of these areas are evaluated for possible NPDES permitting.

Drainages south of the Arroyo del Coyote watershed are generally short and undeveloped. Runoff in this area infiltrates quickly into highly permeable soils. Discharges from these areas do not reach any designated "Waters of the U.S."; but they do discharge to "Surface Waters of the State;" therefore, activities are evaluated for possible NPDES permits for facilities in these areas. TA-III, TA-V, and several remote sites are located in this area.

***NPDES Permit***

The EPA provides regulatory oversight for SNL/NM's Storm Water Program. Operators must submit a Notice of Intent (NOI), implement control measures, sample storm water runoff for comparison to national benchmark values, and develop site-specific Storm Water Pollution Prevention Plans (SWP3). A NOI was submitted to the EPA for coverage under the new 2008 MSGP before the January 5, 2009 deadline and in November 2009 EPA issued a new permit.

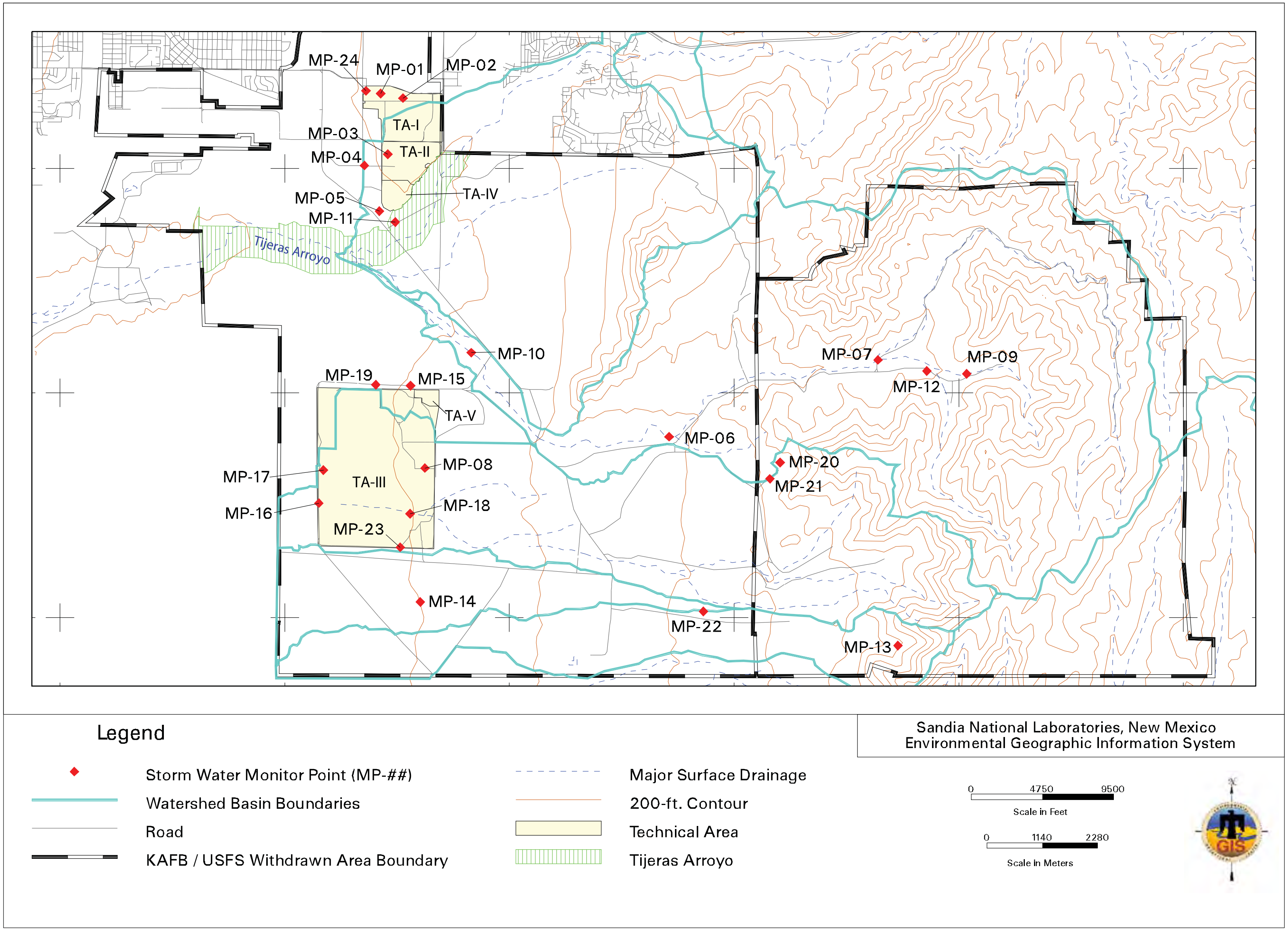



**FIGURE 6-2.** Storm Water Monitoring Point Locations at SNL/NM

In 2009, the existing SWP3 was updated to comply with the new 2008 MSGP requirements. Key facilities affected by NPDES regulations are listed in Table 6-3. Chapter 8 lists all applicable regulations and program documents.

A construction permit requires protection of storm water runoff during and after construction. All areas of the site that are susceptible to erosion must be stabilized upon completion of the project. A General Construction Permit (GCP) 2003 was issued for a five-year term, and expired July 1, 2008. The EPA issued a GCP in 2008 that is in effect from June 30, 2008 to June 30, 2010. On January 28, 2010 the EPA extended the CGP by one year, which will expire on or before June 30, 2011.

During 2010, 14 storm water construction permits were active. Construction permits are listed in Chapter 8, Table 8-1.

### 6.3.2 Storm Water Monitoring Stations

Figure 6-2 illustrates the storm water monitoring point locations. Using the locations of the MSGP sites along with the watershed boundaries and flow patterns the storm water monitoring points were located at points that would best be suited to collect a representative sample of storm water runoff. The locations identified were then checked in the field where slight adjustments were made. This understanding between the hydrologic connection between the watershed outfalls, drainage patterns and locations of MSGP sites allowed for the selection of the monitoring points where representative samples could be collected.

### 6.3.3 Routine Inspections

All routine inspection results are attached to the SWP3. Routine inspections include the following:

- Monitoring station inspections are conducted monthly to ensure that samplers and other equipment are functioning properly.
- Material storage area inspections are conducted quarterly. All waste handling areas, vehicle and equipment cleaning areas, and loading and unloading areas are inspected for uncovered and unprotected potential contaminant sources and spills. These inspections increase personnel awareness and responsibility for storm water P2.
- Wet weather inspections (visual monitoring) are conducted quarterly during a storm event, if possible, but generally during the rainy season from April through September. Samples are collected and visually inspected for foaminess, clarity, and the presence of oil. The pH of the discharge is also measured and recorded. These inspections also provide an opportunity to check for broken levees and floating debris.
- Dry weather inspections are conducted quarterly when storm drains and ditches are dry, primarily to detect illicit discharges. In general, only storm water is allowed in the storm drain system; however, with approval from the Surface Discharge Program, water that meets NPDES permit conditions can be discharged to storm drains. An example of NPDES permit-approved discharges would be water used during fire training exercises or fire hydrant testing. Dry weather inspections also provide an opportunity to inspect ditches for excess vegetation, accumulated sediment, and debris. Storm channels are cleaned out annually, or as necessary.

Annual inspections of all permitted facilities and the entire storm water system are conducted. After the inspections have been completed, a report is generated indicating the extent of the inspections and certifying that is in compliance with the NPDES permit. Any inconsistency between the SWP3

**TABLE 6-3.** SNL/NM Facilities Subject to Storm Water Permitting

*These facilities are in areas where storm water can potentially drain to Tijeras Arroyo*

| Description of SIC Code* | Potential Pollutants and Impacts | Applicable SNL/NM Facilities** |
|---|---|---|
| **NPDES Multi-Sector Storm Water Permit** | | |
| Scrap and Waste Recycling | - Various solid objects with potential residual surface contamination | - Reapplication and Storage Yard<br>- Solid Waste Transfer Station |
| Hazardous Waste Treatment, Storage, or Disposal Facilities | - Regulated hazardous chemical and radioactive waste | - HWMF<br>- Manzano Storage Complex<br>- RMWMF<br>- CWL<br>- TTF<br>- AHCF<br>- CAMU<br>- SWMUs (including those in Lurance and Madera Canyons) |
| Electronic and Electrical Equipment Manufacturing | - Raw chemical storage such as acid and sodium hydroxide<br>- Electroplating processes | - 858 Complex<br>- AMPL<br>- CINT<br>- NGF |
| Fabricated Metal Products | - Metal Fabrication<br>- Turnings | - Machine Shop |
| **Short-Term Construction Permits** | | |
| Construction Permits - 2010 | - Building material pollutants<br>- Disturbed soil | - 20th Street Stockpile Area<br>- Mixed Waste Landfill Cover<br>- TA-III Borrow Site<br>- Heating Systems Modernization<br>- I Ave and 11th Street Mall Waterline Project<br>- 9940 Complex<br>- Building 957 Parking Lot<br>- Liquid Natural Gas<br>- Thunder Range<br>- TA II Escarpment<br>- Ion Beam Laboratory<br>- National Solar Thermal Test<br>- TCR Phase II<br>- 12th Street Roadway |

**NOTES:** *The EPA requires a National Pollution Discharge Elimination System (NPDES) Storm Water Permit for all industrial facilities that have processes defined in the Standard Industrial Classification (SIC) codes listed in Appendix A of 40 CFR 122.

**Applicable facilities are monitored under the expanded Storm Water Program, which was in effect in October 2001. The expanded program is documented in the revised Storm Water Pollution Prevention Plan (SWP3) (SNL 2010d).

AHCF = Auxiliary Hot Cell Facility
AMPL = Advanced Manufacturing Process Laboratory
CAMU = Corrective Action Management Unit
CINT = Center for Integrated Nano Technology
CWL = Classified Waste Landfill
HWMF = Hazardous Waste Management Facility
NGF = Neutron Generation Facility
RMWMF = Radioactive & Mixed Waste Management Facility
SNL/NM = Sandia National Laboratories, New Mexico
SWMU = Solid Waste Management Unit
TA = Technical Area
TCR = Test Capabilities Revitalization
TTF = Thermal Treatment facility

and conditions at the facilities is noted in the report. If changes to the SWP3 are required as a result of these inspections, revisions are initiated. If potential pollution problems are uncovered, they are noted in the report along with a schedule for addressing those problem areas.

***Sampling Protocols***

Quarterly benchmark monitoring is the only analytical monitoring is required at SNL/NM under the 2008 MSGP. Annual effluent limitation monitoring; State monitoring; and impaired monitoring are not currently required.

An alternative to quarterly benchmark monitoring is allowed under the MSGP due to irregular storm water runoff associated with the semi-arid climate in New Mexico and is shown below:

- Period 1: June,
- Period 2: July,
- Period 3: August and,
- Period 4: September.

Table 6-4 shows the parameters to be sampled for each industry sector except Sector AC, which does not have monitoring under the 2008 MSGP.

**TABLE 6.4.** MSGP Storm Water Monitoring Requirements During Calendar Year 2010

| Pollutant | MSGP Sector/Section | Benchmark Value (mg/L) |
|---|---|---|
| Total Recoverable Arsenic | K | 0.15 |
| Total Recoverable Cadmium | K | 0.0029 |
| Total Cyanide | K | 0.022 |
| Total Recoverable Lead | N, K, AA | 0.122 |
| Total Recoverable Mercury | K | 0.0014 |
| Total Recoverable Magnesium | K | 0.064 |
| Total Recoverable Selenium | K | 0.005 |
| Total Recoverable Silver | K | 0.0065 |
| Total Recoverable Aluminum | AA, N | 0.75 |
| Total Recoverable Copper | N | 0.0189 |
| Total Recoverable Iron | AA, N | 1.0 |
| Total Recoverable Zinc | AA, N | 0.16 |
| Chemical Oxygen Demand | K, N | 120 |
| Ammonia | K | 2.14 |
| Nitrate plus Nitrite Nitrogen | AA | 0.68 |
| Total Suspended Solids | L, N | 100 |

**NOTES:** mg/L = milligram per liter
MSGP = Multi-Sector General Permit

After collection of four samples, if the average of the four monitoring values for any parameter does not exceed the benchmark then the sampling requirements for that parameter have been fulfilled for the permit term. If the average of the four values exceeds the benchmark then selection, installation, and implementation of the control measures must be reviewed to determine if modification(s) are necessary.

If it is determined that the average concentration exceeds benchmark value(s) is due solely to the presence of that pollutant in the natural background, corrective action or additional monitoring is not required provided that:

- The average concentration of the benchmark monitoring results is less than or equal to the concentration of the pollutant in the natural background,
- The supporting rational and any data, literature studies that describe the levels of natural background pollutants in the storm water discharge is documented and maintained with the SWP3, and
- EPA is notified on the final quarterly benchmark monitoring report that the benchmark exceedances are attributable solely to natural background pollutant levels.

After a rainfall of sufficient intensity and duration (as defined in the regulation), storm water runoff flowing through each monitoring station is collected as a grab sample by the automatic sampler. The discharge is collected within the first 30 minutes of the runoff event to allow for the sampling of any residues picked up in the soil upstream of the station. All samples are sent to off-site laboratories and analyzed according to protocols established by the EPA.

### 6.3.4 2010 Activities

***2010 Sampling Results***

Quarterly visual sampling and analytical sampling was conducted in 2010. All monitoring data collected must be submitted to EPA no later than 30 days after receiving the complete laboratory results for all monitored outfalls for the reporting period (Section 6.3.3). The monitoring data as submitted to the EPA along with the environmental surveillance sampling results can be found in Appendix D of this report.

Laboratory results received in September 2010 from rainfall runoff collected at SWMP-11 exceeded benchmark values for Total Cadmium and Total Silver therefore controls were installed to minimize on-site erosion and subsequent sediment transport in the drainage area to SWMP-11. These controls will be evaluated by continuing sampling of the storm water runoff at SWMP-11 and comparing these results to the benchmark values.

Visual observations of storm water were performed when there was adequate runoff to collect a sample. The majority of the visual observations of storm water quality were done in the summer months and these assessments did not produce any indications of storm water pollution.

## 6.4 Oil Storage & Spill Control

The oil storage capacity at SNL/NM was reduced from 3.6 million gal in 51 Above Storage Tanks (AST) and five Underground Storage Tanks (UST) to 2.1 million gal in 46 ASTs and five USTs. This does not include oil-containing equipment and transformers. Additional oil storage capacity in 55 gal drums occurs throughout the site on an as needed basis. All oil storage sites with regulated containers must be equipped with secondary spill containment. Secondary containment structures include concrete-lined basins, retaining walls, containment reservoirs, earthen berms, sloped pads, trenches, and containment pallets.

A Spill Prevention Control and Countermeasures (SPCC) Plan is required under the CWA. SNL/NM's SPCC Plan was revised in 2005 to incorporate changes to 40 Code of Federal Regulations (CFR) 112 and 20.5 NMAC. The focus of these 40 CFR 112 regulations is to protect specifically defined waterways, or "navigable waters of the United States" from potential oil contamination. "Navigable waters" is a broad term that includes rivers, lakes, oceans, and water channels (tributaries), such as streambeds and arroyos that connect to a river. This applies to the Tijeras Arroyo, which discharges to the Rio Grande. The 20.5 NMAC regulations are to reduce, mitigate and eliminate the threats to the environment posed by petroleum products released from storage tanks.

SNL/NM's SPCC Plan describes oil storage facilities and the mitigation controls in place to prevent inadvertent discharges of oil. Facilities at SNL/NM subject to the regulations include:

- Oil storage tanks (USTs and ASTs),
- Bulk storage areas (multiple containers), and
- Temporary or portable tanks.

Table 8-1 lists the permit numbers for those tanks that are registered with NMED. SNL/NM's State of New Mexico Owner ID Number is 14109.

***UST***

Five USTs are currently operating at SNL/NM. Two 20,000 gal fiberglass USTs at SNL/NM are registered with NMED; one additional UST, used solely for emergency power generation, is exempt from New Mexico requirements, but is covered by federal regulations in 40 CFR 280; and two USTs in TA-III are exempt from state and federal requirements because they contain insignificant quantities of regulated substances.

***AST***

Forty-six ASTs are currently operating at SNL/NM. In 2002, the State of New Mexico passed oil storage regulations that required the registration of all oil storage tanks with a storage capacity greater than 1,320 gal, but less than 55,000 gal. Seven ASTs at SNL/NM are registered with NMED.

# 7.0 Quality Assurance

## 7.1 Corporate Level Quality Assurance (QA)

The Integrated Laboratory Management System (ILMS) is the framework by which Sandia Corporation (Sandia) manages all work done at the Laboratories. It reflects the major functions performed by the Laboratories as well as the management structure and the management information used to actually plan, execute, and monitor our work (Figure 7-1). ILMS is the means by which Sandia ensures long-term customer confidence by improving management performance and effectiveness, achieving efficiencies to enhance mission work, and satisfying National Nuclear Security Administration (NNSA) and the U.S. Department of Energy's (DOE) contractor assurance requirements.

Sandia deploys responsibility and accountability for implementing and putting into action the QA Program elements specified in International Organization for Standardization (ISO) 9001-2000 (IOS 2008), the Contractor Requirements Document of DOE Order 414.1C, *Quality Assurance* (DOE 2005), and regulation 10 Code of Federal Regulations (CFR) 830, Subpart A, *Quality Assurance*, via policy statements, processes, and procedures; and executing the actions specified in those processes and procedures.

Sandia management is responsible for ensuring the quality of its products and for assessing its operations, programs, projects, and business systems; identifying deficiencies and effecting continuous improvements.


**FIGURE 7-1**. Sandia's Integrated Laboratories Management System (ILMS)
*(The Corporate Work Process is illustrated in the five points of the star.)*

### 7.1.1 Environment, Safety & Health (ES&H) Policy Statement Requirement

Sandia is committed to protecting the environment and to preserving the health and safety of workers and the community. Sandia considers the protection and preservation of the environment and the safety and health of its employees, contractors, visitors, and the public to be critical to its success.

It is the policy of Sandia to protect Members of the Workforce and the public, prevent incidents, integrate environmental stewardship and sustainability throughout the life cycle of its activities and to conserve natural resources and protect the environment.

DOE's Integrated Safety Management System (ISMS) is a key element of Sandia's ILMS. ISMS provides the framework for managing ES&H activities and functions while integrating them into all Sandia operations.

### 7.1.2 Integrated Laboratory Management System (ISMS)

Sandia's corporate ES&H program mandates compliance with all applicable laws, regulations and DOE directives that are included in the Prime Contract between DOE and Sandia. As appropriate, internal corporate policy and permit requirements are included. Sandia is committed to performing work safely and ensuring protection of the Members of the Workforce, the public, and the environment.

***ES&H performance at Sandia<br>is based upon the<br>Five Safety Management Core Functions<br>and the<br>Seven Guiding Principles of ISMS.***

Sandia is committed to environmental protection for current and future generations. This commitment includes identifying and mitigating potential risks to the environment, and incorporating environmental management as an integrated element of all work.

***Environmental Management System (EMS)***
Sandia is committed to integrating environmental protection with its mission and recognizes that the environment must be protected and preserved for current and future generations. Sandia takes this responsibility seriously and expects employees, contractors, and visitors to proactively protect the environment and natural resources. This responsibility includes identifying and mitigating potential risks to the environment and incorporating environmental management in daily work activities.

In compliance with DOE Order 450.1A, *Environmental Protection Program*, Sandia has implemented an EMS as part of the ISMS.

The vision of the Sandia EMS is to implement a system that is a model within the NNSA complex and is consistent with the ISO 14001 Standard. Sandia National Laboratories, New Mexico (SNL/NM) received ISO 14001 certification in 2009.

### *Five Core Safety Management Functions of ISMS*

There are five core safety management functions which provide the necessary work control structures, planning and execution at the activity level to ensure the safety of the Members of the Workforce, the public, and the environment:

1. ***Define the Scope of Work*** – Missions are translated into work, expectations are set, tasks are identified and prioritized, and resources are allocated.
2. ***Analyze the Hazards*** – Hazards and environmental impacts associated with the work are identified, analyzed, categorized, and communicated.
3. ***Develop and Implement Hazard Controls*** – Applicable standards and requirements are identified and agreed upon. Controls to prevent/mitigate hazards and environmental impacts are identified, the safety envelope is established, and controls are implemented.
4. ***Perform Work Within Controls*** – Readiness is confirmed and work is performed safely, and in an environmentally responsible manner.
5. ***Provide Feedback and Continuous Improvement***–Information and feedback on the adequacy of controls is gathered, opportunities for improving the definition and planning of work are identified and implemented, and line and independent oversight is conducted.

Figure 7-2 illustrates the five core safety management functions of ISMS.

### *Seven Guiding Principles of ISMS*

Sandia shall, in the performance of work, ensure implementation of the following Seven Guiding Principles of ISMS:

1. ***Line Management is Responsible for Safety*** – Line management is responsible for the protection of employees, the public, and the environment. Line management includes those contractor and subcontractor employees managing or supervising employees performing work.
2. ***Clear Roles and Responsibilities are Defined*** – Clear and unambiguous line of authority and responsibility for ensuring ES&H is established and maintained at all organizational levels.
3. ***Worker Competence Is Commensurate with Responsibilities*** – Personnel possess the experience, knowledge, skills, and abilities that are necessary to discharge their responsibilities.


**FIGURE 7-2**. ISMS Star

4. ***Priorities are Balanced*** **–** Resources are effectively allocated to address ES&H, programmatic, and operational considerations. Protecting employees, the public, and the environment is a priority whenever activities are planned and performed.

5. ***Safety Standards and Requirements are Identified*** **–** Before work is performed, the associated hazards are evaluated and an agreed-upon set of ES&H standards and requirements are established which, if properly implemented, provide adequate assurance that employees, the public, and the environment are protected from adverse consequences.

6. ***Hazard Controls are Tailored to Work Being Performed*** **–** Administrative and engineering controls to prevent and mitigate hazards are tailored to the work being performed and associated hazards. Emphasis should be on designing the work and/or controls to reduce or eliminate the hazards and prevent accidents and unplanned releases and exposures.

7. ***Operations Authorization Exists*** **–** The conditions and requirements to be satisfied for operations to be initiated and conducted are established and agreed-upon by DOE and the contractor. These agreed-upon conditions and requirements are requirements of the contract and binding upon the contractor. The extent of documentation and level of authority for agreement shall be tailored to the complexity and hazards associated with the work and shall be established in a Safety Management System.

## 7.2 Environmental Program Quality Assurance

Environmental samples are collected by personnel in various programs and analyzed for radiological and non-radiological contaminants. Some sampling is specifically mandated by regulations to meet compliance, while other sampling activities are carried out in accordance with DOE Orders.

***Environmental Sampling***
Environmental sampling is conducted in accordance with program-specific Sampling and Analysis Plans (SAP) or Work Plans which contain applicable QA elements. These documents meet appropriate federal, state, and local regulatory guidelines for conducting sampling and analysis activities.

***Program-Specific SAPs***
Each program involved in environmental monitoring and sampling develops and follows a relevant SAP. Project SAPs include critical elements, such as procedures for sample collection, sample preservation and handling, sample control, references to analytical methods and analyte lists, laboratory quality control (QC) and procedures, required limits of detection, known potential matrix interferences, field QC, health and safety, schedules and frequency of sampling, data review, data acceptability, and reporting.

***Sample Management Office (SMO)***
Environmental samples are packaged, shipped, and tracked to off-site (contracted) laboratories by the SMO. The SMO is responsible for QA and QC once the samples are relinquished to the SMO by field team members.

Some samples are processed and analyzed for radiological constituents by the SNL/NM Radiation Protection Sample Diagnostics (RPSD) laboratory in accordance with RPSD procedures.

The SMO's roles and responsibilities include providing guidance and sample management support for field activities. However, each distinct program is responsible for its overall adherence and compliance regarding any sampling and analysis activity performed.

***Selection of a Contract Laboratory***
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 SMO* (SNL 2010c). All laboratories must employ U.S. Environmental Protection Agency (EPA) test procedures wherever 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 (SOW). All calibrations and detection limits must be verified before sample analysis and data reporting. Once a laboratory has passed initial appraisal and has been awarded a contract, the SMO is responsible for continuously monitoring laboratory performance to ensure that the laboratories are audited annually and meet their contractual requirements.

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.

***Project QC Samples***
Project-specified QC samples are submitted to contract laboratories in order to meet project Data Quality Objectives (DQO) and SAP requirements. Various field QC samples are collected to assess the quality and final usability of the data. Errors that can be introduced into the sampling process include potential sample contamination in the field or during the transportation of samples, some of which are unavoidable. Additionally, the variability present at each sample location can also affect sample results.

***Laboratory QC***
With each SNL/NM sample batch, laboratory QC samples are concurrently prepared at defined frequencies and analyzed in accordance with established methods. Analytical accuracy, precision, contamination, and matrix effects associated with each analytical measurement are determined.

QC sample results are compared either to statistically established control criteria or prescribed acceptance control limits. Analytical results generated concurrently with QC sample results within established limits are considered acceptable. If QC 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 SOW and laboratory procedures. QC sample summaries are included in analytical reports prepared by contract laboratories for SNL/NM.

## 7.3 2010 Sample Management Office (SMO) Activities

In 2010, the SMO processed a total of 4,137 samples in support of Sandia projects, including:

- Environmental Monitoring (air and water),
- Terrestrial Surveillance,
- Long-Term Stewardship (LTS),
- Waste characterization,
- Decontamination and Demolition (D&D), and
- Environmental Restoration (ER).

**SMO Sample Processing**

The SMO processed the following types of samples in 2010 in support of SNL/NM projects:

- Radioactive waste
- Mixed waste
- Hazardous waste
- D&D, D&D swipes and materials
- Sludges and liquids
- Soil
- Groundwater
- Decon water
- Solid waste
- Air
- Wastewater effluent
- Surface water
- Storm water
- Soil gas
- Air filters

Of these, 3,938 were for environmental monitoring and surveillance projects. Compared to FY 2009, this was a 28 percent increase in sample volume. A total of 860 samples were submitted as field and analytical QC samples to assist with data validation and decision making.

SMO contract laboratories perform work in compliance with the Sandia SOW for analytical laboratories (Puissant 2009).

***Inter-Laboratory Comparisons***

SMO contract laboratories are required to participate in the DOE Mixed Analyte Performance Evaluation Program (MAPEP). They also participate in commercial vendor programs designed to meet the requirements given in the proficiency testing section (Chapter II) of the National Environmental Laboratory Accreditation Conference (NELAC) Standard. SMO contract laboratories have a history of achieving a 90 percent or greater success rate during these comparisons. Acceptable results are based either on established control limits (as stated in the applicable methods) or statistically applied acceptance windows as determined by the performance evaluation provider. Windows are typically two or three standard deviations around the true value.

***Laboratory QA***

In 2010, the SMO continued on-site data package assessments and validation at the NELAC approved laboratories used by Sandia. Data packages (including a wide array of analysis methods) are requested at the time of the on-site visit. The laboratories are not notified in advance and do not know which data packages will be assessed. The handling history of the data package is carefully reviewed from sample receipt to data completion by retracing each step through documentation files. Specific checks for documentation completeness, proper equipment calibration, and batch QC data are made. These assessments focus on data defensibility and regulatory compliance.

During 2010, Sandia employed the following contract laboratories to perform analysis of SNL/NM samples:

- *General Engineering Laboratories (GEL)* in Charleston, South Carolina.
- *Test America Inc.* (formerly Severn Trent) in St. Louis, Missouri; Costa Mesa, California; and Austin, Texas.
- *Southwest Research Institute (SWRI)* in San Antonio, Texas.
- *Babcock & Wilcox Technical Services Group, Inc. (BWX) Technologies (formerly BWXT Services)* in Lynchburg, Virginia.

***QA Audits***
The DOE Consolidated Audit Program (DOECAP) conducted audits in 2010 at the primary SMO contract laboratories using DOECAP Quality Systems Analytical Services (QSAS) requirements. The audit reports, responses from the labs, and closure letters are all posted and tracked through the DOECAP website. The SMO works closely with the contract laboratories to expeditiously resolve audit findings. Decisions regarding sample distribution to contract laboratories are based on audit information, including outstanding corrective actions. In 2010, no Priority-1 findings that impacted SMO work were documented during laboratory audits. All corrective actions were expeditiously resolved.

***Data Validation and Records Management***
Sample collection, Analysis Request and Chain-of-Custody (ARCOC) documentation and measurement data were reviewed and validated for each sample collected. Analytical data reported by the laboratories were reviewed to assess laboratory and field precision, accuracy, completeness, representativeness, and comparability with respect to method compliance and the DQOs of the particular program.

The following sources reviewed and validated data at a minimum of three levels:

1. The analytical laboratory, where data was validated according to the laboratory's QA plan, Standard Operating Procedures (SOP), and client-specific requirements,

2. A qualified member of Sandia's SMO staff, who reviews the analytical reports and corresponding sample collection and ARCOC documentation for completeness and laboratory contract compliance, and

3. A Sandia project leader, who is responsible for program objectives, regulatory compliance, and project-specific data quality requirements. The project leader makes the final decision regarding the usability and reporting of the data.

Additionally, all groundwater monitoring data, site wide confirmatory data, and a specified percentage of other program data are validated to detailed method-specified requirements and qualified in accordance with the *Data Validation Procedure for Chemical and Radiochemical Data* (SNL 2007).

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# 8.0 References, Regulations & Standards for Environmental Programs


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## *EXECUTIVE ORDERS*

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## *DOE DIRECTIVES*

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## *CODE OF FEDERAL REGULATIONS*

**10 CFR 830** *Nuclear Safety Management*

**40 CFR 50** *National Primary and Secondary Ambient Air Quality Standards*

**40 CFR 60** S*tandards of Performance for New Stationary Sources*

**40 CFR 61** N*ational 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 82** *Protection of Stratospheric Ozone*

**40 CFR 112** *Oil Pollution Prevention*

**40 CFR 122** *EPA Administered Permit Programs: The National Pollutant Discharge Elimination System (NPDES)*

**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 U.S.C. §1996)
- Archaeological Resources Protection Act (ARPA) of 1979 (16 U.S.C. §470aa )
- Atomic Energy Act (AEA) of 1954 (42 U.S.C. §2011 et seq.) (Amended by the Price-Anderson Act)
- Clean Air Act (CAA) and CAA Amendments (CAAA) of 1990 (42 U.S.C. §7401)
- Clean Water Act (CWA) of 1977 (the Federal Water Pollution Control Act) (33 U.S.C. §1251)
- Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 (42 U.S.C. §9601) Amended by the Superfund Amendments and Reauthorization Act (SARA)
- Emergency Planning and Community Right to Know Act (EPCRA) of 1986 (42 U.S.C. §11001 et seq.) (Also known as SARA Title III.)
- Endangered Species Act (ESA) (16 U.S.C. §1531 et seq.)
- Federal Facility Compliance Act (FFCA) of 1992 (42 U.S.C. §6961)
- Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) (7 U.S.C. §136)
- Migratory Bird Treaty Act (MBTA) of 1918, as amended (16 U.S.C. §703 et seq.)
- National Environmental Policy Act (NEPA) of 1969 (42 U.S.C. §4321)
- National Historic Preservation Act of 1966, as amended (16 U.S.C. §470 et seq.)
- Pollution Prevention Act of 1990 (42 U.S.C. §13101 et seq.
- Price-Anderson Amendments Act (PAAA) (42 U.S.C. §2282 et seq.) (see Atomic Energy Act)
- Resource Conservation and Recovery Act (RCRA) of 1976 (42 U.S.C. §6901 et seq.)
- Safe Drinking Water Act (SDWA) (42 U.S.C §300f)
- Superfund Amendments and Reauthorization Act (SARA) of 1986 (see CERCLA)
- Toxic Substances Control Act (TSCA) of 1976 (15 U.S.C. §2601 et seq.)

**Note:** U.S.C. = United States Code

## *APPLICABLE LOCAL AND STATE LAWS AND REGULATIONS FOR ENVIRONMENTAL PROGRAMS*

### *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*

### *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*

### *Miscellaneous*

NMSA 76-4-1 et seq. *New Mexico Pesticide Control Act*
21.17.50 NMAC, *Pesticides*

### *Oil Storage and Spill Containment*

#### *Oil Storage Programs*
20.5 NMAC, *Petroleum Storage Tanks*

### *Waste Management*

#### *Hazardous Waste Management Program*
*New Mexico Hazardous Waste Act* (NMSA 1978, §74-4-1 et seq.)
20.4.1 NMAC, *Hazardous Waste Management*

#### *Solid Waste Program*
*New Mexico Solid Waste Act* (NMSA 1978, §74-9-1 et seq.)
20.9 NMAC, *Solid Waste Management*

**TABLE 8-1.** Summary of Environmental Permits and Registrations in Effect During Calendar Year 2010

| Permit Type and/or Facility Name | Location | Permit Number | Issue Date | Expiration Date | Regulatory Agency |
|---|---|---|---|---|---|
| **SEWER WASTEWATER** | | | | | |
| General | WW001 Station Manhole, south of TA-IV at Tijeras Arroyo | 2069 A | 7/17/08 | 2/28/13 | ABCWUA |
| General | WW006 Station Manhole, at Pennsylvania Avenue | 2069 F | 6/17/10 | 3/31/14 | ABCWUA |
| Microelectronics Development Laboratory (MDL) | WW007 Station Manhole, TA-I | 2069 G | 5/5/10 | 2/28/15 | ABCWUA |
| General | WW008 Station Manhole, south of TA-II at Tijeras Arroyo | 2069 I | 6/15/10 | 8/31/14 | ABCWUA |
| General | WW011 Station Manhole, north of TA-III (includes TAs-III and V, and Coyote Test Field sewer lines) | 2069 K | 5/25/10 | 10/31/14 | ABCWUA |
| Center for Integrated Nanotechnologies (CINT) | CINT | 2238A | 1/5/07 | 4/30/11 | ABCWUA |
| **SURFACE DISCHARGE** | | | | | |
| Pulsed Power Development Facilities (Discharge Plan) | TA-IV, Lagoons I and II | DP-530 | 9/21/07 | 9/21/12 | NMED |
| **UNDERGROUND STORAGE TANKS (UST)** | | | | | |
| UST (20,000 gallons) | TA-I | 1368 | 6/1/09 | 6/01/10 | NMED |
| UST (20,000 gallons) | TA-I | 1369 | 6/1/09 | 6/01/10 | NMED |
| **ABOVE GROUND STORAGE TANKS (AST)** | | | | | |
| AST / 2,000 | TA-I | 1370 | 6/1/09 | 6/01/10 | NMED |
| AST / 5,000 | TA-III | 1370 | 6/1/09 | 6/01/10 | NMED |
| AST / 5,500 | CTF | 1370 | 6/1/09 | 6/01/10 | NMED |
| **STORM WATER** | | | | | |
| **NPDES INDUSTRIAL PERMITS** | | | | | |
| National Pollution Discharge Elimination System (NPDES) "Multi-sector General" Permit | Storm water discharges from Industrial Activities at SNL/NM on KAFB | SNL/NM – NMR05GQ63<br>DOE/SSO – NMR05GP29 | 10/09<br>11/09 | 9/13<br>9/13 | EPA |
| National Pollution Discharge Elimination System (NPDES) "Multi-sector General" Permit | Storm water discharges from Industrial Activities at the FAA/AANC/NDI Validation Center | SNL/NM – NMR05GL17<br>DOE/SSO – NMR05GH54 | 6/09<br>6/09 | 6/14<br>6/14 | EPA<br>EPA |

**TABLE 8-1.** Summary of Environmental Permits and Registrations in Effect During Calendar Year 2010 (Continued)

| Permit Type and/or Facility Name | Location | Permit Number | Issue Date | Expiration Date | Regulatory Agency |
|---|---|---|---|---|---|
| **NPDES CONSTRUCTION PERMITS** | | | | | |
| 20th Street Stockpile Area | TA-I | SNL/NM - NMR15E764<br>DOE/SSO - NMR15EB81 | 04/29/05 | Active until terminated | EPA |
| Mixed Waste Landfill Cover | TA-III | SNL/NM -NMR15EZ15<br>DOE/SSO - NMR15EZ62 | 05/18/06 | Active until terminated | EPA |
| Technical Area III Concrete Recycle/Borrow | TA-III | SNL/NM -NMR15F015<br>DOE/SSO -NMR15F012 | 5/31/06 | Active until terminated | EPA |
| I Ave and 11th Street Mall Waterline Project | TA-I | SNL/NM -NMR10GE04<br>DOE/SSO -NMR10GJ52 | 2/9/09 | Active until terminated | EPA |
| Heating Systems Modernization (HSM) | TA-I | SNL/NM -NMR15FK02 | 5/11/07 | Active until terminated | EPA |
| Liquid Natural Gas | TA-III | SNL/NM -NMR10G703 | 10/31/08 | Active until terminated | EPA |
| Thunder Range | Range 2, 5, 6<br>Site 91<br>Breaching Site<br>Site 9965 | SNL/NM -NMR15G365<br>DOE/SSO -NMR15G366 | 6/03/08 | Active until terminated | EPA |
| TA II Escarpment | TA-II | SNL/NM -NMR10G475 | 08/12/08 | Active until terminated | EPA |
| Ion Beam Laboratory | TA-I | SNL/NM -NMR10G588 | 10/01/08 | Active until terminated | EPA |
| 9940 Complex | Coyote | SNL/NM - NMR10GO81<br>DOE/SSO -NMR15G366 | 9/1/09 | Active until terminated | EPA |
| Building 957 Parking Lot | TA-I | SNL/NM -NMR10GS55 | 12/14/09 | Active until terminated | EPA |
| National Solar Thermal Test | Coyote | SNL/NM -NMR10H626 | 12/7/10 | Active until terminated | EPA |
| Test Capabilities Revitalization (TCR) Phase II | TA-III | SNL/NM -NMR10GV578 | 4/1/10 | Active until terminated | EPA |
| 12th Street Roadway | TA-I | SNL/NM - NMR10H419<br>DOE/SSO -NMR10H422 | 9/14/10 | Active until terminated | EPA |

**TABLE 8-1.** Summary of Environmental Permits and Registrations in Effect During Calendar Year 2010 (Continued)

| Permit Type and/or Facility Name | Location | Permit Number | Issue Date | Expiration Date | Regulatory Agency |
|---|---|---|---|---|---|
| **ECOLOGICAL** | | | | | |
| New Mexico Department of Game and Fish Authorization for Taking Protected Wildlife for Scientific/Educational Purposes | Site-Wide Ecological Monitoring | 2931 | 3/21/10 | 12/31/10 | NM Department of Game and Fish |
| NM Department of Game and Fish Nuisance Permit | Site-Wide Ecological Monitoring Activity | N/A | 4/1/10 | 3/3/11 | NM Department of Game and Fish |
| Federal Fish and Wildlife Permit – Special Purpose, Relocate | Site-Wide Ecological Monitoring Activity | MB02872A-0 | 2/11/10 | 12/31/12 | U.S. Fish and Wildlife Service |
| Federal Fish and Wildlife Permit – Special Purpose, Salvage | Site-Wide Ecological Monitoring Activity | MB02907A-0 | 2/12/10 | 3/31/13 | U.S. Fish and Wildlife Service |
| **RCRA** | | | | | |
| Operating Permit for the Hazardous Waste Facility Modules I - III | Hazardous Waste Management Facility (HWMF) | NM5890110518-1 | 8/6/92 | 08/06/02, remains in effect until permit is renewed | NMED |
| Operating Permit Module IV | Environmental Restoration (ER) Sites | NM5890110518-1 | 8/26/93 | 9/20/02, remains in effect until permit is renewed | NMED |
| Operating Permit for the Thermal Treatment Facility Modules I - III | Thermal Treatment Facility (TTF) | NM5890110518-2 | 12/4/94 | 12/4/04, remains in effect until permit is renewed | NMED |
| Class III Permit Modification for the Management of Hazardous Remediation Waste in the Corrective Action Management Unit (CAMU), Tech Area III | CAMU | NM5890110518 | 9/25/97 | 9/20/02, remains in effect until permit is renewed | NMED |
| RCRA Part A Permit Application for Hazardous Waste Management Units | Radioactive and Mixed Waste Management Facility (RMWMF); 5 Manzano Bunkers; Auxiliary Hot Cell Facility | NM5890110518 | First submitted 8/90; Rev. 10 3/22/2007 | No expiration date | NMED |
| RCRA Closure Plan Amendment for the Chemical Waste Landfill | CWL | N/A | 10/15/09 | N/A | NMED |

**TABLE 8-1.** Summary of Environmental Permits and Registrations in Effect During Calendar Year 2010 (Continued)

| Permit Type and/or Facility Name | Location | Permit Number | Issue Date | Expiration Date | Regulatory Agency |
|---|---|---|---|---|---|
| **OPEN BURN PERMITS*** | | | | | |
| Blast-Induced Fragment Characterization – Test 1 | TA-III | 08-0049 | 6/1/2010 | 6/30/2010 | COA |
| Blast-Induced Fragment Characterization – Test 2 | TA-III | 08-0050 | 9/1/2010 | 9/30/2010 | COA |
| Blast-Induced Fragment Characterization – Test 3 | TA-III | 08-0051 | 9/1/2010 | 9/30/2010 | COA |
| Explosives Testing | Remote | 10-0001 | 1/1/2010 | 12/31/2010 | COA |
| Explosive Firing Site - Conformation Panel Tests | Remote | 10-0002 | 1/1/2010 | 12/31/2010 | COA |
| Terminal Ballistics Facility – Propellant Applications | TA-III | 10-0003 | 1/1/2010 | 12/31/2010 | COA |
| DESIREE Igloo | Remote | 10-0004 | 1/1/2010 | 12/31/2010 | COA |
| Dynamic Explosive Testing System – Explosives Testing | Remote | 10-0005 | 1/1/2010 | 12/31/2010 | COA |
| Terminal Ballistics Facility –Explosive Applications | TA-III | 10-0006 | 1/1/2010 | 12/31/2010 | COA |
| Terminal Ballistics Facility – Thermite Applications | TA-III | 10-0007 | 1/1/2010 | 12/31/2010 | COA |
| Thunder Range – Explosives Testing | Remote | 10-0008 | 1/1/2010 | 12/31/2010 | COA |
| Thermal Treatment Facility | TA-III | 10-0009 | 1/1/2010 | 12/31/2010 | COA |
| Carbon Fiber Epoxy Burn Tests | Remote | 10-0047 | 6/1/2010 | 12/31/2010 | COA |
| Sodium Metal Tests | TA-III | 10-0017 | 1/6/2010 | 12/31/2010 | COA |
| Thunder Range Explosives Testing | Remote | 10-0066 | 9/27/2010 | 10/27/2010 | COA |
| **AIR (Permits & Registrations)** | | | | | |
| Document Disintegrator | TA-III | Permit #144-M1 | 9/28/2006 | N/A | COA |
| Fire Laboratory used for the Authentication of Modeling and Experiments (FLAME) | Burn Site | Registration #196 | 5/19/1988 | N/A | COA |
| Neutron Generator Facility (NGF) | TA-I | Permit #374-M1 | 7/17/1998 | N/A | COA |
| Standby diesel generators at Bldg 862 | TA-I | Permit #402 | 5/07/1996 | N/A | COA |
| RMWMF | TA-III | Permit #415-M1 | 5/10/1997 | N/A | COA |
| Title V Operating Permit | Site-Wide | 515 (pending) | Submitted 3/1/1996 | N/A | COA |
| Emergency Generator at Building 702 | TA-I | Permit #924 | 5/5/1998 | N/A | COA |
| Processing and Environmental Technology Laboratory (PETL) Emergency Generator | TA-I | Permit #925-M1 | 3/5/2001 | N/A | COA |
| PETL Boilers and HAP Chemicals | TA-I | Registration #936 | 5/5/2004 | N/A | COA |
| Advanced Manufacturing Prototype Facility (AMPF) | TA-I | Registration #1406 | 11/6/2000 | N/A | COA |
| Microelectronics Development Laboratory (MDL) | TA-I | Permit #1678-M1 | 12/14/2004 | N/A | COA |
| Steam Plant | TA-I | Permit #1705-M1 | 11/10/2004 | N/A | COA |
| Thermal Test Complex | TA-III | Permit #1712 | 4/9/2004 | N/A | COA |
| Center for Integrated Nanotechnology (CINT) | Sandia Science & Technology Park | Permit #1725 | 10/11/2004 | N/A | COA |

**TABLE 8-1.** Summary of Environmental Permits and Registrations in Effect During Calendar Year 2010 (Continued)

| Permit Type and/or Facility Name | Location | Permit Number | Issue Date | Expiration Date | Regulatory Agency |
|---|---|---|---|---|---|
| **AIR (Permits & Registrations) (concluded)** | | | | | |
| MESA Facility Central Utility Building 858J | TA-I | Permit #1820 | 9/28/2006 | N/A | COA |
| Building 899A Boilers | TA-I | Registration #1823 | 4/1/2008 | N/A | COA |
| South East Tech Area I | TA-I | Permit #1828 | 9/28/2006 | N/A | COA |
| Heating System Modernization Boilers | TA-I | Permit #1830 | 3/23/2007 | N/A | COA |
| Building 878 HAP Chemical Registration | TA-I | Registration #1888 | 5/28/2008 | N/A | COA |
| Strategic Defense Facility, Building 963 | TA-IV | Permit#1900 | 1/11/2008 | N/A | COA |
| Miscellaneous HAP Registration | Site Wide Permit | Registration #1901 | 5/28/2008 | N/A | COA |
| Building 865 HAP Registration | TA-I | Registration #1902 | 5/28/2008 | N/A | COA |
| Solar Tower HAP Registration | Remote | Registration #1903 | 5/28/2008 | N/A | COA |
| Building 869 HAP Registration | TA-I | Registration #1905 | 5/28/2008 | N/A | COA |
| Advanced Materials Laboratory (AML) HAP Registration | Offsite | Registration #1906 | 5/28/2008 | N/A | COA |
| Building 962 Generator | TA-IV | Permit #1930 | 4/8/2009 | N/A | COA |
| Building 833 Generator | TA-I | Permit #2097 | 9/1/2010 | N/A | COA |
| Building 802 Boiler Registration | TA-I | Registration #2109 | 10/28/2010 | N/A | COA |
| Building 804 Boiler Registration | TA-I | Registration #2110 | 11/8/2010 | N/A | COA |
| Building 810 Boiler Registration | TA-I | Registration #2111 | 11/8/2010 | N/A | COA |
| Building 823 Boiler Registration | TA-I | Registration #2112 | 11/8/2010 | N/A | COA |
| Building 840 Boiler Registration | TA-I | Registration #2113 | 11/8/2010 | N/A | COA |
| Building 857 Boiler Registration | TA-I | Registration #2114 | 11/8/2010 | N/A | COA |
| Building 860 Boiler Registration | TA-I | Registration #2115 | 11/8/2010 | N/A | COA |
| Building 880 Boiler Registration | TA-I | Registration #2116 | 11/30/2010 | N/A | COA |
| Building 890 Boiler Registration | TA-I | Registration #2117 | 11/29/2010 | N/A | COA |
| Building 887 Boiler Registration | TA-I | Registration #2118 | 11/29/2010 | N/A | COA |
| Building 891 Boiler Registration | TA-I | Registration #2119 | 11/29/2010 | N/A | COA |
| Building 892 Boiler Registration | TA-I | Registration #2120 | 11/30/2010 | N/A | COA |
| Building 894 Boiler Registration | TA-I | Registration #2121 | 11/30/2010 | N/A | COA |
| Building 897 Boiler Registration | TA-I | Registration #2122 | 11/30/2010 | N/A | COA |

**TABLE 8-1.** Summary of Environmental Permits and Registrations in Effect During Calendar Year 2010 (Concluded)

| Permit Type and/or Facility Name | Location | Permit Number | Issue Date | Expiration Date | Regulatory Agency |
|---|---|---|---|---|---|
| **FUGITIVE DUST CONTROL AND DEMOLITION PERMIT FILE** (Permits & Registrations)** | | | | | |
| Borrow Site – Cell 1 Programmatic | TA-III | P08-0005 | 12/10/2007 | 12/10/2012 | COA |
| Moving Vehicle Test Track Programmatic | TA-III | P08-0004 | 12/11/2007 | 12/11/2012 | COA |
| Thunder Range – Range 6 programmatic | Remote | P08-0061 | 8/7/2008 | 8/7/2013 | COA |
| Thunder Range – Range 1 Programmatic | Remote | P08-0062 | 8/7/2008 | 8/7/2013 | COA |
| Thunder Range – Range 2 Programmatic | Remote | P08-0064 | 8/7/2008 | 8/7/2013 | COA |
| Thunder Range – Range 5 Programmatic | Remote | P08-0063 | 8/7/2008 | 8/7/2013 | COA |
| Thunder Range – Range 7 Programmatic | Remote | P09-0021 | 12/22/2009 | 12/22/2014 | COA |
| Thunder Range – Range 4 Programmatic | Remote | P09-0022 | 12/22/2009 | 12/22/2014 | COA |
| Thunder Range – Range 8 Programmatic | Remote | P09-0018 | 8/14/2009 | 8/14/2014 | COA |
| DETS Complex/Building 9940 (Modification/Expansion) | Remote | P09-0014 | 7/8/2009 | 7/8/2014 | COA |
| DETS – East | Remote | P09-0016 | 7/9/2009 | 7/9/2014 | COA |
| DETS – West | Remote | P09-0015 | 7/9/2009 | 7/9/2014 | COA |
| DETS – South | Remote | P10-0018 | 12/2/2010 | 12/2/2015 | COA |
| Large Scale LNG Test Site | TA-III | 1009-626-3732 | 5/5/2007 | 5/5/2012 | COA |
| HSM Project | TA-I | 10-10-3726 | 5/14/2007 | 12/31/2010 | COA |
| Ion Beam Lab Construction | TA-I | 10-204-4014 | 6/30/2008 | 6/30/2013 | COA |
| TA-I Water Main Replacement | TA-I | 10-344-4141 | 3/23/2009 | 3/23/2010 | COA |
| Building 919 Demolition | TA-II | 10-210-4142 | 3/23/2009 | 3/23/2010 | COA |
| Steam Plant Tank Farm Removal | TA-I | 10-210-4147 | 4/3/2009 | 4/3/2010 | COA |
| Tank Farm Fuel Line Removal | TA-I | 10-354-4148 | 4/3/2009 | 4/3/2010 | COA |
| Mixed Waste Landfill Cover | TA-III | 10-683-4161 | 4/28/2009 | 4/28/2014 | COA |
| Borrow Pit Cell 3 | TA-III | 10-683-4160 | 4/28/2009 | 4/28/2014 | COA |
| 9920 Berm Construction | TA-III | 10-62-4169 | 5/6/2009 | 5/6/2010 | COA |
| Substation 16 Replacement | Remote | 10-469-4170 | 5/15/2009 | 5/15/2014 | COA |
| 14th Street Channel Repairs | TA-II | 10-564-4208 | 7/27/2009 | 7/27/2010 | COA |
| Building 957 Parking Lot Repairs | TA-II | 1009-720-4284 | 12/11/2009 | 12/11/2010 | COA |
| Building 605 – Steam Plant | TA-I | 10-210-4316 | 3/30/2010 | 3/30/2012 | COA |
| Building 6570 TCR Updates | TA-III | 10-720-4320 | 4/5/2010 | 4/5/2010 | COA |
| Building 884 Demolition | TA-I | 10-210-4398 | 10/1/2010 | 10/1/2012 | COA |
| ARRA Projects at the National Solar Thermal Test Facility | Remote | 10-564-4405 | 10/20/2010 | 10/20/2015 | COA |
| Pedestrian Pathway to TA-IV | TA-II & TA-IV | 1339-786-4439 | 1/3/2010 | 1/3/2012 | COA |

**NOTES:** *Open Burn Permits are issued by the City of Albuquerque for no more than a year at any one time.
**Permits are obtained by general contractors directly from City of Albuquerque

COA = City of Albuquerque
TA= technical area
EPA = U.S. Environmental Protection Agency
N/A = not applicable
NMED = New Mexico Environment Department
RCRA = Resource Conservation and Recovery Act
N/A = not applicable
LNG = Liquefied Natural Gas
DOE = Department of Energy
FAA = Federal Aviation Administration
AANC = Airworthiness Assurance NDI Validation Center
ARRA = American Recovery and Reinvestment Act
CTF = Coyote Test Field
SNL/NM = Sandia National Laboratories, New Mexico
KAFB = Kirtland Air Force Base
NM = New Mexico
CWL = Classified Waste Landfill
HAP = hazardous air pollutant
U.S. = United States
DETS = Dynamic Explosives Test Site
ABCWUA = Albuquerque Bernalillo County Water Utility Authority
SSO = Sandia Site Office
NDI = Non-destructive Inspection

**TABLE 8-2.** Federal and State Air Regulations Applicable to SNL/NM

| CAA Title | CAA Section | Federal Regulation | Local Regulation | Subject |
|---|---|---|---|---|
| I | 176(c) | 40 CFR 51<br>40 CFR 93 | 20 NMAC 11.04<br>20 NMAC 11.03 | Conformity of Federal Actions (State and Federal Plans)<br>General and Transportation |
| | 110 | 40 CFR 53<br>40 CFR 58 | N/A | Ambient Air Quality Surveillance |
| | 109 | 40 CFR 50 | 20 NMAC 11.08 | National Primary and Secondary Ambient Air Quality Standards (NAAQS) |
| | 114 | 40 CFR 98 | | Mandatory Greenhouse Gas Reporting |
| | 165-166 | 40 CFR 52 | 20 NMAC 11.02 | Permit Fees |
| | | 40 CFR 52 | 20 NMAC 11.05 | Visible Air Contaminants |
| | | 40 CFR 52 | 20 NMAC 11.06 | Emergency Action Plan |
| | | 40 CFR 52 | 20 NMAC 11.07 | Variance Procedure |
| | | 40 CFR 52 | 20 NMAC 11.20 | Fugitive Dust Control |
| | | 40 CFR 52 | 20 NMAC 11.21 | Open Burning |
| | | 40 CFR 51–52 | 20 NMAC 11.40 | Source Registration |
| | | 40 CFR 51–52 | 20 NMAC 11.41 | Authority-to-Construct |
| | | 40 CFR 51.100 | 20 NMAC 11.43 | Stack Height Requirements |
| | | 40 CFR 51 | 20 NMAC 11.44 | Emissions Trading |
| | 171-193 | 40 CFR 51–52 | 20 NMAC 11.60 | Permitting in Nonattainment Areas |
| | 160-169 | 40 CFR 52 | 20 NMAC 11.61 | Prevention of Significant Deterioration |
| | 165-166 | 40 CFR 60<br>40 CFR 63 | 20 NMAC 11.65 | Volatile Organic Compounds (VOC) |
| | | 40 CFR 60 | 20 NMAC 11.66 | Process Equipment |
| | | 40 CFR 60 | 20 NMAC 11.22 | Wood Burning |
| | | 40 CFR 60 | 20 NMAC 11.63 | New Source Performance Standards (NSPS) |
| | | 40 CFR 60 | 20 NMAC 11.67 | Equipment, Emissions and Limitations(stationary combustion sources) |
| | | 40 CFR 60 | 20 NMAC 11.68 | Incinerators |
| | | 40 CFR 60 | 20 NMAC 11.69 | Pathological Waste Destructors |
| | | 40 CFR 61<br>40 CFR 63 | 20 NMAC 11.64 | National Emission Standards for Hazardous Air Pollutants (NESHAP)<br>Subpart H – Radionuclides<br>Subpart M – Asbestos<br>Subpart ZZZZ – Stationary Reciprocating Internal Combustion Engines<br>Subpart CCCCCC – Gasoline Dispensing Facilities |
| II | 202-211 | 40 CFR 80 | 20 NMAC 11.101 | Motor Vehicle Inspection: Centralized |
| | | | 20 NMAC 11.102 | Oxygenated Fuels |
| | | | 20 NMAC 11.103 | Motor Vehicle Visible Emissions |
| | 213-219 | 40 CFR 85-86 | 20 NMAC 11.100 | Motor Vehicle Inspection: Decentralized |
| III | 319 | 40 CFR 53 | 20 NMAC 2.3<br>20 NMAC 2.5 | Air Quality Monitoring |
| IV | 401-416 | 40 CFR 72-78 | 20 NMAC 11.62 | Acid Rain |
| V | 501-507 | 40 CFR 70-71 | 20 NMAC 11.42 | Operating Permits |
| VI | 601-618 | 40 CFR 82 | 20 NMAC 11.23 | Stratospheric Ozone Protection |
| VII | 113-114 | 40 CFR 64 | 20 NMAC 11.90 | Administration, Enforcement, Inspection |

**NOTES:** CAA = Clean Air Act
NMAC = New Mexico Administrative Code
CFR = Code of Federal Regulations
SNL/NM = Sandia National Laboratories, New Mexico
N/A = not applicable

**TABLE 8-3.** Summary of Compliance History with Regard to Mixed Waste (MW) at SNL/NM

| Date | Milestone | Comment |
|---|---|---|
| **1984** | Amendments to Resource Conservation and Recovery Act (RCRA) and Hazardous and Solid Waste Amendments (HSWA) in 1984 | MW became an issue after amendments to RCRA and HSWA enforced Land Disposal Restrictions (LDR), including prohibition on storage of wastes for more than one year. |
| **Aug 1990** | RCRA Part A Interim Status Permit Application | Submitted RCRA Part A Interim Status Permit application for MW storage. Later revisions to the interim status permit added proposed MW treatment processes. |
| **Oct 1992** | Federal Facilities Compliance Act (FFCA) Passed | The FFCA allows storage of MW over one-year RCRA time limit. Requires U.S. Department of Energy (DOE) to submit a site treatment plan for MW. |
| **Dec 1992** | Notice of Noncompliance (NON) Issued | U.S. Environmental Protection Agency (EPA) issued a NON for storage of RCRA-regulated MW over the one-year maximum period. |
| **Oct 1993** | Conceptual Site Treatment Plan Submitted | DOE submitted *Conceptual Site Treatment Plan for Mixed Waste* to NMED; other drafts followed. |
| **Mar 1995** | Final Site Treatment Plan Submitted | DOE submitted final *Site Treatment Plan for Mixed Waste* to NMED. |
| **Jun 1995** | Historical Disposal Requests Validation (HDRV) Project Initiated | The HDRV Project was initiated to characterize and sort legacy MW. Project continued into 1997, when it was replaced with new sorting procedures. |
| **Oct 1995** | Federal Facility Compliance Order (FFCO) Signed | The FFCO, an agreement between State, DOE, and Sandia Corporation, details specific actions required with regard to MW management, including the requirement to develop of a Site Treatment Plan (STP), to be updated annually. |
| **Mar 1996** | STP Milestones Met | Updated STP to reflect FY 1995 activities. |
| **Sep 1996** | First MW Shipment<br><br>FFCO Amendment No. 1 | First MW shipment made, MW sent to Perma-Fix/DSSI for treatment.<br><br>FFCO amended. |
| **Dec 1996** | Revisions to Proposed Treatment Methods | DOE and Sandia re-submitted Part A and B permit application, to reflect revisions to proposed on-site treatment methods. |
| **May 1997** | FFCO Amendment No. 2 | FFCO amended. |
| **Dec 1997** | On-site MW Treatment | Onsite treatment of MW began at the RMWMF in Bldg. 6920. Additionally, Bldg. 6921 was converted to a laboratory for the treatment of certain types of MW. |
| **1997** | STP Milestones Met | Treated wastes on site and shipped mixed wastes to off-site treatment and disposal facilities, meeting all treatment and disposal milestones. Updated STP to reflect FY 1996 activities and changes to proposed treatment technologies. NMED approved Revision 1 to STP, revising waste volumes and treatment/disposal technologies, and establishing new deadlines. |
| **1998** | STP Milestones Met | Treated wastes on site and shipped mixed wastes to off-site treatment and disposal facilities, meeting all treatment and disposal milestones. Updated STP to reflect FY 1997 activities and changes to proposed treatment technologies. NMED approved Revision 2 to STP, revising waste volumes and treatment/disposal technologies, and establishing new deadlines. |

**TABLE 8-3.** Summary of Compliance History with Regard to Mixed Waste (MW) at SNL/NM (Continued)

| Date | Milestone | Comment |
|---|---|---|
| **1999** | STP Milestones Met | Treated wastes on site and shipped mixed wastes to off-site treatment and disposal facilities, meeting all treatment and disposal milestones. Updated STP to reflect FY 1998 activities and changes to proposed treatment technologies. NMED approved Revision 3 to STP, revising waste volumes and treatment/disposal technologies, and establishing new deadlines. |
| **2000** | STP Milestones Met | Treated wastes on site and shipped mixed wastes to off-site treatment and disposal facilities, meeting all treatment and disposal milestones. Updated STP to reflect FY 1999 activities and changes to proposed treatment technologies. NMED approved Revision 4 to STP, revising waste volumes and treatment/disposal technologies, and establishing new deadlines. |
| **2001** | STP Milestones Met | Treated wastes on site and shipped mixed wastes to off-site treatment and disposal facilities, meeting all treatment and disposal milestones. Updated STP to reflect FY 2000 activities and changes to proposed treatment technologies. NMED approved Revision 5 to STP, revising waste volumes and treatment/disposal technologies, and establishing new deadlines. |
| **May 2001** | FFCO Amendment No. 3 | FFCO amended. |
| **2002** | STP Milestones Met | Treated wastes on site and shipped mixed wastes to off-site treatment and disposal facilities, meeting all treatment and disposal milestones. Updated STP to reflect FY 2001 activities and changes to proposed treatment technologies. NMED approved Revision 6 to STP, revising waste volumes and treatment/disposal technologies, and establishing new deadlines. |
| **Feb 2002** | Revisions to Permit Application | DOE and Sandia submitted updated Part A and B permit application to NMED to reflect revisions to on-site waste management operations. Permit application for mixed waste management units is combined with permit renewal request for hazardous waste management units at SNL/NM. |
| **2003** | STP Milestones Met | Treated wastes on site and shipped mixed wastes to off-site treatment and disposal facilities, meeting all treatment and disposal milestones. Updated STP to reflect FY 2002 activities and changes to proposed treatment technologies. NMED approved Revision 7 to STP, revising waste volumes and treatment/disposal technologies, and establishing new deadlines. |
| **Apr 2003; Nov 2003** | Revisions to Permit Application | DOE and Sandia revised Part A and Part B permit application in response to NMED comments. |
| **2004** | STP Milestones Met | Treated wastes on site and shipped mixed wastes to off-site treatment and disposal facilities, meeting all treatment and disposal milestones. Updated STP to reflect FY 2003 activities and changes to proposed treatment technologies. NMED approved Revision 8 to STP, revising waste volumes and treatment/disposal technologies, and establishing new deadlines. |
| **Apr 2004** | FFCO Amendment No. 4 | FFCO amended. |

**TABLE 8-3.** Summary of Compliance History with Regard to Mixed Waste (MW) at SNL/NM (Concluded)

| Date | Milestone | Comment |
|---|---|---|
| **Nov 2004** | Revisions to Permit Application | DOE and Sandia revised Part A and Part B permit application in response to NMED comments. |
| **2005** | STP Milestones Met | Treated wastes on site and shipped mixed wastes to off-site treatment and disposal facilities, meeting all treatment and disposal milestones. Updated STP to reflect FY 2004 activities and changes to proposed treatment technologies. NMED approved Revision 9 to STP, revising waste volumes and treatment/disposal technologies, and establishing new deadlines. |
| **Jun 2005; Oct 2005** | Revisions to Permit Application | DOE and Sandia revised Part A and Part B permit application to reflect changes in waste management operations. |
| **May 2006** | Revisions to Permit Application | DOE and Sandia revised Part B permit application to reflect changes in waste management operations. |
| **2006** | STP Milestones Met | Treated wastes on site and shipped mixed wastes to off-site treatment and disposal facilities, meeting all treatment and disposal milestones. Updated STP to reflect FY 2005 activities and changes to proposed treatment technologies. NMED approved Revision 10 to STP, revising waste volumes and treatment/disposal technologies, and establishing new deadlines. |
| **Mar 2007** | Revisions to Permit Application | DOE and Sandia revised Part A and Part B permit application to reflect changes in waste management operations. |
| **Aug 2007** | Draft Permit Issued | NMED issued draft permit to DOE and Sandia, and made it available for public comment. |
| **2007** | STP Milestones Met | Treated wastes on site and shipped mixed wastes to off-site treatment and disposal facilities, meeting all treatment and disposal milestones. Updated STP to reflect FY 2006 activities and changes to proposed treatment technologies. NMED approved Revision 11 to STP, revising waste volumes and treatment/disposal technologies, and establishing new deadlines. |
| **Jan 2008** | Comments on Draft Permit Submitted | DOE and Sandia submit extensive comments on draft permit to NMED and request resolution of comments. |
| **2008** | STP Milestones Met | Treated wastes on site and shipped mixed wastes to off-site treatment and disposal facilities, meeting all treatment and disposal milestones. Updated STP to reflect FY 2007 activities and changes to proposed treatment technologies. NMED approved Revision 12 to STP, revising waste volumes and treatment/disposal technologies, and establishing new deadlines. |
| **2009** | STP Milestones Met | Treated wastes on site and shipped mixed wastes to off-site treatment and disposal facilities, meeting all treatment and disposal milestones. Updated STP to reflect FY 2008 activities and changes to proposed treatment technologies. |
| **2010** | STP Milestones Met | Treated wastes on site and shipped mixed wastes to off-site treatment and disposal facilities, meeting all treatment and disposal milestones. Updated STP to reflect FY 2009 activities and changes to proposed treatment technologies. |
| **Dec 2010** | FFCO Amendment No. 5 | FFCO amended to extend certain compliance deadlines. |

**NOTES:** DSSI = Diversified Scientific Services, Inc.
FY = fiscal year
NMED = New Mexico Environment Department
RMWMF = Radioactive and Mixed Waste Management Facility
SNL/NM = Sandia National Laboratories/New Mexico

**TABLE 8-4.** Mixed Waste Treatment and Disposal Status (End of FY 2010)

| Waste Category | Volume ($m^3$) | Description | Status and Plans |
|---|---|---|---|
| TG 1 | 0 | Inorganic Debris with Explosive 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 | |
| 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 & 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 | 0.003 | Sealed Sources with TCLP Metals | Utilizing on-site treatment or shipping to off-site treatment and disposal facilities. [a] |
| TG 22 | 0 | Reserved | Not Applicable |
| 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 & TCLP Metals | No waste currently in inventory. |
| TG 27 | 0 | High Mercury Solids & Liquids | No waste currently in inventory |
| TRU/MW | 0.92 | TRU/MW | Investigating off-site treatment and disposal options. |

**NOTES**: [a] Treatment and/or disposal at one or more permitted off-site mixed waste management facilities. Treatments are detailed in the *Site Treatment Plan for Mixed Waste, Sandia National Laboratories, New Mexico*, Revision 12, Sandia National Laboratories, New Mexico (April 4, 2008) (SNL 2008) and the *Site Treatment Plan for MW, FY09 Update* (SNL 2010b).

TCLP = toxicity characteristic leaching procedure

$m^3$ = cubic meters

TRU/MW = transuranic/mixed waste

TG = Treatability Group

*At the end of 2010.

## RADIOLOGICAL DOSE

### Radiation Protection

The U.S. Department of Energy (DOE), National Nuclear Security Administration (NNSA) has established radiation protection standards for the public to control and limit radiation doses resulting from activities at DOE facilities. Sandia National Laboratories, New Mexico (SNL/NM) is the DOE facility specific to this discussion. Public areas are defined as any location that is accessible to non-DOE facility employees (e.g., excluding Sandia Corporation employees and contractors), such as Kirtland Air Force Base (KAFB) personnel and the surrounding community. Radiation protection standards are provided in DOE Order 5400.5, *Radiation Protection of the Public and the Environment* (DOE 1993). Environmental monitoring requirements for DOE operations are given in DOE Order 450.1A, *Environmental Protection Program* (DOE 2008a). In addition to these quantitative standards, the overriding DOE policy is that exposures to the public shall be maintained "as low as reasonably achievable" (ALARA).

DOE Order 5400.5 limits the total annual effective dose equivalent (EDE) of all potential exposure pathways to the public (including air, water, and the food chain) to 100 millirem per year (mrem/yr). The Order lists the Derived Concentration Guides (DCGs) for radionuclides in water and air that could be continuously consumed or inhaled (365 days/year). This is a conservative approach that assumes that a member of the public resides at the location continuously. Table 8-5 lists the DCGs pertinent to activities at SNL/NM and to this report.

**TABLE 8-5.** Derived Concentration Guides (DCGs) for Selected Radionuclides*

| | Ingested Water | | Inhaled Air | |
|---|---|---|---|---|
| **Radionuclide** | **DCG (µCi/ml)** | **$f_1$ Value**** | **DCG (µCi/ml)** | **Solubility Class** |
| Tritium (water) | $2 \times 10^{-3}$ | -- | $1 \times 10^{-7}$ | W |
| Cesium-137 | $3 \times 10^{-6}$ | 1 | $4 \times 10^{-10}$ | D |
| Uranium, total ($U_{tot}$) | $6 \times 10^{-6}$ | -- | $1 \times 10^{-13}$ | Y |

**NOTES:** $\mu$Ci/ml = microcuries per milliliter

*From Figure III-1, DOE Order 5400.5, Change 2, January 7, 1993 (DOE 1993). DCG for tritium in air is adjusted for skin absorption.

**$f_1$ value is the gastrointestinal absorption factor. Listed DCG's for $U_{tot}$ are based on $U_{nat}$ listing in 5400.5 (DOE 1993).

- *Water Pathways* - DOE drinking water guidelines are based on an annual EDE not to exceed 4 mrem/yr. Guideline values for drinking water are calculated at four percent of ingested water using DCG values for specific nuclides.

- *Air Pathways* - DOE facilities are required to comply with U.S. Environmental Protection Agency (EPA) standards for radiation protection as given in National Emission Standards for Hazardous Air Pollutants (NESHAP), Subpart H, specific to radionuclides emitted from DOE facilities (with the exception of radon). This rule mandates that air emissions from DOE facilities shall not cause any individual of the public to receive an EDE of greater than 10 mrem/yr from air pathways. Table 8-6 summarizes the public radiation protection standards that are applicable to DOE facilities.

## WATER QUALITY MONITORING PARAMETERS

### Resource Conservation and Recovery Act (RCRA)

Table 8-7 lists the 40 CFR 265, Subpart F, parameters required for groundwater monitoring analysis, implemented under RCRA. Table 8-8 gives the EPA interim primary drinking water standards (40 CFR 265, Appendix III) for the groundwater monitoring parameters. Table 8-9 gives EPA secondary drinking water standards. At SNL/NM, this regulation applies to Environmental Restoration (ER) sites. Table 8-10 gives New Mexico Water Quality Control Commission (NMWQCC) Standards for groundwater.

**TABLE 8-6.** General Dose Limits to the Public from DOE Facilities

| Pathway | Equivalent (EDE) Limit | Comments |
|---|---|---|
| All Pathways* | 100 mrem/yr<br>1 mSv/yr | The EDE for any member of the public from all routine DOE operations (normal planned activities including remedial actions). Radiation dose occurring from natural background and medical exposures are not included in the total allowed dose from all pathways. |
| Air Pathway** | 10 mrem/yr<br>0.10 mSv/yr | Sandia calculates doses resulting from all potential air depositions and direct inhalation (e.g., emissions, ground shine, food crops). |

**NOTES:** *DOE Order 5400.5, Chapters I and II (DOE 1993)
**40 CFR 61, Subpart H for radionuclides, National Emission Standards for Hazardous Air Pollutants (NESHAP)
mrem/yr = millirem per year
mSv/yr = millisievert per year
DOE = U.S. Department of Energy
EDE = effective dose equivalent

**TABLE 8-7.** Groundwater Monitoring Parameters Required by 40 CFR 265, Subpart F*

| Contamination Indicator | Groundwater Quality | Appendix III[†] Drinking Water Supply |
|---|---|---|
| pH | Chloride | Arsenic |
| Specific Conductivity | Iron | Barium |
| Total Organic Halogen (TOX) | Manganese | Cadmium |
| Total Organic Carbon (TOC) | Phenol | Chromium |
| | Sodium | Fluoride |
| | Sulfate | Lead |
| | | Mercury |
| | | Nitrate (as N) |
| | | Selenium |
| | | Silver |
| | | Endrin |
| | | Lindane |
| | | Methoxychlor |
| | | Toxaphene |
| | | 2,4-D |
| | | 2,4,5-TP Silvex |
| | | Radium |
| | | Gross Alpha |
| | | Gross Beta |
| | | Coliform Bacteria |
| | | Turbidity |

**NOTES:** *Resource Conservation and Recovery Act (RCRA)
[†]40 CFR 265, Appendix III.
pH = potential hydrogen (acidity)

**TABLE 8-8.** EPA Primary Drinking Water Supply Standards/New Mexico Drinking Water Standards

| Inorganic Chemicals | MCL | Units |
|---|---|---|
| Antimony | 0.006 | mg/L |
| Arsenic | 0.010 | mg/L |
| Asbestos | 7 | MFL |
| Barium | 2.0 | mg/L |
| Beryllium | 0.004 | mg/L |
| Cadmium | 0.005 | mg/L |
| Chromium | 0.1 | mg/L |
| Copper | 1.3* | mg/L |
| Cyanide (free cyanide) | 0.2 | mg/L |
| Fluoride | 4.0 | mg/L |
| Lead | 0.015 | mg/L |
| Mercury (inorganic) | 0.002 | mg/L |
| Nickel (New Mexico only) | 0.2 | mg/L |
| Nitrate (measured as N) | 10 | mg/L |
| Nitrite (measured as N) | 1 | mg/L |
| Selenium | 0.05 | mg/L |
| Thallium | 0.002 | mg/L |
| **Organic Chemicals** | **MCL** | **Units** |
| Alachlor | 0.002 | mg/L |
| Atrazine | 0.003 | mg/L |
| Benzene | 0.005 | mg/L |
| Benzo(a)pyrene | 0.0002 | mg/L |
| Carbofuran | 0.04 | mg/L |
| Carbon tetrachloride | 0.005 | mg/L |
| Chlordane | 0.002 | mg/L |
| Chlorobenzene | 0.1 | mg/L |
| 2,4-D | 0.07 | mg/L |
| Dalapon | 0.2 | mg/L |
| 1,2-Dibromo-3-chloropropane (DBCP) | 0.0002 | mg/L |
| o-Dichlorobenzene | 0.6 | mg/L |
| p-Dichlorobenzene | 0.075 | mg/L |
| 1,2-Dichloroethane | 0.005 | mg/L |
| 1,1-Dichloroethylene | 0.007 | mg/L |
| cis-1,2-Dichloroethylene | 0.07 | mg/L |
| trans-1,2-Dichloroethylene | 0.1 | mg/L |
| Dichloromethane | 0.005 | mg/L |
| 1,2-Dichloropropane | 0.005 | mg/L |
| Di(2-ethylhexyl)adipate | 0.4 | mg/L |
| Di(2ethylhexyl)phthalate | 0.006 | mg/L |
| Dinoseb | 0.007 | mg/L |
| Dioxin (2,3,7,8-TCDD) | 0.00000003 | mg/L |
| Diquat | 0.02 | mg/L |
| Endothall | 0.1 | mg/L |
| Endrin | 0.002 | mg/L |
| Ethylbenzene | 0.7 | mg/L |

**TABLE 8-8.** EPA Primary Drinking Water Supply Standards/New Mexico Drinking Water Standards (concluded)

| Organic Chemicals (continued) | MCL | Units |
|---|---|---|
| Ethylene Dibromide | 0.00005 | mg/L |
| Glyphosate | 0.7 | mg/L |
| Heptachlor | 0.0004 | mg/L |
| Heptachlor epoxide | 0.0002 | mg/L |
| Hexachlorobenzene | 0.001 | mg/L |
| Hexachlorocyclopentadiene | 0.05 | mg/L |
| Lindane | 0.0002 | mg/L |
| Methoxychlor | 0.04 | mg/L |
| Oxamyl (Vydate) | 0.2 | mg/L |
| Polychlorinated biphenyls (PCBs) | 0.0005 | mg/L |
| Pentachlorophenol | 0.001 | mg/L |
| Picloram | 0.5 | mg/L |
| Simazine | 0.004 | mg/L |
| Styrene | 0.1 | mg/L |
| Tetrachloroethylene | 0.005 | mg/L |
| Toluene | 1 | mg/L |
| Total Trihalomethanes (TTHMs) | 0.1 | mg/L |
| Toxaphene | 0.003 | mg/L |
| 2,4,5-TP (Silvex) | 0.05 | mg/L |
| 1,2,4-Trichlorobenzene | 0.07 | mg/L |
| 1,1,1-Trichloroethane | 0.2 | mg/L |
| 1,1,2-Trichloroethane | 0.005 | mg/L |
| Trichloroethylene | 0.005 | mg/L |
| Vinyl chloride | 0.002 | mg/L |
| Xylenes (total) | 10 | mg/L |
| **Radionuclides** | **MCL** | **Units** |
| Beta particles and photon emitters | 4 | mrem/yr |
| Gross alpha particle activity | 15 | pCi/L |
| Radium 226 and Radium 228 (combined) | 5 | pCi/L |
| Uranium | 0.030 | mg/L |

**NOTES:** EPA = Enviromental Protection Agency
*action level concentrations which trigger systems into taking treatment steps if 10 percent of tap water samples exceed the value
**New Mexico Drinking Water Standard only, EPA removed nickel in 1995
MCL = Maximum Contaminant Level
mg/L = milligram per liter
ml = milliliter
MFL= Micro-fibers per liter
mrem/yr = millirem per year
pCi/L = picocurie per liter

**TABLE 8-9.** EPA Secondary Drinking Water Supply Standards

| Contaminant | Level |
|---|---|
| Aluminum | 0.05 to 0.2 mg/L |
| Chloride | 250 mg/L |
| Color | 15 color units |
| Copper | 1.0 mg/L |
| Corrosivity | Non-corrosive |
| Fluoride | 2.0 mg/L |
| Foaming agents | 0.5 mg/L |
| Iron | 0.3 mg/L |
| Manganese | 0.05 mg/L |
| Odor | 3 threshold odor number |
| pH | 6.5-8.5 |
| Silver | 0.1 mg/L |
| Sulfate | 250 mg/L |
| Total dissolved solids (TDS) | 500 mg/L |
| Zinc | 5 mg/L |

**NOTES:** EPA = Environmental Protection Agency
mg/L = milligram per liter
pH = potential hydrogen (acidity)

**TABLE 8-10.** New Mexico Water Quality Control Commission (NMWQCC) Standards for Groundwater of 10,000 mg/L total dissolved solid (TDS) Concentration or Less

| Contaminant | NMWQCC Standard | Units |
|---|---|---|
| **A. Human Health Standards** | | |
| Arsenic | 0.1 | mg/L |
| Barium | 1.0 | mg/L |
| Cadmium | 0.01 | mg/L |
| Chromium | 0.05 | mg/L |
| Cyanide | 0.2 | mg/L |
| Fluoride | 1.6 | mg/L |
| Lead | 0.05 | mg/L |
| Total Mercury | 0.002 | mg/L |
| Nitrate (as N) | 10.0 | mg/L |
| Selenium | 0.05 | mg/L |
| Silver | 0.05 | mg/L |
| Uranium | 5.0 | mg/L |
| Radioactivity: Radium-226 & Radium 228 | 30.0 | pCi/L |
| Benzene | 0.01 | mg/L |
| Polychlorinated biphenyls (PCB's) | 0.001 | mg/L |
| Toluene | 0.75 | mg/L |
| Carbon Tetrachloride | 0.01 | mg/L |
| 1,2-dichloroethane (EDC) | 0.01 | mg/L |
| 1,1-dichloroethylene (1,1-DCE) | 0.005 | mg/L |
| 1,1,2,2-tetrachloroethylene (PCE) | 0.02 | mg/L |
| 1,1,2- trichloroethylene (TCE) | 0.1 | mg/L |
| Ethylbenzene | 0.75 | mg/L |
| Total Xylene | 0.62 | mg/L |
| Methylene Chloride | 0.1 | mg/L |
| Chloroform | 0.1 | mg/L |
| 1,1 –dichloroethane | 0.025 | mg/L |
| Ethylene dibromide (EDB) | 0.0001 | mg/L |
| 1,1,1 –trichloroethane | 0.06 | mg/L |
| 1,1,2 –trichloroethane | 0.01 | mg/L |
| 1,2,2,2 –tetrachloroethane | 0.01 | mg/L |
| Vinyl Chloride | 0.001 | mg/L |
| PAHs: total naphtalene + monomethylnapthalenes | 0.03 | mg/L |
| Benzo(a)pyrene | 0.0007 | mg/L |

**TABLE 8-10.** New Mexico Water Quality Control Commission (NMWQCC) Standards for Groundwater of 10,000 mg/L total dissolved solid (TDS) Concentration or Less (Concluded)

| Contaminant | NMWQCC Standard | Units |
|---|---|---|
| **B. Other Standards for Domestic Water Supply** | | |
| Chloride | 250.0 | mg/L |
| Copper | 1.0 | mg/L |
| Iron | 1.0 | mg/L |
| Manganese | 0.2 | mg/L |
| Phenols | 0.005 | mg/L |
| Sulfate | 600.0 | mg/L |
| Total Disolved Solids | 1000.0 | mg/L |
| Zinc | 10.0 | mg/L |
| pH | Between 6 and 9 | |
| **C. Standards for Irrigation Use** – Groundwater shall meet the standards of Subsection A,B, and C unless other wise provided | | |
| Aluminum | 5.0 | mg/L |
| Boron | 0.75 | mg/L |
| Cobalt | 0.05 | mg/L |
| Molybdenum | 1.0 | mg/L |
| Nickel | 0.2 | mg/L |

**NOTES:** mg/L = milligram per liter
MAC = maximum allowable concentration
pCi/L = picocurie per liter
pH = potential hydrogen (acidity)

# 9.0 Glossary

## A

Abatement – Reducing the degree or intensity of, or eliminating, pollution.

Absorption – The uptake of water, other fluids, or dissolved chemicals by a cell or an organism (as tree roots absorb dissolved nutrients in soil.)

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 that is undergoing analysis.

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 flame-proofing compounds, paint, semiconductor devices, and ceramic products.

Appraisal – A documented activity performed according to written procedures and specified criteria to evaluate the compliance and conformance of an organization with programs, standards, and other requirements contained in orders, laws, and regulations, or other requirements invoked by SNL.

Aquifer – An underground geological formation, or 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, that varies 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 (BMP) – The preferred methods and practices for managing operations.

Biological niche – A role played by a species in the environment.

Biota – The animal and plant life of a given region.

Borehole – A hole created or enlarged by a drill or auger. Also known as drill hole.

## 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.

Coniferous forest – A type of forest characterized by cone-bearing, needle-leaved trees.

Containment – An enclosed space or facility 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, and 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 surfaces of objects, buildings, and various household and agricultural use products.

Corporate Work Process (CWP) – A five-element process for managing and performing work that applies to all activities, facilities, organizations, and employees.

Corrective action – 1. EPA can require treatment, storage and disposal (TSDF) facilities handling hazardous waste to undertake corrective actions to clean up spills resulting from failure to follow hazardous waste management procedures or other mistakes. The process includes cleanup procedures designed to guide TSDFs toward in spills. 2. An action identified to correct a finding that, when completed, fixes the problem or prevents recurrence.

## D

Data Quality Objectives (DQO) – Following a strategic, systematic process for planning scientific data collection efforts.

Decontamination – 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.

Discharge – Any liquid or solid that flows or is placed on or onto any land or into any water. This includes precipitation discharges to the storm drains, accidental or intentional spilling, leaking, pumping, pouring, emitting, emptying, or dumping of any material or substance on or into any land or water.

Discharge limits – 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 a 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 received by an individual.

## E

Ecology – The relationship of living things to one another and their environment, or the study of such relationships.

Ecosystem – The interacting system of a biological community and its non-living environmental surroundings.

Effective Dose Equivalent (EDE) – The weighted average of dose equivalents in certain organs or tissues of the body; this can be used to estimate the health-effects risk of the 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 (EPEAT) - Is a set of criteria in eight different electronic to determine the environmental attributes of a particular electronic office product. At this point, EPEAT is only targeting computer desktops/towers, notebook computers (laptops) and monitors.

Electroplating – To coat or cover with a thin layer of metal by electrodeposition.

Energy Star Operations - means the equipment (monitors) go into "sleep" (low energy) mode when inactive for a set period of time. (CSU enabled)

Environment – The sum of all external conditions affecting the life, development and survival of an organism.

Environment, Safety and Health (ES&H) – A program designed to protect and preserve the environment and to ensure the safety and health of its employees, contractors, visitors, and the public.

Environmental Assessment (EA) – An environmental analysis prepared pursuant to the National Environmental Policy Act (NEPA) to determine whether a federal action would significantly affect the environment and thus require a more detailed environmental impact statement.

Environmental Impact Statement (EIS) – A document required of federal agencies by the National Environmental Policy Act for major projects or legislative proposals significantly affecting the environment. A tool for decision making, it describes the positive and negative effects of the undertaking and cites alternative actions.

Environmental Management – A program designed to maintain compliance with EPA, state, local and DOE requirements.

Environmental Management System (EMS) – 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 Restoration (ER) – A project chartered with the assessment and, if necessary, the remediation of inactive waste sites.

Environmental surveillance – A program including surveys of soil and vegetation, water sampling and analysis, in an attempt to identify and quantify long-term effects of pollutants resulting from SNL operations.

Ephemeral stream – A stream channel which carries water only during and immediately after periods of rainfall or snowmelt.

ER site – Any location listed on the environmental restoration ER 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 SNL operations. Contaminants may be chemicals, radioactive material, or both.

Exceedance – Violation of the pollutant levels permitted by environmental protection standards.

Explosive 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 a shifting or dislodging of the earth's crust, in 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.

# G

Gamma Radiation – very high-energy/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 origin, history, and structure of the earth.

Groundwater – The supply of fresh water found beneath the Earth's surface, usually in aquifers, which supply wells and springs. Because ground water is a major source of drinking water, there is growing concern over contamination from leaching agricultural or industrial pollutants or leaking underground storage tanks.

# H

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 designated by EPA 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 – Waste that meets any of the following conditions:

Hazardous waste landfill – An excavated or engineered site where hazardous waste is deposited and covered.

Hazardous waste site – Any facility or location at which hazardous waste operations take place.

Herbicides – A chemical pesticide designed to control or destroy plants, weeds, or grasses.

High-Level Radioactive Waste (HLW) – Waste generated in core fuel of a nuclear reactor, found at nuclear reactors or by nuclear fuel reprocessing; is a serious threat to anyone who comes near the waste without shielding.

Hydrology – The science dealing with the properties, distribution, and circulation of water.

# I

Illicit discharges – The absolute prohibitions against the release of certain substances.

Implementation Plan (IP) – The plan developed by the Operational Readiness Review (ORR) or Readiness Assessment (RA) team that describes the specifics of approach, schedule, methodology, team members and their qualifications, and reporting requirements of the ORR or RA. The Implementation Plan (IP) is used by the team leader to execute the ORR or RA.

Industrial discharges – The absolute prohibitions against the release of certain substances.

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 temperature and density of the pellet core 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.

Insecticides – A pesticide compound specifically used to kill or prevent the growth of insects.

Integrated Laboratories Management System (ILMS) – Framework for all management requirements for Sandia. It represents the complete set of policy, business rules, practices, and information that establishes Sandia's business expectations and intent.

Integrated Safety Management System (ISMS) Systematically integrates safety into management and work practices at all levels so that missions are accomplished while protecting the worker, the public, and the environment.

# L

Lagoons – 1. A shallow pond where sunlight, bacterial action, and oxygen work to purify wastewater; also used for storage of wastewater. 2. Shallow body of water, often separated from the sea by coral reefs or sandbars.

Landfill – 1. Sanitary landfills are disposal sites for non-hazardous solid wastes spread in layers, compacted to the smallest practical volume, and covered by material applied at the end of each operating day. 2. Secure chemical landfills are disposal sites for hazardous waste, selected and designed to minimize the chance of release of hazardous substances into the environment.

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

Legacy contamination – Contamination that remains after facilities, operations, or activities that created it have gone out of existence or ceased, often resulting in an orphan site in need of remediation or institutional control.

Line management – The process of managing workers through individual Integrated Job Structure assignments (i.e., work titles) and contractor positions that support SNL's mission core processes and enabling processes.

Long-Term Environmental Stewardship (LTES)– Activities necessary to maintain long-term protection of human health and the environment from hazards posed by residual radioactivity and chemically hazardous materials.

Low-Level Radioactive Waste (LLW) – Wastes less hazardous than most of those associated with a nuclear reactor; generated by hospitals, research laboratories, and certain industries. The Department of Energy, Nuclear Regulatory Commission, and EPA share responsibilities for managing them.

Low-Temperature Thermal Desorption (LTTD) – A process of removing organic compounds from soil by heating it and causing the organics to volatilize and/or decompose. The volatilized compounds may be further degraded by after burning or catalysis.

# M

Maximally Exposed Individual (MEI) – The location of a member of the public which receives or has the potential to receive the maximum radiological dose from air emissions of a National Emissions Standards for Hazardous Air Pollutants (NESHAP) radionuclide source. The dose estimates are based on realistic, yet conservative input parameters.

Migratory birds – All birds listed within the Migratory Bird Treaty Act, 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 (MAPEP) – The MAPEP is used by the DOE as a quality assurance tool for environmental analytical services across the DOE Complex. 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. MAPEP 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; and a hazardous component subject to the Resource Conservation and Recovery Act (RCRA), as amended.

Mixed waste generator – Any person or organization generating mixed waste or causing a material to be subject to mixed waste regulations. Generators are responsible for the generation and subsequent management of mixed waste as part of their occupation or position. Generators may include managers, their employees, and contractors.

# N

National Emissions Standards for Hazardous Air Pollutants (NESHAP) – Emissions standards set by EPA for an air pollutant not covered by NAAQS that may cause an increase in fatalities or in serious, irreversible, or incapacitating illness. Primary standards are designed to protect human health, secondary standards to protect public welfare (e.g. building facades, visibility, crops, and domestic animals).

National Environmental Policy Act (NEPA) – The basic national charter for protection of the environment. It establishes policy, sets goals, and provides means for carrying out the policy.

National Pollutant Discharge Elimination System (NPDES) – A provision of the Clean Water Act which 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 resources – Resources (actual and potential) supplied by nature.

Nitrates – 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 feed lots, agricultural fertilizers, manure, industrial waste waters, sanitary landfills, and garbage dumps.

Nitrites – 1. An intermediate in the process of nitrification. 2. Nitrous oxide salts used in food preservation.

Nitrogen Dioxide – A poisonous brown gas, $NO_2$, often found in smog and automobile exhaust fumes and synthesized for use as a nitrating agent, a catalyst, and an oxidizing agent.

Non-Methane Hydrocarbon (NMHC) – The sum of all hydrocarbon air pollutants except methane; significant precursors to ozone formation.

Non-radiological contaminants – A source of contamination that has no radiological components.

Nuclear energy – The energy released by a nuclear reaction.

Nuclear particle acceleration – Imparting large kinetic energy to electrically charged sub-atomic nuclear particles (e.g., protons, deuterons, electrons) by applying electrical potential differences for the purpose of physics experiments.

# O

Outfalls – The place where effluent is discharged into receiving waters.

Ozone – A colorless gas (O3) 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 periodic spring.

Physiography – The study of the natural features of the earth's surface, especially in its current aspects, including land formation, climate, currents, and distribution of flora and fauna (also called physical geography).

Piezometer – An instrument for measuring pressure, especially high pressure.

$PM_{10}$ – Particulate matter (diameter equal to or less than 10 microns).

$PM_{2.5}$ – Respirable particulate matter (diameter equal to or less than 2.5 microns)

Point source – A stationary location or fixed facility from which pollutants are discharged; any single identifiable source of pollution; e.g. a pipe, ditch, ship, ore pit, factory smokestack.

Point source discharges – Any discernible, confined, and discrete conveyance from which pollutants are or may be discharged.

Pollutant – Generally, any substance introduced into the environment that adversely affects the usefulness of a resource or the health of humans, animals, or ecosystems.

Pollutant, water – Defined by the Environmental Protection Agency (EPA) as any physical, chemical, biological, or radiological substance that has an adverse affect on water.

Pollution Prevention (P2) – The use of materials, processes, and practices that reduce or eliminate the generation and release of pollutants, contaminants, hazardous substances, and waste into land, water, and air. For DOE, this includes recycling.

Polychlorinated biphenyls – "PCB" and "PCBs" are chemical terms limited to the biphenyl molecule that has been chlorinated to varying degrees or any combination of substances that contains such substance. Because of their persistence, toxicity, and ecological damage via water pollution, their manufacture was discontinued in the U.S. in 1976.

Potable Water – Water free from impurities present in quantities sufficient to cause disease or harmful physiological effects.

Practical Quantitation Limit (PQL) – The lowest level of analytical determination that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions.

Pulsed power – Technology is used to generate and apply energetic beams and high-power energy pulses.

## Q

Quality Assurance (QA) – A system of procedures, checks, audits, and corrective actions to ensure that all EPA research design and performance, environmental monitoring and sampling, and other technical and reporting activities are of the highest achievable quality.

Quality Control (QC) – Used in determining analytical accuracy, precision, and contamination when samples are collected , and to assess the quality and usability of the data.

## 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 Contaminants – Radioactive material deposited in any place where it is not desired, particularly where its presence may be harmful.

Radionuclide – Radioactive particle, man-made (anthropogenic) or natural, with a distinct atomic weight number. Can have a long life as soil or water pollutant.

Radon – A colorless naturally occurring, radioactive, inert gas formed by radioactive decay of radium atoms in soil or rocks.

Reportable quantity (RQ) – Quantity of material or product compound or contaminant which when released to the environment is reportable to a regulatory agency.

Rodenticides – A chemical or agent used to destroy rats or other rodent pests, or to prevent them from damaging food, crops, etc.

# S

Sample Management Office (SMO) – An SNL office that manages environmental analytical laboratory contracts and assists with the processing and tracking of samples undergoing chemical and radiochemical analyses performed at these laboratories.

Sampling and Analysis Plan (SAP) – A plan containing various criteria required for conducting sampling activities.

Sanitary discharges – The portion of liquid effluent exclusive of industrial wastewater and storm water. The liquid discharges from rest rooms and food preparation activities.

Screened intervals – The section of water well piping below ground that is perforated or in some manner made porous to allow water to enter the interior of the casing and prohibit the entry of sand and rocks.

Seasonal recharge – Recharge of groundwater during and after a wet season, with a rise in the level of the water table.

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.

Semi-volatile organic compounds – Organic compounds that volatilize slowly at standard temperature (20 degrees C and 1 atm pressure).

Site-Wide Environmental Impact Statement (SWEIS) – A detailed public document, for which a federal agency is responsible, that provides analysis of the expected impacts on the human environment of a proposed action and alternatives to the proposed action.

Solid waste – Any garbage, refuse, sludge from a waste treatment plant, water supply treatment plant, or air pollution control facility and other discarded material including solid, liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations and from community activities.

Statement Of Work (SOW) – A comprehensive description of the goods, services, or combination of goods and services for which SNL contracts.

Storm water – 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, $SO_2$, used in many industrial processes, especially the manufacture of sulfuric acid.

Surface discharge – Spilling, leaking, pumping, pouring, emitting, emptying, or dumping into water or in a location and manner where there is a reasonable probability that the discharged substance will reach surface or subsurface water.

# T

Thermoluminescent Dosimeters (TLD) – A device that monitors both the whole body and skin radiation dose to which a person has been exposed during the course of work. These same devices can also be used to measure environmental exposure rates.

Threatened and endangered species – A species present in such small numbers that it is at risk of extinction.

Time-weighted composites – 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 (chemicals) – Any chemical listed in EPA rules as "Toxic Chemicals Subject to Section 313 of the Emergency Planning and Community Right-to-Know Act of 1986."

Transuranic waste (TRU) – 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 nCi/g.

Trihalomethanes – A chemical compound containing three halogen atoms substituted for the three hydrogen atoms normally present in a methane molecule. It can occur in chlorinated water as a result of reaction between organic materials in the water and chlorine added as a disinfectant.

Tritium – A radioactive hydrogen isotope with atomic mass 3 and half-life 12.5 years, prepared artificially for use as a tracer and as a constituent of hydrogen bombs.

Turbidity – 1. Haziness in air caused by the presence of particles and pollutants. 2. A cloudy condition in water due to suspended silt or organic matter.

## 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 (UST) – A single tank or a combination of tanks, including underground pipes connected thereto, which are used to contain an accumulation of regulated substances, such as petroleum products, mineral oil, and chemicals, and the volume of which, including the volume of underground pipes connected thereto, is 10% or more beneath the surface of the ground.

Up-gradient – In the direction of higher water levels.

Upstream – In, at, or toward the source of a stream.

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.

USFS (U.S. Forest Service) Withdrawn Area – A portion of Kirtland Air Force Base consisting of land within the Cibola National Forest, which has been withdrawn from public access for use by the US Air Force and the US Department of Energy.

## 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.

Vanadium – A bright white, soft, ductile metallic element found in several minerals, notably vanadinite and carnotite, having good structural strength and used in rust-resistant high-speed tools, as a carbon stabilizer in some steels, as a titanium-steel bonding agent, and as a catalyst.

Volatile Organic Compound (VOC) – Any organic compound that participates in atmospheric photochemical reactions except those designated by EPA as having negligible photochemical reactivity.

## W

Waste characterization – Identification of chemical and microbiological constituents of a waste material.

Waste management – The processes involved in dealing with the waste of humans and organisms, including minimization, handling, processing, storage, recycling, transport, 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.

Water table – The level of groundwater.

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.

Wetland – An area that is saturated by surface or ground water with vegetation adapted for life under those soil conditions, as swamps, bogs, fens, marshes, and estuaries.

Wind rose – A graphical presentation of wind speed and direction frequency distribution.

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# APPENDIX A

## 2010 WASTEWATER MONITORING RESULTS

**TABLE A-1. Permitted Sanitary Outfalls of Inorganic Analyses, February 2010 and April 2010**

| Station | Permit Number | Date Collected | Sample ID | Analyte | Result | MDL | Lab Data Qualifier | Units | Regulatory Limit (COA) |
|---|---|---|---|---|---|---|---|---|---|
| CINT | 2238A | 24-Feb-10 | 088052-001 | Aluminum | | 0.068 | U | mg/L | 900 |
| CINT | 2238A | 24-Feb-10 | 088052-001 | Arsenic | 0.00552 | 0.005 | J | mg/L | 0.051 |
| CINT | 2238A | 24-Feb-10 | 088052-001 | Boron | 0.0808 | 0.015 | | mg/L | |
| CINT | 2238A | 24-Feb-10 | 088052-001 | Cadmium | | 0.001 | U | mg/L | 0.5 |
| CINT | 2238A | 24-Feb-10 | 088052-001 | Chromium | 0.00393 | 0.001 | J | mg/L | 4.1 |
| CINT | 2238A | 24-Feb-10 | 088052-001 | Copper | 0.00577 | 0.003 | J | mg/L | 5.3 |
| CINT | 2238A | 24-Feb-10 | 088051-001 | Cyanide, total | | 0.00166 | U | mg/L | 0.45 |
| CINT | 2238A | 24-Feb-10 | 088051-002 | Cyanide, total | 0.0123 | 0.00166 | | mg/L | 0.45 |
| CINT | 2238A | 24-Feb-10 | 088051-003 | Cyanide, total | | 0.00166 | U | mg/L | 0.45 |
| CINT | 2238A | 24-Feb-10 | 088051-004 | Cyanide, total | | 0.00166 | U | mg/L | 0.45 |
| CINT | 2238A | 24-Feb-10 | 088052-002 | Fluoride | 0.948 | 0.033 | | mg/L | 36 |
| CINT | 2238A | 24-Feb-10 | 088052-001 | Lead | | 0.0033 | U | mg/L | 1 |
| CINT | 2238A | 24-Feb-10 | 088052-001 | Molybdenum | 0.0692 | 0.002 | | mg/L | 2 |
| CINT | 2238A | 24-Feb-10 | 088052-001 | Nickel | | 0.0015 | U | mg/L | 2 |
| CINT | 2238A | 24-Feb-10 | 088052-001 | Selenium | | 0.005 | U | mg/L | 0.46 |
| CINT | 2238A | 24-Feb-10 | 088052-001 | Silver | | 0.001 | U | mg/L | 5 |
| CINT | 2238A | 24-Feb-10 | 088052-001 | Zinc | 0.00651 | 0.0033 | J | mg/L | 2.2 |
| CINT | 2238A | 25-Feb-10 | 088053-001 | Aluminum | | 0.068 | U | mg/L | 900 |
| CINT | 2238A | 25-Feb-10 | 088053-001 | Arsenic | 0.00589 | 0.005 | J | mg/L | 0.051 |
| CINT | 2238A | 25-Feb-10 | 088053-001 | Boron | 0.0935 | 0.015 | | mg/L | |
| CINT | 2238A | 25-Feb-10 | 088053-001 | Cadmium | | 0.001 | U | mg/L | 0.5 |
| CINT | 2238A | 25-Feb-10 | 088053-001 | Chromium | 0.00236 | 0.001 | J | mg/L | 4.1 |
| CINT | 2238A | 25-Feb-10 | 088053-001 | Copper | 0.016 | 0.003 | | mg/L | 5.3 |
| CINT | 2238A | 25-Feb-10 | 088053-002 | Fluoride | 0.759 | 0.033 | | mg/L | 36 |
| CINT | 2238A | 25-Feb-10 | 088053-001 | Lead | 0.00451 | 0.0033 | J | mg/L | 1 |
| CINT | 2238A | 25-Feb-10 | 088053-001 | Molybdenum | 0.0771 | 0.002 | | mg/L | 2 |
| CINT | 2238A | 25-Feb-10 | 088053-001 | Nickel | | 0.0015 | U | mg/L | 2 |
| CINT | 2238A | 25-Feb-10 | 088053-001 | Selenium | | 0.005 | U | mg/L | 0.46 |
| CINT | 2238A | 25-Feb-10 | 088053-001 | Silver | | 0.001 | U | mg/L | 5 |
| CINT | 2238A | 25-Feb-10 | 088053-001 | Zinc | 0.00831 | 0.0033 | J | mg/L | 2.2 |
| CINT | 2238A | 20-Apr-10 | 088060-005 | Ammonia | 0.152 | 0.016 | | mg/L | |
| CINT | 2238A | 21-Apr-10 | 088066-001 | Ammonia | 0.172 | 0.016 | | mg/L | |
| WW001 | 2069-A | 20-Apr-10 | 088054-001 | Aluminum | 0.114 | 0.068 | J | mg/L | 900 |
| WW001 | 2069-A | 20-Apr-10 | 088054-007 | Ammonia | 10.3 | 0.16 | | mg/L | |
| WW001 | 2069-A | 20-Apr-10 | 088054-001 | Arsenic | 0.0106 | 0.005 | J | mg/L | 0.051 |
| WW001 | 2069-A | 20-Apr-10 | 088054-001 | Boron | 0.0999 | 0.015 | | mg/L | |
| WW001 | 2069-A | 20-Apr-10 | 088054-001 | Cadmium | | 0.001 | U | mg/L | 0.5 |
| WW001 | 2069-A | 20-Apr-10 | 088054-001 | Chromium | 0.00443 | 0.001 | J | mg/L | 4.1 |

TABLE A-1. Permitted Sanitary Outfalls of Inorganic Analyses, February 2010 and April 2010

| Station | Permit Number | Date Collected | Sample ID | Analyte | Result | MDL | Lab Data Qualifier | Units | Regulatory Limit (COA) |
|---|---|---|---|---|---|---|---|---|---|
| WW001 | 2069-A | 20-Apr-10 | 088054-001 | Copper | 0.0524 | 0.003 | | mg/L | 5.3 |
| WW001 | 2069-A | 20-Apr-10 | 088054-002 | Fluoride | 2.99 | 0.033 | | mg/L | 36 |
| WW001 | 2069-A | 20-Apr-10 | 088054-001 | Lead | 0.0112 | 0.0033 | | mg/L | 1 |
| WW001 | 2069-A | 20-Apr-10 | 088054-001 | Molybdenum | 0.12 | 0.002 | | mg/L | 2 |
| WW001 | 2069-A | 20-Apr-10 | 088054-001 | Nickel | 0.00341 | 0.0015 | J | mg/L | 2 |
| WW001 | 2069-A | 20-Apr-10 | 088054-001 | Selenium | | 0.005 | U | mg/L | 0.46 |
| WW001 | 2069-A | 20-Apr-10 | 088054-001 | Silver | | 0.001 | U | mg/L | 5 |
| WW001 | 2069-A | 20-Apr-10 | 088054-001 | Zinc | 0.0632 | 0.0033 | | mg/L | 2.2 |
| WW001 | 2069-A | 21-Apr-10 | 088061-001 | Aluminum | | 0.068 | U | mg/L | 900 |
| WW001 | 2069-A | 21-Apr-10 | 088061-003 | Ammonia | 0.999 | 0.016 | | mg/L | |
| WW001 | 2069-A | 21-Apr-10 | 088061-001 | Arsenic | 0.0456 | 0.005 | | mg/L | 0.051 |
| WW001 | 2069-A | 21-Apr-10 | 088061-001 | Boron | 0.142 | 0.015 | | mg/L | |
| WW001 | 2069-A | 21-Apr-10 | 088061-001 | Cadmium | | 0.001 | U | mg/L | 0.5 |
| WW001 | 2069-A | 21-Apr-10 | 088061-001 | Chromium | 0.00488 | 0.001 | J | mg/L | 4.1 |
| WW001 | 2069-A | 21-Apr-10 | 088061-001 | Copper | 0.0337 | 0.003 | | mg/L | 5.3 |
| WW001 | 2069-A | 21-Apr-10 | 088061-002 | Fluoride | 3.21 | 0.033 | | mg/L | 36 |
| WW001 | 2069-A | 21-Apr-10 | 088061-001 | Lead | 0.0146 | 0.0033 | | mg/L | 1 |
| WW001 | 2069-A | 21-Apr-10 | 088061-001 | Molybdenum | 0.15 | 0.002 | | mg/L | 2 |
| WW001 | 2069-A | 21-Apr-10 | 088061-001 | Nickel | 0.00209 | 0.0015 | J | mg/L | 2 |
| WW001 | 2069-A | 21-Apr-10 | 088061-001 | Selenium | | 0.005 | U | mg/L | 0.46 |
| WW001 | 2069-A | 21-Apr-10 | 088061-001 | Silver | | 0.001 | U | mg/L | 5 |
| WW001 | 2069-A | 21-Apr-10 | 088061-001 | Zinc | 0.0531 | 0.0033 | | mg/L | 2.2 |
| WW006 | 2069F-4 | 19-Apr-10 | 088067-001 | Cyanide, total | | 0.0017 | U | mg/L | 0.45 |
| WW006 | 2069F-4 | 19-Apr-10 | 088067-002 | Cyanide, total | | 0.0017 | U | mg/L | 0.45 |
| WW006 | 2069F-4 | 19-Apr-10 | 088067-003 | Cyanide, total | | 0.0017 | U | mg/L | 0.45 |
| WW006 | 2069F-4 | 19-Apr-10 | 088067-004 | Cyanide, total | 0.00389 | 0.0017 | J | mg/L | 0.45 |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-001 | Aluminum | 0.138 | 0.068 | J | mg/L | 900 |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-007 | Ammonia | 24.8 | 0.4 | | mg/L | |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-001 | Arsenic | 0.0102 | 0.005 | J | mg/L | 0.051 |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-001 | Boron | 0.125 | 0.015 | | mg/L | |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-001 | Cadmium | | 0.001 | U | mg/L | 0.5 |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-001 | Chromium | 0.00295 | 0.001 | J | mg/L | 4.1 |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-001 | Copper | 0.0103 | 0.003 | | mg/L | 5.3 |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-002 | Fluoride | 0.849 | 0.033 | | mg/L | 36 |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-001 | Lead | 0.00368 | 0.0033 | J | mg/L | 1 |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-001 | Molybdenum | 0.15 | 0.002 | | mg/L | 2 |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-001 | Nickel | 0.00217 | 0.0015 | J | mg/L | 2 |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-001 | Selenium | | 0.005 | U | mg/L | 0.46 |

**TABLE A-1. Permitted Sanitary Outfalls of Inorganic Analyses, February 2010 and April 2010**

| Station | Permit Number | Date Collected | Sample ID | Analyte | Result | MDL | Lab Data Qualifier | Units | Regulatory Limit (COA) |
|---|---|---|---|---|---|---|---|---|---|
| WW006 | 2069F-4 | 20-Apr-10 | 088055-001 | Silver | | 0.005 | U | mg/L | 5 |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-001 | Zinc | 0.0608 | 0.0033 | | mg/L | 2.2 |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-001 | Aluminum | 0.141 | 0.068 | J | mg/L | 900 |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-003 | Ammonia | 11.2 | 0.16 | | mg/L | |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-001 | Arsenic | 0.00977 | 0.005 | J | mg/L | 0.051 |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-001 | Boron | 0.128 | 0.015 | | mg/L | |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-001 | Cadmium | | 0.001 | U | mg/L | 0.5 |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-001 | Chromium | 0.00244 | 0.001 | J | mg/L | 4.1 |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-001 | Copper | 0.0136 | 0.003 | | mg/L | 5.3 |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-002 | Fluoride | 0.908 | 0.033 | | mg/L | 36 |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-001 | Lead | 0.00542 | 0.0033 | J | mg/L | 1 |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-001 | Molybdenum | 0.0997 | 0.002 | | mg/L | 2 |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-001 | Nickel | 0.00218 | 0.0015 | J | mg/L | 2 |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-001 | Selenium | | 0.005 | U | mg/L | 0.46 |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-001 | Silver | | 0.001 | U | mg/L | 5 |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-001 | Zinc | 0.0803 | 0.0033 | | mg/L | 2.2 |
| WW006 #2 | 2069F-4 | 20-Apr-10 | 088070-001 | Cyanide, total | | 0.0017 | U | mg/L | 0.45 |
| WW006 #2 | 2069F-4 | 20-Apr-10 | 088070-002 | Cyanide, total | | 0.0017 | U | mg/L | 0.45 |
| WW006 #2 | 2069F-4 | 20-Apr-10 | 088070-003 | Cyanide, total | | 0.0017 | U | mg/L | 0.45 |
| WW006 #2 | 2069F-4 | 20-Apr-10 | 088070-004 | Cyanide, total | 0.00235 | 0.0017 | J | mg/L | 0.45 |
| WW007 | 2069G-2 | 19-Apr-10 | 088068-001 | Cyanide, total | | 0.0017 | U | mg/L | 0.45 |
| WW007 | 2069G-2 | 19-Apr-10 | 088068-002 | Cyanide, total | | 0.0017 | U | mg/L | 0.45 |
| WW007 | 2069G-2 | 19-Apr-10 | 088068-003 | Cyanide, total | | 0.0017 | U | mg/L | 0.45 |
| WW007 | 2069G-2 | 19-Apr-10 | 088068-004 | Cyanide, total | | 0.0017 | U | mg/L | 0.45 |
| WW007 | 2069G-2 | 20-Apr-10 | 088056-001 | Aluminum | | 0.068 | U | mg/L | 900 |
| WW007 | 2069G-2 | 20-Apr-10 | 088056-004 | Ammonia | 0.951 | 0.016 | | mg/L | |
| WW007 | 2069G-2 | 20-Apr-10 | 088056-001 | Arsenic | | 0.005 | U | mg/L | 0.051 |
| WW007 | 2069G-2 | 20-Apr-10 | 088056-001 | Boron | 0.032 | 0.015 | J | mg/L | |
| WW007 | 2069G-2 | 20-Apr-10 | 088056-001 | Cadmium | | 0.001 | U | mg/L | 0.5 |
| WW007 | 2069G-2 | 20-Apr-10 | 088056-001 | Chromium | 0.00187 | 0.001 | J | mg/L | 4.1 |
| WW007 | 2069G-2 | 20-Apr-10 | 088056-001 | Copper | | 0.003 | U | mg/L | 5.3 |
| WW007 | 2069G-2 | 20-Apr-10 | 088056-002 | Fluoride | 1.39 | 0.033 | | mg/L | 36 |
| WW007 | 2069G-2 | 20-Apr-10 | 088056-001 | Lead | | 0.0033 | U | mg/L | 1 |
| WW007 | 2069G-2 | 20-Apr-10 | 088056-001 | Molybdenum | 0.0232 | 0.002 | | mg/L | 2 |
| WW007 | 2069G-2 | 20-Apr-10 | 088056-001 | Nickel | | 0.0015 | U | mg/L | 2 |
| WW007 | 2069G-2 | 20-Apr-10 | 088056-001 | Selenium | | 0.005 | U | mg/L | 0.46 |
| WW007 | 2069G-2 | 20-Apr-10 | 088056-001 | Silver | | 0.001 | U | mg/L | 5 |
| WW007 | 2069G-2 | 20-Apr-10 | 088056-001 | Zinc | | 0.0033 | U | mg/L | 2.2 |

TABLE A-1. Permitted Sanitary Outfalls of Inorganic Analyses, February 2010 and April 2010

| Station | Permit Number | Date Collected | Sample ID | Analyte | Result | MDL | Lab Data Qualifier | Units | Regulatory Limit (COA) |
|---|---|---|---|---|---|---|---|---|---|
| WW007 | 2069G-2 | 21-Apr-10 | 088063-001 | Aluminum | | 0.068 | U | mg/L | 900 |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-003 | Ammonia | 1.01 | 0.016 | | mg/L | |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-001 | Arsenic | 0.132 | 0.005 | | mg/L | 0.051 |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-001 | Boron | 0.132 | 0.015 | | mg/L | |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-001 | Cadmium | | 0.001 | U | mg/L | 0.5 |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-001 | Chromium | 0.00139 | 0.001 | J | mg/L | 4.1 |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-001 | Copper | | 0.003 | U | mg/L | 5.3 |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-002 | Fluoride | 1.16 | 0.033 | | mg/L | 36 |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-001 | Lead | | 0.0033 | U | mg/L | 1 |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-001 | Molybdenum | 0.0215 | 0.002 | | mg/L | 2 |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-001 | Nickel | | 0.0015 | U | mg/L | 2 |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-001 | Selenium | | 0.005 | U | mg/L | 0.46 |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-001 | Silver | | 0.001 | U | mg/L | 5 |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-001 | Zinc | | 0.0033 | U | mg/L | 2.2 |
| WW008 | 2069I-3 | 19-Apr-10 | 088069-001 | Cyanide, total | | 0.0017 | U | mg/L | 0.45 |
| WW008 | 2069I-3 | 19-Apr-10 | 088069-002 | Cyanide, total | | 0.0017 | U | mg/L | 0.45 |
| WW008 | 2069I-3 | 19-Apr-10 | 088069-003 | Cyanide, total | 0.00442 | 0.0017 | J | mg/L | 0.45 |
| WW008 | 2069I-3 | 19-Apr-10 | 088069-004 | Cyanide, total | | 0.0017 | U | mg/L | 0.45 |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-001 | Aluminum | 0.149 | 0.068 | J | mg/L | 900 |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-007 | Ammonia | 0.135 | 0.016 | | mg/L | |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-001 | Arsenic | 0.00702 | 0.005 | J | mg/L | 0.051 |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-001 | Boron | 0.0842 | 0.015 | | mg/L | |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-001 | Cadmium | | 0.001 | U | mg/L | 0.5 |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-001 | Chromium | 0.00215 | 0.001 | J | mg/L | 4.1 |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-001 | Copper | 0.034 | 0.003 | | mg/L | 5.3 |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-002 | Fluoride | 0.653 | 0.033 | | mg/L | 36 |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-001 | Lead | | 0.0033 | U | mg/L | 1 |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-001 | Molybdenum | 0.00904 | 0.002 | J | mg/L | 2 |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-001 | Nickel | 0.0037 | 0.0015 | J | mg/L | 2 |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-001 | Selenium | | 0.005 | U | mg/L | 0.46 |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-001 | Silver | | 0.001 | U | mg/L | 5 |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-001 | Zinc | 0.104 | 0.0033 | | mg/L | 2.2 |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-001 | Aluminum | 0.13 | 0.068 | J | mg/L | 900 |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-003 | Ammonia | 28.7 | 0.4 | | mg/L | |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-001 | Arsenic | 0.00977 | 0.005 | J | mg/L | 0.051 |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-001 | Boron | 0.0825 | 0.015 | | mg/L | |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-001 | Cadmium | | 0.001 | U | mg/L | 0.5 |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-001 | Chromium | 0.00256 | 0.001 | J | mg/L | 4.1 |

## TABLE A-1. Permitted Sanitary Outfalls of Inorganic Analyses, February 2010 and April 2010

| Station | Permit Number | Date Collected | Sample ID | Analyte | Result | MDL | Lab Data Qualifier | Units | Regulatory Limit (COA) |
|---|---|---|---|---|---|---|---|---|---|
| WW008 | 2069I-3 | 21-Apr-10 | 088064-001 | Copper | 0.0325 | 0.003 | | mg/L | 5.3 |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-002 | Fluoride | 0.756 | 0.033 | | mg/L | 36 |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-001 | Lead | | 0.0033 | U | mg/L | 1 |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-001 | Molybdenum | 0.0831 | 0.002 | | mg/L | 2 |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-001 | Nickel | 0.0027 | 0.0015 | J | mg/L | 2 |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-001 | Selenium | | 0.005 | U | mg/L | 0.46 |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-001 | Silver | | 0.001 | U | mg/L | 5 |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-001 | Zinc | 0.0815 | 0.0033 | | mg/L | 2.2 |
| WW011 | 2069-K | 20-Apr-10 | 088058-001 | Aluminum | 0.136 | 0.068 | J | mg/L | 900 |
| WW011 | 2069-K | 20-Apr-10 | 088058-007 | Ammonia | 14.9 | 0.16 | | mg/L | |
| WW011 | 2069-K | 20-Apr-10 | 088058-001 | Arsenic | 0.00915 | 0.005 | J | mg/L | 0.051 |
| WW011 | 2069-K | 20-Apr-10 | 088058-001 | Boron | 0.0913 | 0.015 | | mg/L | |
| WW011 | 2069-K | 20-Apr-10 | 088058-001 | Cadmium | | 0.001 | U | mg/L | 0.5 |
| WW011 | 2069-K | 20-Apr-10 | 088058-001 | Chromium | 0.0048 | 0.001 | J | mg/L | 4.1 |
| WW011 | 2069-K | 20-Apr-10 | 088058-001 | Copper | 0.0275 | 0.003 | | mg/L | 5.3 |
| WW011 | 2069-K | 20-Apr-10 | 088058-002 | Fluoride | 0.656 | 0.033 | | mg/L | 36 |
| WW011 | 2069-K | 20-Apr-10 | 088058-001 | Lead | | 0.0033 | U | mg/L | 1 |
| WW011 | 2069-K | 20-Apr-10 | 088058-001 | Molybdenum | 0.0145 | 0.002 | | mg/L | 2 |
| WW011 | 2069-K | 20-Apr-10 | 088058-001 | Nickel | 0.00215 | 0.0015 | J | mg/L | 2 |
| WW011 | 2069-K | 20-Apr-10 | 088058-001 | Selenium | | 0.005 | U | mg/L | 0.46 |
| WW011 | 2069-K | 20-Apr-10 | 088058-001 | Silver | | 0.001 | U | mg/L | 5 |
| WW011 | 2069-K | 20-Apr-10 | 088058-001 | Zinc | 0.077 | 0.0033 | | mg/L | 2.2 |
| WW011 | 2069-K | 21-Apr-10 | 088065-001 | Aluminum | 0.433 | 0.068 | | mg/L | 900 |
| WW011 | 2069-K | 21-Apr-10 | 088065-003 | Ammonia | 9.87 | 0.16 | | mg/L | |
| WW011 | 2069-K | 21-Apr-10 | 088065-001 | Arsenic | 0.00771 | 0.005 | J | mg/L | 0.051 |
| WW011 | 2069-K | 21-Apr-10 | 088065-001 | Boron | 0.0856 | 0.015 | | mg/L | |
| WW011 | 2069-K | 21-Apr-10 | 088065-001 | Cadmium | | 0.001 | U | mg/L | 0.5 |
| WW011 | 2069-K | 21-Apr-10 | 088065-001 | Chromium | 0.00868 | 0.001 | | mg/L | 4.1 |
| WW011 | 2069-K | 21-Apr-10 | 088065-001 | Copper | 0.0689 | 0.003 | | mg/L | 5.3 |
| WW011 | 2069-K | 21-Apr-10 | 088065-002 | Fluoride | 0.659 | 0.033 | | mg/L | 36 |
| WW011 | 2069-K | 21-Apr-10 | 088065-001 | Lead | 0.00634 | 0.0033 | J | mg/L | 1 |
| WW011 | 2069-K | 21-Apr-10 | 088065-001 | Molybdenum | 0.0557 | 0.002 | | mg/L | 2 |
| WW011 | 2069-K | 21-Apr-10 | 088065-001 | Nickel | 0.00483 | 0.0015 | J | mg/L | 2 |

**TABLE A-1. Permitted Sanitary Outfalls of Inorganic Analyses, February 2010 and April 2010**

| Station | Permit Number | Date Collected | Sample ID | Analyte | Result | MDL | Lab Data Qualifier | Units | Regulatory Limit (COA) |
|---|---|---|---|---|---|---|---|---|---|
| WW011 | 2069-K | 21-Apr-10 | 088065-001 | Selenium | | 0.005 | U | mg/L | 0.46 |
| WW011 | 2069-K | 21-Apr-10 | 088065-001 | Silver | | 0.001 | U | mg/L | 5 |
| WW011 | 2069-K | 21-Apr-10 | 088065-001 | Zinc | 0.221 | 0.0033 | | mg/L | 2.2 |

**NOTES:**

**COA = City of Albuquerque**
**MDL = Method detection limit**
**mg/L = milligrams per liter**
**J = Estimated value, the analyte concentration fell above the effective MDL and below the effective (PQL) practical quantitation limit**
**U = The analyte was analyzed for, but not detected. For organic and inorganic analytes the result is less than the effective MDL concentration**

## TABLE A-2. Summary of Sanitary Outfalls of Radiological Analyses, April 2010

| Station | Permit Number | Date Collected | Sample ID | Analyte | Activity | Two Sigma Error | Lab Data Qualifier | MDA | Units | Regulatory Sewer Release Limits* (Monthly Avg) |
|---|---|---|---|---|---|---|---|---|---|---|
| CINT | 2238A | 20-Apr-10 | 088060-002 | Actinium-228 | -1.15 | 13.9 | U | 13.3 | pCi/L | 300000 |
| CINT | 2238A | 20-Apr-10 | 088060-001 | Alpha, gross | 1.99 | 0.948 | | 1.21 | pCi/L | |
| CINT | 2238A | 20-Apr-10 | 088060-002 | Americium-241 | -3.73 | 5.31 | U | 8.78 | pCi/L | 200 |
| CINT | 2238A | 20-Apr-10 | 088060-002 | Beryllium-7 | -4.07 | 16.5 | U | 26.7 | pCi/L | |
| CINT | 2238A | 20-Apr-10 | 088060-001 | Beta, gross | 3.25 | 0.825 | | 0.773 | pCi/L | |
| CINT | 2238A | 20-Apr-10 | 088060-002 | Bismuth-212 | 29.7 | 25.2 | U | 44.5 | pCi/L | |
| CINT | 2238A | 20-Apr-10 | 088060-002 | Bismuth-214 | 7.29 | 4 | U | 7.29 | pCi/L | |
| CINT | 2238A | 20-Apr-10 | 088060-002 | Cesium-137 | 0.193 | 1.83 | U | 3.12 | pCi/L | 10000 |
| CINT | 2238A | 20-Apr-10 | 088060-002 | Cobalt-60 | -0.0175 | 1.95 | U | 3.27 | pCi/L | 30000 |
| CINT | 2238A | 20-Apr-10 | 088060-002 | Lead-212 | 3.53 | 5.06 | U | 6.29 | pCi/L | 20000 |
| CINT | 2238A | 20-Apr-10 | 088060-002 | Lead-214 | -3.37 | 5.97 | U | 6.62 | pCi/L | 1000000 |
| CINT | 2238A | 20-Apr-10 | 088060-002 | Neptunium-237 | -20.1 | 14.4 | U | 16 | pCi/L | |
| CINT | 2238A | 20-Apr-10 | 088060-002 | Potassium-40 | 8.92 | 35.9 | U | 46.6 | pCi/L | 40000 |
| CINT | 2238A | 20-Apr-10 | 088060-002 | Radium-223 | 13.9 | 739 | U | 56.6 | pCi/L | |
| CINT | 2238A | 20-Apr-10 | 088060-002 | Radium-224 | -102 | 36.2 | U | 55.6 | pCi/L | |
| CINT | 2238A | 20-Apr-10 | 088060-002 | Radium-226 | -1.54 | 62.5 | U | 67.6 | pCi/L | 600 |
| CINT | 2238A | 20-Apr-10 | 088060-002 | Radium-228 | -1.15 | 13.9 | U | 13.3 | pCi/L | 600 |
| CINT | 2238A | 20-Apr-10 | 088060-002 | Sodium-22 | 1.88 | 1.86 | U | 3.35 | pCi/L | |
| CINT | 2238A | 20-Apr-10 | 088060-002 | Thorium-227 | 1.51 | 81.1 | U | 21.4 | pCi/L | |
| CINT | 2238A | 20-Apr-10 | 088060-002 | Thorium-231 | -21.6 | 26.4 | U | 31.5 | pCi/L | 300 |
| CINT | 2238A | 20-Apr-10 | 088060-002 | Thorium-234 | -10.7 | 89 | U | 93.6 | pCi/L | 50000 |
| CINT | 2238A | 20-Apr-10 | 088060-003 | Tritium | -19.1 | 90.1 | U | 157 | pCi/L | 10000000 |
| CINT | 2238A | 20-Apr-10 | 088060-002 | Uranium-235 | 4.49 | 15.6 | U | 17.3 | pCi/L | 3000 |
| CINT | 2238A | 20-Apr-10 | 088060-002 | Uranium-238 | -10.7 | 89 | U | 93.6 | pCi/L | 3000 |
| WW001 | 2069-A | 20-Apr-10 | 088054-004 | Actinium-228 | -20.4 | 14.6 | U | 17.2 | pCi/L | 300000 |
| WW001 | 2069-A | 20-Apr-10 | 088054-003 | Alpha, gross | 2.65 | 1.28 | | 1.56 | pCi/L | |
| WW001 | 2069-A | 20-Apr-10 | 088054-004 | Americium-241 | 4.26 | 2.96 | U | 5.29 | pCi/L | 200 |
| WW001 | 2069-A | 20-Apr-10 | 088054-004 | Beryllium-7 | -6.21 | 17.3 | U | 28.5 | pCi/L | |
| WW001 | 2069-A | 20-Apr-10 | 088054-003 | Beta, gross | 11.7 | 2.48 | | 2.01 | pCi/L | |
| WW001 | 2069-A | 20-Apr-10 | 088054-004 | Bismuth-212 | -44.7 | 49.4 | U | 53 | pCi/L | |
| WW001 | 2069-A | 20-Apr-10 | 088054-004 | Bismuth-214 | 1.41 | 9.46 | U | 9.27 | pCi/L | |
| WW001 | 2069-A | 20-Apr-10 | 088054-004 | Cesium-137 | 0.111 | 2.41 | U | 3.94 | pCi/L | 10000 |
| WW001 | 2069-A | 20-Apr-10 | 088054-004 | Cobalt-60 | 2.77 | 2.36 | U | 4.37 | pCi/L | 30000 |

## TABLE A-2. Summary of Sanitary Outfalls of Radiological Analyses, April 2010

| Station | Permit Number | Date Collected | Sample ID | Analyte | Activity | Two Sigma Error | Lab Data Qualifier | MDA | Units | Regulatory Sewer Release Limits* (Monthly Avg) |
|---|---|---|---|---|---|---|---|---|---|---|
| WW001 | 2069-A | 20-Apr-10 | 088054-004 | Lead-212 | 0.813 | 5.77 | U | 6.75 | pCi/L | 20000 |
| WW001 | 2069-A | 20-Apr-10 | 088054-004 | Lead-214 | -1.71 | 8.05 | U | 7.66 | pCi/L | 1000000 |
| WW001 | 2069-A | 20-Apr-10 | 088054-004 | Neptunium-237 | -20.1 | 13.8 | U | 13.9 | pCi/L | |
| WW001 | 2069-A | 20-Apr-10 | 088054-004 | Potassium-40 | 27.8 | 43.4 | U | 52.3 | pCi/L | 40000 |
| WW001 | 2069-A | 20-Apr-10 | 088054-004 | Radium-223 | -4.07 | 157 | U | 59.2 | pCi/L | |
| WW001 | 2069-A | 20-Apr-10 | 088054-004 | Radium-224 | -117 | 39 | U | 54.9 | pCi/L | |
| WW001 | 2069-A | 20-Apr-10 | 088054-004 | Radium-226 | 8.24 | 58.5 | U | 70.1 | pCi/L | 600 |
| WW001 | 2069-A | 20-Apr-10 | 088054-004 | Radium-228 | -20.4 | 14.6 | U | 17.2 | pCi/L | 600 |
| WW001 | 2069-A | 20-Apr-10 | 088054-004 | Sodium-22 | 0.46 | 2.35 | U | 3.91 | pCi/L | |
| WW001 | 2069-A | 20-Apr-10 | 088054-004 | Thorium-227 | -0.129 | 14 | U | 21.3 | pCi/L | |
| WW001 | 2069-A | 20-Apr-10 | 088054-004 | Thorium-231 | -8.1 | 26.2 | U | 27.5 | pCi/L | 300 |
| WW001 | 2069-A | 20-Apr-10 | 088054-004 | Thorium-234 | -17.9 | 52.6 | U | 66.7 | pCi/L | 50000 |
| WW001 | 2069-A | 20-Apr-10 | 088054-005 | Tritium | 20.9 | 90.9 | U | 156 | pCi/L | 10000000 |
| WW001 | 2069-A | 20-Apr-10 | 088054-004 | Uranium-235 | -7.17 | 14.3 | U | 16.2 | pCi/L | 3000 |
| WW001 | 2069-A | 20-Apr-10 | 088054-004 | Uranium-238 | -17.9 | 52.6 | U | 66.7 | pCi/L | 3000 |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-004 | Actinium-228 | 3.54 | 17.5 | U | 17.5 | pCi/L | 300000 |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-003 | Alpha, gross | 6.17 | 6.53 | U | 10.3 | pCi/L | |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-004 | Americium-241 | -25 | 12.3 | U | 19 | pCi/L | 200 |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-004 | Beryllium-7 | 6.9 | 19.9 | U | 33 | pCi/L | |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-003 | Beta, gross | 0.792 | 6.67 | | 11.5 | pCi/L | |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-004 | Bismuth-212 | 3.12 | 26.2 | U | 44.5 | pCi/L | |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-004 | Bismuth-214 | 0.92 | 8.95 | U | 8.34 | pCi/L | |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-004 | Cesium-137 | -0.194 | 2.13 | U | 3.61 | pCi/L | 10000 |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-004 | Cobalt-60 | 1.09 | 2.33 | U | 4.08 | pCi/L | 30000 |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-004 | Lead-212 | -0.607 | 7.19 | U | 7.08 | pCi/L | 20000 |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-004 | Lead-214 | 3.91 | 7.72 | U | 8.52 | pCi/L | 1000000 |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-004 | Neptunium-237 | -9.62 | 14.9 | U | 23.7 | pCi/L | |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-004 | Potassium-40 | -20.5 | 46.9 | U | 56.8 | pCi/L | 40000 |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-004 | Radium-223 | 19.8 | 1050 | U | 68.2 | pCi/L | |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-004 | Radium-224 | -46.9 | 41.2 | U | 67.4 | pCi/L | |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-004 | Radium-226 | -32.1 | 81.9 | U | 91.8 | pCi/L | 600 |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-004 | Radium-228 | 3.54 | 17.5 | U | 17.5 | pCi/L | 600 |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-004 | Sodium-22 | 0.482 | 3.27 | U | 3.87 | pCi/L | |

## TABLE A-2. Summary of Sanitary Outfalls of Radiological Analyses, April 2010

| Station | Permit Number | Date Collected | Sample ID | Analyte | Activity | Two Sigma Error | Lab Data Qualifier | MDA | Units | Regulatory Sewer Release Limits* (Monthly Avg) |
|---|---|---|---|---|---|---|---|---|---|---|
| WW006 | 2069F-4 | 20-Apr-10 | 088055-004 | Thorium-227 | -3.61 | 194 | U | 26.9 | pCi/L | |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-004 | Thorium-231 | -12.4 | 44 | U | 47.8 | pCi/L | 300 |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-004 | Thorium-234 | -34.9 | 160 | U | 189 | pCi/L | 50000 |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-005 | Tritium | -53.1 | 88.1 | U | 156 | pCi/L | 10000000 |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-004 | Uranium-235 | 2.32 | 22.2 | U | 22.5 | pCi/L | 3000 |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-004 | Uranium-238 | -34.9 | 160 | U | 189 | pCi/L | 3000 |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-004 | Actinium-228 | -0.671 | 9.61 | U | 11.3 | pCi/L | 300000 |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-003 | Alpha, gross | 1.41 | 1.04 | | 1.19 | pCi/L | |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-004 | Americium-241 | 3.55 | 5.69 | U | 8.74 | pCi/L | 200 |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-004 | Beryllium-7 | -2.46 | 13.7 | U | 22.5 | pCi/L | |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-003 | Beta, gross | 21 | 3.61 | | 0.952 | pCi/L | |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-004 | Bismuth-212 | 0.238 | 30.2 | U | 35.9 | pCi/L | |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-004 | Bismuth-214 | 2.28 | 5.65 | U | 6 | pCi/L | |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-004 | Cesium-137 | 1.26 | 1.45 | U | 2.6 | pCi/L | 10000 |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-004 | Cobalt-60 | 0.0096 | 1.71 | U | 2.8 | pCi/L | 30000 |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-004 | Lead-212 | 3.17 | 4.34 | U | 5.27 | pCi/L | 20000 |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-004 | Lead-214 | 0.14 | 5.72 | U | 5.74 | pCi/L | 1000000 |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-004 | Neptunium-237 | -6.72 | 12.5 | U | 14.8 | pCi/L | |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-004 | Potassium-40 | 54.4 | 42.7 | | 23.9 | pCi/L | 40000 |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-004 | Radium-223 | -5.34 | 286 | U | 46.1 | pCi/L | |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-004 | Radium-224 | -53 | 29.5 | U | 47.1 | pCi/L | |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-004 | Radium-226 | -12.4 | 60.8 | U | 65.4 | pCi/L | 600 |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-004 | Radium-228 | -0.671 | 9.61 | U | 11.3 | pCi/L | 600 |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-004 | Sodium-22 | 1.68 | 1.48 | U | 2.65 | pCi/L | |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-004 | Thorium-227 | -4.55 | 243 | U | 17.9 | pCi/L | |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-004 | Thorium-231 | -19.3 | 25.6 | U | 28.2 | pCi/L | 300 |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-004 | Thorium-234 | 9.48 | 88.9 | U | 103 | pCi/L | 50000 |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-005 | Tritium | -81.6 | 87.2 | U | 156 | pCi/L | 10000000 |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-004 | Uranium-235 | -0.559 | 14.5 | U | 15.2 | pCi/L | 3000 |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-004 | Uranium-238 | 9.48 | 88.9 | U | 103 | pCi/L | 3000 |
| WW011 | 2069-K | 20-Apr-10 | 088058-004 | Actinium-228 | -6.61 | 14.1 | U | 15.6 | pCi/L | 300000 |
| WW011 | 2069-K | 20-Apr-10 | 088058-003 | Alpha, gross | 2.27 | 1.6 | | 1.81 | pCi/L | |
| WW011 | 2069-K | 20-Apr-10 | 088058-004 | Americium-241 | -7.51 | 10.6 | U | 17.6 | pCi/L | 200 |

TABLE A-2. Summary of Sanitary Outfalls of Radiological Analyses, April 2010

| Station | Permit Number | Date Collected | Sample ID | Analyte | Activity | Two Sigma Error | Lab Data Qualifier | MDA | Units | Regulatory Sewer Release Limits* (Monthly Avg) |
|---|---|---|---|---|---|---|---|---|---|---|
| WW011 | 2069-K | 20-Apr-10 | 088058-004 | Beryllium-7 | -10.4 | 17.7 | U | 29.7 | pCi/L | |
| WW011 | 2069-K | 20-Apr-10 | 088058-003 | Beta, gross | 19.6 | 3.62 | | 1.89 | pCi/L | |
| WW011 | 2069-K | 20-Apr-10 | 088058-004 | Bismuth-212 | -9.35 | 28.4 | U | 46.5 | pCi/L | |
| WW011 | 2069-K | 20-Apr-10 | 088058-004 | Bismuth-214 | -1.26 | 7.43 | U | 8.04 | pCi/L | |
| WW011 | 2069-K | 20-Apr-10 | 088058-004 | Cesium-137 | 1.33 | 2.03 | U | 3.52 | pCi/L | 10000 |
| WW011 | 2069-K | 20-Apr-10 | 088058-004 | Cobalt-60 | -0.533 | 4.1 | U | 3.87 | pCi/L | 30000 |
| WW011 | 2069-K | 20-Apr-10 | 088058-004 | Lead-212 | 7.35 | 6.56 | U | 7.35 | pCi/L | 20000 |
| WW011 | 2069-K | 20-Apr-10 | 088058-004 | Lead-214 | 2.82 | 7.32 | U | 7.73 | pCi/L | 1000000 |
| WW011 | 2069-K | 20-Apr-10 | 088058-004 | Neptunium-237 | -9.03 | 13.2 | U | 21.4 | pCi/L | |
| WW011 | 2069-K | 20-Apr-10 | 088058-004 | Potassium-40 | 4 | 34.2 | U | 51.2 | pCi/L | 40000 |
| WW011 | 2069-K | 20-Apr-10 | 088058-004 | Radium-223 | -5.73 | 309 | U | 63.9 | pCi/L | |
| WW011 | 2069-K | 20-Apr-10 | 088058-004 | Radium-224 | 26 | 41.2 | U | 63 | pCi/L | |
| WW011 | 2069-K | 20-Apr-10 | 088058-004 | Radium-226 | 14.3 | 67.3 | U | 76.9 | pCi/L | 600 |
| WW011 | 2069-K | 20-Apr-10 | 088058-004 | Radium-228 | -6.61 | 14.1 | U | 15.6 | pCi/L | 600 |
| WW011 | 2069-K | 20-Apr-10 | 088058-004 | Sodium-22 | -1.41 | 2.26 | U | 3.6 | pCi/L | |
| WW011 | 2069-K | 20-Apr-10 | 088058-004 | Thorium-227 | -14.7 | 789 | U | 24.3 | pCi/L | |
| WW011 | 2069-K | 20-Apr-10 | 088058-004 | Thorium-231 | 5.29 | 25.3 | U | 42.4 | pCi/L | 300 |
| WW011 | 2069-K | 20-Apr-10 | 088058-004 | Thorium-234 | -38.3 | 147 | U | 161 | pCi/L | 50000 |
| WW011 | 2069-K | 20-Apr-10 | 088058-005 | Tritium | 11.5 | 91 | U | 157 | pCi/L | 10000000 |
| WW011 | 2069-K | 20-Apr-10 | 088058-004 | Uranium-235 | 13.4 | 16.3 | U | 20 | pCi/L | 3000 |
| WW011 | 2069-K | 20-Apr-10 | 088058-004 | Uranium-238 | -38.3 | 147 | U | 161 | pCi/L | 3000 |

**NOTES:**

**MDA = minimum detectable amount.**

**pCi/L = picocuries per liter**

**U = The result is less than the MDA.**

*** = The monthly average concentration values for release of sanitary sewage were derived by taking the most restrictive occupational stochastic oral ingestion annual limits on intake (ALT) for a reference mean.**

## TABLE A-3.  Summary of Sanitary Outfalls of Semi-Volitile Organic Compounds, April 2010

| Station | Permit Number | Date Collected | Sample ID | Analyte | Result | MDL | Lab Data Qualifier | Units |
|---|---|---|---|---|---|---|---|---|
| CINT | 2238A | 21-Apr-10 | 088066-002 | Acenaphthene | | 0.292 | U | ug/L |
| CINT | 2238A | 21-Apr-10 | 088066-002 | Acenaphthylene | | 0.189 | U | ug/L |
| CINT | 2238A | 21-Apr-10 | 088066-002 | Anthracene | | 0.189 | U | ug/L |
| CINT | 2238A | 21-Apr-10 | 088066-002 | Benzo(a)anthracene | | 0.189 | U | ug/L |
| CINT | 2238A | 21-Apr-10 | 088066-002 | Benzo(a)pyrene | | 0.189 | U | ug/L |
| CINT | 2238A | 21-Apr-10 | 088066-002 | Benzo(b)fluoranthene | | 0.189 | U | ug/L |
| CINT | 2238A | 21-Apr-10 | 088066-002 | Benzo(ghi)perylene | | 0.189 | U | ug/L |
| CINT | 2238A | 21-Apr-10 | 088066-002 | Benzo(k)fluoranthene | | 0.189 | U | ug/L |
| CINT | 2238A | 21-Apr-10 | 088066-002 | Bromophenyl phenyl ether, 4- | | 1.89 | U | ug/L |
| CINT | 2238A | 21-Apr-10 | 088066-002 | Butylbenzyl phthalate | | 1.89 | U | ug/L |
| CINT | 2238A | 21-Apr-10 | 088066-002 | Carbazole | | 0.189 | U | ug/L |
| CINT | 2238A | 21-Apr-10 | 088066-002 | Chloro-3-methylphenol, 4- | | 1.89 | U | ug/L |
| CINT | 2238A | 21-Apr-10 | 088066-002 | Chlorobenzenamine, 4- | | 1.89 | U | ug/L |
| CINT | 2238A | 21-Apr-10 | 088066-002 | Chloroethoxy)methane, bis(2- | | 2.83 | U | ug/L |
| CINT | 2238A | 21-Apr-10 | 088066-002 | Chloroethyl)ether, bis(2- | | 1.89 | U | ug/L |
| CINT | 2238A | 21-Apr-10 | 088066-002 | Chloroisopropyl ether, bis- | | 1.89 | U | ug/L |
| CINT | 2238A | 21-Apr-10 | 088066-002 | Chloronaphthalene, 2- | | 0.283 | U | ug/L |
| CINT | 2238A | 21-Apr-10 | 088066-002 | Chlorophenol, 2- | | 1.89 | U | ug/L |
| CINT | 2238A | 21-Apr-10 | 088066-002 | Chlorophenyl phenyl ether, 4- | | 1.89 | U | ug/L |
| CINT | 2238A | 21-Apr-10 | 088066-002 | Chrysene | | 0.189 | U | ug/L |
| CINT | 2238A | 21-Apr-10 | 088066-002 | Cresol, m,p- | | 2.83 | U | ug/L |
| CINT | 2238A | 21-Apr-10 | 088066-002 | Cresol, o- | | 1.89 | U | ug/L |
| CINT | 2238A | 21-Apr-10 | 088066-002 | Di-n-butyl phthalate | | 1.89 | U | ug/L |
| CINT | 2238A | 21-Apr-10 | 088066-002 | Di-n-octyl phthalate | | 2.83 | U | ug/L |
| CINT | 2238A | 21-Apr-10 | 088066-002 | Dibenz[a,h]anthracene | | 0.189 | U | ug/L |
| CINT | 2238A | 21-Apr-10 | 088066-002 | Dibenzofuran | | 1.89 | U | ug/L |
| CINT | 2238A | 21-Apr-10 | 088066-002 | Dichlorobenzene, 1,2- | | 1.89 | U | ug/L |
| CINT | 2238A | 21-Apr-10 | 088066-002 | Dichlorobenzene, 1,3- | | 1.89 | U | ug/L |
| CINT | 2238A | 21-Apr-10 | 088066-002 | Dichlorobenzene, 1,4- | | 1.89 | U | ug/L |
| CINT | 2238A | 21-Apr-10 | 088066-002 | Dichlorobenzidine, 3,3'- | | 1.89 | U | ug/L |
| CINT | 2238A | 21-Apr-10 | 088066-002 | Dichlorophenol, 2,4- | | 1.89 | U | ug/L |
| CINT | 2238A | 21-Apr-10 | 088066-002 | Diethylphthalate | | 1.89 | U | ug/L |
| CINT | 2238A | 21-Apr-10 | 088066-002 | Dimethylphenol, 2,4- | | 1.89 | U | ug/L |

## TABLE A-3.  Summary of Sanitary Outfalls of Semi-Volitile Organic Compounds, April 2010

| Station | Permit Number | Date Collected | Sample ID | Analyte | Result | MDL | Lab Data Qualifier | Units |
|---|---|---|---|---|---|---|---|---|
| CINT | 2238A | 21-Apr-10 | 088066-002 | Dimethylphthalate | | 1.89 | U | ug/L |
| CINT | 2238A | 21-Apr-10 | 088066-002 | Dinitro-o-cresol | | 2.83 | U | ug/L |
| CINT | 2238A | 21-Apr-10 | 088066-002 | Dinitrophenol, 2,4- | | 4.72 | U | ug/L |
| CINT | 2238A | 21-Apr-10 | 088066-002 | Dinitrotoluene, 2,4- | | 1.89 | U | ug/L |
| CINT | 2238A | 21-Apr-10 | 088066-002 | Dinitrotoluene, 2,6- | | 1.89 | U | ug/L |
| CINT | 2238A | 21-Apr-10 | 088066-002 | Diphenyl amine | | 2.83 | U | ug/L |
| CINT | 2238A | 21-Apr-10 | 088066-002 | Ethylhexyl)phthalate, bis(2- | | 1.89 | U | ug/L |
| CINT | 2238A | 21-Apr-10 | 088066-002 | Fluoranthene | | 0.189 | U | ug/L |
| CINT | 2238A | 21-Apr-10 | 088066-002 | Fluorene | | 0.189 | U | ug/L |
| CINT | 2238A | 21-Apr-10 | 088066-002 | Hexachlorobenzene | | 1.89 | U | ug/L |
| CINT | 2238A | 21-Apr-10 | 088066-002 | Hexachlorobutadiene | | 1.89 | U | ug/L |
| CINT | 2238A | 21-Apr-10 | 088066-002 | Hexachlorocyclopentadiene | | 2.83 | U | ug/L |
| CINT | 2238A | 21-Apr-10 | 088066-002 | Hexachloroethane | | 1.89 | U | ug/L |
| CINT | 2238A | 21-Apr-10 | 088066-002 | Indeno(1,2,3-c,d)pyrene | | 0.189 | U | ug/L |
| CINT | 2238A | 21-Apr-10 | 088066-002 | Isophorone | | 2.83 | U | ug/L |
| CINT | 2238A | 21-Apr-10 | 088066-002 | Methylnaphthalene, 2- | | 0.283 | U | ug/L |
| CINT | 2238A | 21-Apr-10 | 088066-002 | Naphthalene | | 0.283 | U | ug/L |
| CINT | 2238A | 21-Apr-10 | 088066-002 | Nitro-benzene | | 2.83 | U | ug/L |
| CINT | 2238A | 21-Apr-10 | 088066-002 | Nitroaniline, 2- | | 1.89 | U | ug/L |
| CINT | 2238A | 21-Apr-10 | 088066-002 | Nitroaniline, 3- | | 1.89 | U | ug/L |
| CINT | 2238A | 21-Apr-10 | 088066-002 | Nitroaniline, 4- | | 2.83 | U | ug/L |
| CINT | 2238A | 21-Apr-10 | 088066-002 | Nitrophenol, 2- | | 1.89 | U | ug/L |
| CINT | 2238A | 21-Apr-10 | 088066-002 | Nitrophenol, 4- | | 1.89 | U | ug/L |
| CINT | 2238A | 21-Apr-10 | 088066-002 | Nitrosodipropylamine, n- | | 1.89 | U | ug/L |
| CINT | 2238A | 21-Apr-10 | 088066-002 | Pentachlorophenol | | 1.89 | U | ug/L |
| CINT | 2238A | 21-Apr-10 | 088066-002 | Phenanthrene | | 0.189 | U | ug/L |
| CINT | 2238A | 21-Apr-10 | 088066-002 | Phenol | | 0.943 | U | ug/L |
| CINT | 2238A | 21-Apr-10 | 088066-002 | Pyrene | | 0.283 | U | ug/L |
| CINT | 2238A | 21-Apr-10 | 088066-002 | Trichlorobenzene, 1,2,4- | | 1.89 | U | ug/L |
| CINT | 2238A | 21-Apr-10 | 088066-002 | Trichlorophenol, 2,4,5- | | 1.89 | U | ug/L |
| CINT | 2238A | 21-Apr-10 | 088066-002 | Trichlorophenol, 2,4,6- | | 1.89 | U | ug/L |
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Acenaphthene | | 1.11 | U | ug/L |
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Acenaphthylene | | 0.714 | U | ug/L |

## TABLE A-3.  Summary of Sanitary Outfalls of Semi-Volitile Organic Compounds, April 2010

| Station | Permit Number | Date Collected | Sample ID | Analyte | Result | MDL | Lab Data Qualifier | Units |
|---|---|---|---|---|---|---|---|---|
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Anthracene | | 0.714 | U | ug/L |
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Benzo(a)anthracene | | 0.714 | U | ug/L |
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Benzo(a)pyrene | | 0.714 | U | ug/L |
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Benzo(b)fluoranthene | | 0.714 | U | ug/L |
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Benzo(ghi)perylene | | 0.714 | U | ug/L |
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Benzo(k)fluoranthene | | 0.714 | U | ug/L |
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Bromophenyl phenyl ether, 4- | | 7.14 | U | ug/L |
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Butylbenzyl phthalate | | 7.14 | U | ug/L |
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Carbazole | | 0.714 | U | ug/L |
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Chloro-3-methylphenol, 4- | | 7.14 | U | ug/L |
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Chlorobenzenamine, 4- | | 7.14 | U | ug/L |
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Chloroethoxy)methane, bis(2- | | 10.7 | U | ug/L |
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Chloroethyl)ether, bis(2- | | 7.14 | U | ug/L |
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Chloroisopropyl ether, bis- | | 7.14 | U | ug/L |
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Chloronaphthalene, 2- | | 1.07 | U | ug/L |
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Chlorophenol, 2- | | 7.14 | U | ug/L |
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Chlorophenyl phenyl ether, 4- | | 7.14 | U | ug/L |
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Chrysene | | 0.714 | U | ug/L |
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Cresol, m,p- | | 10.7 | U | ug/L |
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Cresol, o- | | 7.14 | U | ug/L |
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Di-n-butyl phthalate | | 7.14 | U | ug/L |
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Di-n-octyl phthalate | | 10.7 | U | ug/L |
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Dibenz[a,h]anthracene | | 0.714 | U | ug/L |
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Dibenzofuran | | 7.14 | U | ug/L |
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Dichlorobenzene, 1,2- | | 7.14 | U | ug/L |
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Dichlorobenzene, 1,3- | | 7.14 | U | ug/L |
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Dichlorobenzene, 1,4- | | 7.14 | U | ug/L |
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Dichlorobenzidine, 3,3'- | | 7.14 | U | ug/L |
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Dichlorophenol, 2,4- | | 7.14 | U | ug/L |
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Diethylphthalate | | 7.14 | U | ug/L |
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Dimethylphenol, 2,4- | | 7.14 | U | ug/L |
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Dimethylphthalate | | 7.14 | U | ug/L |
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Dinitro-o-cresol | | 10.7 | U | ug/L |

## TABLE A-3. Summary of Sanitary Outfalls of Semi-Volitile Organic Compounds, April 2010

| Station | Permit Number | Date Collected | Sample ID | Analyte | Result | MDL | Lab Data Qualifier | Units |
|---|---|---|---|---|---|---|---|---|
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Dinitrophenol, 2,4- | | 17.9 | U | ug/L |
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Dinitrotoluene, 2,4- | | 7.14 | U | ug/L |
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Dinitrotoluene, 2,6- | | 7.14 | U | ug/L |
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Diphenyl amine | | 10.7 | U | ug/L |
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Ethylhexyl)phthalate, bis(2- | | 7.14 | U | ug/L |
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Fluoranthene | | 0.714 | U | ug/L |
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Fluorene | | 0.714 | U | ug/L |
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Hexachlorobenzene | | 7.14 | U | ug/L |
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Hexachlorobutadiene | | 7.14 | U | ug/L |
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Hexachlorocyclopentadiene | | 10.7 | U | ug/L |
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Hexachloroethane | | 7.14 | U | ug/L |
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Indeno(1,2,3-c,d)pyrene | | 0.714 | U | ug/L |
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Isophorone | | 10.7 | U | ug/L |
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Methylnaphthalene, 2- | | 1.07 | U | ug/L |
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Naphthalene | | 1.07 | U | ug/L |
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Nitro-benzene | | 10.7 | U | ug/L |
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Nitroaniline, 2- | | 7.14 | U | ug/L |
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Nitroaniline, 3- | | 7.14 | U | ug/L |
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Nitroaniline, 4- | | 10.7 | U | ug/L |
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Nitrophenol, 2- | | 7.14 | U | ug/L |
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Nitrophenol, 4- | | 7.14 | U | ug/L |
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Nitrosodipropylamine, n- | | 7.14 | U | ug/L |
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Pentachlorophenol | | 7.14 | U | ug/L |
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Phenanthrene | | 0.714 | U | ug/L |
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Phenol | | 3.57 | U | ug/L |
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Pyrene | | 1.07 | U | ug/L |
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Trichlorobenzene, 1,2,4- | | 7.14 | U | ug/L |
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Trichlorophenol, 2,4,5- | | 7.14 | U | ug/L |
| WW001 | 2069-A | 21-Apr-10 | 088061-004 | Trichlorophenol, 2,4,6- | | 7.14 | U | ug/L |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Acenaphthene | | 1.19 | U | ug/L |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Acenaphthylene | | 0.769 | U | ug/L |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Anthracene | | 0.769 | U | ug/L |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Benzo(a)anthracene | | 0.769 | U | ug/L |

## TABLE A-3. Summary of Sanitary Outfalls of Semi-Volitile Organic Compounds, April 2010

| Station | Permit Number | Date Collected | Sample ID | Analyte | Result | MDL | Lab Data Qualifier | Units |
|---|---|---|---|---|---|---|---|---|
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Benzo(a)pyrene | | 0.769 | U | ug/L |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Benzo(b)fluoranthene | | 0.769 | U | ug/L |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Benzo(ghi)perylene | | 0.769 | U | ug/L |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Benzo(k)fluoranthene | | 0.769 | U | ug/L |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Bromophenyl phenyl ether, 4- | | 7.69 | U | ug/L |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Butylbenzyl phthalate | | 7.69 | U | ug/L |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Carbazole | | 0.769 | U | ug/L |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Chloro-3-methylphenol, 4- | | 7.69 | U | ug/L |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Chlorobenzenamine, 4- | | 7.69 | U | ug/L |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Chloroethoxy)methane, bis(2- | | 11.5 | U | ug/L |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Chloroethyl)ether, bis(2- | | 7.69 | U | ug/L |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Chloroisopropyl ether, bis- | | 7.69 | U | ug/L |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Chloronaphthalene, 2- | | 1.15 | U | ug/L |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Chlorophenol, 2- | | 7.69 | U | ug/L |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Chlorophenyl phenyl ether, 4- | | 7.69 | U | ug/L |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Chrysene | | 0.769 | U | ug/L |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Cresol, m,p- | | 11.5 | U | ug/L |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Cresol, o- | | 7.69 | U | ug/L |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Di-n-butyl phthalate | | 7.69 | U | ug/L |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Di-n-octyl phthalate | | 11.5 | U | ug/L |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Dibenz[a,h]anthracene | | 0.769 | U | ug/L |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Dibenzofuran | | 7.69 | U | ug/L |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Dichlorobenzene, 1,2- | | 7.69 | U | ug/L |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Dichlorobenzene, 1,3- | | 7.69 | U | ug/L |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Dichlorobenzene, 1,4- | | 7.69 | U | ug/L |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Dichlorobenzidine, 3,3'- | | 7.69 | U | ug/L |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Dichlorophenol, 2,4- | | 7.69 | U | ug/L |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Diethylphthalate | | 7.69 | U | ug/L |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Dimethylphenol, 2,4- | | 7.69 | U | ug/L |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Dimethylphthalate | | 7.69 | U | ug/L |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Dinitro-o-cresol | | 11.5 | U | ug/L |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Dinitrophenol, 2,4- | | 19.2 | U | ug/L |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Dinitrotoluene, 2,4- | | 7.69 | U | ug/L |

## TABLE A-3. Summary of Sanitary Outfalls of Semi-Volitile Organic Compounds, April 2010

| Station | Permit Number | Date Collected | Sample ID | Analyte | Result | MDL | Lab Data Qualifier | Units |
|---|---|---|---|---|---|---|---|---|
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Dinitrotoluene, 2,6- | | 7.69 | U | ug/L |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Diphenyl amine | | 11.5 | U | ug/L |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Ethylhexyl)phthalate, bis(2- | 12.5 | 7.69 | J | ug/L |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Fluoranthene | | 0.769 | U | ug/L |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Fluorene | | 0.769 | U | ug/L |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Hexachlorobenzene | | 7.69 | U | ug/L |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Hexachlorobutadiene | | 7.69 | U | ug/L |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Hexachlorocyclopentadiene | | 11.5 | U | ug/L |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Hexachloroethane | | 7.69 | U | ug/L |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Indeno(1,2,3-c,d)pyrene | | 0.769 | U | ug/L |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Isophorone | | 11.5 | U | ug/L |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Methylnaphthalene, 2- | | 1.15 | U | ug/L |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Naphthalene | | 1.15 | U | ug/L |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Nitro-benzene | | 11.5 | U | ug/L |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Nitroaniline, 2- | | 7.69 | U | ug/L |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Nitroaniline, 3- | | 7.69 | U | ug/L |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Nitroaniline, 4- | | 11.5 | U | ug/L |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Nitrophenol, 2- | | 7.69 | U | ug/L |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Nitrophenol, 4- | | 7.69 | U | ug/L |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Nitrosodipropylamine, n- | | 7.69 | U | ug/L |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Pentachlorophenol | | 7.69 | U | ug/L |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Phenanthrene | | 0.769 | U | ug/L |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Phenol | | 3.85 | U | ug/L |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Pyrene | | 1.15 | U | ug/L |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Trichlorobenzene, 1,2,4- | | 7.69 | U | ug/L |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Trichlorophenol, 2,4,5- | | 7.69 | U | ug/L |
| WW006 | 2069F-4 | 21-Apr-10 | 088062-004 | Trichlorophenol, 2,4,6- | | 7.69 | U | ug/L |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Acenaphthene | | 0.298 | U | ug/L |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Acenaphthylene | | 0.192 | U | ug/L |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Anthracene | | 0.192 | U | ug/L |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Benzo(a)anthracene | | 0.192 | U | ug/L |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Benzo(a)pyrene | | 0.192 | U | ug/L |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Benzo(b)fluoranthene | | 0.192 | U | ug/L |

## TABLE A-3. Summary of Sanitary Outfalls of Semi-Volitile Organic Compounds, April 2010

| Station | Permit Number | Date Collected | Sample ID | Analyte | Result | MDL | Lab Data Qualifier | Units |
|---|---|---|---|---|---|---|---|---|
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Benzo(ghi)perylene | | 0.192 | U | ug/L |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Benzo(k)fluoranthene | | 0.192 | U | ug/L |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Bromophenyl phenyl ether, 4- | | 1.92 | U | ug/L |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Butylbenzyl phthalate | | 1.92 | U | ug/L |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Carbazole | | 0.192 | U | ug/L |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Chloro-3-methylphenol, 4- | | 1.92 | U | ug/L |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Chlorobenzenamine, 4- | | 1.92 | U | ug/L |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Chloroethoxy)methane, bis(2- | | 2.88 | U | ug/L |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Chloroethyl)ether, bis(2- | | 1.92 | U | ug/L |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Chloroisopropyl ether, bis- | | 1.92 | U | ug/L |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Chloronaphthalene, 2- | | 0.288 | U | ug/L |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Chlorophenol, 2- | | 1.92 | U | ug/L |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Chlorophenyl phenyl ether, 4- | | 1.92 | U | ug/L |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Chrysene | | 0.192 | U | ug/L |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Cresol, m,p- | | 2.88 | U | ug/L |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Cresol, o- | | 1.92 | U | ug/L |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Di-n-butyl phthalate | | 1.92 | U | ug/L |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Di-n-octyl phthalate | | 2.88 | U | ug/L |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Dibenz[a,h]anthracene | | 0.192 | U | ug/L |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Dibenzofuran | | 1.92 | U | ug/L |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Dichlorobenzene, 1,2- | | 1.92 | U | ug/L |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Dichlorobenzene, 1,3- | | 1.92 | U | ug/L |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Dichlorobenzene, 1,4- | | 1.92 | U | ug/L |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Dichlorobenzidine, 3,3'- | | 1.92 | U | ug/L |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Dichlorophenol, 2,4- | | 1.92 | U | ug/L |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Diethylphthalate | | 1.92 | U | ug/L |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Dimethylphenol, 2,4- | | 1.92 | U | ug/L |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Dimethylphthalate | | 1.92 | U | ug/L |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Dinitro-o-cresol | | 2.88 | U | ug/L |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Dinitrophenol, 2,4- | | 4.81 | U | ug/L |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Dinitrotoluene, 2,4- | | 1.92 | U | ug/L |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Dinitrotoluene, 2,6- | | 1.92 | U | ug/L |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Diphenyl amine | | 2.88 | U | ug/L |

## TABLE A-3.  Summary of Sanitary Outfalls of Semi-Volitile Organic Compounds, April 2010

| Station | Permit Number | Date Collected | Sample ID | Analyte | Result | MDL | Lab Data Qualifier | Units |
|---|---|---|---|---|---|---|---|---|
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Ethylhexyl)phthalate, bis(2- | | 1.92 | U | ug/L |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Fluoranthene | | 0.192 | U | ug/L |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Fluorene | | 0.192 | U | ug/L |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Hexachlorobenzene | | 1.92 | U | ug/L |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Hexachlorobutadiene | | 1.92 | U | ug/L |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Hexachlorocyclopentadiene | | 2.88 | U | ug/L |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Hexachloroethane | | 1.92 | U | ug/L |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Indeno(1,2,3-c,d)pyrene | | 0.192 | U | ug/L |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Isophorone | | 2.88 | U | ug/L |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Methylnaphthalene, 2- | | 0.288 | U | ug/L |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Naphthalene | | 0.288 | U | ug/L |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Nitro-benzene | | 2.88 | U | ug/L |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Nitroaniline, 2- | | 1.92 | U | ug/L |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Nitroaniline, 3- | | 1.92 | U | ug/L |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Nitroaniline, 4- | | 2.88 | U | ug/L |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Nitrophenol, 2- | | 1.92 | U | ug/L |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Nitrophenol, 4- | | 1.92 | U | ug/L |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Nitrosodipropylamine, n- | | 1.92 | U | ug/L |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Pentachlorophenol | | 1.92 | U | ug/L |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Phenanthrene | | 0.192 | U | ug/L |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Phenol | | 0.962 | U | ug/L |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Pyrene | | 0.288 | U | ug/L |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Trichlorobenzene, 1,2,4- | | 1.92 | U | ug/L |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Trichlorophenol, 2,4,5- | | 1.92 | U | ug/L |
| WW007 | 2069G-2 | 21-Apr-10 | 088063-004 | Trichlorophenol, 2,4,6- | | 1.92 | U | ug/L |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Acenaphthene | | 1.19 | U | ug/L |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Acenaphthylene | | 0.769 | U | ug/L |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Anthracene | | 0.769 | U | ug/L |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Benzo(a)anthracene | | 0.769 | U | ug/L |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Benzo(a)pyrene | | 0.769 | U | ug/L |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Benzo(b)fluoranthene | | 0.769 | U | ug/L |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Benzo(ghi)perylene | | 0.769 | U | ug/L |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Benzo(k)fluoranthene | | 0.769 | U | ug/L |

## TABLE A-3.  Summary of Sanitary Outfalls of Semi-Volitile Organic Compounds, April 2010

| Station | Permit Number | Date Collected | Sample ID | Analyte | Result | MDL | Lab Data Qualifier | Units |
|---|---|---|---|---|---|---|---|---|
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Bromophenyl phenyl ether, 4- | | 7.69 | U | ug/L |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Butylbenzyl phthalate | | 7.69 | U | ug/L |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Carbazole | | 0.769 | U | ug/L |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Chloro-3-methylphenol, 4- | | 7.69 | U | ug/L |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Chlorobenzenamine, 4- | | 7.69 | U | ug/L |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Chloroethoxy)methane, bis(2- | | 11.5 | U | ug/L |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Chloroethyl)ether, bis(2- | | 7.69 | U | ug/L |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Chloroisopropyl ether, bis- | | 7.69 | U | ug/L |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Chloronaphthalene, 2- | | 1.15 | U | ug/L |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Chlorophenol, 2- | | 7.69 | U | ug/L |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Chlorophenyl phenyl ether, 4- | | 7.69 | U | ug/L |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Chrysene | | 0.769 | U | ug/L |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Cresol, m,p- | | 11.5 | U | ug/L |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Cresol, o- | | 7.69 | U | ug/L |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Di-n-butyl phthalate | | 7.69 | U | ug/L |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Di-n-octyl phthalate | | 11.5 | U | ug/L |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Dibenz[a,h]anthracene | | 0.769 | U | ug/L |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Dibenzofuran | | 7.69 | U | ug/L |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Dichlorobenzene, 1,2- | | 7.69 | U | ug/L |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Dichlorobenzene, 1,3- | | 7.69 | U | ug/L |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Dichlorobenzene, 1,4- | | 7.69 | U | ug/L |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Dichlorobenzidine, 3,3'- | | 7.69 | U | ug/L |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Dichlorophenol, 2,4- | | 7.69 | U | ug/L |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Diethylphthalate | | 7.69 | U | ug/L |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Dimethylphenol, 2,4- | | 7.69 | U | ug/L |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Dimethylphthalate | | 7.69 | U | ug/L |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Dinitro-o-cresol | | 11.5 | U | ug/L |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Dinitrophenol, 2,4- | | 19.2 | U | ug/L |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Dinitrotoluene, 2,4- | | 7.69 | U | ug/L |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Dinitrotoluene, 2,6- | | 7.69 | U | ug/L |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Diphenyl amine | | 11.5 | U | ug/L |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Ethylhexyl)phthalate, bis(2- | | 7.69 | U | ug/L |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Fluoranthene | | 0.769 | U | ug/L |

TABLE A-3. Summary of Sanitary Outfalls of Semi-Volitile Organic Compounds, April 2010

| Station | Permit Number | Date Collected | Sample ID | Analyte | Result | MDL | Lab Data Qualifier | Units |
|---|---|---|---|---|---|---|---|---|
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Fluorene | | 0.769 | U | ug/L |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Hexachlorobenzene | | 7.69 | U | ug/L |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Hexachlorobutadiene | | 7.69 | U | ug/L |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Hexachlorocyclopentadiene | | 11.5 | U | ug/L |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Hexachloroethane | | 7.69 | U | ug/L |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Indeno(1,2,3-c,d)pyrene | | 0.769 | U | ug/L |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Isophorone | | 11.5 | U | ug/L |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Methylnaphthalene, 2- | | 1.15 | U | ug/L |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Naphthalene | | 1.15 | U | ug/L |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Nitro-benzene | | 11.5 | U | ug/L |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Nitroaniline, 2- | | 7.69 | U | ug/L |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Nitroaniline, 3- | | 7.69 | U | ug/L |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Nitroaniline, 4- | | 11.5 | U | ug/L |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Nitrophenol, 2- | | 7.69 | U | ug/L |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Nitrophenol, 4- | | 7.69 | U | ug/L |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Nitrosodipropylamine, n- | | 7.69 | U | ug/L |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Pentachlorophenol | | 7.69 | U | ug/L |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Phenanthrene | | 0.769 | U | ug/L |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Phenol | | 3.85 | U | ug/L |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Pyrene | | 1.15 | U | ug/L |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Trichlorobenzene, 1,2,4- | | 7.69 | U | ug/L |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Trichlorophenol, 2,4,5- | | 7.69 | U | ug/L |
| WW008 | 2069I-3 | 21-Apr-10 | 088064-004 | Trichlorophenol, 2,4,6- | | 7.69 | U | ug/L |
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Acenaphthene | | 1.18 | U | ug/L |
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Acenaphthylene | | 0.762 | U | ug/L |
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Anthracene | | 0.762 | U | ug/L |
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Benzo(a)anthracene | | 0.762 | U | ug/L |
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Benzo(a)pyrene | | 0.762 | U | ug/L |
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Benzo(b)fluoranthene | | 0.762 | U | ug/L |
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Benzo(ghi)perylene | | 0.762 | U | ug/L |
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Benzo(k)fluoranthene | | 0.762 | U | ug/L |
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Bromophenyl phenyl ether, 4- | | 7.62 | U | ug/L |
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Butylbenzyl phthalate | | 7.62 | U | ug/L |

## TABLE A-3. Summary of Sanitary Outfalls of Semi-Volitile Organic Compounds, April 2010

| Station | Permit Number | Date Collected | Sample ID | Analyte | Result | MDL | Lab Data Qualifier | Units |
|---|---|---|---|---|---|---|---|---|
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Carbazole | | 0.762 | U | ug/L |
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Chloro-3-methylphenol, 4- | | 7.62 | U | ug/L |
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Chlorobenzenamine, 4- | | 7.62 | U | ug/L |
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Chloroethoxy)methane, bis(2- | | 11.4 | U | ug/L |
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Chloroethyl)ether, bis(2- | | 7.62 | U | ug/L |
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Chloroisopropyl ether, bis- | | 7.62 | U | ug/L |
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Chloronaphthalene, 2- | | 1.14 | U | ug/L |
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Chlorophenol, 2- | | 7.62 | U | ug/L |
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Chlorophenyl phenyl ether, 4- | | 7.62 | U | ug/L |
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Chrysene | | 0.762 | U | ug/L |
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Cresol, m,p- | | 11.4 | U | ug/L |
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Cresol, o- | | 7.62 | U | ug/L |
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Di-n-butyl phthalate | | 7.62 | U | ug/L |
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Di-n-octyl phthalate | | 11.4 | U | ug/L |
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Dibenz[a,h]anthracene | | 0.762 | U | ug/L |
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Dibenzofuran | | 7.62 | U | ug/L |
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Dichlorobenzene, 1,2- | | 7.62 | U | ug/L |
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Dichlorobenzene, 1,3- | | 7.62 | U | ug/L |
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Dichlorobenzene, 1,4- | | 7.62 | U | ug/L |
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Dichlorobenzidine, 3,3'- | | 7.62 | U | ug/L |
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Dichlorophenol, 2,4- | | 7.62 | U | ug/L |
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Diethylphthalate | | 7.62 | U | ug/L |
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Dimethylphenol, 2,4- | | 7.62 | U | ug/L |
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Dimethylphthalate | | 7.62 | U | ug/L |
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Dinitro-o-cresol | | 11.4 | U | ug/L |
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Dinitrophenol, 2,4- | | 19 | U | ug/L |
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Dinitrotoluene, 2,4- | | 7.62 | U | ug/L |
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Dinitrotoluene, 2,6- | | 7.62 | U | ug/L |
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Diphenyl amine | | 11.4 | U | ug/L |
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Ethylhexyl)phthalate, bis(2- | | 7.62 | U | ug/L |
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Fluoranthene | | 0.762 | U | ug/L |
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Fluorene | | 0.762 | U | ug/L |
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Hexachlorobenzene | | 7.62 | U | ug/L |

## TABLE A-3. Summary of Sanitary Outfalls of Semi-Volitile Organic Compounds, April 2010

| Station | Permit Number | Date Collected | Sample ID | Analyte | Result | MDL | Lab Data Qualifier | Units |
|---|---|---|---|---|---|---|---|---|
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Hexachlorobutadiene | | 7.62 | U | ug/L |
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Hexachlorocyclopentadiene | | 11.4 | U | ug/L |
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Hexachloroethane | | 7.62 | U | ug/L |
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Indeno(1,2,3-c,d)pyrene | | 0.762 | U | ug/L |
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Isophorone | | 11.4 | U | ug/L |
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Methylnaphthalene, 2- | | 1.14 | U | ug/L |
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Naphthalene | | 1.14 | U | ug/L |
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Nitro-benzene | | 11.4 | U | ug/L |
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Nitroaniline, 2- | | 7.62 | U | ug/L |
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Nitroaniline, 3- | | 7.62 | U | ug/L |
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Nitroaniline, 4- | | 11.4 | U | ug/L |
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Nitrophenol, 2- | | 7.62 | U | ug/L |
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Nitrophenol, 4- | | 7.62 | U | ug/L |
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Nitrosodipropylamine, n- | | 7.62 | U | ug/L |
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Pentachlorophenol | | 7.62 | U | ug/L |
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Phenanthrene | | 0.762 | U | ug/L |
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Phenol | | 3.81 | U | ug/L |
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Pyrene | | 1.14 | U | ug/L |
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Trichlorobenzene, 1,2,4- | | 7.62 | U | ug/L |
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Trichlorophenol, 2,4,5- | | 7.62 | U | ug/L |
| WW011 | 2069-K | 21-Apr-10 | 088065-004 | Trichlorophenol, 2,4,6- | | 7.62 | U | ug/L |

**NOTES:**

**MDL = Minimum detection limit.**

**J = Estimated value, the analyte concentration fell above the effective MDL and below the effective (PQL) practical quantitation limit.**

**ug/L = micrograms per liter.**

**U = The analyte was analyzed for, but not detected. For organic and inorganic analytes the result is less than the effective MDL concentration.**

## TABLE A-4. Summary of Sanitary Outfalls of Volatile Organic Compounds, April 2010

| Station | Permit Number | Date Collected | Sample ID | Analyte | Result | MDL | Lab Data Qualifier | Units |
|---|---|---|---|---|---|---|---|---|
| CINT | 2238A | 20-Apr-10 | 088060-004 | Acetone | 48.4 | 3.5 | | ug/L |
| CINT | 2238A | 20-Apr-10 | 088060-004 | Benzene | | 0.3 | U | ug/L |
| CINT | 2238A | 20-Apr-10 | 088060-004 | Bromodichloromethane | | 0.25 | U | ug/L |
| CINT | 2238A | 20-Apr-10 | 088060-004 | Bromoform | 0.567 | 0.25 | J | ug/L |
| CINT | 2238A | 20-Apr-10 | 088060-004 | Bromomethane | | 0.3 | U | ug/L |
| CINT | 2238A | 20-Apr-10 | 088060-004 | Butanone, 2- | 23.5 | 1.25 | | ug/L |
| CINT | 2238A | 20-Apr-10 | 088060-004 | Carbon disulfide | | 1.25 | U | ug/L |
| CINT | 2238A | 20-Apr-10 | 088060-004 | Carbon tetrachloride | | 0.3 | U | ug/L |
| CINT | 2238A | 20-Apr-10 | 088060-004 | Chlorobenzene | | 0.25 | U | ug/L |
| CINT | 2238A | 20-Apr-10 | 088060-004 | Chloroethane | | 0.3 | U | ug/L |
| CINT | 2238A | 20-Apr-10 | 088060-004 | Chloroform | | 0.25 | U | ug/L |
| CINT | 2238A | 20-Apr-10 | 088060-004 | Chloromethane | | 0.3 | U | ug/L |
| CINT | 2238A | 20-Apr-10 | 088060-004 | Dibromochloromethane | | 0.3 | U | ug/L |
| CINT | 2238A | 20-Apr-10 | 088060-004 | Dichloroethane, 1,1- | | 0.3 | U | ug/L |
| CINT | 2238A | 20-Apr-10 | 088060-004 | Dichloroethane, 1,2- | | 0.25 | U | ug/L |
| CINT | 2238A | 20-Apr-10 | 088060-004 | Dichloroethene, 1,1- | | 0.3 | U | ug/L |
| CINT | 2238A | 20-Apr-10 | 088060-004 | Dichloroethene, cis-1,2- | | 0.3 | U | ug/L |
| CINT | 2238A | 20-Apr-10 | 088060-004 | Dichloroethene, trans-1,2- | | 0.3 | U | ug/L |
| CINT | 2238A | 20-Apr-10 | 088060-004 | Dichloropropane, 1,2- | | 0.25 | U | ug/L |
| CINT | 2238A | 20-Apr-10 | 088060-004 | Dichloropropene, cis-1,3- | | 0.25 | U | ug/L |
| CINT | 2238A | 20-Apr-10 | 088060-004 | Dichloropropene, trans-1,3- | | 0.25 | U | ug/L |
| CINT | 2238A | 20-Apr-10 | 088060-004 | Ethyl benzene | | 0.25 | U | ug/L |
| CINT | 2238A | 20-Apr-10 | 088060-004 | Hexanone, 2- | | 1.25 | U | ug/L |
| CINT | 2238A | 20-Apr-10 | 088060-004 | Methylene chloride | | 3 | U | ug/L |
| CINT | 2238A | 20-Apr-10 | 088060-004 | Pentanone, 4-methyl-, 2- | | 1.25 | U | ug/L |
| CINT | 2238A | 20-Apr-10 | 088060-004 | Styrene | | 0.25 | U | ug/L |
| CINT | 2238A | 20-Apr-10 | 088060-004 | Tetrachloroethane, 1,1,2,2- | | 0.25 | U | ug/L |
| CINT | 2238A | 20-Apr-10 | 088060-004 | Tetrachloroethene | | 0.3 | U | ug/L |
| CINT | 2238A | 20-Apr-10 | 088060-004 | Toluene | | 0.25 | U | ug/L |
| CINT | 2238A | 20-Apr-10 | 088060-004 | Trichloroethane, 1,1,1- | | 0.325 | U | ug/L |
| CINT | 2238A | 20-Apr-10 | 088060-004 | Trichloroethane, 1,1,2- | | 0.25 | U | ug/L |
| CINT | 2238A | 20-Apr-10 | 088060-004 | Trichloroethene | | 0.25 | U | ug/L |

## TABLE A-4. Summary of Sanitary Outfalls of Volatile Organic Compounds, April 2010

| Station | Permit Number | Date Collected | Sample ID | Analyte | Result | MDL | Lab Data Qualifier | Units |
|---|---|---|---|---|---|---|---|---|
| CINT | 2238A | 20-Apr-10 | 088060-004 | Vinyl acetate | | 1.5 | U | ug/L |
| CINT | 2238A | 20-Apr-10 | 088060-004 | Vinyl chloride | | 0.5 | U | ug/L |
| CINT | 2238A | 20-Apr-10 | 088060-004 | Xylene | | 0.3 | U | ug/L |
| WW001 | 2069-A | 20-Apr-10 | 088054-006 | Acetone | 27.3 | 3.5 | | ug/L |
| WW001 | 2069-A | 20-Apr-10 | 088054-006 | Benzene | | 0.3 | U | ug/L |
| WW001 | 2069-A | 20-Apr-10 | 088054-006 | Bromodichloromethane | | 0.25 | U | ug/L |
| WW001 | 2069-A | 20-Apr-10 | 088054-006 | Bromoform | 1.2 | 0.25 | | ug/L |
| WW001 | 2069-A | 20-Apr-10 | 088054-006 | Bromomethane | | 0.3 | U | ug/L |
| WW001 | 2069-A | 20-Apr-10 | 088054-006 | Butanone, 2- | 1.55 | 1.25 | J | ug/L |
| WW001 | 2069-A | 20-Apr-10 | 088054-006 | Carbon disulfide | | 1.25 | U | ug/L |
| WW001 | 2069-A | 20-Apr-10 | 088054-006 | Carbon tetrachloride | | 0.3 | U | ug/L |
| WW001 | 2069-A | 20-Apr-10 | 088054-006 | Chlorobenzene | | 0.25 | U | ug/L |
| WW001 | 2069-A | 20-Apr-10 | 088054-006 | Chloroethane | | 0.3 | U | ug/L |
| WW001 | 2069-A | 20-Apr-10 | 088054-006 | Chloroform | | 0.25 | U | ug/L |
| WW001 | 2069-A | 20-Apr-10 | 088054-006 | Chloromethane | | 0.3 | U | ug/L |
| WW001 | 2069-A | 20-Apr-10 | 088054-006 | Dibromochloromethane | 0.346 | 0.3 | J | ug/L |
| WW001 | 2069-A | 20-Apr-10 | 088054-006 | Dichloroethane, 1,1- | | 0.3 | U | ug/L |
| WW001 | 2069-A | 20-Apr-10 | 088054-006 | Dichloroethane, 1,2- | | 0.25 | U | ug/L |
| WW001 | 2069-A | 20-Apr-10 | 088054-006 | Dichloroethene, 1,1- | | 0.3 | U | ug/L |
| WW001 | 2069-A | 20-Apr-10 | 088054-006 | Dichloroethene, cis-1,2- | | 0.3 | U | ug/L |
| WW001 | 2069-A | 20-Apr-10 | 088054-006 | Dichloroethene, trans-1,2- | | 0.3 | U | ug/L |
| WW001 | 2069-A | 20-Apr-10 | 088054-006 | Dichloropropane, 1,2- | | 0.25 | U | ug/L |
| WW001 | 2069-A | 20-Apr-10 | 088054-006 | Dichloropropene, cis-1,3- | | 0.25 | U | ug/L |
| WW001 | 2069-A | 20-Apr-10 | 088054-006 | Dichloropropene, trans-1,3- | | 0.25 | U | ug/L |
| WW001 | 2069-A | 20-Apr-10 | 088054-006 | Ethyl benzene | | 0.25 | U | ug/L |
| WW001 | 2069-A | 20-Apr-10 | 088054-006 | Hexanone, 2- | | 1.25 | U | ug/L |
| WW001 | 2069-A | 20-Apr-10 | 088054-006 | Methylene chloride | | 3 | U | ug/L |
| WW001 | 2069-A | 20-Apr-10 | 088054-006 | Pentanone, 4-methyl-, 2- | | 1.25 | U | ug/L |
| WW001 | 2069-A | 20-Apr-10 | 088054-006 | Styrene | | 0.25 | U | ug/L |
| WW001 | 2069-A | 20-Apr-10 | 088054-006 | Tetrachloroethane, 1,1,2,2- | | 0.25 | U | ug/L |
| WW001 | 2069-A | 20-Apr-10 | 088054-006 | Tetrachloroethene | | 0.3 | U | ug/L |
| WW001 | 2069-A | 20-Apr-10 | 088054-006 | Toluene | | 0.25 | U | ug/L |

## TABLE A-4. Summary of Sanitary Outfalls of Volatile Organic Compounds, April 2010

| Station | Permit Number | Date Collected | Sample ID | Analyte | Result | MDL | Lab Data Qualifier | Units |
|---|---|---|---|---|---|---|---|---|
| WW001 | 2069-A | 20-Apr-10 | 088054-006 | Trichloroethane, 1,1,1- | | 0.325 | U | ug/L |
| WW001 | 2069-A | 20-Apr-10 | 088054-006 | Trichloroethane, 1,1,2- | | 0.25 | U | ug/L |
| WW001 | 2069-A | 20-Apr-10 | 088054-006 | Trichloroethene | | 0.25 | U | ug/L |
| WW001 | 2069-A | 20-Apr-10 | 088054-006 | Vinyl acetate | | 1.5 | U | ug/L |
| WW001 | 2069-A | 20-Apr-10 | 088054-006 | Vinyl chloride | | 0.5 | U | ug/L |
| WW001 | 2069-A | 20-Apr-10 | 088054-006 | Xylene | | 0.3 | U | ug/L |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-006 | Acetone | 76.4 | 3.5 | | ug/L |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-006 | Benzene | | 0.3 | U | ug/L |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-006 | Bromodichloromethane | | 0.25 | U | ug/L |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-006 | Bromoform | | 0.25 | U | ug/L |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-006 | Bromomethane | | 0.3 | U | ug/L |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-006 | Butanone, 2- | 2.38 | 1.25 | J | ug/L |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-006 | Carbon disulfide | | 1.25 | U | ug/L |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-006 | Carbon tetrachloride | | 0.3 | U | ug/L |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-006 | Chlorobenzene | | 0.25 | U | ug/L |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-006 | Chloroethane | | 0.3 | U | ug/L |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-006 | Chloroform | | 0.25 | U | ug/L |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-006 | Chloromethane | | 0.3 | U | ug/L |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-006 | Dibromochloromethane | | 0.3 | U | ug/L |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-006 | Dichloroethane, 1,1- | | 0.3 | U | ug/L |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-006 | Dichloroethane, 1,2- | | 0.25 | U | ug/L |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-006 | Dichloroethene, 1,1- | | 0.3 | U | ug/L |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-006 | Dichloroethene, cis-1,2- | | 0.3 | U | ug/L |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-006 | Dichloroethene, trans-1,2- | | 0.3 | U | ug/L |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-006 | Dichloropropane, 1,2- | | 0.25 | U | ug/L |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-006 | Dichloropropene, cis-1,3- | | 0.25 | U | ug/L |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-006 | Dichloropropene, trans-1,3- | | 0.25 | U | ug/L |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-006 | Ethyl benzene | | 0.25 | U | ug/L |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-006 | Hexanone, 2- | | 1.25 | U | ug/L |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-006 | Methylene chloride | | 3 | U | ug/L |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-006 | Pentanone, 4-methyl-, 2- | | 1.25 | U | ug/L |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-006 | Styrene | | 0.25 | U | ug/L |

## TABLE A-4. Summary of Sanitary Outfalls of Volatile Organic Compounds, April 2010

| Station | Permit Number | Date Collected | Sample ID | Analyte | Result | MDL | Lab Data Qualifier | Units |
|---|---|---|---|---|---|---|---|---|
| WW006 | 2069F-4 | 20-Apr-10 | 088055-006 | Tetrachloroethane, 1,1,2,2- | | 0.25 | U | ug/L |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-006 | Tetrachloroethene | | 0.3 | U | ug/L |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-006 | Toluene | | 0.25 | U | ug/L |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-006 | Trichloroethane, 1,1,1- | | 0.325 | U | ug/L |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-006 | Trichloroethane, 1,1,2- | | 0.25 | U | ug/L |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-006 | Trichloroethene | | 0.25 | U | ug/L |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-006 | Vinyl acetate | | 1.5 | U | ug/L |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-006 | Vinyl chloride | | 0.5 | U | ug/L |
| WW006 | 2069F-4 | 20-Apr-10 | 088055-006 | Xylene | | 0.3 | U | ug/L |
| WW007 | 2069G-2 | 20-Apr-10 | 088056-003 | Acetone | | 3.5 | U | ug/L |
| WW007 | 2069G-2 | 20-Apr-10 | 088056-003 | Benzene | | 0.3 | U | ug/L |
| WW007 | 2069G-2 | 20-Apr-10 | 088056-003 | Bromodichloromethane | | 0.25 | U | ug/L |
| WW007 | 2069G-2 | 20-Apr-10 | 088056-003 | Bromoform | | 0.25 | U | ug/L |
| WW007 | 2069G-2 | 20-Apr-10 | 088056-003 | Bromomethane | | 0.3 | U | ug/L |
| WW007 | 2069G-2 | 20-Apr-10 | 088056-003 | Butanone, 2- | | 1.25 | U | ug/L |
| WW007 | 2069G-2 | 20-Apr-10 | 088056-003 | Carbon disulfide | | 1.25 | U | ug/L |
| WW007 | 2069G-2 | 20-Apr-10 | 088056-003 | Carbon tetrachloride | | 0.3 | U | ug/L |
| WW007 | 2069G-2 | 20-Apr-10 | 088056-003 | Chlorobenzene | | 0.25 | U | ug/L |
| WW007 | 2069G-2 | 20-Apr-10 | 088056-003 | Chloroethane | | 0.3 | U | ug/L |
| WW007 | 2069G-2 | 20-Apr-10 | 088056-003 | Chloroform | | 0.25 | U | ug/L |
| WW007 | 2069G-2 | 20-Apr-10 | 088056-003 | Chloromethane | | 0.3 | U | ug/L |
| WW007 | 2069G-2 | 20-Apr-10 | 088056-003 | Dibromochloromethane | | 0.3 | U | ug/L |
| WW007 | 2069G-2 | 20-Apr-10 | 088056-003 | Dichloroethane, 1,1- | | 0.3 | U | ug/L |
| WW007 | 2069G-2 | 20-Apr-10 | 088056-003 | Dichloroethane, 1,2- | | 0.25 | U | ug/L |
| WW007 | 2069G-2 | 20-Apr-10 | 088056-003 | Dichloroethene, 1,1- | | 0.3 | U | ug/L |
| WW007 | 2069G-2 | 20-Apr-10 | 088056-003 | Dichloroethene, cis-1,2- | | 0.3 | U | ug/L |
| WW007 | 2069G-2 | 20-Apr-10 | 088056-003 | Dichloroethene, trans-1,2- | | 0.3 | U | ug/L |
| WW007 | 2069G-2 | 20-Apr-10 | 088056-003 | Dichloropropane, 1,2- | | 0.25 | U | ug/L |
| WW007 | 2069G-2 | 20-Apr-10 | 088056-003 | Dichloropropene, cis-1,3- | | 0.25 | U | ug/L |
| WW007 | 2069G-2 | 20-Apr-10 | 088056-003 | Dichloropropene, trans-1,3- | | 0.25 | U | ug/L |
| WW007 | 2069G-2 | 20-Apr-10 | 088056-003 | Ethyl benzene | | 0.25 | U | ug/L |
| WW007 | 2069G-2 | 20-Apr-10 | 088056-003 | Hexanone, 2- | | 1.25 | U | ug/L |

## TABLE A-4.  Summary of Sanitary Outfalls of Volatile Organic Compounds, April 2010

| Station | Permit Number | Date Collected | Sample ID | Analyte | Result | MDL | Lab Data Qualifier | Units |
|---|---|---|---|---|---|---|---|---|
| WW007 | 2069G-2 | 20-Apr-10 | 088056-003 | Methylene chloride | | 3 | U | ug/L |
| WW007 | 2069G-2 | 20-Apr-10 | 088056-003 | Pentanone, 4-methyl-, 2- | | 1.25 | U | ug/L |
| WW007 | 2069G-2 | 20-Apr-10 | 088056-003 | Styrene | | 0.25 | U | ug/L |
| WW007 | 2069G-2 | 20-Apr-10 | 088056-003 | Tetrachloroethane, 1,1,2,2- | | 0.25 | U | ug/L |
| WW007 | 2069G-2 | 20-Apr-10 | 088056-003 | Tetrachloroethene | | 0.3 | U | ug/L |
| WW007 | 2069G-2 | 20-Apr-10 | 088056-003 | Toluene | | 0.25 | U | ug/L |
| WW007 | 2069G-2 | 20-Apr-10 | 088056-003 | Trichloroethane, 1,1,1- | | 0.325 | U | ug/L |
| WW007 | 2069G-2 | 20-Apr-10 | 088056-003 | Trichloroethane, 1,1,2- | | 0.25 | U | ug/L |
| WW007 | 2069G-2 | 20-Apr-10 | 088056-003 | Trichloroethene | | 0.25 | U | ug/L |
| WW007 | 2069G-2 | 20-Apr-10 | 088056-003 | Vinyl acetate | | 1.5 | U | ug/L |
| WW007 | 2069G-2 | 20-Apr-10 | 088056-003 | Vinyl chloride | | 0.5 | U | ug/L |
| WW007 | 2069G-2 | 20-Apr-10 | 088056-003 | Xylene | | 0.3 | U | ug/L |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-006 | Acetone | 9.43 | 3.5 | J | ug/L |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-006 | Benzene | | 0.3 | U | ug/L |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-006 | Bromodichloromethane | | 0.25 | U | ug/L |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-006 | Bromoform | 0.339 | 0.25 | J | ug/L |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-006 | Bromomethane | | 0.3 | U | ug/L |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-006 | Butanone, 2- | 2.46 | 1.25 | J | ug/L |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-006 | Carbon disulfide | | 1.25 | U | ug/L |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-006 | Carbon tetrachloride | | 0.3 | U | ug/L |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-006 | Chlorobenzene | | 0.25 | U | ug/L |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-006 | Chloroethane | | 0.3 | U | ug/L |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-006 | Chloroform | | 0.25 | U | ug/L |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-006 | Chloromethane | | 0.3 | U | ug/L |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-006 | Dibromochloromethane | | 0.3 | U | ug/L |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-006 | Dichloroethane, 1,1- | | 0.3 | U | ug/L |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-006 | Dichloroethane, 1,2- | | 0.25 | U | ug/L |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-006 | Dichloroethene, 1,1- | | 0.3 | U | ug/L |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-006 | Dichloroethene, cis-1,2- | | 0.3 | U | ug/L |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-006 | Dichloroethene, trans-1,2- | | 0.3 | U | ug/L |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-006 | Dichloropropane, 1,2- | | 0.25 | U | ug/L |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-006 | Dichloropropene, cis-1,3- | | 0.25 | U | ug/L |

# TABLE A-4.  Summary of Sanitary Outfalls of Volatile Organic Compounds, April 2010

| Station | Permit Number | Date Collected | Sample ID | Analyte | Result | MDL | Lab Data Qualifier | Units |
|---|---|---|---|---|---|---|---|---|
| WW008 | 2069I-3 | 20-Apr-10 | 088057-006 | Dichloropropene, trans-1,3- | | 0.25 | U | ug/L |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-006 | Ethyl benzene | | 0.25 | U | ug/L |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-006 | Hexanone, 2- | | 1.25 | U | ug/L |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-006 | Methylene chloride | | 3 | U | ug/L |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-006 | Pentanone, 4-methyl-, 2- | | 1.25 | U | ug/L |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-006 | Styrene | | 0.25 | U | ug/L |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-006 | Tetrachloroethane, 1,1,2,2- | | 0.25 | U | ug/L |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-006 | Tetrachloroethene | | 0.3 | U | ug/L |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-006 | Toluene | | 0.25 | U | ug/L |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-006 | Trichloroethane, 1,1,1- | | 0.325 | U | ug/L |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-006 | Trichloroethane, 1,1,2- | | 0.25 | U | ug/L |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-006 | Trichloroethene | | 0.25 | U | ug/L |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-006 | Vinyl acetate | | 1.5 | U | ug/L |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-006 | Vinyl chloride | | 0.5 | U | ug/L |
| WW008 | 2069I-3 | 20-Apr-10 | 088057-006 | Xylene | | 0.3 | U | ug/L |
| WW011 | 2069-K | 20-Apr-10 | 088058-006 | Acetone | 47.4 | 3.5 | | ug/L |
| WW011 | 2069-K | 20-Apr-10 | 088058-006 | Benzene | | 0.3 | U | ug/L |
| WW011 | 2069-K | 20-Apr-10 | 088058-006 | Bromodichloromethane | | 0.25 | U | ug/L |
| WW011 | 2069-K | 20-Apr-10 | 088058-006 | Bromoform | 0.287 | 0.25 | J | ug/L |
| WW011 | 2069-K | 20-Apr-10 | 088058-006 | Bromomethane | | 0.3 | U | ug/L |
| WW011 | 2069-K | 20-Apr-10 | 088058-006 | Butanone, 2- | 6.58 | 1.25 | | ug/L |
| WW011 | 2069-K | 20-Apr-10 | 088058-006 | Carbon disulfide | | 1.25 | U | ug/L |
| WW011 | 2069-K | 20-Apr-10 | 088058-006 | Carbon tetrachloride | | 0.3 | U | ug/L |
| WW011 | 2069-K | 20-Apr-10 | 088058-006 | Chlorobenzene | | 0.25 | U | ug/L |
| WW011 | 2069-K | 20-Apr-10 | 088058-006 | Chloroethane | | 0.3 | U | ug/L |
| WW011 | 2069-K | 20-Apr-10 | 088058-006 | Chloroform | 0.519 | 0.25 | J | ug/L |
| WW011 | 2069-K | 20-Apr-10 | 088058-006 | Chloromethane | | 0.3 | U | ug/L |
| WW011 | 2069-K | 20-Apr-10 | 088058-006 | Dibromochloromethane | | 0.3 | U | ug/L |
| WW011 | 2069-K | 20-Apr-10 | 088058-006 | Dichloroethane, 1,1- | | 0.3 | U | ug/L |
| WW011 | 2069-K | 20-Apr-10 | 088058-006 | Dichloroethane, 1,2- | | 0.25 | U | ug/L |
| WW011 | 2069-K | 20-Apr-10 | 088058-006 | Dichloroethene, 1,1- | | 0.3 | U | ug/L |
| WW011 | 2069-K | 20-Apr-10 | 088058-006 | Dichloroethene, cis-1,2- | | 0.3 | U | ug/L |

## TABLE A-4. Summary of Sanitary Outfalls of Volatile Organic Compounds, April 2010

| Station | Permit Number | Date Collected | Sample ID | Analyte | Result | MDL | Lab Data Qualifier | Units |
|---|---|---|---|---|---|---|---|---|
| WW011 | 2069-K | 20-Apr-10 | 088058-006 | Dichloroethene, trans-1,2- | | 0.3 | U | ug/L |
| WW011 | 2069-K | 20-Apr-10 | 088058-006 | Dichloropropane, 1,2- | | 0.25 | U | ug/L |
| WW011 | 2069-K | 20-Apr-10 | 088058-006 | Dichloropropene, cis-1,3- | | 0.25 | U | ug/L |
| WW011 | 2069-K | 20-Apr-10 | 088058-006 | Dichloropropene, trans-1,3- | | 0.25 | U | ug/L |
| WW011 | 2069-K | 20-Apr-10 | 088058-006 | Ethyl benzene | | 0.25 | U | ug/L |
| WW011 | 2069-K | 20-Apr-10 | 088058-006 | Hexanone, 2- | | 1.25 | U | ug/L |
| WW011 | 2069-K | 20-Apr-10 | 088058-006 | Methylene chloride | | 3 | U | ug/L |
| WW011 | 2069-K | 20-Apr-10 | 088058-006 | Pentanone, 4-methyl-, 2- | | 1.25 | U | ug/L |
| WW011 | 2069-K | 20-Apr-10 | 088058-006 | Styrene | | 0.25 | U | ug/L |
| WW011 | 2069-K | 20-Apr-10 | 088058-006 | Tetrachloroethane, 1,1,2,2- | | 0.25 | U | ug/L |
| WW011 | 2069-K | 20-Apr-10 | 088058-006 | Tetrachloroethene | | 0.3 | U | ug/L |
| WW011 | 2069-K | 20-Apr-10 | 088058-006 | Toluene | 1.56 | 0.25 | | ug/L |
| WW011 | 2069-K | 20-Apr-10 | 088058-006 | Trichloroethane, 1,1,1- | | 0.325 | U | ug/L |
| WW011 | 2069-K | 20-Apr-10 | 088058-006 | Trichloroethane, 1,1,2- | | 0.25 | U | ug/L |
| WW011 | 2069-K | 20-Apr-10 | 088058-006 | Trichloroethene | | 0.25 | U | ug/L |
| WW011 | 2069-K | 20-Apr-10 | 088058-006 | Vinyl acetate | | 1.5 | U | ug/L |
| WW011 | 2069-K | 20-Apr-10 | 088058-006 | Vinyl chloride | | 0.5 | U | ug/L |
| WW011 | 2069-K | 20-Apr-10 | 088058-006 | Xylene | | 0.3 | U | ug/L |

**NOTES:**

**MDL = Method detection limit.**

**J = Estimated value, the analyte concentration fell above the effective MDL limit and below the effective (PQL) practical quantitation limit.**

**ug/L = micrograms per liter.**

**U = The analyte was analyzed for, but not detected. For organic and inorganic analytes the result is less than the effective MDL concentration.**

**TABLE A-5. Permitted Sanitary Outfalls of Non-radiological (Inorganic) Analyses, CY 2010**

| Permit Number | Station | Analyte | Result | Units | Regulatory Limit (COA) |
|---|---|---|---|---|---|
| 2069-A | WW001 | Aluminum | 0.068 | mg/L | 900 |
| 2069-A | WW001 | Aluminum | 0.0708 | mg/L | 900 |
| 2069-A | WW001 | Aluminum | 0.0971 | mg/L | 900 |
| 2069-A | WW001 | Aluminum | 0.114 | mg/L | 900 |
| | | **Aluminum Average** | **0.09** | | |
| | | **Aluminum StdDev** | **0.02** | | |
| | | **Aluminum Min** | **0.07** | | |
| | | **Aluminum Max** | **0.11** | | |
| 2069-A | WW001 | Ammonia | 0.999 | mg/L | |
| 2069-A | WW001 | Ammonia | 8.71 | mg/L | |
| 2069-A | WW001 | Ammonia | 10.3 | mg/L | |
| 2069-A | WW001 | Ammonia | 11.3 | mg/L | |
| | | **Ammonia Average** | **7.83** | | |
| | | **Ammonia StdDev** | **4.68** | | |
| | | **Ammonia Min** | **1.00** | | |
| | | **Ammonia Max** | **11.30** | | |
| 2069-A | WW001 | Arsenic | 0.00765 | mg/L | 0.051 |
| 2069-A | WW001 | Arsenic | 0.0106 | mg/L | 0.051 |
| 2069-A | WW001 | Arsenic | 0.0327 | mg/L | 0.051 |
| 2069-A | WW001 | Arsenic | 0.0456 | mg/L | 0.051 |
| | | **Arsenic Average** | **0.02** | | |
| | | **Arsenic StdDev** | **0.02** | | |
| | | **Arsenic Min** | **0.01** | | |
| | | **Arsenic Max** | **0.05** | | |
| 2069-A | WW001 | Boron | 0.0785 | mg/L | |
| 2069-A | WW001 | Boron | 0.0869 | mg/L | |
| 2069-A | WW001 | Boron | 0.0999 | mg/L | |
| 2069-A | WW001 | Boron | 0.142 | mg/L | |
| | | **Boron Average** | **0.10** | | |
| | | **Boron StdDev** | **0.03** | | |
| | | **Boron Min** | **0.08** | | |
| | | **Boron Max** | **0.14** | | |
| 2069-A | WW001 | Cadmium | 0.001 | mg/L | 0.5 |
| 2069-A | WW001 | Cadmium | 0.001 | mg/L | 0.5 |
| 2069-A | WW001 | Cadmium | 0.001 | mg/L | 0.5 |
| 2069-A | WW001 | Cadmium | 0.001 | mg/L | 0.5 |
| | | **Cadmium Average** | **0.001** | | |
| | | **Cadmium StdDev** | **0** | | |
| | | **Cadmium Min** | **0.001** | | |
| | | **Cadmium Max** | **0.001** | | |
| 2069-A | WW001 | Chromium | 0.00351 | mg/L | 4.1 |
| 2069-A | WW001 | Chromium | 0.00376 | mg/L | 4.1 |
| 2069-A | WW001 | Chromium | 0.00443 | mg/L | 4.1 |
| 2069-A | WW001 | Chromium | 0.00488 | mg/L | 4.1 |
| | | **Chromium Average** | **0.00** | | |
| | | **Chromium StdDev** | **0.00** | | |
| | | **Chromium Min** | **0.00** | | |
| | | **Chromium Max** | **0.00** | | |

## TABLE A-5.  Permitted Sanitary Outfalls of Non-radiological (Inorganic) Analyses, CY 2010

| Permit Number | Station | Analyte | Result | Units | Regulatory Limit (COA) |
|---|---|---|---|---|---|
| 2069-A | WW001 | Copper | 0.0337 | mg/L | 5.3 |
| 2069-A | WW001 | Copper | 0.0421 | mg/L | 5.3 |
| 2069-A | WW001 | Copper | 0.0524 | mg/L | 5.3 |
| 2069-A | WW001 | Copper | 0.0616 | mg/L | 5.3 |
| | | **Copper Average** | **0.05** | | |
| | | **Copper StdDev** | **0.01** | | |
| | | **Copper Min** | **0.03** | | |
| | | **Copper Max** | **0.06** | | |
| 2069-A | WW001 | Fluoride | 1.63 | mg/L | 36 |
| 2069-A | WW001 | Fluoride | 2.11 | mg/L | 36 |
| 2069-A | WW001 | Fluoride | 2.99 | mg/L | 36 |
| 2069-A | WW001 | Fluoride | 3.21 | mg/L | 36 |
| | | **Fluoride Average** | **2.49** | | |
| | | **Fluoride StdDev** | **0.74** | | |
| | | **Fluoride Min** | **1.63** | | |
| | | **Fluoride Max** | **3.21** | | |
| 2069-A | WW001 | Lead | 0.0033 | mg/L | 1 |
| 2069-A | WW001 | Lead | 0.00392 | mg/L | 1 |
| 2069-A | WW001 | Lead | 0.0112 | mg/L | 1 |
| 2069-A | WW001 | Lead | 0.0146 | mg/L | 1 |
| | | **Lead Average** | **0.01** | | |
| | | **Lead StdDev** | **0.01** | | |
| | | **Lead Min** | **0.00** | | |
| | | **Lead Max** | **0.01** | | |
| 2069-A | WW001 | Molybdenum | 0.0896 | mg/L | 2 |
| 2069-A | WW001 | Molybdenum | 0.0946 | mg/L | 2 |
| 2069-A | WW001 | Molybdenum | 0.12 | mg/L | 2 |
| 2069-A | WW001 | Molybdenum | 0.15 | mg/L | 2 |
| | | **Molybdenum Average** | **0.11** | | |
| | | **Molybdenum StdDev** | **0.03** | | |
| | | **Molybdenum Min** | **0.09** | | |
| | | **Molybdenum Max** | **0.15** | | |
| 2069-A | WW001 | Nickel | 0.00156 | mg/L | 2 |
| 2069-A | WW001 | Nickel | 0.00209 | mg/L | 2 |
| 2069-A | WW001 | Nickel | 0.00326 | mg/L | 2 |
| 2069-A | WW001 | Nickel | 0.00341 | mg/L | 2 |
| | | **Nickel Average** | **0.00** | | |
| | | **Nickel StdDev** | **0.00** | | |
| | | **Nickel Min** | **0.00** | | |
| | | **Nickel Max** | **0.00** | | |
| 2069-A | WW001 | Selenium | 0.005 | mg/L | 0.46 |
| 2069-A | WW001 | Selenium | 0.005 | mg/L | 0.46 |
| 2069-A | WW001 | Selenium | 0.005 | mg/L | 0.46 |
| 2069-A | WW001 | Selenium | 0.00785 | mg/L | 0.46 |
| | | **Selenium Average** | **0.01** | | |
| | | **Selenium StdDev** | **0.00** | | |
| | | **Selenium Min** | **0.01** | | |
| | | **Selenium Max** | **0.01** | | |

**TABLE A-5. Permitted Sanitary Outfalls of Non-radiological (Inorganic) Analyses, CY 2010**

| Permit Number | Station | Analyte | Result | Units | Regulatory Limit (COA) |
|---|---|---|---|---|---|
| 2069-A | WW001 | Silver | 0.001 | mg/L | 5 |
| 2069-A | WW001 | Silver | 0.001 | mg/L | 5 |
| 2069-A | WW001 | Silver | 0.001 | mg/L | 5 |
| 2069-A | WW001 | Silver | 0.001 | mg/L | 5 |
| | | **Silver Average** | **0.00** | | |
| | | **Silver StdDev** | **0.00** | | |
| | | **Silver Min** | **0.00** | | |
| | | **Silver Max** | **0.00** | | |
| 2069-A | WW001 | Zinc | 0.0406 | mg/L | 2.2 |
| 2069-A | WW001 | Zinc | 0.0419 | mg/L | 2.2 |
| 2069-A | WW001 | Zinc | 0.0531 | mg/L | 2.2 |
| 2069-A | WW001 | Zinc | 0.0632 | mg/L | 2.2 |
| | | **Zinc Average** | **0.05** | | |
| | | **Zinc StdDev** | **0.01** | | |
| | | **Zinc Min** | **0.04** | | |
| | | **Zinc Max** | **0.06** | | |
| 2069-K | WW011 | Aluminum | 0.12 | mg/L | 900 |
| 2069-K | WW011 | Aluminum | 0.136 | mg/L | 900 |
| 2069-K | WW011 | Aluminum | 0.25 | mg/L | 900 |
| 2069-K | WW011 | Aluminum | 0.433 | mg/L | 900 |
| | | **Aluminum Average** | **0.23** | | |
| | | **Aluminum StdDev** | **0.14** | | |
| | | **Aluminum Min** | **0.12** | | |
| | | **Aluminum Max** | **0.43** | | |
| 2069-K | WW011 | Ammonia | 9.87 | mg/L | |
| 2069-K | WW011 | Ammonia | 12.5 | mg/L | |
| 2069-K | WW011 | Ammonia | 14.9 | mg/L | |
| 2069-K | WW011 | Ammonia | 21.6 | mg/L | |
| | | **Ammonia Average** | **14.72** | | |
| | | **Ammonia StdDev** | **5.03** | | |
| | | **Ammonia Min** | **9.87** | | |
| | | **Ammonia Max** | **21.60** | | |
| 2069-K | WW011 | Arsenic | 0.005 | mg/L | 0.051 |
| 2069-K | WW011 | Arsenic | 0.00771 | mg/L | 0.051 |
| 2069-K | WW011 | Arsenic | 0.00915 | mg/L | 0.051 |
| 2069-K | WW011 | Arsenic | 0.0236 | mg/L | 0.051 |
| | | **Arsenic Average** | **0.01** | | |
| | | **Arsenic StdDev** | **0.01** | | |
| | | **Arsenic Min** | **0.01** | | |
| | | **Arsenic Max** | **0.02** | | |
| 2069-K | WW011 | Boron | 0.0856 | mg/L | |
| 2069-K | WW011 | Boron | 0.0885 | mg/L | |
| 2069-K | WW011 | Boron | 0.0913 | mg/L | |
| 2069-K | WW011 | Boron | 0.113 | mg/L | |
| | | **Boron Average** | **0.09** | | |
| | | **Boron StdDev** | **0.01** | | |
| | | **Boron Min** | **0.09** | | |
| | | **Boron Max** | **0.11** | | |

**TABLE A-5.  Permitted Sanitary Outfalls of Non-radiological (Inorganic) Analyses, CY 2010**

| Permit Number | Station | Analyte | Result | Units | Regulatory Limit (COA) |
|---|---|---|---|---|---|
| 2069-K | WW011 | Cadmium | 0.001 | mg/L | 0.5 |
| 2069-K | WW011 | Cadmium | 0.001 | mg/L | 0.5 |
| 2069-K | WW011 | Cadmium | 0.001 | mg/L | 0.5 |
| 2069-K | WW011 | Cadmium | 0.001 | mg/L | 0.5 |
| | | **Cadmium Average** | **0.00** | | |
| | | **Cadmium StdDev** | **0.00** | | |
| | | **Cadmium Min** | **0.00** | | |
| | | **Cadmium Max** | **0.00** | | |
| 2069-K | WW011 | Chromium | 0.0048 | mg/L | 4.1 |
| 2069-K | WW011 | Chromium | 0.00495 | mg/L | 4.1 |
| 2069-K | WW011 | Chromium | 0.00665 | mg/L | 4.1 |
| 2069-K | WW011 | Chromium | 0.00868 | mg/L | 4.1 |
| | | **Chromium Average** | **0.01** | | |
| | | **Chromium StdDev** | **0.00** | | |
| | | **Chromium Min** | **0.00** | | |
| | | **Chromium Max** | **0.01** | | |
| 2069-K | WW011 | Copper | 0.0275 | mg/L | 5.3 |
| 2069-K | WW011 | Copper | 0.0689 | mg/L | 5.3 |
| 2069-K | WW011 | Copper | 0.136 | mg/L | 5.3 |
| 2069-K | WW011 | Copper | 0.211 | mg/L | 5.3 |
| | | **Copper Average** | **0.11** | | |
| | | **Copper StdDev** | **0.08** | | |
| | | **Copper Min** | **0.03** | | |
| | | **Copper Max** | **0.21** | | |
| 2069-K | WW011 | Fluoride | 0.635 | mg/L | 36 |
| 2069-K | WW011 | Fluoride | 0.656 | mg/L | 36 |
| 2069-K | WW011 | Fluoride | 0.659 | mg/L | 36 |
| 2069-K | WW011 | Fluoride | 0.776 | mg/L | 36 |
| | | **Fluoride Average** | **0.68** | | |
| | | **Fluoride StdDev** | **0.06** | | |
| | | **Fluoride Min** | **0.64** | | |
| | | **Fluoride Max** | **0.78** | | |
| 2069-K | WW011 | Lead | 0.0033 | mg/L | 1 |
| 2069-K | WW011 | Lead | 0.0033 | mg/L | 1 |
| 2069-K | WW011 | Lead | 0.00441 | mg/L | 1 |
| 2069-K | WW011 | Lead | 0.00634 | mg/L | 1 |
| | | **Lead Average** | **0.00** | | |
| | | **Lead StdDev** | **0.00** | | |
| | | **Lead Min** | **0.00** | | |
| | | **Lead Max** | **0.01** | | |
| 2069-K | WW011 | Molybdenum | 0.0145 | mg/L | 2 |
| 2069-K | WW011 | Molybdenum | 0.0419 | mg/L | 2 |
| 2069-K | WW011 | Molybdenum | 0.0445 | mg/L | 2 |
| 2069-K | WW011 | Molybdenum | 0.0557 | mg/L | 2 |
| | | **Molybdenum Average** | **0.04** | | |
| | | **Molybdenum StdDev** | **0.02** | | |
| | | **Molybdenum Min** | **0.01** | | |
| | | **Molybdenum Max** | **0.06** | | |

TABLE A-5.  Permitted Sanitary Outfalls of Non-radiological (Inorganic) Analyses, CY 2010

| Permit Number | Station | Analyte | Result | Units | Regulatory Limit (COA) |
|---|---|---|---|---|---|
| 2069-K | WW011 | Nickel | 0.00215 | mg/L | 2 |
| 2069-K | WW011 | Nickel | 0.00326 | mg/L | 2 |
| 2069-K | WW011 | Nickel | 0.0041 | mg/L | 2 |
| 2069-K | WW011 | Nickel | 0.00483 | mg/L | 2 |
| | | **Nickel Average** | **0.00** | | |
| | | **Nickel StdDev** | **0.00** | | |
| | | **Nickel Min** | **0.00** | | |
| | | **Nickel Max** | **0.00** | | |
| 2069-K | WW011 | Selenium | 0.005 | mg/L | 0.46 |
| 2069-K | WW011 | Selenium | 0.005 | mg/L | 0.46 |
| 2069-K | WW011 | Selenium | 0.00722 | mg/L | 0.46 |
| 2069-K | WW011 | Selenium | 0.0158 | mg/L | 0.46 |
| | | **Selenium Average** | **0.01** | | |
| | | **Selenium StdDev** | **0.01** | | |
| | | **Selenium Min** | **0.01** | | |
| | | **Selenium Max** | **0.02** | | |
| 2069-K | WW011 | Silver | 0.001 | mg/L | 5 |
| 2069-K | WW011 | Silver | 0.001 | mg/L | 5 |
| 2069-K | WW011 | Silver | 0.001 | mg/L | 5 |
| 2069-K | WW011 | Silver | 0.001 | mg/L | 5 |
| | | **Silver Average** | **0.00** | | |
| | | **Silver StdDev** | **0.00** | | |
| | | **Silver Min** | **0.00** | | |
| | | **Silver Max** | **0.00** | | |
| 2069-K | WW011 | Zinc | 0.0518 | mg/L | 2.2 |
| 2069-K | WW011 | Zinc | 0.077 | mg/L | 2.2 |
| 2069-K | WW011 | Zinc | 0.106 | mg/L | 2.2 |
| 2069-K | WW011 | Zinc | 0.221 | mg/L | 2.2 |
| | | **Zinc Average** | **0.11** | | |
| | | **Zinc StdDev** | **0.07** | | |
| | | **Zinc Min** | **0.05** | | |
| | | **Zinc Max** | **0.22** | | |
| 2069F-4 | WW006 | Aluminum | 0.127 | mg/L | 900 |
| 2069F-4 | WW006 | Aluminum | 0.138 | mg/L | 900 |
| 2069F-4 | WW006 | Aluminum | 0.141 | mg/L | 900 |
| 2069F-4 | WW006 | Aluminum | 0.145 | mg/L | 900 |
| | | **Aluminum Average** | **0.14** | | |
| | | **Aluminum StdDev** | **0.01** | | |
| | | **Aluminum Min** | **0.13** | | |
| | | **Aluminum Max** | **0.15** | | |
| 2069F-4 | WW006 | Ammonia | 11.2 | mg/L | |
| 2069F-4 | WW006 | Ammonia | 24.8 | mg/L | |
| 2069F-4 | WW006 | Ammonia | 30.1 | mg/L | |
| 2069F-4 | WW006 | Ammonia | 37.2 | mg/L | |
| | | **Ammonia Average** | **25.83** | | |
| | | **Ammonia StdDev** | **10.99** | | |
| | | **Ammonia Min** | **11.20** | | |
| | | **Ammonia Max** | **37.20** | | |

TABLE A-5. Permitted Sanitary Outfalls of Non-radiological (Inorganic) Analyses, CY 2010

| Permit Number | Station | Analyte | Result | Units | Regulatory Limit (COA) |
|---|---|---|---|---|---|
| 2069F-4 | WW006 | Arsenic | 0.00514 | mg/L | 0.051 |
| 2069F-4 | WW006 | Arsenic | 0.00977 | mg/L | 0.051 |
| 2069F-4 | WW006 | Arsenic | 0.0102 | mg/L | 0.051 |
| 2069F-4 | WW006 | Arsenic | 0.0295 | mg/L | 0.051 |
| | | **Arsenic Average** | **0.01** | | |
| | | **Arsenic StdDev** | **0.01** | | |
| | | **Arsenic Min** | **0.01** | | |
| | | **Arsenic Max** | **0.03** | | |
| 2069F-4 | WW006 | Boron | 0.0847 | mg/L | |
| 2069F-4 | WW006 | Boron | 0.125 | mg/L | |
| 2069F-4 | WW006 | Boron | 0.128 | mg/L | |
| 2069F-4 | WW006 | Boron | 0.16 | mg/L | |
| | | **Boron Average** | **0.12** | | |
| | | **Boron StdDev** | **0.03** | | |
| | | **Boron Min** | **0.08** | | |
| | | **Boron Max** | **0.16** | | |
| 2069F-4 | WW006 | Cadmium | 0.001 | mg/L | 0.5 |
| 2069F-4 | WW006 | Cadmium | 0.001 | mg/L | 0.5 |
| 2069F-4 | WW006 | Cadmium | 0.001 | mg/L | 0.5 |
| 2069F-4 | WW006 | Cadmium | 0.001 | mg/L | 0.5 |
| | | **Cadmium Average** | **0.00** | | |
| | | **Cadmium StdDev** | **0.00** | | |
| | | **Cadmium Min** | **0.00** | | |
| | | **Cadmium Max** | **0.00** | | |
| 2069F-4 | WW006 | Chromium | 0.00224 | mg/L | 4.1 |
| 2069F-4 | WW006 | Chromium | 0.00244 | mg/L | 4.1 |
| 2069F-4 | WW006 | Chromium | 0.00295 | mg/L | 4.1 |
| 2069F-4 | WW006 | Chromium | 0.00296 | mg/L | 4.1 |
| | | **Chromium Average** | **0.00** | | |
| | | **Chromium StdDev** | **0.00** | | |
| | | **Chromium Min** | **0.00** | | |
| | | **Chromium Max** | **0.00** | | |
| 2069F-4 | WW006 | Copper | 0.0103 | mg/L | 5.3 |
| 2069F-4 | WW006 | Copper | 0.0136 | mg/L | 5.3 |
| 2069F-4 | WW006 | Copper | 0.0196 | mg/L | 5.3 |
| 2069F-4 | WW006 | Copper | 0.0335 | mg/L | 5.3 |
| | | **Copper Average** | **0.02** | | |
| | | **Copper StdDev** | **0.01** | | |
| | | **Copper Min** | **0.01** | | |
| | | **Copper Max** | **0.03** | | |
| 2069F-4 | WW006 | Cyanide, total | 0.0017 | mg/L | 0.45 |
| 2069F-4 | WW006 | Cyanide, total | 0.0017 | mg/L | 0.45 |
| 2069F-4 | WW006 | Cyanide, total | 0.0017 | mg/L | 0.45 |
| 2069F-4 | WW006 | Cyanide, total | 0.0017 | mg/L | 0.45 |
| 2069F-4 | WW006 | Cyanide, total | 0.0017 | mg/L | 0.45 |
| 2069F-4 | WW006 | Cyanide, total | 0.00172 | mg/L | 0.45 |
| 2069F-4 | WW006 | Cyanide, total | 0.00389 | mg/L | 0.45 |
| 2069F-4 | WW006 | Cyanide, total | 0.00568 | mg/L | 0.45 |

**TABLE A-5. Permitted Sanitary Outfalls of Non-radiological (Inorganic) Analyses, CY 2010**

| Permit Number | Station | Analyte | Result | Units | Regulatory Limit (COA) |
|---|---|---|---|---|---|
| | | **Cyanide, total Average** | **0.00** | | |
| | | **Cyanide, total StdDev** | **0.00** | | |
| | | **Cyanide, total Min** | **0.00** | | |
| | | **Cyanide, total Max** | **0.01** | | |
| 2069F-4 | WW006 | Fluoride | 0.744 | mg/L | 36 |
| 2069F-4 | WW006 | Fluoride | 0.849 | mg/L | 36 |
| 2069F-4 | WW006 | Fluoride | 0.907 | mg/L | 36 |
| 2069F-4 | WW006 | Fluoride | 0.908 | mg/L | 36 |
| | | **Fluoride Average** | **0.85** | | |
| | | **Fluoride StdDev** | **0.08** | | |
| | | **Fluoride Min** | **0.74** | | |
| | | **Fluoride Max** | **0.91** | | |
| 2069F-4 | WW006 | Lead | 0.0033 | mg/L | 1 |
| 2069F-4 | WW006 | Lead | 0.0033 | mg/L | 1 |
| 2069F-4 | WW006 | Lead | 0.00368 | mg/L | 1 |
| 2069F-4 | WW006 | Lead | 0.00542 | mg/L | 1 |
| | | **Lead Average** | **0.00** | | |
| | | **Lead StdDev** | **0.00** | | |
| | | **Lead Min** | **0.00** | | |
| | | **Lead Max** | **0.01** | | |
| 2069F-4 | WW006 | Molybdenum | 0.0508 | mg/L | 2 |
| 2069F-4 | WW006 | Molybdenum | 0.0754 | mg/L | 2 |
| 2069F-4 | WW006 | Molybdenum | 0.0997 | mg/L | 2 |
| 2069F-4 | WW006 | Molybdenum | 0.15 | mg/L | 2 |
| | | **Molybdenum Average** | **0.09** | | |
| | | **Molybdenum StdDev** | **0.04** | | |
| | | **Molybdenum Min** | **0.05** | | |
| | | **Molybdenum Max** | **0.15** | | |
| 2069F-4 | WW006 | Nickel | 0.0015 | mg/L | 2 |
| 2069F-4 | WW006 | Nickel | 0.00217 | mg/L | 2 |
| 2069F-4 | WW006 | Nickel | 0.00218 | mg/L | 2 |
| 2069F-4 | WW006 | Nickel | 0.00226 | mg/L | 2 |
| | | **Nickel Average** | **0.00** | | |
| | | **Nickel StdDev** | **0.00** | | |
| | | **Nickel Min** | **0.00** | | |
| | | **Nickel Max** | **0.00** | | |
| 2069F-4 | WW006 | Selenium | 0.005 | mg/L | 0.46 |
| 2069F-4 | WW006 | Selenium | 0.005 | mg/L | 0.46 |
| 2069F-4 | WW006 | Selenium | 0.00793 | mg/L | 0.46 |
| 2069F-4 | WW006 | Selenium | 0.00996 | mg/L | 0.46 |
| | | **Selenium Average** | **0.01** | | |
| | | **Selenium StdDev** | **0.00** | | |
| | | **Selenium Min** | **0.01** | | |
| | | **Selenium Max** | **0.01** | | |
| 2069F-4 | WW006 | Silver | 0.001 | mg/L | 5 |
| 2069F-4 | WW006 | Silver | 0.001 | mg/L | 5 |
| 2069F-4 | WW006 | Silver | 0.001 | mg/L | 5 |
| 2069F-4 | WW006 | Silver | 0.005 | mg/L | 5 |

TABLE A-5.  Permitted Sanitary Outfalls of Non-radiological (Inorganic) Analyses, CY 2010

| Permit Number | Station | Analyte | Result | Units | Regulatory Limit (COA) |
|---|---|---|---|---|---|
| | | **Silver Average** | **0.00** | | |
| | | **Silver StdDev** | **0.00** | | |
| | | **Silver Min** | **0.00** | | |
| | | **Silver Max** | **0.01** | | |
| 2069F-4 | WW006 | Zinc | 0.0589 | mg/L | 2.2 |
| 2069F-4 | WW006 | Zinc | 0.0608 | mg/L | 2.2 |
| 2069F-4 | WW006 | Zinc | 0.0671 | mg/L | 2.2 |
| 2069F-4 | WW006 | Zinc | 0.0803 | mg/L | 2.2 |
| | | **Zinc Average** | **0.07** | | |
| | | **Zinc StdDev** | **0.01** | | |
| | | **Zinc Min** | **0.06** | | |
| | | **Zinc Max** | **0.08** | | |
| 2069F-4 | WW006 #2 | Cyanide, total | 0.0017 | mg/L | 0.45 |
| 2069F-4 | WW006 #2 | Cyanide, total | 0.0017 | mg/L | 0.45 |
| 2069F-4 | WW006 #2 | Cyanide, total | 0.0017 | mg/L | 0.45 |
| 2069F-4 | WW006 #2 | Cyanide, total | 0.0017 | mg/L | 0.45 |
| 2069F-4 | WW006 #2 | Cyanide, total | 0.0017 | mg/L | 0.45 |
| 2069F-4 | WW006 #2 | Cyanide, total | 0.0017 | mg/L | 0.45 |
| 2069F-4 | WW006 #2 | Cyanide, total | 0.00235 | mg/L | 0.45 |
| 2069F-4 | WW006 #2 | Cyanide, total | 0.00371 | mg/L | 0.45 |
| | | **Cyanide, total Average** | **0.00** | | |
| | | **Cyanide, total StdDev** | **0.00** | | |
| | | **Cyanide, total Min** | **0.00** | | |
| | | **Cyanide, total Max** | **0.00** | | |
| 2069G-2 | WW007 | Aluminum | 0.068 | mg/L | 900 |
| 2069G-2 | WW007 | Aluminum | 0.068 | mg/L | 900 |
| 2069G-2 | WW007 | Aluminum | 0.068 | mg/L | 900 |
| 2069G-2 | WW007 | Aluminum | 0.068 | mg/L | 900 |
| | | **Aluminum Average** | **0.07** | | |
| | | **Aluminum StdDev** | **0.00** | | |
| | | **Aluminum Min** | **0.07** | | |
| | | **Aluminum Max** | **0.07** | | |
| 2069G-2 | WW007 | Ammonia | **0.95** | mg/L | |
| 2069G-2 | WW007 | Ammonia | 1.01 | mg/L | |
| 2069G-2 | WW007 | Ammonia | 1.47 | mg/L | |
| 2069G-2 | WW007 | Ammonia | 6.18 | mg/L | |
| | | **Ammonia Average** | **2.40** | | |
| | | **Ammonia StdDev** | **2.53** | | |
| | | **Ammonia Min** | **0.95** | | |
| | | **Ammonia Max** | **6.18** | | |
| 2069G-2 | WW007 | Arsenic | 0.005 | mg/L | 0.051 |
| 2069G-2 | WW007 | Arsenic | 0.005 | mg/L | 0.051 |
| 2069G-2 | WW007 | Arsenic | 0.00971 | mg/L | 0.051 |
| 2069G-2 | WW007 | Arsenic | 0.0108 | mg/L | 0.051 |
| 2069G-2 | WW007 | Arsenic | 0.011 | mg/L | 0.051 |
| 2069G-2 | WW007 | Arsenic | 0.0114 | mg/L | 0.051 |
| 2069G-2 | WW007 | Arsenic | 0.0226 | mg/L | 0.051 |
| 2069G-2 | WW007 | Arsenic | 0.132 | mg/L | 0.051 |

TABLE A-5.  Permitted Sanitary Outfalls of Non-radiological (Inorganic) Analyses, CY 2010

| Permit Number | Station | Analyte | Result | Units | Regulatory Limit (COA) |
|---|---|---|---|---|---|
| | | **Arsenic Average** | **0.03** | | |
| | | **Arsenic StdDev** | **0.04** | | |
| | | **Arsenic Min** | **0.01** | | |
| | | **Arsenic Max** | **0.13** | | |
| 2069G-2 | WW007 | Boron | 0.032 | mg/L | |
| 2069G-2 | WW007 | Boron | 0.0324 | mg/L | |
| 2069G-2 | WW007 | Boron | 0.0663 | mg/L | |
| 2069G-2 | WW007 | Boron | 0.132 | mg/L | |
| | | **Boron Average** | **0.07** | | |
| | | **Boron StdDev** | **0.05** | | |
| | | **Boron Min** | **0.03** | | |
| | | **Boron Max** | **0.13** | | |
| 2069G-2 | WW007 | Cadmium | 0.001 | mg/L | 0.5 |
| 2069G-2 | WW007 | Cadmium | 0.001 | mg/L | 0.5 |
| 2069G-2 | WW007 | Cadmium | 0.001 | mg/L | 0.5 |
| 2069G-2 | WW007 | Cadmium | 0.001 | mg/L | 0.5 |
| | | **Cadmium Average** | **0.00** | | |
| | | **Cadmium StdDev** | **0.00** | | |
| | | **Cadmium Min** | **0.00** | | |
| | | **Cadmium Max** | **0.00** | | |
| 2069G-2 | WW007 | Chromium | 0.00139 | mg/L | 4.1 |
| 2069G-2 | WW007 | Chromium | 0.00187 | mg/L | 4.1 |
| 2069G-2 | WW007 | Chromium | 0.00237 | mg/L | 4.1 |
| 2069G-2 | WW007 | Chromium | 0.00254 | mg/L | 4.1 |
| | | **Chromium Average** | **0.00** | | |
| | | **Chromium StdDev** | **0.00** | | |
| | | **Chromium Min** | **0.00** | | |
| | | **Chromium Max** | **0.00** | | |
| 2069G-2 | WW007 | Copper | **0.00** | mg/L | 5.3 |
| 2069G-2 | WW007 | Copper | 0.003 | mg/L | 5.3 |
| 2069G-2 | WW007 | Copper | 0.003 | mg/L | 5.3 |
| 2069G-2 | WW007 | Copper | 0.003 | mg/L | 5.3 |
| | | **Copper Average** | **0.00** | | |
| | | **Copper StdDev** | **0.00** | | |
| | | **Copper Min** | **0.00** | | |
| | | **Copper Max** | **0.00** | | |
| 2069G-2 | WW007 | Cyanide, total | 0.0017 | mg/L | 0.45 |
| 2069G-2 | WW007 | Cyanide, total | 0.0017 | mg/L | 0.45 |
| 2069G-2 | WW007 | Cyanide, total | 0.0017 | mg/L | 0.45 |
| 2069G-2 | WW007 | Cyanide, total | 0.0017 | mg/L | 0.45 |
| 2069G-2 | WW007 | Cyanide, total | 0.0017 | mg/L | 0.45 |
| 2069G-2 | WW007 | Cyanide, total | 0.0017 | mg/L | 0.45 |
| 2069G-2 | WW007 | Cyanide, total | 0.0017 | mg/L | 0.45 |
| 2069G-2 | WW007 | Cyanide, total | 0.0017 | mg/L | 0.45 |
| | | **Cyanide, total Average** | **0.00** | | |
| | | **Cyanide, total StdDev** | **0.00** | | |
| | | **Cyanide, total Min** | **0.00** | | |
| | | **Cyanide, total Max** | **0.00** | | |

**TABLE A-5. Permitted Sanitary Outfalls of Non-radiological (Inorganic) Analyses, CY 2010**

| Permit Number | Station | Analyte | Result | Units | Regulatory Limit (COA) |
|---|---|---|---|---|---|
| 2069G-2 | WW007 | Fluoride | 1.16 | mg/L | 36 |
| 2069G-2 | WW007 | Fluoride | 1.39 | mg/L | 36 |
| 2069G-2 | WW007 | Fluoride | 1.63 | mg/L | 36 |
| 2069G-2 | WW007 | Fluoride | 2.06 | mg/L | 36 |
| | | **Fluoride Average** | **1.56** | | |
| | | **Fluoride StdDev** | **0.38** | | |
| | | **Fluoride Min** | **1.16** | | |
| | | **Fluoride Max** | **2.06** | | |
| 2069G-2 | WW007 | Lead | 0.0033 | mg/L | 1 |
| 2069G-2 | WW007 | Lead | 0.0033 | mg/L | 1 |
| 2069G-2 | WW007 | Lead | 0.0033 | mg/L | 1 |
| 2069G-2 | WW007 | Lead | 0.0165 | mg/L | 1 |
| | | **Lead Average** | **0.01** | | |
| | | **Lead StdDev** | **0.01** | | |
| | | **Lead Min** | **0.00** | | |
| | | **Lead Max** | **0.02** | | |
| 2069G-2 | WW007 | Molybdenum | 0.0189 | mg/L | 2 |
| 2069G-2 | WW007 | Molybdenum | 0.0215 | mg/L | 2 |
| 2069G-2 | WW007 | Molybdenum | 0.0232 | mg/L | 2 |
| 2069G-2 | WW007 | Molybdenum | 0.0313 | mg/L | 2 |
| | | **Molybdenum Average** | **0.02** | | |
| | | **Molybdenum StdDev** | **0.01** | | |
| | | **Molybdenum Min** | **0.02** | | |
| | | **Molybdenum Max** | **0.03** | | |
| 2069G-2 | WW007 | Nickel | 0.0015 | mg/L | 2 |
| 2069G-2 | WW007 | Nickel | 0.0015 | mg/L | 2 |
| 2069G-2 | WW007 | Nickel | 0.0015 | mg/L | 2 |
| 2069G-2 | WW007 | Nickel | 0.00166 | mg/L | 2 |
| | | **Nickel Average** | **0.00** | | |
| | | **Nickel StdDev** | **0.00** | | |
| | | **Nickel Min** | **0.00** | | |
| | | **Nickel Max** | **0.00** | | |
| 2069G-2 | WW007 | Selenium | 0.005 | mg/L | 0.46 |
| 2069G-2 | WW007 | Selenium | 0.005 | mg/L | 0.46 |
| 2069G-2 | WW007 | Selenium | 0.0064 | mg/L | 0.46 |
| 2069G-2 | WW007 | Selenium | 0.00732 | mg/L | 0.46 |
| | | **Selenium Average** | **0.01** | | |
| | | **Selenium StdDev** | **0.00** | | |
| | | **Selenium Min** | **0.01** | | |
| | | **Selenium Max** | **0.01** | | |
| 2069G-2 | WW007 | Silver | 0.001 | mg/L | 5 |
| 2069G-2 | WW007 | Silver | 0.001 | mg/L | 5 |
| 2069G-2 | WW007 | Silver | 0.001 | mg/L | 5 |
| 2069G-2 | WW007 | Silver | 0.001 | mg/L | 5 |
| | | **Silver Average** | **0.00** | | |
| | | **Silver StdDev** | **0.00** | | |
| | | **Silver Min** | **0.00** | | |
| | | **Silver Max** | **0.00** | | |

**TABLE A-5. Permitted Sanitary Outfalls of Non-radiological (Inorganic) Analyses, CY 2010**

| Permit Number | Station | Analyte | Result | Units | Regulatory Limit (COA) |
|---|---|---|---|---|---|
| 2069G-2 | WW007 | Zinc | 0.0033 | mg/L | 2.2 |
| 2069G-2 | WW007 | Zinc | 0.0033 | mg/L | 2.2 |
| 2069G-2 | WW007 | Zinc | 0.0033 | mg/L | 2.2 |
| 2069G-2 | WW007 | Zinc | 0.00423 | mg/L | 2.2 |
| | | **Zinc Average** | **0.00** | | |
| | | **Zinc StdDev** | **0.00** | | |
| | | **Zinc Min** | **0.00** | | |
| | | **Zinc Max** | **0.00** | | |
| 2069I-3 | WW008 | Aluminum | 0.0917 | mg/L | 900 |
| 2069I-3 | WW008 | Aluminum | 0.13 | mg/L | 900 |
| 2069I-3 | WW008 | Aluminum | 0.149 | mg/L | 900 |
| 2069I-3 | WW008 | Aluminum | 0.355 | mg/L | 900 |
| | | **Aluminum Average** | **0.18** | | |
| | | **Aluminum StdDev** | **0.12** | | |
| | | **Aluminum Min** | **0.09** | | |
| | | **Aluminum Max** | **0.36** | | |
| 2069I-3 | WW008 | Ammonia | 0.135 | mg/L | |
| 2069I-3 | WW008 | Ammonia | 28.7 | mg/L | |
| 2069I-3 | WW008 | Ammonia | 57.4 | mg/L | |
| 2069I-3 | WW008 | Ammonia | 67 | mg/L | |
| | | **Ammonia Average** | **38.31** | | |
| | | **Ammonia StdDev** | **30.21** | | |
| | | **Ammonia Min** | **0.14** | | |
| | | **Ammonia Max** | **67.00** | | |
| 2069I-3 | WW008 | Arsenic | 0.005 | mg/L | 0.051 |
| 2069I-3 | WW008 | Arsenic | 0.00702 | mg/L | 0.051 |
| 2069I-3 | WW008 | Arsenic | 0.00977 | mg/L | 0.051 |
| 2069I-3 | WW008 | Arsenic | 0.0276 | mg/L | 0.051 |
| | | **Arsenic Average** | **0.01** | | |
| | | **Arsenic StdDev** | **0.01** | | |
| | | **Arsenic Min** | **0.01** | | |
| | | **Arsenic Max** | **0.03** | | |
| 2069I-3 | WW008 | Boron | 0.0825 | mg/L | |
| 2069I-3 | WW008 | Boron | 0.0842 | mg/L | |
| 2069I-3 | WW008 | Boron | 0.0909 | mg/L | |
| 2069I-3 | WW008 | Boron | 0.105 | mg/L | |
| | | **Boron Average** | **0.09** | | |
| | | **Boron StdDev** | **0.01** | | |
| | | **Boron Min** | **0.08** | | |
| | | **Boron Max** | **0.11** | | |
| 2069I-3 | WW008 | Cadmium | 0.001 | mg/L | 0.5 |
| 2069I-3 | WW008 | Cadmium | 0.001 | mg/L | 0.5 |
| 2069I-3 | WW008 | Cadmium | 0.001 | mg/L | 0.5 |
| 2069I-3 | WW008 | Cadmium | 0.001 | mg/L | 0.5 |
| | | **Cadmium Average** | **0.00** | | |
| | | **Cadmium StdDev** | **0.00** | | |
| | | **Cadmium Min** | **0.00** | | |
| | | **Cadmium Max** | **0.00** | | |

**TABLE A-5. Permitted Sanitary Outfalls of Non-radiological (Inorganic) Analyses, CY 2010**

| Permit Number | Station | Analyte | Result | Units | Regulatory Limit (COA) |
|---|---|---|---|---|---|
| 2069I-3 | WW008 | Chromium | 0.00197 | mg/L | 4.1 |
| 2069I-3 | WW008 | Chromium | 0.00215 | mg/L | 4.1 |
| 2069I-3 | WW008 | Chromium | 0.00256 | mg/L | 4.1 |
| 2069I-3 | WW008 | Chromium | 0.00285 | mg/L | 4.1 |
| | | **Chromium Average** | **0.00** | | |
| | | **Chromium StdDev** | **0.00** | | |
| | | **Chromium Min** | **0.00** | | |
| | | **Chromium Max** | **0.00** | | |
| 2069I-3 | WW008 | Copper | 0.0238 | mg/L | 5.3 |
| 2069I-3 | WW008 | Copper | 0.0325 | mg/L | 5.3 |
| 2069I-3 | WW008 | Copper | 0.034 | mg/L | 5.3 |
| 2069I-3 | WW008 | Copper | 0.0424 | mg/L | 5.3 |
| | | **Copper Average** | **0.03** | | |
| | | **Copper StdDev** | **0.01** | | |
| | | **Copper Min** | **0.02** | | |
| | | **Copper Max** | **0.04** | | |
| 2069I-3 | WW008 | Cyanide, total | 0.0017 | mg/L | 0.45 |
| 2069I-3 | WW008 | Cyanide, total | 0.0017 | mg/L | 0.45 |
| 2069I-3 | WW008 | Cyanide, total | 0.0017 | mg/L | 0.45 |
| 2069I-3 | WW008 | Cyanide, total | 0.00215 | mg/L | 0.45 |
| 2069I-3 | WW008 | Cyanide, total | 0.00231 | mg/L | 0.45 |
| 2069I-3 | WW008 | Cyanide, total | 0.00382 | mg/L | 0.45 |
| 2069I-3 | WW008 | Cyanide, total | 0.00442 | mg/L | 0.45 |
| 2069I-3 | WW008 | Cyanide, total | 0.00458 | mg/L | 0.45 |
| | | **Cyanide, total Average** | **0.00** | | |
| | | **Cyanide, total StdDev** | **0.00** | | |
| | | **Cyanide, total Min** | **0.00** | | |
| | | **Cyanide, total Max** | **0.00** | | |
| 2069I-3 | WW008 | Fluoride | 0.637 | mg/L | 36 |
| 2069I-3 | WW008 | Fluoride | 0.648 | mg/L | 36 |
| 2069I-3 | WW008 | Fluoride | 0.653 | mg/L | 36 |
| 2069I-3 | WW008 | Fluoride | 0.756 | mg/L | 36 |
| | | **Fluoride Average** | **0.67** | | |
| | | **Fluoride StdDev** | **0.06** | | |
| | | **Fluoride Min** | **0.64** | | |
| | | **Fluoride Max** | **0.76** | | |
| 2069I-3 | WW008 | Lead | 0.0033 | mg/L | 1 |
| 2069I-3 | WW008 | Lead | 0.0033 | mg/L | 1 |
| 2069I-3 | WW008 | Lead | 0.0033 | mg/L | 1 |
| 2069I-3 | WW008 | Lead | 0.00537 | mg/L | 1 |
| | | **Lead Average** | **0.00** | | |
| | | **Lead StdDev** | **0.00** | | |
| | | **Lead Min** | **0.00** | | |
| | | **Lead Max** | **0.01** | | |
| 2069I-3 | WW008 | Molybdenum | 0.00352 | mg/L | 2 |
| 2069I-3 | WW008 | Molybdenum | 0.00575 | mg/L | 2 |
| 2069I-3 | WW008 | Molybdenum | 0.00904 | mg/L | 2 |
| 2069I-3 | WW008 | Molybdenum | 0.0831 | mg/L | 2 |

**TABLE A-5. Permitted Sanitary Outfalls of Non-radiological (Inorganic) Analyses, CY 2010**

| Permit Number | Station | Analyte | Result | Units | Regulatory Limit (COA) |
|---|---|---|---|---|---|
| | | **Molybdenum Average** | **0.03** | | |
| | | **Molybdenum StdDev** | **0.04** | | |
| | | **Molybdenum Min** | **0.00** | | |
| | | **Molybdenum Max** | **0.08** | | |
| 2069I-3 | WW008 | Nickel | 0.0027 | mg/L | 2 |
| 2069I-3 | WW008 | Nickel | 0.00295 | mg/L | 2 |
| 2069I-3 | WW008 | Nickel | 0.0037 | mg/L | 2 |
| 2069I-3 | WW008 | Nickel | 0.00611 | mg/L | 2 |
| | | **Nickel Average** | **0.00** | | |
| | | **Nickel StdDev** | **0.00** | | |
| | | **Nickel Min** | **0.00** | | |
| | | **Nickel Max** | **0.01** | | |
| 2069I-3 | WW008 | Selenium | 0.005 | mg/L | 0.46 |
| 2069I-3 | WW008 | Selenium | 0.005 | mg/L | 0.46 |
| 2069I-3 | WW008 | Selenium | 0.005 | mg/L | 0.46 |
| 2069I-3 | WW008 | Selenium | 0.00886 | mg/L | 0.46 |
| | | **Selenium Average** | **0.01** | | |
| | | **Selenium StdDev** | **0.00** | | |
| | | **Selenium Min** | **0.01** | | |
| | | **Selenium Max** | **0.01** | | |
| 2069I-3 | WW008 | Silver | 0.001 | mg/L | 5 |
| 2069I-3 | WW008 | Silver | 0.001 | mg/L | 5 |
| 2069I-3 | WW008 | Silver | 0.001 | mg/L | 5 |
| 2069I-3 | WW008 | Silver | 0.001 | mg/L | 5 |
| | | **Silver Average** | **0.00** | | |
| | | **Silver StdDev** | **0.00** | | |
| | | **Silver Min** | **0.00** | | |
| | | **Silver Max** | **0.00** | | |
| 2069I-3 | WW008 | Zinc | 0.0668 | mg/L | 2.2 |
| 2069I-3 | WW008 | Zinc | 0.0815 | mg/L | 2.2 |
| 2069I-3 | WW008 | Zinc | 0.104 | mg/L | 2.2 |
| 2069I-3 | WW008 | Zinc | 0.105 | mg/L | 2.2 |
| | | **Zinc Average** | **0.09** | | |
| | | **Zinc StdDev** | **0.02** | | |
| | | **Zinc Min** | **0.07** | | |
| | | **Zinc Max** | **0.11** | | |
| 2238A | CINT | Aluminum | 0.068 | mg/L | 900 |
| 2238A | CINT | Aluminum | 0.068 | mg/L | 900 |
| 2238A | CINT | Aluminum | 0.068 | mg/L | 900 |
| 2238A | CINT | Aluminum | 0.068 | mg/L | 900 |
| | | **Aluminum Average** | **0.07** | | |
| | | **Aluminum StdDev** | **0.00** | | |
| | | **Aluminum Min** | **0.07** | | |
| | | **Aluminum Max** | **0.07** | | |
| 2238A | CINT | Ammonia | 0.072 | mg/L | |
| 2238A | CINT | Ammonia | 0.127 | mg/L | |
| 2238A | CINT | Ammonia | 0.152 | mg/L | |
| 2238A | CINT | Ammonia | 0.172 | mg/L | |

**TABLE A-5. Permitted Sanitary Outfalls of Non-radiological (Inorganic) Analyses, CY 2010**

| Permit Number | Station | Analyte | Result | Units | Regulatory Limit (COA) |
|---|---|---|---|---|---|
| | | **Ammonia Average** | **0.13** | | |
| | | **Ammonia StdDev** | **0.04** | | |
| | | **Ammonia Min** | **0.07** | | |
| | | **Ammonia Max** | **0.17** | | |
| 2238A | CINT | Arsenic | 0.00552 | mg/L | 0.051 |
| 2238A | CINT | Arsenic | 0.00589 | mg/L | 0.051 |
| 2238A | CINT | Arsenic | 0.0182 | mg/L | 0.051 |
| 2238A | CINT | Arsenic | 0.0195 | mg/L | 0.051 |
| | | **Arsenic Average** | **0.01** | | |
| | | **Arsenic StdDev** | **0.01** | | |
| | | **Arsenic Min** | **0.01** | | |
| | | **Arsenic Max** | **0.02** | | |
| 2238A | CINT | Boron | 0.0808 | mg/L | |
| 2238A | CINT | Boron | 0.0935 | mg/L | |
| 2238A | CINT | Boron | 0.155 | mg/L | |
| 2238A | CINT | Boron | 0.164 | mg/L | |
| | | **Boron Average** | **0.12** | | |
| | | **Boron StdDev** | **0.04** | | |
| | | **Boron Min** | **0.08** | | |
| | | **Boron Max** | **0.16** | | |
| 2238A | CINT | Cadmium | 0.001 | mg/L | 0.5 |
| 2238A | CINT | Cadmium | 0.001 | mg/L | 0.5 |
| 2238A | CINT | Cadmium | 0.001 | mg/L | 0.5 |
| 2238A | CINT | Cadmium | 0.001 | mg/L | 0.5 |
| | | **Cadmium Average** | **0.00** | | |
| | | **Cadmium StdDev** | **0.00** | | |
| | | **Cadmium Min** | **0.00** | | |
| | | **Cadmium Max** | **0.00** | | |
| 2238A | CINT | Chromium | 0.00236 | mg/L | 4.1 |
| 2238A | CINT | Chromium | 0.00393 | mg/L | 4.1 |
| 2238A | CINT | Chromium | 0.00586 | mg/L | 4.1 |
| 2238A | CINT | Chromium | 0.00613 | mg/L | 4.1 |
| | | **Chromium Average** | **0.00** | | |
| | | **Chromium StdDev** | **0.00** | | |
| | | **Chromium Min** | **0.00** | | |
| | | **Chromium Max** | **0.01** | | |
| 2238A | CINT | Copper | 0.00577 | mg/L | 5.3 |
| 2238A | CINT | Copper | 0.0133 | mg/L | 5.3 |
| 2238A | CINT | Copper | 0.016 | mg/L | 5.3 |
| 2238A | CINT | Copper | 0.0162 | mg/L | 5.3 |
| | | **Copper Average** | **0.01** | | |
| | | **Copper StdDev** | **0.00** | | |
| | | **Copper Min** | **0.01** | | |
| | | **Copper Max** | **0.02** | | |
| 2238A | CINT | Cyanide, total | 0.00166 | mg/L | 0.45 |
| 2238A | CINT | Cyanide, total | 0.00166 | mg/L | 0.45 |
| 2238A | CINT | Cyanide, total | 0.00166 | mg/L | 0.45 |
| 2238A | CINT | Cyanide, total | 0.0017 | mg/L | 0.45 |

TABLE A-5. Permitted Sanitary Outfalls of Non-radiological (Inorganic) Analyses, CY 2010

| Permit Number | Station | Analyte | Result | Units | Regulatory Limit (COA) |
|---|---|---|---|---|---|
| 2238A | CINT | Cyanide, total | 0.0017 | mg/L | 0.45 |
| 2238A | CINT | Cyanide, total | 0.0017 | mg/L | 0.45 |
| 2238A | CINT | Cyanide, total | 0.0017 | mg/L | 0.45 |
| 2238A | CINT | Cyanide, total | 0.0123 | mg/L | 0.45 |
| | | **Cyanide, total Average** | **0.00** | | |
| | | **Cyanide, total StdDev** | **0.00** | | |
| | | **Cyanide, total Min** | **0.00** | | |
| | | **Cyanide, total Max** | **0.01** | | |
| 2238A | CINT | Fluoride | 0.759 | mg/L | 36 |
| 2238A | CINT | Fluoride | 0.948 | mg/L | 36 |
| 2238A | CINT | Fluoride | 1.96 | mg/L | 36 |
| 2238A | CINT | Fluoride | 2.02 | mg/L | 36 |
| | | **Fluoride Average** | **1.42** | | |
| | | **Fluoride StdDev** | **0.66** | | |
| | | **Fluoride Min** | **0.76** | | |
| | | **Fluoride Max** | **2.02** | | |
| 2238A | CINT | Lead | 0.0033 | mg/L | 1 |
| 2238A | CINT | Lead | 0.0033 | mg/L | 1 |
| 2238A | CINT | Lead | 0.0033 | mg/L | 1 |
| 2238A | CINT | Lead | 0.00451 | mg/L | 1 |
| | | **Lead Average** | **0.00** | | |
| | | **Lead StdDev** | **0.00** | | |
| | | **Lead Min** | **0.00** | | |
| | | **Lead Max** | **0.00** | | |
| 2238A | CINT | Molybdenum | 0.0255 | mg/L | 2 |
| 2238A | CINT | Molybdenum | 0.0302 | mg/L | 2 |
| 2238A | CINT | Molybdenum | 0.0692 | mg/L | 2 |
| 2238A | CINT | Molybdenum | 0.0771 | mg/L | 2 |
| | | **Molybdenum Average** | **0.05** | | |
| | | **Molybdenum StdDev** | **0.03** | | |
| | | **Molybdenum Min** | **0.03** | | |
| | | **Molybdenum Max** | **0.08** | | |
| 2238A | CINT | Nickel | 0.0015 | mg/L | 2 |
| 2238A | CINT | Nickel | 0.0015 | mg/L | 2 |
| 2238A | CINT | Nickel | 0.0015 | mg/L | 2 |
| 2238A | CINT | Nickel | 0.0015 | mg/L | 2 |
| | | **Nickel Average** | **0.00** | | |
| | | **Nickel StdDev** | **0.00** | | |
| | | **Nickel Min** | **0.00** | | |
| | | **Nickel Max** | **0.00** | | |
| 2238A | CINT | Selenium | 0.005 | mg/L | 0.46 |
| 2238A | CINT | Selenium | 0.005 | mg/L | 0.46 |
| 2238A | CINT | Selenium | 0.005 | mg/L | 0.46 |
| 2238A | CINT | Selenium | 0.005 | mg/L | 0.46 |
| | | **Selenium Average** | **0.01** | | |
| | | **Selenium StdDev** | **0.00** | | |
| | | **Selenium Min** | **0.01** | | |
| | | **Selenium Max** | **0.01** | | |

**TABLE A-5. Permitted Sanitary Outfalls of Non-radiological (Inorganic) Analyses, CY 2010**

| Permit Number | Station | Analyte | Result | Units | Regulatory Limit (COA) |
|---|---|---|---|---|---|
| 2238A | CINT | Silver | 0.001 | mg/L | 5 |
| 2238A | CINT | Silver | 0.001 | mg/L | 5 |
| 2238A | CINT | Silver | 0.001 | mg/L | 5 |
| 2238A | CINT | Silver | 0.001 | mg/L | 5 |
| | | **Silver Average** | **0.00** | | |
| | | **Silver StdDev** | **0.00** | | |
| | | **Silver Min** | **0.00** | | |
| | | **Silver Max** | **0.00** | | |
| 2238A | CINT | Zinc | 0.0033 | mg/L | 2.2 |
| 2238A | CINT | Zinc | 0.0033 | mg/L | 2.2 |
| 2238A | CINT | Zinc | 0.00651 | mg/L | 2.2 |
| 2238A | CINT | Zinc | 0.00831 | mg/L | 2.2 |
| | | **Zinc Average** | **0.01** | | |
| | | **Zinc StdDev** | **0.00** | | |
| | | **Zinc Min** | **0.00** | | |
| | | **Zinc Max** | **0.01** | | |

**NOTES:**

**COA = City of Albuquerque**
**mg/L = milligrams per liter**
**Min = Minimum**
**Max = Maximum**
**StdDev = Standard Deviation**

## TABLE A-6. Permitted Sanitary Outfalls of Radiological Analyses, CY 2010

| Permit Number | Station | Analyte | Activity | Units | Regulatory Sewer Release Limits* (Monthly Avg) |
|---|---|---|---|---|---|
| 2069-A | WW001 | Actinium-228 | -20.4 | pCi/L | 300000 |
| 2069-A | WW001 | Actinium-228 | 7.74 | pCi/L | 300000 |
| | | **Actinium-228 Average** | **-6.33** | | |
| | | **Actinium-228 StdDev** | **19.90** | | |
| | | **Actinium-228 Min** | **-20.40** | | |
| | | **Actinium-228 Max** | **7.74** | | |
| 2069-A | WW001 | Alpha, gross | 1.6 | pCi/L | |
| 2069-A | WW001 | Alpha, gross | 2.65 | pCi/L | |
| | | **Alpha, gross Average** | **2.13** | | |
| | | **Alpha, gross StdDev** | **0.74** | | |
| | | **Alpha, gross Min** | **1.60** | | |
| | | **Alpha, gross Max** | **2.65** | | |
| 2069-A | WW001 | Americium-241 | 4.26 | pCi/L | 200 |
| 2069-A | WW001 | Americium-241 | 5.58 | pCi/L | 200 |
| | | **Americium-241 Average** | **4.92** | | |
| | | **Americium-241 StdDev** | **0.93** | | |
| | | **Americium-241 Min** | **4.26** | | |
| | | **Americium-241 Max** | **5.58** | | |
| 2069-A | WW001 | Beryllium-7 | -6.21 | pCi/L | |
| 2069-A | WW001 | Beryllium-7 | 2.3 | pCi/L | |
| | | **Beryllium-7 Average** | **-1.96** | | |
| | | **Beryllium-7 StdDev** | **6.02** | | |
| | | **Beryllium-7 Min** | **-6.21** | | |
| | | **Beryllium-7 Max** | **2.30** | | |
| 2069-A | WW001 | Beta, gross | 8.82 | pCi/L | |
| 2069-A | WW001 | Beta, gross | 11.7 | pCi/L | |
| | | **Beta, gross Average** | **10.26** | | |
| | | **Beta, gross StdDev** | **2.04** | | |
| | | **Beta, gross Min** | **8.82** | | |
| | | **Beta, gross Max** | **11.70** | | |
| 2069-A | WW001 | Bismuth-212 | -44.7 | pCi/L | |
| 2069-A | WW001 | Bismuth-212 | 21 | pCi/L | |
| | | **Bismuth-212 Average** | **-11.85** | | |
| | | **Bismuth-212 StdDev** | **46.46** | | |

## TABLE A-6. Permitted Sanitary Outfalls of Radiological Analyses, CY 2010

| Permit Number | Station | Analyte | Activity | Units | Regulatory Sewer Release Limits* (Monthly Avg) |
|---|---|---|---|---|---|
| | | **Bismuth-212 Min** | **-44.70** | | |
| | | **Bismuth-212 Max** | **21.00** | | |
| 2069-A | WW001 | Bismuth-214 | 1.41 | pCi/L | |
| 2069-A | WW001 | Bismuth-214 | 13.3 | pCi/L | |
| | | **Bismuth-214 Average** | **7.36** | | |
| | | **Bismuth-214 StdDev** | **8.41** | | |
| | | **Bismuth-214 Min** | **1.41** | | |
| | | **Bismuth-214 Max** | **13.30** | | |
| 2069-A | WW001 | Cesium-137 | 0.111 | pCi/L | 10000 |
| 2069-A | WW001 | Cesium-137 | 1.76 | pCi/L | 10000 |
| | | **Cesium-137 Average** | **0.94** | | |
| | | **Cesium-137 StdDev** | **1.17** | | |
| | | **Cesium-137 Min** | **0.11** | | |
| | | **Cesium-137 Max** | **1.76** | | |
| 2069-A | WW001 | Cobalt-60 | 1.61 | pCi/L | 30000 |
| 2069-A | WW001 | Cobalt-60 | 2.77 | pCi/L | 30000 |
| | | **Cobalt-60 Average** | **2.19** | | |
| | | **Cobalt-60 StdDev** | **0.82** | | |
| | | **Cobalt-60 Min** | **1.61** | | |
| | | **Cobalt-60 Max** | **2.77** | | |
| 2069-A | WW001 | Lead-212 | -1.5 | pCi/L | 20000 |
| 2069-A | WW001 | Lead-212 | 0.813 | pCi/L | 20000 |
| | | **Lead-212 Average** | **-0.34** | | |
| | | **Lead-212 StdDev** | **1.64** | | |
| | | **Lead-212 Min** | **-1.50** | | |
| | | **Lead-212 Max** | **0.81** | | |
| 2069-A | WW001 | Lead-214 | -1.71 | pCi/L | 1000000 |
| 2069-A | WW001 | Lead-214 | 13.2 | pCi/L | 1000000 |
| | | **Lead-214 Average** | **5.75** | | |
| | | **Lead-214 StdDev** | **10.54** | | |
| | | **Lead-214 Min** | **-1.71** | | |
| | | **Lead-214 Max** | **13.20** | | |
| 2069-A | WW001 | Neptunium-237 | -20.1 | pCi/L | |
| 2069-A | WW001 | Neptunium-237 | 3.12 | pCi/L | |

## TABLE A-6. Permitted Sanitary Outfalls of Radiological Analyses, CY 2010

| Permit Number | Station | Analyte | Activity | Units | Regulatory Sewer Release Limits* (Monthly Avg) |
|---|---|---|---|---|---|
| | | **Neptunium-237 Average** | **-8.49** | | |
| | | **Neptunium-237 StdDev** | **16.42** | | |
| | | **Neptunium-237 Min** | **-20.10** | | |
| | | **Neptunium-237 Max** | **3.12** | | |
| 2069-A | WW001 | Potassium-40 | 16.4 | pCi/L | 40000 |
| 2069-A | WW001 | Potassium-40 | 27.8 | pCi/L | 40000 |
| | | **Potassium-40 Average** | **22.10** | | |
| | | **Potassium-40 StdDev** | **8.06** | | |
| | | **Potassium-40 Min** | **16.40** | | |
| | | **Potassium-40 Max** | **27.80** | | |
| 2069-A | WW001 | Radium-223 | -5.7 | pCi/L | |
| 2069-A | WW001 | Radium-223 | -4.07 | pCi/L | |
| | | **Radium-223 Average** | **-4.89** | | |
| | | **Radium-223 StdDev** | **1.15** | | |
| | | **Radium-223 Min** | **-5.70** | | |
| | | **Radium-223 Max** | **-4.07** | | |
| 2069-A | WW001 | Radium-224 | -117 | pCi/L | |
| 2069-A | WW001 | Radium-224 | -66.1 | pCi/L | |
| | | **Radium-224 Average** | **-91.55** | | |
| | | **Radium-224 StdDev** | **35.99** | | |
| | | **Radium-224 Min** | **-117.00** | | |
| | | **Radium-224 Max** | **-66.10** | | |
| 2069-A | WW001 | Radium-226 | -51.5 | pCi/L | 600 |
| 2069-A | WW001 | Radium-226 | 8.24 | pCi/L | 600 |
| | | **Radium-226 Average** | **-21.63** | | |
| | | **Radium-226 StdDev** | **42.24** | | |
| | | **Radium-226 Min** | **-51.50** | | |
| | | **Radium-226 Max** | **8.24** | | |
| 2069-A | WW001 | Radium-228 | -20.4 | pCi/L | 600 |
| 2069-A | WW001 | Radium-228 | 7.74 | pCi/L | 600 |
| | | **Radium-228 Average** | **-6.33** | | |
| | | **Radium-228 StdDev** | **19.90** | | |
| | | **Radium-228 Min** | **-20.40** | | |
| | | **Radium-228 Max** | **7.74** | | |

## TABLE A-6. Permitted Sanitary Outfalls of Radiological Analyses, CY 2010

| Permit Number | Station | Analyte | Activity | Units | Regulatory Sewer Release Limits* (Monthly Avg) |
|---|---|---|---|---|---|
| 2069-A | WW001 | Sodium-22 | 0.46 | pCi/L | |
| 2069-A | WW001 | Sodium-22 | 0.554 | pCi/L | |
| | | **Sodium-22 Average** | **0.51** | | |
| | | **Sodium-22 StdDev** | **0.07** | | |
| | | **Sodium-22 Min** | **0.46** | | |
| | | **Sodium-22 Max** | **0.55** | | |
| 2069-A | WW001 | Thorium-227 | -0.567 | pCi/L | |
| 2069-A | WW001 | Thorium-227 | -0.129 | pCi/L | |
| | | **Thorium-227 Average** | **-0.35** | | |
| | | **Thorium-227 StdDev** | **0.31** | | |
| | | **Thorium-227 Min** | **-0.57** | | |
| | | **Thorium-227 Max** | **-0.13** | | |
| 2069-A | WW001 | Thorium-231 | -8.1 | pCi/L | 300 |
| 2069-A | WW001 | Thorium-231 | 2.38 | pCi/L | 300 |
| | | **Thorium-231 Average** | **-2.86** | | |
| | | **Thorium-231 StdDev** | **7.41** | | |
| | | **Thorium-231 Min** | **-8.10** | | |
| | | **Thorium-231 Max** | **2.38** | | |
| 2069-A | WW001 | Thorium-234 | -17.9 | pCi/L | 50000 |
| 2069-A | WW001 | Thorium-234 | 45.5 | pCi/L | 50000 |
| | | **Thorium-234 Average** | **13.80** | | |
| | | **Thorium-234 StdDev** | **44.83** | | |
| | | **Thorium-234 Min** | **-17.90** | | |
| | | **Thorium-234 Max** | **45.50** | | |
| 2069-A | WW001 | Tritium | 16.4 | pCi/L | 10000000 |
| 2069-A | WW001 | Tritium | 20.9 | pCi/L | 10000000 |
| | | **Tritium Average** | **18.65** | | |
| | | **Tritium StdDev** | **3.18** | | |
| | | **Tritium Min** | **16.40** | | |
| | | **Tritium Max** | **20.90** | | |
| 2069-A | WW001 | Uranium-235 | -7.17 | pCi/L | 3000 |
| 2069-A | WW001 | Uranium-235 | 0.635 | pCi/L | 3000 |
| | | **Uranium-235 Average** | **-3.27** | | |
| | | **Uranium-235 StdDev** | **5.52** | | |

## TABLE A-6. Permitted Sanitary Outfalls of Radiological Analyses, CY 2010

| Permit Number | Station | Analyte | Activity | Units | Regulatory Sewer Release Limits* (Monthly Avg) |
|---|---|---|---|---|---|
| | | **Uranium-235 Min** | **-7.17** | | |
| | | **Uranium-235 Max** | **0.64** | | |
| 2069-A | WW001 | Uranium-238 | -17.9 | pCi/L | 3000 |
| 2069-A | WW001 | Uranium-238 | 45.5 | pCi/L | 3000 |
| | | **Uranium-238 Average** | **13.80** | | |
| | | **Uranium-238 StdDev** | **44.83** | | |
| | | **Uranium-238 Min** | **-17.90** | | |
| | | **Uranium-238 Max** | **45.50** | | |
| 2069-K | WW011 | Actinium-228 | -6.61 | pCi/L | 300000 |
| 2069-K | WW011 | Actinium-228 | -1.59 | pCi/L | 300000 |
| | | **Actinium-228 Average** | **-4.10** | | |
| | | **Actinium-228 StdDev** | **3.55** | | |
| | | **Actinium-228 Min** | **-6.61** | | |
| | | **Actinium-228 Max** | **-1.59** | | |
| 2069-K | WW011 | Alpha, gross | 2.27 | pCi/L | |
| 2069-K | WW011 | Alpha, gross | 2.29 | pCi/L | |
| | | **Alpha, gross Average** | **2.28** | | |
| | | **Alpha, gross StdDev** | **0.01** | | |
| | | **Alpha, gross Min** | **2.27** | | |
| | | **Alpha, gross Max** | **2.29** | | |
| 2069-K | WW011 | Americium-241 | -7.51 | pCi/L | 200 |
| 2069-K | WW011 | Americium-241 | -2.97 | pCi/L | 200 |
| | | **Americium-241 Average** | **-5.24** | | |
| | | **Americium-241 StdDev** | **3.21** | | |
| | | **Americium-241 Min** | **-7.51** | | |
| | | **Americium-241 Max** | **-2.97** | | |
| 2069-K | WW011 | Beryllium-7 | -10.4 | pCi/L | |
| 2069-K | WW011 | Beryllium-7 | 17 | pCi/L | |
| | | **Beryllium-7 Average** | **3.30** | | |
| | | **Beryllium-7 StdDev** | **19.37** | | |
| | | **Beryllium-7 Min** | **-10.40** | | |
| | | **Beryllium-7 Max** | **17.00** | | |
| 2069-K | WW011 | Beta, gross | 19.6 | pCi/L | |
| 2069-K | WW011 | Beta, gross | 24.3 | pCi/L | |

## TABLE A-6.  Permitted Sanitary Outfalls of Radiological Analyses, CY 2010

| Permit Number | Station | Analyte | Activity | Units | Regulatory Sewer Release Limits* (Monthly Avg) |
|---|---|---|---|---|---|
| | | **Beta, gross Average** | **21.95** | | |
| | | **Beta, gross StdDev** | **3.32** | | |
| | | **Beta, gross Min** | **19.60** | | |
| | | **Beta, gross Max** | **24.30** | | |
| 2069-K | WW011 | Bismuth-212 | -9.35 | pCi/L | |
| 2069-K | WW011 | Bismuth-212 | 10.4 | pCi/L | |
| | | **Bismuth-212 Average** | **0.53** | | |
| | | **Bismuth-212 StdDev** | **13.97** | | |
| | | **Bismuth-212 Min** | **-9.35** | | |
| | | **Bismuth-212 Max** | **10.40** | | |
| 2069-K | WW011 | Bismuth-214 | -2.54 | pCi/L | |
| 2069-K | WW011 | Bismuth-214 | -1.26 | pCi/L | |
| | | **Bismuth-214 Average** | **-1.90** | | |
| | | **Bismuth-214 StdDev** | **0.91** | | |
| | | **Bismuth-214 Min** | **-2.54** | | |
| | | **Bismuth-214 Max** | **-1.26** | | |
| 2069-K | WW011 | Cesium-137 | -0.163 | pCi/L | 10000 |
| 2069-K | WW011 | Cesium-137 | 1.33 | pCi/L | 10000 |
| | | **Cesium-137 Average** | **0.58** | | |
| | | **Cesium-137 StdDev** | **1.06** | | |
| | | **Cesium-137 Min** | **-0.16** | | |
| | | **Cesium-137 Max** | **1.33** | | |
| 2069-K | WW011 | Cobalt-60 | -0.533 | pCi/L | 30000 |
| 2069-K | WW011 | Cobalt-60 | 1.49 | pCi/L | 30000 |
| | | **Cobalt-60 Average** | **0.48** | | |
| | | **Cobalt-60 StdDev** | **1.43** | | |
| | | **Cobalt-60 Min** | **-0.53** | | |
| | | **Cobalt-60 Max** | **1.49** | | |
| 2069-K | WW011 | Lead-212 | 1.01 | pCi/L | 20000 |
| 2069-K | WW011 | Lead-212 | 7.35 | pCi/L | 20000 |
| | | **Lead-212 Average** | **4.18** | | |
| | | **Lead-212 StdDev** | **4.48** | | |
| | | **Lead-212 Min** | **1.01** | | |
| | | **Lead-212 Max** | **7.35** | | |

## TABLE A-6. Permitted Sanitary Outfalls of Radiological Analyses, CY 2010

| Permit Number | Station | Analyte | Activity | Units | Regulatory Sewer Release Limits* (Monthly Avg) |
|---|---|---|---|---|---|
| 2069-K | WW011 | Lead-214 | -4.8 | pCi/L | 1000000 |
| 2069-K | WW011 | Lead-214 | 2.82 | pCi/L | 1000000.00 |
| | | **Lead-214 Average** | **-0.99** | | |
| | | **Lead-214 StdDev** | **5.39** | | |
| | | **Lead-214 Min** | **-4.80** | | |
| | | **Lead-214 Max** | **2.82** | | |
| 2069-K | WW011 | Neptunium-237 | -9.03 | pCi/L | |
| 2069-K | WW011 | Neptunium-237 | 0.644 | pCi/L | |
| | | **Neptunium-237 Average** | **-4.19** | | |
| | | **Neptunium-237 StdDev** | **6.84** | | |
| | | **Neptunium-237 Min** | **-9.03** | | |
| | | **Neptunium-237 Max** | **0.64** | | |
| 2069-K | WW011 | Potassium-40 | 4 | pCi/L | 40000 |
| 2069-K | WW011 | Potassium-40 | 46.2 | pCi/L | 40000 |
| | | **Potassium-40 Average** | **25.10** | | |
| | | **Potassium-40 StdDev** | **29.84** | | |
| | | **Potassium-40 Min** | **4.00** | | |
| | | **Potassium-40 Max** | **46.20** | | |
| 2069-K | WW011 | Radium-223 | -5.73 | pCi/L | |
| 2069-K | WW011 | Radium-223 | -1.47 | pCi/L | |
| | | **Radium-223 Average** | **-3.60** | | |
| | | **Radium-223 StdDev** | **3.01** | | |
| | | **Radium-223 Min** | **-5.73** | | |
| | | **Radium-223 Max** | **-1.47** | | |
| 2069-K | WW011 | Radium-224 | 24.5 | pCi/L | |
| 2069-K | WW011 | Radium-224 | 26 | pCi/L | |
| | | **Radium-224 Average** | **25.25** | | |
| | | **Radium-224 StdDev** | **1.06** | | |
| | | **Radium-224 Min** | **24.50** | | |
| | | **Radium-224 Max** | **26.00** | | |
| 2069-K | WW011 | Radium-226 | -13.5 | pCi/L | 600 |
| 2069-K | WW011 | Radium-226 | 14.3 | pCi/L | 600 |
| | | **Radium-226 Average** | **0.40** | | |
| | | **Radium-226 StdDev** | **19.66** | | |

## TABLE A-6. Permitted Sanitary Outfalls of Radiological Analyses, CY 2010

| Permit Number | Station | Analyte | Activity | Units | Regulatory Sewer Release Limits* (Monthly Avg) |
|---|---|---|---|---|---|
| | | **Radium-226 Min** | **-13.50** | | |
| | | **Radium-226 Max** | **14.30** | | |
| 2069-K | WW011 | Radium-228 | -6.61 | pCi/L | 600 |
| 2069-K | WW011 | Radium-228 | -1.59 | pCi/L | 600 |
| | | **Radium-228 Average** | **-4.10** | | |
| | | **Radium-228 StdDev** | **3.55** | | |
| | | **Radium-228 Min** | **-6.61** | | |
| | | **Radium-228 Max** | **-1.59** | | |
| 2069-K | WW011 | Sodium-22 | -1.41 | pCi/L | |
| 2069-K | WW011 | Sodium-22 | 1.8 | pCi/L | |
| | | **Sodium-22 Average** | **0.20** | | |
| | | **Sodium-22 StdDev** | **2.27** | | |
| | | **Sodium-22 Min** | **-1.41** | | |
| | | **Sodium-22 Max** | **1.80** | | |
| 2069-K | WW011 | Thorium-227 | -14.7 | pCi/L | |
| 2069-K | WW011 | Thorium-227 | -9.02 | pCi/L | |
| | | **Thorium-227 Average** | **-11.86** | | |
| | | **Thorium-227 StdDev** | **4.02** | | |
| | | **Thorium-227 Min** | **-14.70** | | |
| | | **Thorium-227 Max** | **-9.02** | | |
| 2069-K | WW011 | Thorium-231 | 5.29 | pCi/L | 300 |
| 2069-K | WW011 | Thorium-231 | 38.9 | pCi/L | 300 |
| | | **Thorium-231 Average** | **22.10** | | |
| | | **Thorium-231 StdDev** | **23.77** | | |
| | | **Thorium-231 Min** | **5.29** | | |
| | | **Thorium-231 Max** | **38.90** | | |
| 2069-K | WW011 | Thorium-234 | -38.3 | pCi/L | 50000 |
| 2069-K | WW011 | Thorium-234 | 40.6 | pCi/L | 50000 |
| | | **Thorium-234 Average** | **1.15** | | |
| | | **Thorium-234 StdDev** | **55.79** | | |
| | | **Thorium-234 Min** | **-38.30** | | |
| | | **Thorium-234 Max** | **40.60** | | |
| 2069-K | WW011 | Tritium | -27 | pCi/L | 10000000 |
| 2069-K | WW011 | Tritium | 11.5 | pCi/L | 10000000 |

**TABLE A-6. Permitted Sanitary Outfalls of Radiological Analyses, CY 2010**

| Permit Number | Station | Analyte | Activity | Units | Regulatory Sewer Release Limits* (Monthly Avg) |
|---|---|---|---|---|---|
| | | **Tritium Average** | **-7.75** | | |
| | | **Tritium StdDev** | **27.22** | | |
| | | **Tritium Min** | **-27.00** | | |
| | | **Tritium Max** | **11.50** | | |
| 2069-K | WW011 | Uranium-235 | 13.3 | pCi/L | 3000 |
| 2069-K | WW011 | Uranium-235 | 13.4 | pCi/L | 3000 |
| | | **Uranium-235 Average** | **13.35** | | |
| | | **Uranium-235 StdDev** | **0.07** | | |
| | | **Uranium-235 Min** | **13.30** | | |
| | | **Uranium-235 Max** | **13.40** | | |
| 2069-K | WW011 | Uranium-238 | -38.3 | pCi/L | 3000 |
| 2069-K | WW011 | Uranium-238 | 40.6 | pCi/L | 3000 |
| | | **Uranium-238 Average** | **1.15** | | |
| | | **Uranium-238 StdDev** | **55.79** | | |
| | | **Uranium-238 Min** | **-38.30** | | |
| | | **Uranium-238 Max** | **40.60** | | |
| 2069F-4 | WW006 | Actinium-228 | 3.54 | pCi/L | 300000 |
| 2069F-4 | WW006 | Actinium-228 | 10.1 | pCi/L | 300000 |
| | | **Actinium-228 Average** | **6.82** | | |
| | | **Actinium-228 StdDev** | **4.64** | | |
| | | **Actinium-228 Min** | **3.54** | | |
| | | **Actinium-228 Max** | **10.10** | | |
| 2069F-4 | WW006 | Alpha, gross | 3.03 | pCi/L | |
| 2069F-4 | WW006 | Alpha, gross | 6.17 | pCi/L | |
| | | **Alpha, gross Average** | **4.60** | | |
| | | **Alpha, gross StdDev** | **2.22** | | |
| | | **Alpha, gross Min** | **3.03** | | |
| | | **Alpha, gross Max** | **6.17** | | |
| 2069F-4 | WW006 | Americium-241 | -25 | pCi/L | 200 |
| 2069F-4 | WW006 | Americium-241 | 0.595 | pCi/L | 200 |
| | | **Americium-241 Average** | **-12.20** | | |
| | | **Americium-241 StdDev** | **18.10** | | |
| | | **Americium-241 Min** | **-25.00** | | |
| | | **Americium-241 Max** | **0.60** | | |

## TABLE A-6. Permitted Sanitary Outfalls of Radiological Analyses, CY 2010

| Permit Number | Station | Analyte | Activity | Units | Regulatory Sewer Release Limits* (Monthly Avg) |
|---|---|---|---|---|---|
| 2069F-4 | WW006 | Beryllium-7 | -5.84 | pCi/L | |
| 2069F-4 | WW006 | Beryllium-7 | 6.9 | pCi/L | |
| | | **Beryllium-7 Average** | **0.53** | | |
| | | **Beryllium-7 StdDev** | **9.01** | | |
| | | **Beryllium-7 Min** | **-5.84** | | |
| | | **Beryllium-7 Max** | **6.90** | | |
| 2069F-4 | WW006 | Beta, gross | 0.792 | pCi/L | |
| 2069F-4 | WW006 | Beta, gross | 8.69 | pCi/L | |
| | | **Beta, gross Average** | **4.74** | | |
| | | **Beta, gross StdDev** | **5.58** | | |
| | | **Beta, gross Min** | **0.79** | | |
| | | **Beta, gross Max** | **8.69** | | |
| 2069F-4 | WW006 | Bismuth-212 | 3.12 | pCi/L | |
| 2069F-4 | WW006 | Bismuth-212 | 8.62 | pCi/L | |
| | | **Bismuth-212 Average** | **5.87** | | |
| | | **Bismuth-212 StdDev** | **3.89** | | |
| | | **Bismuth-212 Min** | **3.12** | | |
| | | **Bismuth-212 Max** | **8.62** | | |
| 2069F-4 | WW006 | Bismuth-214 | -5.36 | pCi/L | |
| 2069F-4 | WW006 | Bismuth-214 | 0.92 | pCi/L | |
| | | **Bismuth-214 Average** | **-2.22** | | |
| | | **Bismuth-214 StdDev** | **4.44** | | |
| | | **Bismuth-214 Min** | **-5.36** | | |
| | | **Bismuth-214 Max** | **0.92** | | |
| 2069F-4 | WW006 | Cesium-137 | -0.194 | pCi/L | 10000 |
| 2069F-4 | WW006 | Cesium-137 | 0.742 | pCi/L | 10000 |
| | | **Cesium-137 Average** | **0.27** | | |
| | | **Cesium-137 StdDev** | **0.66** | | |
| | | **Cesium-137 Min** | **-0.19** | | |
| | | **Cesium-137 Max** | **0.74** | | |
| 2069F-4 | WW006 | Cobalt-60 | -2.65 | pCi/L | 30000 |
| 2069F-4 | WW006 | Cobalt-60 | 1.09 | pCi/L | 30000 |
| | | **Cobalt-60 Average** | **-0.78** | | |
| | | **Cobalt-60 StdDev** | **2.64** | | |

## TABLE A-6.  Permitted Sanitary Outfalls of Radiological Analyses, CY 2010

| Permit Number | Station | Analyte | Activity | Units | Regulatory Sewer Release Limits* (Monthly Avg) |
|---|---|---|---|---|---|
| | | **Cobalt-60 Min** | **-2.65** | | |
| | | **Cobalt-60 Max** | **1.09** | | |
| 2069F-4 | WW006 | Lead-212 | -0.607 | pCi/L | 20000 |
| 2069F-4 | WW006 | Lead-212 | 4.42 | pCi/L | 20000 |
| | | **Lead-212 Average** | **1.91** | | |
| | | **Lead-212 StdDev** | **3.55** | | |
| | | **Lead-212 Min** | **-0.61** | | |
| | | **Lead-212 Max** | **4.42** | | |
| 2069F-4 | WW006 | Lead-214 | -4.96 | pCi/L | 1000000 |
| 2069F-4 | WW006 | Lead-214 | 3.91 | pCi/L | 1000000 |
| | | **Lead-214 Average** | **-0.53** | | |
| | | **Lead-214 StdDev** | **6.27** | | |
| | | **Lead-214 Min** | **-4.96** | | |
| | | **Lead-214 Max** | **3.91** | | |
| 2069F-4 | WW006 | Neptunium-237 | -9.62 | pCi/L | |
| 2069F-4 | WW006 | Neptunium-237 | -1.50 | pCi/L | |
| | | **Neptunium-237 Average** | **-5.56** | | |
| | | **Neptunium-237 StdDev** | **5.74** | | |
| | | **Neptunium-237 Min** | **-9.62** | | |
| | | **Neptunium-237 Max** | **-1.50** | | |
| 2069F-4 | WW006 | Potassium-40 | -20.5 | pCi/L | 40000 |
| 2069F-4 | WW006 | Potassium-40 | 15.5 | pCi/L | 40000 |
| | | **Potassium-40 Average** | **-2.50** | | |
| | | **Potassium-40 StdDev** | **25.46** | | |
| | | **Potassium-40 Min** | **-20.50** | | |
| | | **Potassium-40 Max** | **15.50** | | |
| 2069F-4 | WW006 | Radium-223 | 2.47 | pCi/L | |
| 2069F-4 | WW006 | Radium-223 | 19.8 | pCi/L | |
| | | **Radium-223 Average** | **11.14** | | |
| | | **Radium-223 StdDev** | **12.25** | | |
| | | **Radium-223 Min** | **2.47** | | |
| | | **Radium-223 Max** | **19.80** | | |
| 2069F-4 | WW006 | Radium-224 | -46.9 | pCi/L | |
| 2069F-4 | WW006 | Radium-224 | 262 | pCi/L | |

**TABLE A-6.  Permitted Sanitary Outfalls of Radiological Analyses, CY 2010**

| Permit Number | Station | Analyte | Activity | Units | Regulatory Sewer Release Limits* (Monthly Avg) |
|---|---|---|---|---|---|
| | | **Radium-224 Average** | **107.55** | | |
| | | **Radium-224 StdDev** | **218.43** | | |
| | | **Radium-224 Min** | **-46.90** | | |
| | | **Radium-224 Max** | **262.00** | | |
| 2069F-4 | WW006 | Radium-226 | -61.8 | pCi/L | 600 |
| 2069F-4 | WW006 | Radium-226 | -32.1 | pCi/L | 600 |
| | | **Radium-226 Average** | **-46.95** | | |
| | | **Radium-226 StdDev** | **21.00** | | |
| | | **Radium-226 Min** | **-61.80** | | |
| | | **Radium-226 Max** | **-32.10** | | |
| 2069F-4 | WW006 | Radium-228 | 3.54 | pCi/L | 600 |
| 2069F-4 | WW006 | Radium-228 | 10.1 | pCi/L | 600 |
| | | **Radium-228 Average** | **6.82** | | |
| | | **Radium-228 StdDev** | **4.64** | | |
| | | **Radium-228 Min** | **3.54** | | |
| | | **Radium-228 Max** | **10.10** | | |
| 2069F-4 | WW006 | Sodium-22 | 0.404 | pCi/L | |
| 2069F-4 | WW006 | Sodium-22 | 0.482 | pCi/L | |
| | | **Sodium-22 Average** | **0.44** | | |
| | | **Sodium-22 StdDev** | **0.06** | | |
| | | **Sodium-22 Min** | **0.40** | | |
| | | **Sodium-22 Max** | **0.48** | | |
| 2069F-4 | WW006 | Thorium-227 | -7.51 | pCi/L | |
| 2069F-4 | WW006 | Thorium-227 | -3.61 | pCi/L | |
| | | **Thorium-227 Average** | **-5.56** | | |
| | | **Thorium-227 StdDev** | **2.76** | | |
| | | **Thorium-227 Min** | **-7.51** | | |
| | | **Thorium-227 Max** | **-3.61** | | |
| 2069F-4 | WW006 | Thorium-231 | -12.4 | pCi/L | 300 |
| 2069F-4 | WW006 | Thorium-231 | 14.4 | pCi/L | 300 |
| | | **Thorium-231 Average** | **1.00** | | |
| | | **Thorium-231 StdDev** | **18.95** | | |
| | | **Thorium-231 Min** | **-12.40** | | |
| | | **Thorium-231 Max** | **14.40** | | |

## TABLE A-6.  Permitted Sanitary Outfalls of Radiological Analyses, CY 2010

| Permit Number | Station | Analyte | Activity | Units | Regulatory Sewer Release Limits* (Monthly Avg) |
|---|---|---|---|---|---|
| 2069F-4 | WW006 | Thorium-234 | -34.9 | pCi/L | 50000 |
| 2069F-4 | WW006 | Thorium-234 | 131 | pCi/L | 50000 |
| | | **Thorium-234 Average** | **48.05** | | |
| | | **Thorium-234 StdDev** | **117.31** | | |
| | | **Thorium-234 Min** | **-34.90** | | |
| | | **Thorium-234 Max** | **131.00** | | |
| 2069F-4 | WW006 | Tritium | -53.1 | pCi/L | 10000000 |
| 2069F-4 | WW006 | Tritium | -13.1 | pCi/L | 10000000 |
| | | **Tritium Average** | **-33.10** | | |
| | | **Tritium StdDev** | **28.28** | | |
| | | **Tritium Min** | **-53.10** | | |
| | | **Tritium Max** | **-13.10** | | |
| 2069F-4 | WW006 | Uranium-235 | -2.57 | pCi/L | 3000 |
| 2069F-4 | WW006 | Uranium-235 | 2.32 | pCi/L | 3000 |
| | | **Uranium-235 Average** | **-0.13** | | |
| | | **Uranium-235 StdDev** | **3.46** | | |
| | | **Uranium-235 Min** | **-2.57** | | |
| | | **Uranium-235 Max** | **2.32** | | |
| 2069F-4 | WW006 | Uranium-238 | -34.9 | pCi/L | 3000 |
| 2069F-4 | WW006 | Uranium-238 | 131 | pCi/L | 3000 |
| | | **Uranium-238 Average** | **48.05** | | |
| | | **Uranium-238 StdDev** | **117.31** | | |
| | | **Uranium-238 Min** | **-34.90** | | |
| | | **Uranium-238 Max** | **131.00** | | |
| 2069I-3 | WW008 | Actinium-228 | -14.5 | pCi/L | 300000 |
| 2069I-3 | WW008 | Actinium-228 | -0.671 | pCi/L | 300000 |
| | | **Actinium-228 Average** | **-7.59** | | |
| | | **Actinium-228 StdDev** | **9.78** | | |
| | | **Actinium-228 Min** | **-14.50** | | |
| | | **Actinium-228 Max** | **-0.67** | | |
| 2069I-3 | WW008 | Alpha, gross | 1.41 | pCi/L | |
| 2069I-3 | WW008 | Alpha, gross | 1.54 | pCi/L | |
| | | **Alpha, gross Average** | **1.48** | | |
| | | **Alpha, gross StdDev** | **0.09** | | |

## TABLE A-6.  Permitted Sanitary Outfalls of Radiological Analyses, CY 2010

| Permit Number | Station | Analyte | Activity | Units | Regulatory Sewer Release Limits* (Monthly Avg) |
|---|---|---|---|---|---|
| | | **Alpha, gross Min** | **1.41** | | |
| | | **Alpha, gross Max** | **1.54** | | |
| 2069I-3 | WW008 | Americium-241 | -9.27 | pCi/L | 200 |
| 2069I-3 | WW008 | Americium-241 | 3.55 | pCi/L | 200 |
| | | **Americium-241 Average** | **-2.86** | | |
| | | **Americium-241 StdDev** | **9.07** | | |
| | | **Americium-241 Min** | **-9.27** | | |
| | | **Americium-241 Max** | **3.55** | | |
| 2069I-3 | WW008 | Beryllium-7 | -18 | pCi/L | |
| 2069I-3 | WW008 | Beryllium-7 | -2.46 | pCi/L | |
| | | **Beryllium-7 Average** | **-10.23** | | |
| | | **Beryllium-7 StdDev** | **10.99** | | |
| | | **Beryllium-7 Min** | **-18.00** | | |
| | | **Beryllium-7 Max** | **-2.46** | | |
| 2069I-3 | WW008 | Beta, gross | 21 | pCi/L | |
| 2069I-3 | WW008 | Beta, gross | 25.2 | pCi/L | |
| | | **Beta, gross Average** | **23.10** | | |
| | | **Beta, gross StdDev** | **2.97** | | |
| | | **Beta, gross Min** | **21.00** | | |
| | | **Beta, gross Max** | **25.20** | | |
| 2069I-3 | WW008 | Bismuth-212 | 0.238 | pCi/L | |
| 2069I-3 | WW008 | Bismuth-212 | 28.8 | pCi/L | |
| | | **Bismuth-212 Average** | **14.52** | | |
| | | **Bismuth-212 StdDev** | **20.20** | | |
| | | **Bismuth-212 Min** | **0.24** | | |
| | | **Bismuth-212 Max** | **28.80** | | |
| 2069I-3 | WW008 | Bismuth-214 | -5.93 | pCi/L | |
| 2069I-3 | WW008 | Bismuth-214 | 2.28 | pCi/L | |
| | | **Bismuth-214 Average** | **-1.83** | | |
| | | **Bismuth-214 StdDev** | **5.81** | | |
| | | **Bismuth-214 Min** | **-5.93** | | |
| | | **Bismuth-214 Max** | **2.28** | | |
| 2069I-3 | WW008 | Cesium-137 | -0.295 | pCi/L | 10000 |
| 2069I-3 | WW008 | Cesium-137 | 1.26 | pCi/L | 10000 |

## TABLE A-6. Permitted Sanitary Outfalls of Radiological Analyses, CY 2010

| Permit Number | Station | Analyte | Activity | Units | Regulatory Sewer Release Limits* (Monthly Avg) |
|---|---|---|---|---|---|
| | | **Cesium-137 Average** | **0.48** | | |
| | | **Cesium-137 StdDev** | **1.10** | | |
| | | **Cesium-137 Min** | **-0.30** | | |
| | | **Cesium-137 Max** | **1.26** | | |
| 2069I-3 | WW008 | Cobalt-60 | -4.34 | pCi/L | 30000 |
| 2069I-3 | WW008 | Cobalt-60 | 0.0096 | pCi/L | 30000 |
| | | **Cobalt-60 Average** | **-2.17** | | |
| | | **Cobalt-60 StdDev** | **3.08** | | |
| | | **Cobalt-60 Min** | **-4.34** | | |
| | | **Cobalt-60 Max** | **0.01** | | |
| 2069I-3 | WW008 | Lead-212 | 3.17 | pCi/L | 20000 |
| 2069I-3 | WW008 | Lead-212 | 4.05 | pCi/L | 20000 |
| | | **Lead-212 Average** | **3.61** | | |
| | | **Lead-212 StdDev** | **0.62** | | |
| | | **Lead-212 Min** | **3.17** | | |
| | | **Lead-212 Max** | **4.05** | | |
| 2069I-3 | WW008 | Lead-214 | -5.27 | pCi/L | 1000000 |
| 2069I-3 | WW008 | Lead-214 | 0.14 | pCi/L | 1000000 |
| | | **Lead-214 Average** | **-2.57** | | |
| | | **Lead-214 StdDev** | **3.83** | | |
| | | **Lead-214 Min** | **-5.27** | | |
| | | **Lead-214 Max** | **0.14** | | |
| 2069I-3 | WW008 | Neptunium-237 | -6.72 | pCi/L | |
| 2069I-3 | WW008 | Neptunium-237 | 3.55 | pCi/L | |
| | | **Neptunium-237 Average** | **-1.59** | | |
| | | **Neptunium-237 StdDev** | **7.26** | | |
| | | **Neptunium-237 Min** | **-6.72** | | |
| | | **Neptunium-237 Max** | **3.55** | | |
| 2069I-3 | WW008 | Potassium-40 | 54.4 | pCi/L | 40000 |
| 2069I-3 | WW008 | Potassium-40 | 56.8 | pCi/L | 40000 |
| | | **Potassium-40 Average** | **55.60** | | |
| | | **Potassium-40 StdDev** | **1.70** | | |
| | | **Potassium-40 Min** | **54.40** | | |
| | | **Potassium-40 Max** | **56.80** | | |

## TABLE A-6.  Permitted Sanitary Outfalls of Radiological Analyses, CY 2010

| Permit Number | Station | Analyte | Activity | Units | Regulatory Sewer Release Limits* (Monthly Avg) |
|---|---|---|---|---|---|
| 2069I-3 | WW008 | Radium-223 | -5.34 | pCi/L | |
| 2069I-3 | WW008 | Radium-223 | 8.85 | pCi/L | |
| | | **Radium-223 Average** | **1.76** | | |
| | | **Radium-223 StdDev** | **10.03** | | |
| | | **Radium-223 Min** | **-5.34** | | |
| | | **Radium-223 Max** | **8.85** | | |
| 2069I-3 | WW008 | Radium-224 | -53 | pCi/L | |
| 2069I-3 | WW008 | Radium-224 | 73.4 | pCi/L | |
| | | **Radium-224 Average** | **10.20** | | |
| | | **Radium-224 StdDev** | **89.38** | | |
| | | **Radium-224 Min** | **-53.00** | | |
| | | **Radium-224 Max** | **73.40** | | |
| 2069I-3 | WW008 | Radium-226 | -12.4 | pCi/L | 600 |
| 2069I-3 | WW008 | Radium-226 | 24.7 | pCi/L | 600 |
| | | **Radium-226 Average** | **6.15** | | |
| | | **Radium-226 StdDev** | **26.23** | | |
| | | **Radium-226 Min** | **-12.40** | | |
| | | **Radium-226 Max** | **24.70** | | |
| 2069I-3 | WW008 | Radium-228 | -14.5 | pCi/L | 600 |
| 2069I-3 | WW008 | Radium-228 | -0.671 | pCi/L | 600 |
| | | **Radium-228 Average** | **-7.59** | | |
| | | **Radium-228 StdDev** | **9.78** | | |
| | | **Radium-228 Min** | **-14.50** | | |
| | | **Radium-228 Max** | **-0.67** | | |
| 2069I-3 | WW008 | Sodium-22 | -1.09 | pCi/L | |
| 2069I-3 | WW008 | Sodium-22 | 1.68 | pCi/L | |
| | | **Sodium-22 Average** | **0.30** | | |
| | | **Sodium-22 StdDev** | **1.96** | | |
| | | **Sodium-22 Min** | **-1.09** | | |
| | | **Sodium-22 Max** | **1.68** | | |
| 2069I-3 | WW008 | Thorium-227 | -16.6 | pCi/L | |
| 2069I-3 | WW008 | Thorium-227 | -4.55 | pCi/L | |
| | | **Thorium-227 Average** | **-10.58** | | |
| | | **Thorium-227 StdDev** | **8.52** | | |

TABLE A-6.  Permitted Sanitary Outfalls of Radiological Analyses, CY 2010

| Permit Number | Station | Analyte | Activity | Units | Regulatory Sewer Release Limits* (Monthly Avg) |
|---|---|---|---|---|---|
| | | **Thorium-227 Min** | **-16.60** | | |
| | | **Thorium-227 Max** | **-4.55** | | |
| 2069I-3 | WW008 | Thorium-231 | -31 | pCi/L | 300 |
| 2069I-3 | WW008 | Thorium-231 | -19.3 | pCi/L | 300 |
| | | **Thorium-231 Average** | **-25.15** | | |
| | | **Thorium-231 StdDev** | **8.27** | | |
| | | **Thorium-231 Min** | **-31.00** | | |
| | | **Thorium-231 Max** | **-19.30** | | |
| 2069I-3 | WW008 | Thorium-234 | 9.48 | pCi/L | 50000 |
| 2069I-3 | WW008 | Thorium-234 | 152 | pCi/L | 50000 |
| | | **Thorium-234 Average** | **80.74** | | |
| | | **Thorium-234 StdDev** | **100.78** | | |
| | | **Thorium-234 Min** | **9.48** | | |
| | | **Thorium-234 Max** | **152.00** | | |
| 2069I-3 | WW008 | Tritium | -81.6 | pCi/L | 10000000 |
| 2069I-3 | WW008 | Tritium | 57.7 | pCi/L | 10000000 |
| | | **Tritium Average** | **-11.95** | | |
| | | **Tritium StdDev** | **98.50** | | |
| | | **Tritium Min** | **-81.60** | | |
| | | **Tritium Max** | **57.70** | | |
| 2069I-3 | WW008 | Uranium-235 | -0.559 | pCi/L | 3000 |
| 2069I-3 | WW008 | Uranium-235 | 26.7 | pCi/L | 3000 |
| | | **Uranium-235 Average** | **13.07** | | |
| | | **Uranium-235 StdDev** | **19.28** | | |
| | | **Uranium-235 Min** | **-0.56** | | |
| | | **Uranium-235 Max** | **26.70** | | |
| 2069I-3 | WW008 | Uranium-238 | 9.48 | pCi/L | 3000 |
| 2069I-3 | WW008 | Uranium-238 | 152 | pCi/L | 3000 |
| | | **Uranium-238 Average** | **80.74** | | |
| | | **Uranium-238 StdDev** | **100.78** | | |
| | | **Uranium-238 Min** | **9.48** | | |
| | | **Uranium-238 Max** | **152.00** | | |
| 2238A | CINT | Actinium-228 | -1.7 | pCi/L | 300000 |
| 2238A | CINT | Actinium-228 | -1.15 | pCi/L | 300000 |

TABLE A-6.  Permitted Sanitary Outfalls of Radiological Analyses, CY 2010

| Permit Number | Station | Analyte | Activity | Units | Regulatory Sewer Release Limits* (Monthly Avg) |
|---|---|---|---|---|---|
| | | **Actinium-228 Average** | **-1.43** | | |
| | | **Actinium-228 StdDev** | **0.39** | | |
| | | **Actinium-228 Min** | **-1.70** | | |
| | | **Actinium-228 Max** | **-1.15** | | |
| 2238A | CINT | Alpha, gross | 1.99 | pCi/L | |
| 2238A | CINT | Alpha, gross | 5.91 | pCi/L | |
| | | **Alpha, gross Average** | **3.95** | | |
| | | **Alpha, gross StdDev** | **2.77** | | |
| | | **Alpha, gross Min** | **1.99** | | |
| | | **Alpha, gross Max** | **5.91** | | |
| 2238A | CINT | Americium-241 | -3.73 | pCi/L | 200 |
| 2238A | CINT | Americium-241 | -2.69 | pCi/L | 200 |
| | | **Americium-241 Average** | **-3.21** | | |
| | | **Americium-241 StdDev** | **0.74** | | |
| | | **Americium-241 Min** | **-3.73** | | |
| | | **Americium-241 Max** | **-2.69** | | |
| 2238A | CINT | Beryllium-7 | -4.07 | pCi/L | |
| 2238A | CINT | Beryllium-7 | -2.67 | pCi/L | |
| | | **Beryllium-7 Average** | **-3.37** | | |
| | | **Beryllium-7 StdDev** | **0.99** | | |
| | | **Beryllium-7 Min** | **-4.07** | | |
| | | **Beryllium-7 Max** | **-2.67** | | |
| 2238A | CINT | Beta, gross | 3.25 | pCi/L | |
| 2238A | CINT | Beta, gross | 7.73 | pCi/L | |
| | | **Beta, gross Average** | **5.49** | | |
| | | **Beta, gross StdDev** | **3.17** | | |
| | | **Beta, gross Min** | **3.25** | | |
| | | **Beta, gross Max** | **7.73** | | |
| 2238A | CINT | Bismuth-212 | 29.7 | pCi/L | |
| 2238A | CINT | Bismuth-212 | 50.1 | pCi/L | |
| | | **Bismuth-212 Average** | **39.90** | | |
| | | **Bismuth-212 StdDev** | **14.42** | | |
| | | **Bismuth-212 Min** | **29.70** | | |
| | | **Bismuth-212 Max** | **50.10** | | |

## TABLE A-6.  Permitted Sanitary Outfalls of Radiological Analyses, CY 2010

| Permit Number | Station | Analyte | Activity | Units | Regulatory Sewer Release Limits* (Monthly Avg) |
|---|---|---|---|---|---|
| 2238A | CINT | Bismuth-214 | 6.44 | pCi/L | |
| 2238A | CINT | Bismuth-214 | 7.29 | pCi/L | |
| | | **Bismuth-214 Average** | **6.87** | | |
| | | **Bismuth-214 StdDev** | **0.60** | | |
| | | **Bismuth-214 Min** | **6.44** | | |
| | | **Bismuth-214 Max** | **7.29** | | |
| 2238A | CINT | Cesium-137 | 0.193 | pCi/L | 10000 |
| 2238A | CINT | Cesium-137 | 0.549 | pCi/L | 10000 |
| | | **Cesium-137 Average** | **0.37** | | |
| | | **Cesium-137 StdDev** | **0.25** | | |
| | | **Cesium-137 Min** | **0.19** | | |
| | | **Cesium-137 Max** | **0.55** | | |
| 2238A | CINT | Cobalt-60 | -0.0175 | pCi/L | 30000 |
| 2238A | CINT | Cobalt-60 | 0.416 | pCi/L | 30000 |
| | | **Cobalt-60 Average** | **0.20** | | |
| | | **Cobalt-60 StdDev** | **0.31** | | |
| | | **Cobalt-60 Min** | **-0.02** | | |
| | | **Cobalt-60 Max** | **0.42** | | |
| 2238A | CINT | Lead-212 | 0.434 | pCi/L | 20000 |
| 2238A | CINT | Lead-212 | 3.53 | pCi/L | 20000 |
| | | **Lead-212 Average** | **1.98** | | |
| | | **Lead-212 StdDev** | **2.19** | | |
| | | **Lead-212 Min** | **0.43** | | |
| | | **Lead-212 Max** | **3.53** | | |
| 2238A | CINT | Lead-214 | -3.37 | pCi/L | 1000000 |
| 2238A | CINT | Lead-214 | -2.58 | pCi/L | 1000000 |
| | | **Lead-214 Average** | **-2.98** | | |
| | | **Lead-214 StdDev** | **0.56** | | |
| | | **Lead-214 Min** | **-3.37** | | |
| | | **Lead-214 Max** | **-2.58** | | |
| 2238A | CINT | Neptunium-237 | -20.1 | pCi/L | |
| 2238A | CINT | Neptunium-237 | -0.306 | pCi/L | |
| | | **Neptunium-237 Average** | **-10.20** | | |
| | | **Neptunium-237 StdDev** | **14.00** | | |

## TABLE A-6. Permitted Sanitary Outfalls of Radiological Analyses, CY 2010

| Permit Number | Station | Analyte | Activity | Units | Regulatory Sewer Release Limits* (Monthly Avg) |
|---|---|---|---|---|---|
| | | **Neptunium-237 Min** | **-20.10** | | |
| | | **Neptunium-237 Max** | **-0.31** | | |
| 2238A | CINT | Potassium-40 | 2.77 | pCi/L | 40000 |
| 2238A | CINT | Potassium-40 | 8.92 | pCi/L | 40000 |
| | | **Potassium-40 Average** | **5.85** | | |
| | | **Potassium-40 StdDev** | **4.35** | | |
| | | **Potassium-40 Min** | **2.77** | | |
| | | **Potassium-40 Max** | **8.92** | | |
| 2238A | CINT | Radium-223 | 12.3 | pCi/L | |
| 2238A | CINT | Radium-223 | 13.9 | pCi/L | |
| | | **Radium-223 Average** | **13.10** | | |
| | | **Radium-223 StdDev** | **1.13** | | |
| | | **Radium-223 Min** | **12.30** | | |
| | | **Radium-223 Max** | **13.90** | | |
| 2238A | CINT | Radium-224 | -102 | pCi/L | |
| 2238A | CINT | Radium-224 | 36.6 | pCi/L | |
| | | **Radium-224 Average** | **-32.70** | | |
| | | **Radium-224 StdDev** | **98.00** | | |
| | | **Radium-224 Min** | **-102.00** | | |
| | | **Radium-224 Max** | **36.60** | | |
| 2238A | CINT | Radium-226 | -29.1 | pCi/L | 600 |
| 2238A | CINT | Radium-226 | -1.54 | pCi/L | 600 |
| | | **Radium-226 Average** | **-15.32** | | |
| | | **Radium-226 StdDev** | **19.49** | | |
| | | **Radium-226 Min** | **-29.10** | | |
| | | **Radium-226 Max** | **-1.54** | | |
| 2238A | CINT | Radium-228 | -1.7 | pCi/L | 600 |
| 2238A | CINT | Radium-228 | -1.15 | pCi/L | 600 |
| | | **Radium-228 Average** | **-1.43** | | |
| | | **Radium-228 StdDev** | **0.39** | | |
| | | **Radium-228 Min** | **-1.70** | | |
| | | **Radium-228 Max** | **-1.15** | | |
| 2238A | CINT | Sodium-22 | 1.28 | pCi/L | |
| 2238A | CINT | Sodium-22 | 1.88 | pCi/L | |

TABLE A-6. Permitted Sanitary Outfalls of Radiological Analyses, CY 2010

| Permit Number | Station | Analyte | Activity | Units | Regulatory Sewer Release Limits* (Monthly Avg) |
|---|---|---|---|---|---|
| | | **Sodium-22 Average** | **1.58** | | |
| | | **Sodium-22 StdDev** | **0.42** | | |
| | | **Sodium-22 Min** | **1.28** | | |
| | | **Sodium-22 Max** | **1.88** | | |
| 2238A | CINT | Thorium-227 | -6.54 | pCi/L | |
| 2238A | CINT | Thorium-227 | 1.51 | pCi/L | |
| | | **Thorium-227 Average** | **-2.52** | | |
| | | **Thorium-227 StdDev** | **5.69** | | |
| | | **Thorium-227 Min** | **-6.54** | | |
| | | **Thorium-227 Max** | **1.51** | | |
| 2238A | CINT | Thorium-231 | -32.9 | pCi/L | 300 |
| 2238A | CINT | Thorium-231 | -21.6 | pCi/L | 300 |
| | | **Thorium-231 Average** | **-27.25** | | |
| | | **Thorium-231 StdDev** | **7.99** | | |
| | | **Thorium-231 Min** | **-32.90** | | |
| | | **Thorium-231 Max** | **-21.60** | | |
| 2238A | CINT | Thorium-234 | -10.7 | pCi/L | 50000 |
| 2238A | CINT | Thorium-234 | 16.9 | pCi/L | 50000 |
| | | **Thorium-234 Average** | **3.10** | | |
| | | **Thorium-234 StdDev** | **19.52** | | |
| | | **Thorium-234 Min** | **-10.70** | | |
| | | **Thorium-234 Max** | **16.90** | | |
| 2238A | CINT | Tritium | -19.1 | pCi/L | 10000000 |
| 2238A | CINT | Tritium | -17.3 | pCi/L | 10000000 |
| | | **Tritium Average** | **-18.20** | | |
| | | **Tritium StdDev** | **1.27** | | |
| | | **Tritium Min** | **-19.10** | | |
| | | **Tritium Max** | **-17.30** | | |
| 2238A | CINT | Uranium-235 | -12.5 | pCi/L | 3000 |
| 2238A | CINT | Uranium-235 | 4.49 | pCi/L | 3000 |
| | | **Uranium-235 Average** | **-4.01** | | |
| | | **Uranium-235 StdDev** | **12.01** | | |
| | | **Uranium-235 Min** | **-12.50** | | |
| | | **Uranium-235 Max** | **4.49** | | |

## TABLE A-6. Permitted Sanitary Outfalls of Radiological Analyses, CY 2010

| Permit Number | Station | Analyte | Activity | Units | Regulatory Sewer Release Limits* (Monthly Avg) |
|---|---|---|---|---|---|
| 2238A | CINT | Uranium-238 | -10.7 | pCi/L | 3000 |
| 2238A | CINT | Uranium-238 | 16.9 | pCi/L | 3000 |
| | | **Uranium-238 Average** | **3.10** | | |
| | | **Uranium-238 StdDev** | **19.52** | | |
| | | **Uranium-238 Min** | **-10.70** | | |
| | | **Uranium-238 Max** | **16.90** | | |

**NOTES:**

**COA = City of Albuquerque**
**Min = Minimum**
**Max = Maximum**
**pCi/L = picocuries per liter**
**StdDev = Standard Deviation**
*** = The monthly average concentration values for release of sanitary sewage were derived by taking the most restrictive occupational stochastic oral ingestion annual limits on intake (ALT) for a reference mean.**

## TABLE A-7. Permitted Sanitary Outfalls of Inorganic Analyses, August 2010 and October 2010

| Station | Permit Number | Date Collected | Sample ID | Analyte | Result | MDL | Lab Data Qualifier | Units | Regulatory Limit (COA) |
|---|---|---|---|---|---|---|---|---|---|
| CINT | 2238A | 24-Aug-10 | 089590-001 | Aluminum | | 0.068 | U | mg/L | 900 |
| CINT | 2238A | 24-Aug-10 | 089590-001 | Arsenic | 0.0195 | 0.005 | J | mg/L | 0.051 |
| CINT | 2238A | 24-Aug-10 | 089590-001 | Boron | 0.164 | 0.015 | | mg/L | |
| CINT | 2238A | 24-Aug-10 | 089590-001 | Cadmium | | 0.001 | U | mg/L | 0.5 |
| CINT | 2238A | 24-Aug-10 | 089590-001 | Chromium | 0.00613 | 0.001 | | mg/L | 4.1 |
| CINT | 2238A | 24-Aug-10 | 089590-001 | Copper | 0.0133 | 0.003 | | mg/L | 5.3 |
| CINT | 2238A | 24-Aug-10 | 089590-002 | Fluoride | 2.02 | 0.033 | | mg/L | 36 |
| CINT | 2238A | 24-Aug-10 | 089590-001 | Lead | | 0.0033 | U | mg/L | 1 |
| CINT | 2238A | 24-Aug-10 | 089590-001 | Molybdenum | 0.0302 | 0.002 | | mg/L | 2 |
| CINT | 2238A | 24-Aug-10 | 089590-001 | Nickel | | 0.0015 | U | mg/L | 2 |
| CINT | 2238A | 24-Aug-10 | 089590-001 | Selenium | | 0.005 | U | mg/L | 0.46 |
| CINT | 2238A | 24-Aug-10 | 089590-001 | Silver | | 0.001 | U | mg/L | 5 |
| CINT | 2238A | 24-Aug-10 | 089590-001 | Zinc | | 0.0033 | U | mg/L | 2.2 |
| CINT | 2238A | 25-Aug-10 | 089591-001 | Aluminum | | 0.068 | U | mg/L | 900 |
| CINT | 2238A | 25-Aug-10 | 089591-001 | Arsenic | 0.0182 | 0.005 | J | mg/L | 0.051 |
| CINT | 2238A | 25-Aug-10 | 089591-001 | Boron | 0.155 | 0.015 | | mg/L | |
| CINT | 2238A | 25-Aug-10 | 089591-001 | Cadmium | | 0.001 | U | mg/L | 0.5 |
| CINT | 2238A | 25-Aug-10 | 089591-001 | Chromium | 0.00586 | 0.001 | | mg/L | 4.1 |
| CINT | 2238A | 25-Aug-10 | 089591-001 | Copper | 0.0162 | 0.003 | | mg/L | 5.3 |
| CINT | 2238A | 25-Aug-10 | 089592-001 | Cyanide, total | | 0.0017 | U | mg/L | 0.45 |
| CINT | 2238A | 25-Aug-10 | 089592-002 | Cyanide, total | | 0.0017 | U | mg/L | 0.45 |
| CINT | 2238A | 25-Aug-10 | 089592-003 | Cyanide, total | | 0.0017 | U | mg/L | 0.45 |
| CINT | 2238A | 25-Aug-10 | 089592-004 | Cyanide, total | | 0.0017 | U | mg/L | 0.45 |
| CINT | 2238A | 25-Aug-10 | 089591-002 | Fluoride | 1.96 | 0.033 | | mg/L | 36 |
| CINT | 2238A | 25-Aug-10 | 089591-001 | Lead | | 0.0033 | U | mg/L | 1 |
| CINT | 2238A | 25-Aug-10 | 089591-001 | Molybdenum | 0.0255 | 0.002 | | mg/L | 2 |
| CINT | 2238A | 25-Aug-10 | 089591-001 | Nickel | | 0.0015 | U | mg/L | 2 |
| CINT | 2238A | 25-Aug-10 | 089591-001 | Selenium | | 0.005 | U | mg/L | 0.46 |
| CINT | 2238A | 25-Aug-10 | 089591-001 | Silver | | 0.001 | U | mg/L | 5 |
| CINT | 2238A | 25-Aug-10 | 089591-001 | Zinc | | 0.0033 | U | mg/L | 2.2 |
| CINT | 2238A | 26-Oct-10 | 089599-005 | Ammonia | 0.072 | 0.016 | | mg/L | |
| CINT | 2238A | 27-Oct-10 | 089605-001 | Ammonia | 0.127 | 0.016 | | mg/L | |
| WW001 | 2069-A | 26-Oct-10 | 089593-001 | Aluminum | 0.0708 | 0.068 | J | mg/L | 900 |
| WW001 | 2069-A | 26-Oct-10 | 089593-007 | Ammonia | 8.71 | 0.16 | | mg/L | |

## TABLE A-7. Permitted Sanitary Outfalls of Inorganic Analyses, August 2010 and October 2010

| Station | Permit Number | Date Collected | Sample ID | Analyte | Result | MDL | Lab Data Qualifier | Units | Regulatory Limit (COA) |
|---|---|---|---|---|---|---|---|---|---|
| WW001 | 2069-A | 26-Oct-10 | 089593-001 | Arsenic | 0.00765 | 0.005 | J | mg/L | 0.051 |
| WW001 | 2069-A | 26-Oct-10 | 089593-001 | Boron | 0.0869 | 0.015 | | mg/L | |
| WW001 | 2069-A | 26-Oct-10 | 089593-001 | Cadmium | | 0.001 | U | mg/L | 0.5 |
| WW001 | 2069-A | 26-Oct-10 | 089593-001 | Chromium | 0.00376 | 0.001 | J | mg/L | 4.1 |
| WW001 | 2069-A | 26-Oct-10 | 089593-001 | Copper | 0.0421 | 0.003 | | mg/L | 5.3 |
| WW001 | 2069-A | 26-Oct-10 | 089593-002 | Fluoride | 1.63 | 0.033 | | mg/L | 36 |
| WW001 | 2069-A | 26-Oct-10 | 089593-001 | Lead | 0.00392 | 0.0033 | J | mg/L | 1 |
| WW001 | 2069-A | 26-Oct-10 | 089593-001 | Molybdenum | 0.0946 | 0.002 | | mg/L | 2 |
| WW001 | 2069-A | 26-Oct-10 | 089593-001 | Nickel | 0.00326 | 0.0015 | J | mg/L | 2 |
| WW001 | 2069-A | 26-Oct-10 | 089593-001 | Selenium | 0.00785 | 0.005 | J | mg/L | 0.46 |
| WW001 | 2069-A | 26-Oct-10 | 089593-001 | Silver | | 0.001 | U | mg/L | 5 |
| WW001 | 2069-A | 26-Oct-10 | 089593-001 | Zinc | 0.0419 | 0.0033 | | mg/L | 2.2 |
| WW001 | 2069-A | 27-Oct-10 | 089600-001 | Aluminum | 0.0971 | 0.068 | J | mg/L | 900 |
| WW001 | 2069-A | 27-Oct-10 | 089600-003 | Ammonia | 11.3 | 0.16 | | mg/L | |
| WW001 | 2069-A | 27-Oct-10 | 089600-001 | Arsenic | 0.0327 | 0.005 | | mg/L | 0.051 |
| WW001 | 2069-A | 27-Oct-10 | 089600-001 | Boron | 0.0785 | 0.015 | | mg/L | |
| WW001 | 2069-A | 27-Oct-10 | 089600-001 | Cadmium | | 0.001 | U | mg/L | 0.5 |
| WW001 | 2069-A | 27-Oct-10 | 089600-001 | Chromium | 0.00351 | 0.001 | J | mg/L | 4.1 |
| WW001 | 2069-A | 27-Oct-10 | 089600-001 | Copper | 0.0616 | 0.003 | | mg/L | 5.3 |
| WW001 | 2069-A | 27-Oct-10 | 089600-002 | Fluoride | 2.11 | 0.033 | | mg/L | 36 |
| WW001 | 2069-A | 27-Oct-10 | 089600-001 | Lead | | 0.0033 | U | mg/L | 1 |
| WW001 | 2069-A | 27-Oct-10 | 089600-001 | Molybdenum | 0.0896 | 0.002 | | mg/L | 2 |
| WW001 | 2069-A | 27-Oct-10 | 089600-001 | Nickel | 0.00156 | 0.0015 | J | mg/L | 2 |
| WW001 | 2069-A | 27-Oct-10 | 089600-001 | Selenium | | 0.005 | U | mg/L | 0.46 |
| WW001 | 2069-A | 27-Oct-10 | 089600-001 | Silver | | 0.001 | U | mg/L | 5 |
| WW001 | 2069-A | 27-Oct-10 | 089600-001 | Zinc | 0.0406 | 0.0033 | | mg/L | 2.2 |
| WW006 | 2069F-4 | 25-Oct-10 | 089606-001 | Cyanide, total | | 0.0017 | U | mg/L | 0.45 |
| WW006 | 2069F-4 | 25-Oct-10 | 089606-002 | Cyanide, total | 0.00568 | 0.0017 | | mg/L | 0.45 |
| WW006 | 2069F-4 | 25-Oct-10 | 089606-003 | Cyanide, total | | 0.0017 | U | mg/L | 0.45 |
| WW006 | 2069F-4 | 25-Oct-10 | 089606-004 | Cyanide, total | 0.00172 | 0.0017 | J | mg/L | 0.45 |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-001 | Aluminum | 0.127 | 0.068 | J | mg/L | 900 |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-007 | Ammonia | 30.1 | 0.8 | | mg/L | |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-001 | Arsenic | 0.00514 | 0.005 | J | mg/L | 0.051 |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-001 | Boron | 0.16 | 0.015 | | mg/L | |

## TABLE A-7. Permitted Sanitary Outfalls of Inorganic Analyses, August 2010 and October 2010

| Station | Permit Number | Date Collected | Sample ID | Analyte | Result | MDL | Lab Data Qualifier | Units | Regulatory Limit (COA) |
|---|---|---|---|---|---|---|---|---|---|
| WW006 | 2069F-4 | 26-Oct-10 | 089594-001 | Cadmium | | 0.001 | U | mg/L | 0.5 |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-001 | Chromium | 0.00296 | 0.001 | J | mg/L | 4.1 |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-001 | Copper | 0.0196 | 0.003 | | mg/L | 5.3 |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-002 | Fluoride | 0.907 | 0.033 | | mg/L | 36 |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-001 | Lead | | 0.0033 | U | mg/L | 1 |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-001 | Molybdenum | 0.0754 | 0.002 | | mg/L | 2 |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-001 | Nickel | 0.00226 | 0.0015 | J | mg/L | 2 |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-001 | Selenium | 0.00996 | 0.005 | J | mg/L | 0.46 |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-001 | Silver | | 0.001 | U | mg/L | 5 |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-001 | Zinc | 0.0589 | 0.0033 | | mg/L | 2.2 |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-001 | Aluminum | 0.145 | 0.068 | J | mg/L | 900 |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-003 | Ammonia | 37.2 | 0.8 | | mg/L | |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-001 | Arsenic | 0.0295 | 0.005 | J | mg/L | 0.051 |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-001 | Boron | 0.0847 | 0.015 | | mg/L | |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-001 | Cadmium | | 0.001 | U | mg/L | 0.5 |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-001 | Chromium | 0.00224 | 0.001 | J | mg/L | 4.1 |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-001 | Copper | 0.0335 | 0.003 | | mg/L | 5.3 |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-002 | Fluoride | 0.744 | 0.033 | | mg/L | 36 |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-001 | Lead | | 0.0033 | U | mg/L | 1 |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-001 | Molybdenum | 0.0508 | 0.002 | | mg/L | 2 |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-001 | Nickel | | 0.0015 | U | mg/L | 2 |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-001 | Selenium | 0.00793 | 0.005 | J | mg/L | 0.46 |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-001 | Silver | | 0.001 | U | mg/L | 5 |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-001 | Zinc | 0.0671 | 0.0033 | | mg/L | 2.2 |
| WW006 #2 | 2069F-4 | 26-Oct-10 | 089643-001 | Cyanide, total | 0.00371 | 0.0017 | J | mg/L | 0.45 |
| WW006 #2 | 2069F-4 | 26-Oct-10 | 089643-002 | Cyanide, total | | 0.0017 | U | mg/L | 0.45 |
| WW006 #2 | 2069F-4 | 26-Oct-10 | 089643-003 | Cyanide, total | | 0.0017 | U | mg/L | 0.45 |
| WW006 #2 | 2069F-4 | 26-Oct-10 | 089643-004 | Cyanide, total | | 0.0017 | U | mg/L | 0.45 |
| WW007 | 2069G-2 | 24-Aug-10 | 089582-001 | Arsenic | 0.0114 | 0.005 | J | mg/L | 0.051 |
| WW007 | 2069G-2 | 25-Aug-10 | 089583-001 | Arsenic | 0.0108 | 0.005 | J | mg/L | 0.051 |
| WW007 | 2069G-2 | 26-Aug-10 | 089584-001 | Arsenic | 0.00971 | 0.005 | J | mg/L | 0.051 |
| WW007 | 2069G-2 | 27-Aug-10 | 089585-001 | Arsenic | 0.011 | 0.005 | J | mg/L | 0.051 |
| WW007 | 2069G-2 | 25-Oct-10 | 089607-001 | Cyanide, total | | 0.0017 | U | mg/L | 0.45 |
| WW007 | 2069G-2 | 25-Oct-10 | 089607-002 | Cyanide, total | | 0.0017 | U | mg/L | 0.45 |

## TABLE A-7. Permitted Sanitary Outfalls of Inorganic Analyses, August 2010 and October 2010

| Station | Permit Number | Date Collected | Sample ID | Analyte | Result | MDL | Lab Data Qualifier | Units | Regulatory Limit (COA) |
|---|---|---|---|---|---|---|---|---|---|
| WW007 | 2069G-2 | 25-Oct-10 | 089607-003 | Cyanide, total | | 0.0017 | U | mg/L | 0.45 |
| WW007 | 2069G-2 | 25-Oct-10 | 089607-004 | Cyanide, total | | 0.0017 | U | mg/L | 0.45 |
| WW007 | 2069G-2 | 26-Oct-10 | 089595-001 | Aluminum | | 0.068 | U | mg/L | 900 |
| WW007 | 2069G-2 | 26-Oct-10 | 089595-004 | Ammonia | 1.47 | 0.016 | | mg/L | |
| WW007 | 2069G-2 | 26-Oct-10 | 089595-001 | Arsenic | | 0.005 | U | mg/L | 0.051 |
| WW007 | 2069G-2 | 26-Oct-10 | 089595-001 | Boron | 0.0324 | 0.015 | J | mg/L | |
| WW007 | 2069G-2 | 26-Oct-10 | 089595-001 | Cadmium | | 0.001 | U | mg/L | 0.5 |
| WW007 | 2069G-2 | 26-Oct-10 | 089595-001 | Chromium | 0.00237 | 0.001 | J | mg/L | 4.1 |
| WW007 | 2069G-2 | 26-Oct-10 | 089595-001 | Copper | | 0.003 | U | mg/L | 5.3 |
| WW007 | 2069G-2 | 26-Oct-10 | 089595-002 | Fluoride | 1.63 | 0.033 | | mg/L | 36 |
| WW007 | 2069G-2 | 26-Oct-10 | 089595-001 | Lead | | 0.0033 | U | mg/L | 1 |
| WW007 | 2069G-2 | 26-Oct-10 | 089595-001 | Molybdenum | 0.0313 | 0.002 | | mg/L | 2 |
| WW007 | 2069G-2 | 26-Oct-10 | 089595-001 | Nickel | | 0.0015 | U | mg/L | 2 |
| WW007 | 2069G-2 | 26-Oct-10 | 089595-001 | Selenium | 0.0064 | 0.005 | J | mg/L | 0.46 |
| WW007 | 2069G-2 | 26-Oct-10 | 089595-001 | Silver | | 0.001 | U | mg/L | 5 |
| WW007 | 2069G-2 | 26-Oct-10 | 089595-001 | Zinc | 0.00423 | 0.0033 | J | mg/L | 2.2 |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-001 | Aluminum | | 0.068 | U | mg/L | 900 |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-003 | Ammonia | 6.18 | 0.08 | | mg/L | |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-001 | Arsenic | 0.0226 | 0.005 | J | mg/L | 0.051 |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-001 | Boron | 0.0663 | 0.015 | | mg/L | |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-001 | Cadmium | | 0.001 | U | mg/L | 0.5 |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-001 | Chromium | 0.00254 | 0.001 | J | mg/L | 4.1 |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-001 | Copper | | 0.003 | U | mg/L | 5.3 |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-002 | Fluoride | 2.06 | 0.033 | | mg/L | 36 |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-001 | Lead | | 0.0165 | U | mg/L | 1 |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-001 | Molybdenum | 0.0189 | 0.002 | | mg/L | 2 |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-001 | Nickel | 0.00166 | 0.0015 | J | mg/L | 2 |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-001 | Selenium | 0.00732 | 0.005 | J | mg/L | 0.46 |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-001 | Silver | | 0.001 | U | mg/L | 5 |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-001 | Zinc | | 0.0033 | U | mg/L | 2.2 |
| WW008 | 2069I-3 | 25-Oct-10 | 089608-001 | Cyanide, total | 0.00231 | 0.0017 | J | mg/L | 0.45 |
| WW008 | 2069I-3 | 25-Oct-10 | 089608-002 | Cyanide, total | 0.00458 | 0.0017 | J | mg/L | 0.45 |
| WW008 | 2069I-3 | 25-Oct-10 | 089608-003 | Cyanide, total | 0.00382 | 0.0017 | J | mg/L | 0.45 |
| WW008 | 2069I-3 | 25-Oct-10 | 089608-004 | Cyanide, total | 0.00215 | 0.0017 | J | mg/L | 0.45 |

## TABLE A-7. Permitted Sanitary Outfalls of Inorganic Analyses, August 2010 and October 2010

| Station | Permit Number | Date Collected | Sample ID | Analyte | Result | MDL | Lab Data Qualifier | Units | Regulatory Limit (COA) |
|---|---|---|---|---|---|---|---|---|---|
| WW008 | 2069I-3 | 26-Oct-10 | 089596-001 | Aluminum | 0.355 | 0.068 | | mg/L | 900 |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-007 | Ammonia | 67 | 0.8 | | mg/L | |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-001 | Arsenic | | 0.005 | U | mg/L | 0.051 |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-001 | Boron | 0.105 | 0.015 | | mg/L | |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-001 | Cadmium | | 0.001 | U | mg/L | 0.5 |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-001 | Chromium | 0.00285 | 0.001 | J | mg/L | 4.1 |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-001 | Copper | 0.0424 | 0.003 | | mg/L | 5.3 |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-002 | Fluoride | 0.648 | 0.033 | | mg/L | 36 |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-001 | Lead | 0.00537 | 0.0033 | J | mg/L | 1 |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-001 | Molybdenum | 0.00575 | 0.002 | J | mg/L | 2 |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-001 | Nickel | 0.00611 | 0.0015 | | mg/L | 2 |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-001 | Selenium | 0.00886 | 0.005 | J | mg/L | 0.46 |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-001 | Silver | | 0.001 | U | mg/L | 5 |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-001 | Zinc | 0.105 | 0.0033 | | mg/L | 2.2 |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-001 | Aluminum | 0.0917 | 0.068 | J | mg/L | 900 |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-003 | Ammonia | 57.4 | 0.8 | | mg/L | |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-001 | Arsenic | 0.0276 | 0.005 | J | mg/L | 0.051 |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-001 | Boron | 0.0909 | 0.015 | | mg/L | |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-001 | Cadmium | | 0.001 | U | mg/L | 0.5 |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-001 | Chromium | 0.00197 | 0.001 | J | mg/L | 4.1 |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-001 | Copper | 0.0238 | 0.003 | | mg/L | 5.3 |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-002 | Fluoride | 0.637 | 0.033 | | mg/L | 36 |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-001 | Lead | | 0.0033 | U | mg/L | 1 |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-001 | Molybdenum | 0.00352 | 0.002 | J | mg/L | 2 |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-001 | Nickel | 0.00295 | 0.0015 | J | mg/L | 2 |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-001 | Selenium | | 0.005 | U | mg/L | 0.46 |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-001 | Silver | | 0.001 | U | mg/L | 5 |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-001 | Zinc | 0.0668 | 0.0033 | | mg/L | 2.2 |
| WW011 | 2069-K | 26-Oct-10 | 089597-001 | Aluminum | 0.25 | 0.068 | | mg/L | 900 |
| WW011 | 2069-K | 26-Oct-10 | 089597-007 | Ammonia | 21.6 | 0.8 | | mg/L | |
| WW011 | 2069-K | 26-Oct-10 | 089597-001 | Arsenic | | 0.005 | U | mg/L | 0.051 |
| WW011 | 2069-K | 26-Oct-10 | 089597-001 | Boron | 0.113 | 0.015 | | mg/L | |
| WW011 | 2069-K | 26-Oct-10 | 089597-001 | Cadmium | | 0.001 | U | mg/L | 0.5 |
| WW011 | 2069-K | 26-Oct-10 | 089597-001 | Chromium | 0.00665 | 0.001 | | mg/L | 4.1 |

## TABLE A-7. Permitted Sanitary Outfalls of Inorganic Analyses, August 2010 and October 2010

| Station | Permit Number | Date Collected | Sample ID | Analyte | Result | MDL | Lab Data Qualifier | Units | Regulatory Limit (COA) |
|---|---|---|---|---|---|---|---|---|---|
| WW011 | 2069-K | 26-Oct-10 | 089597-001 | Copper | 0.136 | 0.003 | | mg/L | 5.3 |
| WW011 | 2069-K | 26-Oct-10 | 089597-002 | Fluoride | 0.635 | 0.033 | | mg/L | 36 |
| WW011 | 2069-K | 26-Oct-10 | 089597-001 | Lead | 0.00441 | 0.0033 | J | mg/L | 1 |
| WW011 | 2069-K | 26-Oct-10 | 089597-001 | Molybdenum | 0.0445 | 0.002 | | mg/L | 2 |
| WW011 | 2069-K | 26-Oct-10 | 089597-001 | Nickel | 0.0041 | 0.0015 | J | mg/L | 2 |
| WW011 | 2069-K | 26-Oct-10 | 089597-001 | Selenium | 0.00722 | 0.005 | J | mg/L | 0.46 |
| WW011 | 2069-K | 26-Oct-10 | 089597-001 | Silver | | 0.001 | U | mg/L | 5 |
| WW011 | 2069-K | 26-Oct-10 | 089597-001 | Zinc | 0.106 | 0.0033 | | mg/L | 2.2 |
| WW011 | 2069-K | 27-Oct-10 | 089604-001 | Aluminum | 0.12 | 0.068 | J | mg/L | 900 |
| WW011 | 2069-K | 27-Oct-10 | 089604-003 | Ammonia | 12.5 | 0.16 | | mg/L | |
| WW011 | 2069-K | 27-Oct-10 | 089604-001 | Arsenic | 0.0236 | 0.005 | J | mg/L | 0.051 |
| WW011 | 2069-K | 27-Oct-10 | 089604-001 | Boron | 0.0885 | 0.015 | | mg/L | |
| WW011 | 2069-K | 27-Oct-10 | 089604-001 | Cadmium | | 0.001 | U | mg/L | 0.5 |
| WW011 | 2069-K | 27-Oct-10 | 089604-001 | Chromium | 0.00495 | 0.001 | J | mg/L | 4.1 |
| WW011 | 2069-K | 27-Oct-10 | 089604-001 | Copper | 0.211 | 0.003 | | mg/L | 5.3 |
| WW011 | 2069-K | 27-Oct-10 | 089604-002 | Fluoride | 0.776 | 0.033 | | mg/L | 36 |
| WW011 | 2069-K | 27-Oct-10 | 089604-001 | Lead | | 0.0033 | U | mg/L | 1 |
| WW011 | 2069-K | 27-Oct-10 | 089604-001 | Molybdenum | 0.0419 | 0.002 | | mg/L | 2 |
| WW011 | 2069-K | 27-Oct-10 | 089604-001 | Nickel | 0.00326 | 0.0015 | J | mg/L | 2 |
| WW011 | 2069-K | 27-Oct-10 | 089604-001 | Selenium | 0.0158 | 0.005 | J | mg/L | 0.46 |
| WW011 | 2069-K | 27-Oct-10 | 089604-001 | Silver | | 0.001 | U | mg/L | 5 |
| WW011 | 2069-K | 27-Oct-10 | 089604-001 | Zinc | 0.0518 | 0.0033 | | mg/L | 2.2 |

**NOTES:**

**COA = City of Albuquerque**
**MDL = Method detection limit.**
**J = Estimated value, the analyte concentration fell above the effective MDL and below the effective (PQL) practical quantitation limit.**
**U = The analyte was analyzed for, but not detected. For organic and inorganic analytes the result is less than the effective MDL concentration**

## TABLE A-8. Summary of Sanitary Outfalls of Radiological Analyses, October 2010

| Station | Permit Number | Date Collected | Sample ID | Analyte | Activity | Two Sigma Error | Lab Data Qualifier | MDA | Units | Regulatory Sewer Release Limits* (Monthly Avg) |
|---|---|---|---|---|---|---|---|---|---|---|
| CINT | 2238A | 26-Oct-10 | 089599-002 | Actinium-228 | -1.7 | 18.3 | U | 16.5 | pCi/L | 300000 |
| CINT | 2238A | 26-Oct-10 | 089599-001 | Alpha, gross | 5.91 | 1.89 | | 1.9 | pCi/L | |
| CINT | 2238A | 26-Oct-10 | 089599-002 | Americium-241 | -2.69 | 5.08 | U | 5.02 | pCi/L | 200 |
| CINT | 2238A | 26-Oct-10 | 089599-002 | Beryllium-7 | -2.67 | 20.4 | U | 33.9 | pCi/L | |
| CINT | 2238A | 26-Oct-10 | 089599-001 | Beta, gross | 7.73 | 1.68 | | 1.37 | pCi/L | |
| CINT | 2238A | 26-Oct-10 | 089599-002 | Bismuth-212 | 50.1 | 57 | U | 57.8 | pCi/L | |
| CINT | 2238A | 26-Oct-10 | 089599-002 | Bismuth-214 | 6.44 | 10.3 | U | 9.82 | pCi/L | |
| CINT | 2238A | 26-Oct-10 | 089599-002 | Cesium-137 | 0.549 | 2.31 | U | 3.83 | pCi/L | 10000 |
| CINT | 2238A | 26-Oct-10 | 089599-002 | Cobalt-60 | 0.416 | 2.42 | U | 4.19 | pCi/L | 30000 |
| CINT | 2238A | 26-Oct-10 | 089599-002 | Lead-212 | 0.434 | 7.27 | U | 5.08 | pCi/L | 20000 |
| CINT | 2238A | 26-Oct-10 | 089599-002 | Lead-214 | -2.58 | 6.99 | U | 7.92 | pCi/L | 1000000 |
| CINT | 2238A | 26-Oct-10 | 089599-002 | Neptunium-237 | -0.306 | 3.31 | U | 5.67 | pCi/L | |
| CINT | 2238A | 26-Oct-10 | 089599-002 | Potassium-40 | 2.77 | 45.8 | U | 50.1 | pCi/L | 40000 |
| CINT | 2238A | 26-Oct-10 | 089599-002 | Radium-223 | 12.3 | 995 | U | 60.6 | pCi/L | |
| CINT | 2238A | 26-Oct-10 | 089599-002 | Radium-224 | 36.6 | 36.5 | U | 55 | pCi/L | |
| CINT | 2238A | 26-Oct-10 | 089599-002 | Radium-226 | -29.1 | 59.1 | U | 68.4 | pCi/L | 600 |
| CINT | 2238A | 26-Oct-10 | 089599-002 | Radium-228 | -1.7 | 18.3 | U | 16.5 | pCi/L | 600 |
| CINT | 2238A | 26-Oct-10 | 089599-002 | Sodium-22 | 1.28 | 2.36 | U | 4.05 | pCi/L | |
| CINT | 2238A | 26-Oct-10 | 089599-002 | Thorium-227 | -6.54 | 529 | U | 21.4 | pCi/L | |
| CINT | 2238A | 26-Oct-10 | 089599-002 | Thorium-231 | -32.9 | 28.5 | U | 28 | pCi/L | 300 |
| CINT | 2238A | 26-Oct-10 | 089599-002 | Thorium-234 | 16.9 | 68.5 | U | 66.4 | pCi/L | 50000 |
| CINT | 2238A | 26-Oct-10 | 089599-003 | Tritium | -17.3 | 91.7 | U | 160 | pCi/L | 10000000 |
| CINT | 2238A | 26-Oct-10 | 089599-002 | Uranium-235 | -12.5 | 15.3 | U | 16 | pCi/L | 3000 |
| CINT | 2238A | 26-Oct-10 | 089599-002 | Uranium-238 | 16.9 | 68.5 | U | 66.4 | pCi/L | 3000 |
| WW001 | 2069-A | 26-Oct-10 | 089593-004 | Actinium-228 | 7.74 | 6.06 | U | 10.8 | pCi/L | 300000 |
| WW001 | 2069-A | 26-Oct-10 | 089593-003 | Alpha, gross | 1.6 | 0.939 | | 1.33 | pCi/L | |
| WW001 | 2069-A | 26-Oct-10 | 089593-004 | Americium-241 | 5.58 | 6.11 | U | 9.19 | pCi/L | 200 |
| WW001 | 2069-A | 26-Oct-10 | 089593-004 | Beryllium-7 | 2.3 | 15 | U | 24.8 | pCi/L | |
| WW001 | 2069-A | 26-Oct-10 | 089593-003 | Beta, gross | 8.82 | 1.81 | | 1.35 | pCi/L | |
| WW001 | 2069-A | 26-Oct-10 | 089593-004 | Bismuth-212 | 21 | 22.5 | U | 39.6 | pCi/L | |
| WW001 | 2069-A | 26-Oct-10 | 089593-004 | Bismuth-214 | 13.3 | 8.06 | | 5.09 | pCi/L | |
| WW001 | 2069-A | 26-Oct-10 | 089593-004 | Cesium-137 | 1.76 | 1.6 | U | 2.85 | pCi/L | 10000 |
| WW001 | 2069-A | 26-Oct-10 | 089593-004 | Cobalt-60 | 1.61 | 1.67 | U | 2.94 | pCi/L | 30000 |

## TABLE A-8.  Summary of Sanitary Outfalls of Radiological Analyses, October 2010

| Station | Permit Number | Date Collected | Sample ID | Analyte | Activity | Two Sigma Error | Lab Data Qualifier | MDA | Units | Regulatory Sewer Release Limits* (Monthly Avg) |
|---|---|---|---|---|---|---|---|---|---|---|
| WW001 | 2069-A | 26-Oct-10 | 089593-004 | Lead-212 | -1.5 | 4.9 | U | 5.46 | pCi/L | 20000 |
| WW001 | 2069-A | 26-Oct-10 | 089593-004 | Lead-214 | 13.2 | 6.81 | | 5.11 | pCi/L | 1000000 |
| WW001 | 2069-A | 26-Oct-10 | 089593-004 | Neptunium-237 | 3.12 | 2.93 | U | 5.04 | pCi/L | |
| WW001 | 2069-A | 26-Oct-10 | 089593-004 | Potassium-40 | 16.4 | 37.5 | U | 24.8 | pCi/L | 40000 |
| WW001 | 2069-A | 26-Oct-10 | 089593-004 | Radium-223 | -5.7 | 423 | U | 48.7 | pCi/L | |
| WW001 | 2069-A | 26-Oct-10 | 089593-004 | Radium-224 | -66.1 | 31.3 | U | 49 | pCi/L | |
| WW001 | 2069-A | 26-Oct-10 | 089593-004 | Radium-226 | -51.5 | 68.3 | U | 65.4 | pCi/L | 600 |
| WW001 | 2069-A | 26-Oct-10 | 089593-004 | Radium-228 | 7.74 | 6.06 | U | 10.8 | pCi/L | 600 |
| WW001 | 2069-A | 26-Oct-10 | 089593-004 | Sodium-22 | 0.554 | 1.56 | U | 2.64 | pCi/L | |
| WW001 | 2069-A | 26-Oct-10 | 089593-004 | Thorium-227 | -0.567 | 43.4 | U | 18.8 | pCi/L | |
| WW001 | 2069-A | 26-Oct-10 | 089593-004 | Thorium-231 | 2.38 | 18.2 | U | 29.6 | pCi/L | 300 |
| WW001 | 2069-A | 26-Oct-10 | 089593-004 | Thorium-234 | 45.5 | 84.3 | U | 77.4 | pCi/L | 50000 |
| WW001 | 2069-A | 26-Oct-10 | 089593-005 | Tritium | 16.4 | 101 | U | 174 | pCi/L | 10000000 |
| WW001 | 2069-A | 26-Oct-10 | 089593-004 | Uranium-235 | 0.635 | 14.7 | U | 15.4 | pCi/L | 3000 |
| WW001 | 2069-A | 26-Oct-10 | 089593-004 | Uranium-238 | 45.5 | 84.3 | U | 77.4 | pCi/L | 3000 |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-004 | Actinium-228 | 10.1 | 12.9 | U | 14.5 | pCi/L | 300000 |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-003 | Alpha, gross | 3.03 | 3.27 | U | 5.34 | pCi/L | |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-004 | Americium-241 | 0.595 | 13.9 | U | 21 | pCi/L | 200 |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-004 | Beryllium-7 | -5.84 | 19.1 | U | 32.3 | pCi/L | |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-003 | Beta, gross | 8.69 | 3.4 | | 4.63 | pCi/L | |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-004 | Bismuth-212 | 8.62 | 60.6 | U | 57.6 | pCi/L | |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-004 | Bismuth-214 | -5.36 | 7.85 | U | 8.19 | pCi/L | |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-004 | Cesium-137 | 0.742 | 1.97 | U | 3.36 | pCi/L | 10000 |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-004 | Cobalt-60 | -2.65 | 2.16 | U | 3.17 | pCi/L | 30000 |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-004 | Lead-212 | 4.42 | 9.2 | U | 5.52 | pCi/L | 20000 |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-004 | Lead-214 | -4.96 | 8.17 | U | 7.83 | pCi/L | 1000000 |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-004 | Neptunium-237 | -1.5 | 3.71 | U | 6.09 | pCi/L | |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-004 | Potassium-40 | 15.5 | 42.5 | U | 32 | pCi/L | 40000 |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-004 | Radium-223 | 2.47 | 204 | U | 61.3 | pCi/L | |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-004 | Radium-224 | 262 | 50.3 | U | 263 | pCi/L | |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-004 | Radium-226 | -61.8 | 88.4 | U | 88.2 | pCi/L | 600 |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-004 | Radium-228 | 10.1 | 12.9 | U | 14.5 | pCi/L | 600 |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-004 | Sodium-22 | 0.404 | 2.13 | U | 3.6 | pCi/L | |

**TABLE A-8. Summary of Sanitary Outfalls of Radiological Analyses, October 2010**

| Station | Permit Number | Date Collected | Sample ID | Analyte | Activity | Two Sigma Error | Lab Data Qualifier | MDA | Units | Regulatory Sewer Release Limits* (Monthly Avg) |
|---|---|---|---|---|---|---|---|---|---|---|
| WW006 | 2069F-4 | 26-Oct-10 | 089594-004 | Thorium-227 | -7.51 | 609 | U | 24 | pCi/L | |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-004 | Thorium-231 | 14.4 | 28.5 | U | 47.8 | pCi/L | 300 |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-004 | Thorium-234 | 131 | 224 | U | 209 | pCi/L | 50000 |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-005 | Tritium | -13.1 | 92.9 | U | 162 | pCi/L | 10000000 |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-004 | Uranium-235 | -2.57 | 20.4 | U | 21.7 | pCi/L | 3000 |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-004 | Uranium-238 | 131 | 224 | U | 209 | pCi/L | 3000 |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-004 | Actinium-228 | -14.5 | 13.7 | U | 14.7 | pCi/L | 300000 |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-003 | Alpha, gross | 1.54 | 1.09 | U | 1.65 | pCi/L | |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-004 | Americium-241 | -9.27 | 14.9 | U | 22 | pCi/L | 200 |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-004 | Beryllium-7 | -18 | 20 | U | 31 | pCi/L | |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-003 | Beta, gross | 25.2 | 4.37 | | 1.59 | pCi/L | |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-004 | Bismuth-212 | 28.8 | 27.3 | U | 47.7 | pCi/L | |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-004 | Bismuth-214 | -5.93 | 8.09 | U | 8.23 | pCi/L | |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-004 | Cesium-137 | -0.295 | 1.92 | U | 3.21 | pCi/L | 10000 |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-004 | Cobalt-60 | -4.34 | 3.07 | U | 3.15 | pCi/L | 30000 |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-004 | Lead-212 | 4.05 | 5.92 | U | 6.33 | pCi/L | 20000 |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-004 | Lead-214 | -5.27 | 7.79 | U | 7.89 | pCi/L | 1000000 |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-004 | Neptunium-237 | 3.55 | 3.64 | U | 6.26 | pCi/L | |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-004 | Potassium-40 | 56.8 | 55.7 | | 29.1 | pCi/L | 40000 |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-004 | Radium-223 | 8.85 | 720 | U | 61.7 | pCi/L | |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-004 | Radium-224 | 73.4 | 37.7 | U | 73.4 | pCi/L | |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-004 | Radium-226 | 24.7 | 76.2 | U | 59.7 | pCi/L | 600 |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-004 | Radium-228 | -14.5 | 13.7 | U | 14.7 | pCi/L | 600 |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-004 | Sodium-22 | -1.09 | 2.02 | U | 3.23 | pCi/L | |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-004 | Thorium-227 | -16.6 | 1350 | U | 23.8 | pCi/L | |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-004 | Thorium-231 | -31 | 44 | U | 46 | pCi/L | 300 |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-004 | Thorium-234 | 152 | 220 | U | 196 | pCi/L | 50000 |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-005 | Tritium | 57.7 | 97.5 | U | 165 | pCi/L | 10000000 |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-004 | Uranium-235 | 26.7 | 18.7 | X | 17 | pCi/L | 3000 |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-004 | Uranium-238 | 152 | 220 | U | 196 | pCi/L | 3000 |
| WW011 | 2069-K | 26-Oct-10 | 089597-004 | Actinium-228 | -1.59 | 12.9 | U | 12.8 | pCi/L | 300000 |
| WW011 | 2069-K | 26-Oct-10 | 089597-003 | Alpha, gross | 2.29 | 1.05 | | 1.3 | pCi/L | |
| WW011 | 2069-K | 26-Oct-10 | 089597-004 | Americium-241 | -2.97 | 8.03 | U | 11.6 | pCi/L | 200 |

**TABLE A-8. Summary of Sanitary Outfalls of Radiological Analyses, October 2010**

| Station | Permit Number | Date Collected | Sample ID | Analyte | Activity | Two Sigma Error | Lab Data Qualifier | MDA | Units | Regulatory Sewer Release Limits* (Monthly Avg) |
|---|---|---|---|---|---|---|---|---|---|---|
| WW011 | 2069-K | 26-Oct-10 | 089597-004 | Beryllium-7 | 17 | 16.3 | U | 28.6 | pCi/L | |
| WW011 | 2069-K | 26-Oct-10 | 089597-003 | Beta, gross | 24.3 | 4.2 | | 1.3 | pCi/L | |
| WW011 | 2069-K | 26-Oct-10 | 089597-004 | Bismuth-212 | 10.4 | 23.4 | U | 39.2 | pCi/L | |
| WW011 | 2069-K | 26-Oct-10 | 089597-004 | Bismuth-214 | -2.54 | 6.72 | U | 6.96 | pCi/L | |
| WW011 | 2069-K | 26-Oct-10 | 089597-004 | Cesium-137 | -0.163 | 1.77 | U | 2.9 | pCi/L | 10000 |
| WW011 | 2069-K | 26-Oct-10 | 089597-004 | Cobalt-60 | 1.49 | 1.72 | U | 3.02 | pCi/L | 30000 |
| WW011 | 2069-K | 26-Oct-10 | 089597-004 | Lead-212 | 1.01 | 5.59 | U | 6.09 | pCi/L | 20000 |
| WW011 | 2069-K | 26-Oct-10 | 089597-004 | Lead-214 | -4.8 | 6.68 | U | 6.74 | pCi/L | 1000000 |
| WW011 | 2069-K | 26-Oct-10 | 089597-004 | Neptunium-237 | 0.644 | 3.14 | U | 5.12 | pCi/L | |
| WW011 | 2069-K | 26-Oct-10 | 089597-004 | Potassium-40 | 46.2 | 45.3 | | 25.7 | pCi/L | 40000 |
| WW011 | 2069-K | 26-Oct-10 | 089597-004 | Radium-223 | -1.47 | 124 | U | 52.8 | pCi/L | |
| WW011 | 2069-K | 26-Oct-10 | 089597-004 | Radium-224 | 24.5 | 34.5 | U | 51.9 | pCi/L | |
| WW011 | 2069-K | 26-Oct-10 | 089597-004 | Radium-226 | -13.5 | 65.1 | U | 69.4 | pCi/L | 600 |
| WW011 | 2069-K | 26-Oct-10 | 089597-004 | Radium-228 | -1.59 | 12.9 | U | 12.8 | pCi/L | 600 |
| WW011 | 2069-K | 26-Oct-10 | 089597-004 | Sodium-22 | 1.8 | 1.76 | U | 3.13 | pCi/L | |
| WW011 | 2069-K | 26-Oct-10 | 089597-004 | Thorium-227 | -9.02 | 734 | U | 19.8 | pCi/L | |
| WW011 | 2069-K | 26-Oct-10 | 089597-004 | Thorium-231 | 38.9 | 26.3 | X | 31.6 | pCi/L | 300 |
| WW011 | 2069-K | 26-Oct-10 | 089597-004 | Thorium-234 | 40.6 | 126 | U | 123 | pCi/L | 50000 |
| WW011 | 2069-K | 26-Oct-10 | 089597-005 | Tritium | -27 | 95.1 | U | 167 | pCi/L | 10000000 |
| WW011 | 2069-K | 26-Oct-10 | 089597-004 | Uranium-235 | 13.3 | 19.7 | U | 16.8 | pCi/L | 3000 |
| WW011 | 2069-K | 26-Oct-10 | 089597-004 | Uranium-238 | 40.6 | 126 | U | 123 | pCi/L | 3000 |

**NOTES:**

**MDA = minimum detectable activity.**
**pCi/L = picocuries per liter**
**U = The result is less than the MDA.**
**X = Presumptive evidence analyte is not present.**
*** = The monthly average concentration values for release of sanitary sewage were derived by taking the most restrictive occupational stochastic oral ingestion annual limits on intake (ALT) for a reference mean.**

**TABLE A-9. Summary of Sanitary Outfalls of Volatile Organic Compounds, October 2010**

| Station | Permit Number | Date Collected | Sample ID | Analyte | Result | MDL | Lab Data Qualifier | Units |
|---|---|---|---|---|---|---|---|---|
| CINT | 2238A | 26-Oct-10 | 089599-004 | Acetone | 416 | 3.5 | | ug/L |
| CINT | 2238A | 26-Oct-10 | 089599-004 | Benzene | | 0.3 | U | ug/L |
| CINT | 2238A | 26-Oct-10 | 089599-004 | Bromodichloromethane | 0.53 | 0.25 | J | ug/L |
| CINT | 2238A | 26-Oct-10 | 089599-004 | Bromoform | 0.61 | 0.25 | J | ug/L |
| CINT | 2238A | 26-Oct-10 | 089599-004 | Bromomethane | | 0.3 | U | ug/L |
| CINT | 2238A | 26-Oct-10 | 089599-004 | Butanone, 2- | | 1.25 | U | ug/L |
| CINT | 2238A | 26-Oct-10 | 089599-004 | Carbon disulfide | | 1.25 | U | ug/L |
| CINT | 2238A | 26-Oct-10 | 089599-004 | Carbon tetrachloride | | 0.3 | U | ug/L |
| CINT | 2238A | 26-Oct-10 | 089599-004 | Chlorobenzene | | 0.25 | U | ug/L |
| CINT | 2238A | 26-Oct-10 | 089599-004 | Chloroethane | | 0.3 | U | ug/L |
| CINT | 2238A | 26-Oct-10 | 089599-004 | Chloroform | 0.45 | 0.25 | J | ug/L |
| CINT | 2238A | 26-Oct-10 | 089599-004 | Chloromethane | | 0.3 | U | ug/L |
| CINT | 2238A | 26-Oct-10 | 089599-004 | Dibromochloromethane | 0.73 | 0.3 | J | ug/L |
| CINT | 2238A | 26-Oct-10 | 089599-004 | Dichloroethane, 1,1- | | 0.3 | U | ug/L |
| CINT | 2238A | 26-Oct-10 | 089599-004 | Dichloroethane, 1,2- | | 0.25 | U | ug/L |
| CINT | 2238A | 26-Oct-10 | 089599-004 | Dichloroethene, 1,1- | | 0.3 | U | ug/L |
| CINT | 2238A | 26-Oct-10 | 089599-004 | Dichloroethene, cis-1,2- | | 0.3 | U | ug/L |
| CINT | 2238A | 26-Oct-10 | 089599-004 | Dichloroethene, trans-1,2- | | 0.3 | U | ug/L |
| CINT | 2238A | 26-Oct-10 | 089599-004 | Dichloropropane, 1,2- | | 0.25 | U | ug/L |
| CINT | 2238A | 26-Oct-10 | 089599-004 | Dichloropropene, cis-1,3- | | 0.25 | U | ug/L |
| CINT | 2238A | 26-Oct-10 | 089599-004 | Dichloropropene, trans-1,3- | | 0.25 | U | ug/L |
| CINT | 2238A | 26-Oct-10 | 089599-004 | Ethyl benzene | | 0.25 | U | ug/L |
| CINT | 2238A | 26-Oct-10 | 089599-004 | Hexanone, 2- | | 1.25 | U | ug/L |
| CINT | 2238A | 26-Oct-10 | 089599-004 | Methylene chloride | | 3 | U | ug/L |
| CINT | 2238A | 26-Oct-10 | 089599-004 | Pentanone, 4-methyl-, 2- | | 1.25 | U | ug/L |
| CINT | 2238A | 26-Oct-10 | 089599-004 | Styrene | | 0.25 | U | ug/L |
| CINT | 2238A | 26-Oct-10 | 089599-004 | Tetrachloroethane, 1,1,2,2- | | 0.25 | U | ug/L |
| CINT | 2238A | 26-Oct-10 | 089599-004 | Tetrachloroethene | | 0.3 | U | ug/L |
| CINT | 2238A | 26-Oct-10 | 089599-004 | Toluene | | 0.25 | U | ug/L |
| CINT | 2238A | 26-Oct-10 | 089599-004 | Trichloroethane, 1,1,1- | | 0.325 | U | ug/L |
| CINT | 2238A | 26-Oct-10 | 089599-004 | Trichloroethane, 1,1,2- | | 0.25 | U | ug/L |
| CINT | 2238A | 26-Oct-10 | 089599-004 | Trichloroethene | | 0.25 | U | ug/L |

## TABLE A-9. Summary of Sanitary Outfalls of Volatile Organic Compounds, October 2010

| Station | Permit Number | Date Collected | Sample ID | Analyte | Result | MDL | Lab Data Qualifier | Units |
|---|---|---|---|---|---|---|---|---|
| CINT | 2238A | 26-Oct-10 | 089599-004 | Vinyl acetate | | 1.5 | U | ug/L |
| CINT | 2238A | 26-Oct-10 | 089599-004 | Vinyl chloride | | 0.5 | U | ug/L |
| CINT | 2238A | 26-Oct-10 | 089599-004 | Xylene | | 0.3 | U | ug/L |
| WW001 | 2069-A | 26-Oct-10 | 089593-006 | Acetone | 20 | 3.5 | | ug/L |
| WW001 | 2069-A | 26-Oct-10 | 089593-006 | Benzene | | 0.3 | U | ug/L |
| WW001 | 2069-A | 26-Oct-10 | 089593-006 | Bromodichloromethane | | 0.25 | U | ug/L |
| WW001 | 2069-A | 26-Oct-10 | 089593-006 | Bromoform | 1.16 | 0.25 | | ug/L |
| WW001 | 2069-A | 26-Oct-10 | 089593-006 | Bromomethane | | 0.3 | U | ug/L |
| WW001 | 2069-A | 26-Oct-10 | 089593-006 | Butanone, 2- | | 1.25 | U | ug/L |
| WW001 | 2069-A | 26-Oct-10 | 089593-006 | Carbon disulfide | | 1.25 | U | ug/L |
| WW001 | 2069-A | 26-Oct-10 | 089593-006 | Carbon tetrachloride | | 0.3 | U | ug/L |
| WW001 | 2069-A | 26-Oct-10 | 089593-006 | Chlorobenzene | | 0.25 | U | ug/L |
| WW001 | 2069-A | 26-Oct-10 | 089593-006 | Chloroethane | | 0.3 | U | ug/L |
| WW001 | 2069-A | 26-Oct-10 | 089593-006 | Chloroform | | 0.25 | U | ug/L |
| WW001 | 2069-A | 26-Oct-10 | 089593-006 | Chloromethane | 0.42 | 0.3 | J | ug/L |
| WW001 | 2069-A | 26-Oct-10 | 089593-006 | Dibromochloromethane | 0.49 | 0.3 | J | ug/L |
| WW001 | 2069-A | 26-Oct-10 | 089593-006 | Dichloroethane, 1,1- | | 0.3 | U | ug/L |
| WW001 | 2069-A | 26-Oct-10 | 089593-006 | Dichloroethane, 1,2- | | 0.25 | U | ug/L |
| WW001 | 2069-A | 26-Oct-10 | 089593-006 | Dichloroethene, 1,1- | | 0.3 | U | ug/L |
| WW001 | 2069-A | 26-Oct-10 | 089593-006 | Dichloroethene, cis-1,2- | | 0.3 | U | ug/L |
| WW001 | 2069-A | 26-Oct-10 | 089593-006 | Dichloroethene, trans-1,2- | | 0.3 | U | ug/L |
| WW001 | 2069-A | 26-Oct-10 | 089593-006 | Dichloropropane, 1,2- | | 0.25 | U | ug/L |
| WW001 | 2069-A | 26-Oct-10 | 089593-006 | Dichloropropene, cis-1,3- | | 0.25 | U | ug/L |
| WW001 | 2069-A | 26-Oct-10 | 089593-006 | Dichloropropene, trans-1,3- | | 0.25 | U | ug/L |
| WW001 | 2069-A | 26-Oct-10 | 089593-006 | Ethyl benzene | | 0.25 | U | ug/L |
| WW001 | 2069-A | 26-Oct-10 | 089593-006 | Hexanone, 2- | | 1.25 | U | ug/L |
| WW001 | 2069-A | 26-Oct-10 | 089593-006 | Methylene chloride | | 3 | U | ug/L |
| WW001 | 2069-A | 26-Oct-10 | 089593-006 | Pentanone, 4-methyl-, 2- | | 1.25 | U | ug/L |
| WW001 | 2069-A | 26-Oct-10 | 089593-006 | Styrene | | 0.25 | U | ug/L |
| WW001 | 2069-A | 26-Oct-10 | 089593-006 | Tetrachloroethane, 1,1,2,2- | | 0.25 | U | ug/L |
| WW001 | 2069-A | 26-Oct-10 | 089593-006 | Tetrachloroethene | | 0.3 | U | ug/L |
| WW001 | 2069-A | 26-Oct-10 | 089593-006 | Toluene | | 0.25 | U | ug/L |

## TABLE A-9.  Summary of Sanitary Outfalls of Volatile Organic Compounds, October 2010

| Station | Permit Number | Date Collected | Sample ID | Analyte | Result | MDL | Lab Data Qualifier | Units |
|---|---|---|---|---|---|---|---|---|
| WW001 | 2069-A | 26-Oct-10 | 089593-006 | Trichloroethane, 1,1,1- | | 0.325 | U | ug/L |
| WW001 | 2069-A | 26-Oct-10 | 089593-006 | Trichloroethane, 1,1,2- | | 0.25 | U | ug/L |
| WW001 | 2069-A | 26-Oct-10 | 089593-006 | Trichloroethene | | 0.25 | U | ug/L |
| WW001 | 2069-A | 26-Oct-10 | 089593-006 | Vinyl acetate | | 1.5 | U | ug/L |
| WW001 | 2069-A | 26-Oct-10 | 089593-006 | Vinyl chloride | | 0.5 | U | ug/L |
| WW001 | 2069-A | 26-Oct-10 | 089593-006 | Xylene | | 0.3 | U | ug/L |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-006 | Acetone | 51.3 | 3.5 | | ug/L |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-006 | Benzene | | 0.3 | U | ug/L |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-006 | Bromodichloromethane | | 0.25 | U | ug/L |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-006 | Bromoform | | 0.25 | U | ug/L |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-006 | Bromomethane | | 0.3 | U | ug/L |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-006 | Butanone, 2- | | 1.25 | U | ug/L |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-006 | Carbon disulfide | | 1.25 | U | ug/L |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-006 | Carbon tetrachloride | | 0.3 | U | ug/L |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-006 | Chlorobenzene | | 0.25 | U | ug/L |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-006 | Chloroethane | | 0.3 | U | ug/L |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-006 | Chloroform | | 0.25 | U | ug/L |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-006 | Chloromethane | | 0.3 | U | ug/L |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-006 | Dibromochloromethane | | 0.3 | U | ug/L |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-006 | Dichloroethane, 1,1- | | 0.3 | U | ug/L |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-006 | Dichloroethane, 1,2- | | 0.25 | U | ug/L |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-006 | Dichloroethene, 1,1- | | 0.3 | U | ug/L |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-006 | Dichloroethene, cis-1,2- | | 0.3 | U | ug/L |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-006 | Dichloroethene, trans-1,2- | | 0.3 | U | ug/L |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-006 | Dichloropropane, 1,2- | | 0.25 | U | ug/L |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-006 | Dichloropropene, cis-1,3- | | 0.25 | U | ug/L |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-006 | Dichloropropene, trans-1,3- | | 0.25 | U | ug/L |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-006 | Ethyl benzene | | 0.25 | U | ug/L |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-006 | Hexanone, 2- | | 1.25 | U | ug/L |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-006 | Methylene chloride | | 3 | U | ug/L |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-006 | Pentanone, 4-methyl-, 2- | | 1.25 | U | ug/L |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-006 | Styrene | | 0.25 | U | ug/L |

## TABLE A-9.  Summary of Sanitary Outfalls of Volatile Organic Compounds, October 2010

| Station | Permit Number | Date Collected | Sample ID | Analyte | Result | MDL | Lab Data Qualifier | Units |
|---|---|---|---|---|---|---|---|---|
| WW006 | 2069F-4 | 26-Oct-10 | 089594-006 | Tetrachloroethane, 1,1,2,2- | | 0.25 | U | ug/L |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-006 | Tetrachloroethene | | 0.3 | U | ug/L |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-006 | Toluene | | 0.25 | U | ug/L |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-006 | Trichloroethane, 1,1,1- | | 0.325 | U | ug/L |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-006 | Trichloroethane, 1,1,2- | | 0.25 | U | ug/L |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-006 | Trichloroethene | | 0.25 | U | ug/L |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-006 | Vinyl acetate | | 1.5 | U | ug/L |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-006 | Vinyl chloride | | 0.5 | U | ug/L |
| WW006 | 2069F-4 | 26-Oct-10 | 089594-006 | Xylene | | 0.3 | U | ug/L |
| WW007 | 2069G-2 | 26-Oct-10 | 089595-003 | Acetone | 5.26 | 3.5 | J | ug/L |
| WW007 | 2069G-2 | 26-Oct-10 | 089595-003 | Benzene | | 0.3 | U | ug/L |
| WW007 | 2069G-2 | 26-Oct-10 | 089595-003 | Bromodichloromethane | | 0.25 | U | ug/L |
| WW007 | 2069G-2 | 26-Oct-10 | 089595-003 | Bromoform | | 0.25 | U | ug/L |
| WW007 | 2069G-2 | 26-Oct-10 | 089595-003 | Bromomethane | | 0.3 | U | ug/L |
| WW007 | 2069G-2 | 26-Oct-10 | 089595-003 | Butanone, 2- | | 1.25 | U | ug/L |
| WW007 | 2069G-2 | 26-Oct-10 | 089595-003 | Carbon disulfide | | 1.25 | U | ug/L |
| WW007 | 2069G-2 | 26-Oct-10 | 089595-003 | Carbon tetrachloride | | 0.3 | U | ug/L |
| WW007 | 2069G-2 | 26-Oct-10 | 089595-003 | Chlorobenzene | | 0.25 | U | ug/L |
| WW007 | 2069G-2 | 26-Oct-10 | 089595-003 | Chloroethane | | 0.3 | U | ug/L |
| WW007 | 2069G-2 | 26-Oct-10 | 089595-003 | Chloroform | | 0.25 | U | ug/L |
| WW007 | 2069G-2 | 26-Oct-10 | 089595-003 | Chloromethane | 0.67 | 0.3 | J | ug/L |
| WW007 | 2069G-2 | 26-Oct-10 | 089595-003 | Dibromochloromethane | | 0.3 | U | ug/L |
| WW007 | 2069G-2 | 26-Oct-10 | 089595-003 | Dichloroethane, 1,1- | | 0.3 | U | ug/L |
| WW007 | 2069G-2 | 26-Oct-10 | 089595-003 | Dichloroethane, 1,2- | | 0.25 | U | ug/L |
| WW007 | 2069G-2 | 26-Oct-10 | 089595-003 | Dichloroethene, 1,1- | | 0.3 | U | ug/L |
| WW007 | 2069G-2 | 26-Oct-10 | 089595-003 | Dichloroethene, cis-1,2- | | 0.3 | U | ug/L |
| WW007 | 2069G-2 | 26-Oct-10 | 089595-003 | Dichloroethene, trans-1,2- | | 0.3 | U | ug/L |
| WW007 | 2069G-2 | 26-Oct-10 | 089595-003 | Dichloropropane, 1,2- | | 0.25 | U | ug/L |
| WW007 | 2069G-2 | 26-Oct-10 | 089595-003 | Dichloropropene, cis-1,3- | | 0.25 | U | ug/L |
| WW007 | 2069G-2 | 26-Oct-10 | 089595-003 | Dichloropropene, trans-1,3- | | 0.25 | U | ug/L |
| WW007 | 2069G-2 | 26-Oct-10 | 089595-003 | Ethyl benzene | | 0.25 | U | ug/L |
| WW007 | 2069G-2 | 26-Oct-10 | 089595-003 | Hexanone, 2- | | 1.25 | U | ug/L |

**TABLE A-9. Summary of Sanitary Outfalls of Volatile Organic Compounds, October 2010**

| Station | Permit Number | Date Collected | Sample ID | Analyte | Result | MDL | Lab Data Qualifier | Units |
|---|---|---|---|---|---|---|---|---|
| WW007 | 2069G-2 | 26-Oct-10 | 089595-003 | Methylene chloride | | 3 | U | ug/L |
| WW007 | 2069G-2 | 26-Oct-10 | 089595-003 | Pentanone, 4-methyl-, 2- | | 1.25 | U | ug/L |
| WW007 | 2069G-2 | 26-Oct-10 | 089595-003 | Styrene | | 0.25 | U | ug/L |
| WW007 | 2069G-2 | 26-Oct-10 | 089595-003 | Tetrachloroethane, 1,1,2,2- | | 0.25 | U | ug/L |
| WW007 | 2069G-2 | 26-Oct-10 | 089595-003 | Tetrachloroethene | | 0.3 | U | ug/L |
| WW007 | 2069G-2 | 26-Oct-10 | 089595-003 | Toluene | | 0.25 | U | ug/L |
| WW007 | 2069G-2 | 26-Oct-10 | 089595-003 | Trichloroethane, 1,1,1- | | 0.325 | U | ug/L |
| WW007 | 2069G-2 | 26-Oct-10 | 089595-003 | Trichloroethane, 1,1,2- | | 0.25 | U | ug/L |
| WW007 | 2069G-2 | 26-Oct-10 | 089595-003 | Trichloroethene | | 0.25 | U | ug/L |
| WW007 | 2069G-2 | 26-Oct-10 | 089595-003 | Vinyl acetate | | 1.5 | U | ug/L |
| WW007 | 2069G-2 | 26-Oct-10 | 089595-003 | Vinyl chloride | | 0.5 | U | ug/L |
| WW007 | 2069G-2 | 26-Oct-10 | 089595-003 | Xylene | | 0.3 | U | ug/L |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-006 | Acetone | | 3.5 | U | ug/L |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-006 | Benzene | | 0.3 | U | ug/L |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-006 | Bromodichloromethane | | 0.25 | U | ug/L |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-006 | Bromoform | | 0.25 | U | ug/L |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-006 | Bromomethane | | 0.3 | U | ug/L |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-006 | Butanone, 2- | 1.47 | 1.25 | J | ug/L |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-006 | Carbon disulfide | | 1.25 | U | ug/L |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-006 | Carbon tetrachloride | | 0.3 | U | ug/L |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-006 | Chlorobenzene | | 0.25 | U | ug/L |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-006 | Chloroethane | | 0.3 | U | ug/L |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-006 | Chloroform | | 0.25 | U | ug/L |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-006 | Chloromethane | 0.56 | 0.3 | J | ug/L |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-006 | Dibromochloromethane | | 0.3 | U | ug/L |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-006 | Dichloroethane, 1,1- | | 0.3 | U | ug/L |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-006 | Dichloroethane, 1,2- | | 0.25 | U | ug/L |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-006 | Dichloroethene, 1,1- | | 0.3 | U | ug/L |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-006 | Dichloroethene, cis-1,2- | | 0.3 | U | ug/L |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-006 | Dichloroethene, trans-1,2- | | 0.3 | U | ug/L |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-006 | Dichloropropane, 1,2- | | 0.25 | U | ug/L |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-006 | Dichloropropene, cis-1,3- | | 0.25 | U | ug/L |

## TABLE A-9. Summary of Sanitary Outfalls of Volatile Organic Compounds, October 2010

| Station | Permit Number | Date Collected | Sample ID | Analyte | Result | MDL | Lab Data Qualifier | Units |
|---|---|---|---|---|---|---|---|---|
| WW008 | 2069I-3 | 26-Oct-10 | 089596-006 | Dichloropropene, trans-1,3- | | 0.25 | U | ug/L |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-006 | Ethyl benzene | | 0.25 | U | ug/L |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-006 | Hexanone, 2- | | 1.25 | U | ug/L |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-006 | Methylene chloride | | 3 | U | ug/L |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-006 | Pentanone, 4-methyl-, 2- | | 1.25 | U | ug/L |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-006 | Styrene | | 0.25 | U | ug/L |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-006 | Tetrachloroethane, 1,1,2,2- | | 0.25 | U | ug/L |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-006 | Tetrachloroethene | | 0.3 | U | ug/L |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-006 | Toluene | 0.25 | 0.25 | J | ug/L |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-006 | Trichloroethane, 1,1,1- | | 0.325 | U | ug/L |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-006 | Trichloroethane, 1,1,2- | | 0.25 | U | ug/L |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-006 | Trichloroethene | | 0.25 | U | ug/L |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-006 | Vinyl acetate | | 1.5 | U | ug/L |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-006 | Vinyl chloride | | 0.5 | U | ug/L |
| WW008 | 2069I-3 | 26-Oct-10 | 089596-006 | Xylene | | 0.3 | U | ug/L |
| WW011 | 2069-K | 26-Oct-10 | 089597-006 | Acetone | 64.8 | 3.5 | | ug/L |
| WW011 | 2069-K | 26-Oct-10 | 089597-006 | Benzene | | 0.3 | U | ug/L |
| WW011 | 2069-K | 26-Oct-10 | 089597-006 | Bromodichloromethane | | 0.25 | U | ug/L |
| WW011 | 2069-K | 26-Oct-10 | 089597-006 | Bromoform | 0.31 | 0.25 | J | ug/L |
| WW011 | 2069-K | 26-Oct-10 | 089597-006 | Bromomethane | | 0.3 | U | ug/L |
| WW011 | 2069-K | 26-Oct-10 | 089597-006 | Butanone, 2- | 2.88 | 1.25 | J | ug/L |
| WW011 | 2069-K | 26-Oct-10 | 089597-006 | Carbon disulfide | | 1.25 | U | ug/L |
| WW011 | 2069-K | 26-Oct-10 | 089597-006 | Carbon tetrachloride | | 0.3 | U | ug/L |
| WW011 | 2069-K | 26-Oct-10 | 089597-006 | Chlorobenzene | | 0.25 | U | ug/L |
| WW011 | 2069-K | 26-Oct-10 | 089597-006 | Chloroethane | | 0.3 | U | ug/L |
| WW011 | 2069-K | 26-Oct-10 | 089597-006 | Chloroform | | 0.25 | U | ug/L |
| WW011 | 2069-K | 26-Oct-10 | 089597-006 | Chloromethane | 0.36 | 0.3 | J | ug/L |
| WW011 | 2069-K | 26-Oct-10 | 089597-006 | Dibromochloromethane | | 0.3 | U | ug/L |
| WW011 | 2069-K | 26-Oct-10 | 089597-006 | Dichloroethane, 1,1- | | 0.3 | U | ug/L |
| WW011 | 2069-K | 26-Oct-10 | 089597-006 | Dichloroethane, 1,2- | | 0.25 | U | ug/L |
| WW011 | 2069-K | 26-Oct-10 | 089597-006 | Dichloroethene, 1,1- | | 0.3 | U | ug/L |
| WW011 | 2069-K | 26-Oct-10 | 089597-006 | Dichloroethene, cis-1,2- | | 0.3 | U | ug/L |

**TABLE A-9.  Summary of Sanitary Outfalls of Volatile Organic Compounds, October 2010**

| Station | Permit Number | Date Collected | Sample ID | Analyte | Result | MDL | Lab Data Qualifier | Units |
|---|---|---|---|---|---|---|---|---|
| WW011 | 2069-K | 26-Oct-10 | 089597-006 | Dichloroethene, trans-1,2- | | 0.3 | U | ug/L |
| WW011 | 2069-K | 26-Oct-10 | 089597-006 | Dichloropropane, 1,2- | | 0.25 | U | ug/L |
| WW011 | 2069-K | 26-Oct-10 | 089597-006 | Dichloropropene, cis-1,3- | | 0.25 | U | ug/L |
| WW011 | 2069-K | 26-Oct-10 | 089597-006 | Dichloropropene, trans-1,3- | | 0.25 | U | ug/L |
| WW011 | 2069-K | 26-Oct-10 | 089597-006 | Ethyl benzene | | 0.25 | U | ug/L |
| WW011 | 2069-K | 26-Oct-10 | 089597-006 | Hexanone, 2- | | 1.25 | U | ug/L |
| WW011 | 2069-K | 26-Oct-10 | 089597-006 | Methylene chloride | | 3 | U | ug/L |
| WW011 | 2069-K | 26-Oct-10 | 089597-006 | Pentanone, 4-methyl-, 2- | | 1.25 | U | ug/L |
| WW011 | 2069-K | 26-Oct-10 | 089597-006 | Styrene | | 0.25 | U | ug/L |
| WW011 | 2069-K | 26-Oct-10 | 089597-006 | Tetrachloroethane, 1,1,2,2- | | 0.25 | U | ug/L |
| WW011 | 2069-K | 26-Oct-10 | 089597-006 | Tetrachloroethene | | 0.3 | U | ug/L |
| WW011 | 2069-K | 26-Oct-10 | 089597-006 | Toluene | | 0.25 | U | ug/L |
| WW011 | 2069-K | 26-Oct-10 | 089597-006 | Trichloroethane, 1,1,1- | | 0.325 | U | ug/L |
| WW011 | 2069-K | 26-Oct-10 | 089597-006 | Trichloroethane, 1,1,2- | | 0.25 | U | ug/L |
| WW011 | 2069-K | 26-Oct-10 | 089597-006 | Trichloroethene | | 0.25 | U | ug/L |
| WW011 | 2069-K | 26-Oct-10 | 089597-006 | Vinyl acetate | | 1.5 | U | ug/L |
| WW011 | 2069-K | 26-Oct-10 | 089597-006 | Vinyl chloride | | 0.5 | U | ug/L |
| WW011 | 2069-K | 26-Oct-10 | 089597-006 | Xylene | | 0.3 | U | ug/L |

**NOTES:**

**MDL = Method detection limit.**

**J = Estimated value, the analyte concentration fell above the effective MDL limit and below the effective (PQL) practical quantitation limit.**

**ug/L = micrograms per liter.**

**U = The analyte was analyzed for, but not detected. For organic and inorganic analytes the result is less than the effective MDL concentration.**

## TABLE A-10.  Summary of Sanitary Outfalls of Semi-Volitile Organic Compounds, October 2010

| Station | Permit Number | Date Collected | Sample ID | Analyte | Result | MDL | Lab Data Qualifier | Units |
|---|---|---|---|---|---|---|---|---|
| CINT | 2238A | 27-Oct-10 | 089605-002 | Acenaphthene | | 0.292 | U | ug/L |
| CINT | 2238A | 27-Oct-10 | 089605-002 | Acenaphthylene | | 0.189 | U | ug/L |
| CINT | 2238A | 27-Oct-10 | 089605-002 | Anthracene | | 0.189 | U | ug/L |
| CINT | 2238A | 27-Oct-10 | 089605-002 | Benzo(a)anthracene | | 0.189 | U | ug/L |
| CINT | 2238A | 27-Oct-10 | 089605-002 | Benzo(a)pyrene | | 0.189 | U | ug/L |
| CINT | 2238A | 27-Oct-10 | 089605-002 | Benzo(b)fluoranthene | | 0.189 | U | ug/L |
| CINT | 2238A | 27-Oct-10 | 089605-002 | Benzo(ghi)perylene | | 0.189 | U | ug/L |
| CINT | 2238A | 27-Oct-10 | 089605-002 | Benzo(k)fluoranthene | | 0.189 | U | ug/L |
| CINT | 2238A | 27-Oct-10 | 089605-002 | Bromophenyl phenyl ether, 4- | | 1.89 | U | ug/L |
| CINT | 2238A | 27-Oct-10 | 089605-002 | Butylbenzyl phthalate | | 1.89 | U | ug/L |
| CINT | 2238A | 27-Oct-10 | 089605-002 | Carbazole | | 0.189 | U | ug/L |
| CINT | 2238A | 27-Oct-10 | 089605-002 | Chloro-3-methylphenol, 4- | | 1.89 | U | ug/L |
| CINT | 2238A | 27-Oct-10 | 089605-002 | Chlorobenzenamine, 4- | | 1.89 | U | ug/L |
| CINT | 2238A | 27-Oct-10 | 089605-002 | Chloroethoxy)methane, bis(2- | | 2.83 | U | ug/L |
| CINT | 2238A | 27-Oct-10 | 089605-002 | Chloroethyl)ether, bis(2- | | 1.89 | U | ug/L |
| CINT | 2238A | 27-Oct-10 | 089605-002 | Chloroisopropyl ether, bis- | | 1.89 | U | ug/L |
| CINT | 2238A | 27-Oct-10 | 089605-002 | Chloronaphthalene, 2- | | 0.283 | U | ug/L |
| CINT | 2238A | 27-Oct-10 | 089605-002 | Chlorophenol, 2- | | 1.89 | U | ug/L |
| CINT | 2238A | 27-Oct-10 | 089605-002 | Chlorophenyl phenyl ether, 4- | | 1.89 | U | ug/L |
| CINT | 2238A | 27-Oct-10 | 089605-002 | Chrysene | | 0.189 | U | ug/L |
| CINT | 2238A | 27-Oct-10 | 089605-002 | Cresol, m,p- | | 2.83 | U | ug/L |
| CINT | 2238A | 27-Oct-10 | 089605-002 | Cresol, o- | | 1.89 | U | ug/L |
| CINT | 2238A | 27-Oct-10 | 089605-002 | Di-n-butyl phthalate | | 1.89 | U | ug/L |
| CINT | 2238A | 27-Oct-10 | 089605-002 | Di-n-octyl phthalate | | 2.83 | U | ug/L |
| CINT | 2238A | 27-Oct-10 | 089605-002 | Dibenz[a,h]anthracene | | 0.189 | U | ug/L |
| CINT | 2238A | 27-Oct-10 | 089605-002 | Dibenzofuran | | 1.89 | U | ug/L |
| CINT | 2238A | 27-Oct-10 | 089605-002 | Dichlorobenzene, 1,2- | | 1.89 | U | ug/L |
| CINT | 2238A | 27-Oct-10 | 089605-002 | Dichlorobenzene, 1,3- | | 1.89 | U | ug/L |
| CINT | 2238A | 27-Oct-10 | 089605-002 | Dichlorobenzene, 1,4- | | 1.89 | U | ug/L |
| CINT | 2238A | 27-Oct-10 | 089605-002 | Dichlorobenzidine, 3,3'- | | 1.89 | U | ug/L |
| CINT | 2238A | 27-Oct-10 | 089605-002 | Dichlorophenol, 2,4- | | 1.89 | U | ug/L |
| CINT | 2238A | 27-Oct-10 | 089605-002 | Diethylphthalate | | 1.89 | U | ug/L |
| CINT | 2238A | 27-Oct-10 | 089605-002 | Dimethylphenol, 2,4- | | 1.89 | U | ug/L |
| CINT | 2238A | 27-Oct-10 | 089605-002 | Dimethylphthalate | | 1.89 | U | ug/L |

## TABLE A-10.  Summary of Sanitary Outfalls of Semi-Volitile Organic Compounds, October 2010

| Station | Permit Number | Date Collected | Sample ID | Analyte | Result | MDL | Lab Data Qualifier | Units |
|---|---|---|---|---|---|---|---|---|
| CINT | 2238A | 27-Oct-10 | 089605-002 | Dinitro-o-cresol | | 2.83 | U | ug/L |
| CINT | 2238A | 27-Oct-10 | 089605-002 | Dinitrophenol, 2,4- | | 4.72 | U | ug/L |
| CINT | 2238A | 27-Oct-10 | 089605-002 | Dinitrotoluene, 2,4- | | 1.89 | U | ug/L |
| CINT | 2238A | 27-Oct-10 | 089605-002 | Dinitrotoluene, 2,6- | | 1.89 | U | ug/L |
| CINT | 2238A | 27-Oct-10 | 089605-002 | Diphenyl amine | | 2.83 | U | ug/L |
| CINT | 2238A | 27-Oct-10 | 089605-002 | Ethylhexyl)phthalate, bis(2- | | 1.89 | U | ug/L |
| CINT | 2238A | 27-Oct-10 | 089605-002 | Fluoranthene | | 0.189 | U | ug/L |
| CINT | 2238A | 27-Oct-10 | 089605-002 | Fluorene | | 0.189 | U | ug/L |
| CINT | 2238A | 27-Oct-10 | 089605-002 | Hexachlorobenzene | | 1.89 | U | ug/L |
| CINT | 2238A | 27-Oct-10 | 089605-002 | Hexachlorobutadiene | | 1.89 | U | ug/L |
| CINT | 2238A | 27-Oct-10 | 089605-002 | Hexachlorocyclopentadiene | | 2.83 | U | ug/L |
| CINT | 2238A | 27-Oct-10 | 089605-002 | Hexachloroethane | | 1.89 | U | ug/L |
| CINT | 2238A | 27-Oct-10 | 089605-002 | Indeno(1,2,3-c,d)pyrene | | 0.189 | U | ug/L |
| CINT | 2238A | 27-Oct-10 | 089605-002 | Isophorone | | 2.83 | U | ug/L |
| CINT | 2238A | 27-Oct-10 | 089605-002 | Methylnaphthalene, 2- | | 0.283 | U | ug/L |
| CINT | 2238A | 27-Oct-10 | 089605-002 | Naphthalene | | 0.283 | U | ug/L |
| CINT | 2238A | 27-Oct-10 | 089605-002 | Nitro-benzene | | 2.83 | U | ug/L |
| CINT | 2238A | 27-Oct-10 | 089605-002 | Nitroaniline, 2- | | 1.89 | U | ug/L |
| CINT | 2238A | 27-Oct-10 | 089605-002 | Nitroaniline, 3- | | 1.89 | U | ug/L |
| CINT | 2238A | 27-Oct-10 | 089605-002 | Nitroaniline, 4- | | 2.83 | U | ug/L |
| CINT | 2238A | 27-Oct-10 | 089605-002 | Nitrophenol, 2- | | 1.89 | U | ug/L |
| CINT | 2238A | 27-Oct-10 | 089605-002 | Nitrophenol, 4- | | 1.89 | U | ug/L |
| CINT | 2238A | 27-Oct-10 | 089605-002 | Nitrosodipropylamine, n- | | 1.89 | U | ug/L |
| CINT | 2238A | 27-Oct-10 | 089605-002 | Pentachlorophenol | | 1.89 | U | ug/L |
| CINT | 2238A | 27-Oct-10 | 089605-002 | Phenanthrene | | 0.189 | U | ug/L |
| CINT | 2238A | 27-Oct-10 | 089605-002 | Phenol | | 0.943 | U | ug/L |
| CINT | 2238A | 27-Oct-10 | 089605-002 | Pyrene | | 0.283 | U | ug/L |
| CINT | 2238A | 27-Oct-10 | 089605-002 | Trichlorobenzene, 1,2,4- | | 1.89 | U | ug/L |
| CINT | 2238A | 27-Oct-10 | 089605-002 | Trichlorophenol, 2,4,5- | | 1.89 | U | ug/L |
| CINT | 2238A | 27-Oct-10 | 089605-002 | Trichlorophenol, 2,4,6- | | 1.89 | U | ug/L |
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Acenaphthene | | 0.292 | U | ug/L |
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Acenaphthylene | | 0.189 | U | ug/L |
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Anthracene | | 0.189 | U | ug/L |
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Benzo(a)anthracene | | 0.189 | U | ug/L |

TABLE A-10.  Summary of Sanitary Outfalls of Semi-Volitile Organic Compounds, October 2010

| Station | Permit Number | Date Collected | Sample ID | Analyte | Result | MDL | Lab Data Qualifier | Units |
|---|---|---|---|---|---|---|---|---|
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Benzo(a)pyrene | | 0.189 | U | ug/L |
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Benzo(b)fluoranthene | | 0.189 | U | ug/L |
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Benzo(ghi)perylene | | 0.189 | U | ug/L |
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Benzo(k)fluoranthene | | 0.189 | U | ug/L |
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Bromophenyl phenyl ether, 4- | | 1.89 | U | ug/L |
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Butylbenzyl phthalate | | 1.89 | U | ug/L |
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Carbazole | | 0.189 | U | ug/L |
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Chloro-3-methylphenol, 4- | | 1.89 | U | ug/L |
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Chlorobenzenamine, 4- | | 1.89 | U | ug/L |
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Chloroethoxy)methane, bis(2- | | 2.83 | U | ug/L |
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Chloroethyl)ether, bis(2- | | 1.89 | U | ug/L |
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Chloroisopropyl ether, bis- | | 1.89 | U | ug/L |
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Chloronaphthalene, 2- | | 0.283 | U | ug/L |
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Chlorophenol, 2- | | 1.89 | U | ug/L |
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Chlorophenyl phenyl ether, 4- | | 1.89 | U | ug/L |
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Chrysene | | 0.189 | U | ug/L |
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Cresol, m,p- | | 2.83 | U | ug/L |
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Cresol, o- | | 1.89 | U | ug/L |
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Di-n-butyl phthalate | | 1.89 | U | ug/L |
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Di-n-octyl phthalate | | 2.83 | U | ug/L |
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Dibenz[a,h]anthracene | | 0.189 | U | ug/L |
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Dibenzofuran | | 1.89 | U | ug/L |
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Dichlorobenzene, 1,2- | | 1.89 | U | ug/L |
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Dichlorobenzene, 1,3- | | 1.89 | U | ug/L |
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Dichlorobenzene, 1,4- | | 1.89 | U | ug/L |
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Dichlorobenzidine, 3,3'- | | 1.89 | U | ug/L |
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Dichlorophenol, 2,4- | | 1.89 | U | ug/L |
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Diethylphthalate | | 1.89 | U | ug/L |
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Dimethylphenol, 2,4- | | 1.89 | U | ug/L |
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Dimethylphthalate | | 1.89 | U | ug/L |
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Dinitro-o-cresol | | 2.83 | U | ug/L |
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Dinitrophenol, 2,4- | | 4.72 | U | ug/L |
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Dinitrotoluene, 2,4- | | 1.89 | U | ug/L |
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Dinitrotoluene, 2,6- | | 1.89 | U | ug/L |

**TABLE A-10.  Summary of Sanitary Outfalls of Semi-Volitile Organic Compounds, October 2010**

| Station | Permit Number | Date Collected | Sample ID | Analyte | Result | MDL | Lab Data Qualifier | Units |
|---|---|---|---|---|---|---|---|---|
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Diphenyl amine | | 2.83 | U | ug/L |
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Ethylhexyl)phthalate, bis(2- | 3.05 | 1.89 | J | ug/L |
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Fluoranthene | | 0.189 | U | ug/L |
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Fluorene | | 0.189 | U | ug/L |
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Hexachlorobenzene | | 1.89 | U | ug/L |
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Hexachlorobutadiene | | 1.89 | U | ug/L |
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Hexachlorocyclopentadiene | | 2.83 | U | ug/L |
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Hexachloroethane | | 1.89 | U | ug/L |
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Indeno(1,2,3-c,d)pyrene | | 0.189 | U | ug/L |
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Isophorone | | 2.83 | U | ug/L |
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Methylnaphthalene, 2- | | 0.283 | U | ug/L |
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Naphthalene | | 0.283 | U | ug/L |
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Nitro-benzene | | 2.83 | U | ug/L |
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Nitroaniline, 2- | | 1.89 | U | ug/L |
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Nitroaniline, 3- | | 1.89 | U | ug/L |
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Nitroaniline, 4- | | 2.83 | U | ug/L |
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Nitrophenol, 2- | | 1.89 | U | ug/L |
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Nitrophenol, 4- | | 1.89 | U | ug/L |
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Nitrosodipropylamine, n- | | 1.89 | U | ug/L |
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Pentachlorophenol | | 1.89 | U | ug/L |
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Phenanthrene | | 0.189 | U | ug/L |
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Phenol | | 0.943 | U | ug/L |
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Pyrene | | 0.283 | U | ug/L |
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Trichlorobenzene, 1,2,4- | | 1.89 | U | ug/L |
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Trichlorophenol, 2,4,5- | | 1.89 | U | ug/L |
| WW001 | 2069-A | 27-Oct-10 | 089600-004 | Trichlorophenol, 2,4,6- | | 1.89 | U | ug/L |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Acenaphthene | | 0.292 | U | ug/L |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Acenaphthylene | | 0.189 | U | ug/L |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Anthracene | | 0.189 | U | ug/L |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Benzo(a)anthracene | | 0.189 | U | ug/L |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Benzo(a)pyrene | | 0.189 | U | ug/L |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Benzo(b)fluoranthene | | 0.189 | U | ug/L |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Benzo(ghi)perylene | | 0.189 | U | ug/L |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Benzo(k)fluoranthene | | 0.189 | U | ug/L |

## TABLE A-10. Summary of Sanitary Outfalls of Semi-Volitile Organic Compounds, October 2010

| Station | Permit Number | Date Collected | Sample ID | Analyte | Result | MDL | Lab Data Qualifier | Units |
|---|---|---|---|---|---|---|---|---|
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Bromophenyl phenyl ether, 4- | | 1.89 | U | ug/L |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Butylbenzyl phthalate | | 1.89 | U | ug/L |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Carbazole | | 0.189 | U | ug/L |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Chloro-3-methylphenol, 4- | | 1.89 | U | ug/L |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Chlorobenzenamine, 4- | | 1.89 | U | ug/L |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Chloroethoxy)methane, bis(2- | | 2.83 | U | ug/L |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Chloroethyl)ether, bis(2- | | 1.89 | U | ug/L |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Chloroisopropyl ether, bis- | | 1.89 | U | ug/L |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Chloronaphthalene, 2- | | 0.283 | U | ug/L |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Chlorophenol, 2- | | 1.89 | U | ug/L |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Chlorophenyl phenyl ether, 4- | | 1.89 | U | ug/L |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Chrysene | | 0.189 | U | ug/L |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Cresol, m,p- | | 2.83 | U | ug/L |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Cresol, o- | | 1.89 | U | ug/L |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Di-n-butyl phthalate | | 1.89 | U | ug/L |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Di-n-octyl phthalate | | 2.83 | U | ug/L |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Dibenz[a,h]anthracene | | 0.189 | U | ug/L |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Dibenzofuran | | 1.89 | U | ug/L |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Dichlorobenzene, 1,2- | | 1.89 | U | ug/L |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Dichlorobenzene, 1,3- | | 1.89 | U | ug/L |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Dichlorobenzene, 1,4- | | 1.89 | U | ug/L |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Dichlorobenzidine, 3,3'- | | 1.89 | U | ug/L |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Dichlorophenol, 2,4- | | 1.89 | U | ug/L |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Diethylphthalate | | 1.89 | U | ug/L |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Dimethylphenol, 2,4- | | 1.89 | U | ug/L |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Dimethylphthalate | | 1.89 | U | ug/L |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Dinitro-o-cresol | | 2.83 | U | ug/L |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Dinitrophenol, 2,4- | | 4.72 | U | ug/L |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Dinitrotoluene, 2,4- | | 1.89 | U | ug/L |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Dinitrotoluene, 2,6- | | 1.89 | U | ug/L |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Diphenyl amine | | 2.83 | U | ug/L |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Ethylhexyl)phthalate, bis(2- | 20.6 | 1.89 | | ug/L |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Fluoranthene | | 0.189 | U | ug/L |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Fluorene | | 0.189 | U | ug/L |

TABLE A-10. Summary of Sanitary Outfalls of Semi-Volitile Organic Compounds, October 2010

| Station | Permit Number | Date Collected | Sample ID | Analyte | Result | MDL | Lab Data Qualifier | Units |
|---|---|---|---|---|---|---|---|---|
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Hexachlorobenzene | | 1.89 | U | ug/L |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Hexachlorobutadiene | | 1.89 | U | ug/L |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Hexachlorocyclopentadiene | | 2.83 | U | ug/L |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Hexachloroethane | | 1.89 | U | ug/L |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Indeno(1,2,3-c,d)pyrene | | 0.189 | U | ug/L |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Isophorone | | 2.83 | U | ug/L |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Methylnaphthalene, 2- | | 0.283 | U | ug/L |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Naphthalene | | 0.283 | U | ug/L |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Nitro-benzene | | 2.83 | U | ug/L |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Nitroaniline, 2- | | 1.89 | U | ug/L |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Nitroaniline, 3- | | 1.89 | U | ug/L |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Nitroaniline, 4- | | 2.83 | U | ug/L |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Nitrophenol, 2- | | 1.89 | U | ug/L |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Nitrophenol, 4- | | 1.89 | U | ug/L |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Nitrosodipropylamine, n- | | 1.89 | U | ug/L |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Pentachlorophenol | | 1.89 | U | ug/L |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Phenanthrene | | 0.189 | U | ug/L |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Phenol | | 0.943 | U | ug/L |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Pyrene | | 0.283 | U | ug/L |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Trichlorobenzene, 1,2,4- | | 1.89 | U | ug/L |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Trichlorophenol, 2,4,5- | | 1.89 | U | ug/L |
| WW006 | 2069F-4 | 27-Oct-10 | 089601-004 | Trichlorophenol, 2,4,6- | | 1.89 | U | ug/L |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Acenaphthene | | 0.31 | U | ug/L |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Acenaphthylene | | 0.2 | U | ug/L |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Anthracene | | 0.2 | U | ug/L |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Benzo(a)anthracene | | 0.2 | U | ug/L |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Benzo(a)pyrene | | 0.2 | U | ug/L |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Benzo(b)fluoranthene | | 0.2 | U | ug/L |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Benzo(ghi)perylene | | 0.2 | U | ug/L |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Benzo(k)fluoranthene | | 0.2 | U | ug/L |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Bromophenyl phenyl ether, 4- | | 2 | U | ug/L |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Butylbenzyl phthalate | | 2 | U | ug/L |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Carbazole | | 0.2 | U | ug/L |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Chloro-3-methylphenol, 4- | | 2 | U | ug/L |

TABLE A-10.  Summary of Sanitary Outfalls of Semi-Volitile Organic Compounds, October 2010

| Station | Permit Number | Date Collected | Sample ID | Analyte | Result | MDL | Lab Data Qualifier | Units |
|---|---|---|---|---|---|---|---|---|
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Chlorobenzenamine, 4- | | 2 | U | ug/L |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Chloroethoxy)methane, bis(2- | | 3 | U | ug/L |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Chloroethyl)ether, bis(2- | | 2 | U | ug/L |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Chloroisopropyl ether, bis- | | 2 | U | ug/L |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Chloronaphthalene, 2- | | 0.3 | U | ug/L |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Chlorophenol, 2- | | 2 | U | ug/L |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Chlorophenyl phenyl ether, 4- | | 2 | U | ug/L |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Chrysene | | 0.2 | U | ug/L |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Cresol, m,p- | | 3 | U | ug/L |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Cresol, o- | | 2 | U | ug/L |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Di-n-butyl phthalate | | 2 | U | ug/L |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Di-n-octyl phthalate | | 3 | U | ug/L |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Dibenz[a,h]anthracene | | 0.2 | U | ug/L |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Dibenzofuran | | 2 | U | ug/L |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Dichlorobenzene, 1,2- | | 2 | U | ug/L |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Dichlorobenzene, 1,3- | | 2 | U | ug/L |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Dichlorobenzene, 1,4- | | 2 | U | ug/L |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Dichlorobenzidine, 3,3'- | | 2 | U | ug/L |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Dichlorophenol, 2,4- | | 2 | U | ug/L |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Diethylphthalate | | 2 | U | ug/L |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Dimethylphenol, 2,4- | | 2 | U | ug/L |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Dimethylphthalate | | 2 | U | ug/L |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Dinitro-o-cresol | | 3 | U | ug/L |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Dinitrophenol, 2,4- | | 5 | U | ug/L |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Dinitrotoluene, 2,4- | | 2 | U | ug/L |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Dinitrotoluene, 2,6- | | 2 | U | ug/L |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Diphenyl amine | | 3 | U | ug/L |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Ethylhexyl)phthalate, bis(2- | | 2 | U | ug/L |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Fluoranthene | | 0.2 | U | ug/L |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Fluorene | | 0.2 | U | ug/L |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Hexachlorobenzene | | 2 | U | ug/L |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Hexachlorobutadiene | | 2 | U | ug/L |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Hexachlorocyclopentadiene | | 3 | U | ug/L |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Hexachloroethane | | 2 | U | ug/L |

TABLE A-10.  Summary of Sanitary Outfalls of Semi-Volitile Organic Compounds, October 2010

| Station | Permit Number | Date Collected | Sample ID | Analyte | Result | MDL | Lab Data Qualifier | Units |
|---|---|---|---|---|---|---|---|---|
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Indeno(1,2,3-c,d)pyrene | | 0.2 | U | ug/L |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Isophorone | | 3 | U | ug/L |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Methylnaphthalene, 2- | | 0.3 | U | ug/L |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Naphthalene | | 0.3 | U | ug/L |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Nitro-benzene | | 3 | U | ug/L |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Nitroaniline, 2- | | 2 | U | ug/L |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Nitroaniline, 3- | | 2 | U | ug/L |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Nitroaniline, 4- | | 3 | U | ug/L |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Nitrophenol, 2- | | 2 | U | ug/L |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Nitrophenol, 4- | | 2 | U | ug/L |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Nitrosodipropylamine, n- | | 2 | U | ug/L |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Pentachlorophenol | | 2 | U | ug/L |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Phenanthrene | | 0.2 | U | ug/L |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Phenol | | 1 | U | ug/L |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Pyrene | | 0.3 | U | ug/L |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Trichlorobenzene, 1,2,4- | | 2 | U | ug/L |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Trichlorophenol, 2,4,5- | | 2 | U | ug/L |
| WW007 | 2069G-2 | 27-Oct-10 | 089602-004 | Trichlorophenol, 2,4,6- | | 2 | U | ug/L |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Acenaphthene | | 0.292 | U | ug/L |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Acenaphthylene | | 0.189 | U | ug/L |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Anthracene | | 0.189 | U | ug/L |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Benzo(a)anthracene | | 0.189 | U | ug/L |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Benzo(a)pyrene | | 0.189 | U | ug/L |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Benzo(b)fluoranthene | | 0.189 | U | ug/L |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Benzo(ghi)perylene | | 0.189 | U | ug/L |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Benzo(k)fluoranthene | | 0.189 | U | ug/L |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Bromophenyl phenyl ether, 4- | | 1.89 | U | ug/L |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Butylbenzyl phthalate | | 1.89 | U | ug/L |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Carbazole | | 0.189 | U | ug/L |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Chloro-3-methylphenol, 4- | | 1.89 | U | ug/L |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Chlorobenzenamine, 4- | | 1.89 | U | ug/L |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Chloroethoxy)methane, bis(2- | | 2.83 | U | ug/L |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Chloroethyl)ether, bis(2- | | 1.89 | U | ug/L |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Chloroisopropyl ether, bis- | | 1.89 | U | ug/L |

## TABLE A-10.  Summary of Sanitary Outfalls of Semi-Volitile Organic Compounds, October 2010

| Station | Permit Number | Date Collected | Sample ID | Analyte | Result | MDL | Lab Data Qualifier | Units |
|---|---|---|---|---|---|---|---|---|
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Chloronaphthalene, 2- | | 0.283 | U | ug/L |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Chlorophenol, 2- | | 1.89 | U | ug/L |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Chlorophenyl phenyl ether, 4- | | 1.89 | U | ug/L |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Chrysene | | 0.189 | U | ug/L |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Cresol, m,p- | | 2.83 | U | ug/L |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Cresol, o- | | 1.89 | U | ug/L |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Di-n-butyl phthalate | | 1.89 | U | ug/L |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Di-n-octyl phthalate | | 2.83 | U | ug/L |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Dibenz[a,h]anthracene | | 0.189 | U | ug/L |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Dibenzofuran | | 1.89 | U | ug/L |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Dichlorobenzene, 1,2- | | 1.89 | U | ug/L |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Dichlorobenzene, 1,3- | | 1.89 | U | ug/L |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Dichlorobenzene, 1,4- | | 1.89 | U | ug/L |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Dichlorobenzidine, 3,3'- | | 1.89 | U | ug/L |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Dichlorophenol, 2,4- | | 1.89 | U | ug/L |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Diethylphthalate | | 1.89 | U | ug/L |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Dimethylphenol, 2,4- | | 1.89 | U | ug/L |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Dimethylphthalate | | 1.89 | U | ug/L |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Dinitro-o-cresol | | 2.83 | U | ug/L |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Dinitrophenol, 2,4- | | 4.72 | U | ug/L |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Dinitrotoluene, 2,4- | | 1.89 | U | ug/L |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Dinitrotoluene, 2,6- | | 1.89 | U | ug/L |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Diphenyl amine | | 2.83 | U | ug/L |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Ethylhexyl)phthalate, bis(2- | | 1.89 | U | ug/L |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Fluoranthene | | 0.189 | U | ug/L |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Fluorene | | 0.189 | U | ug/L |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Hexachlorobenzene | | 1.89 | U | ug/L |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Hexachlorobutadiene | | 1.89 | U | ug/L |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Hexachlorocyclopentadiene | | 2.83 | U | ug/L |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Hexachloroethane | | 1.89 | U | ug/L |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Indeno(1,2,3-c,d)pyrene | | 0.189 | U | ug/L |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Isophorone | | 2.83 | U | ug/L |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Methylnaphthalene, 2- | | 0.283 | U | ug/L |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Naphthalene | | 0.283 | U | ug/L |

TABLE A-10. Summary of Sanitary Outfalls of Semi-Volitile Organic Compounds, October 2010

| Station | Permit Number | Date Collected | Sample ID | Analyte | Result | MDL | Lab Data Qualifier | Units |
|---|---|---|---|---|---|---|---|---|
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Nitro-benzene | | 2.83 | U | ug/L |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Nitroaniline, 2- | | 1.89 | U | ug/L |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Nitroaniline, 3- | | 1.89 | U | ug/L |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Nitroaniline, 4- | | 2.83 | U | ug/L |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Nitrophenol, 2- | | 1.89 | U | ug/L |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Nitrophenol, 4- | | 1.89 | U | ug/L |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Nitrosodipropylamine, n- | | 1.89 | U | ug/L |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Pentachlorophenol | | 1.89 | U | ug/L |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Phenanthrene | | 0.189 | U | ug/L |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Phenol | | 0.943 | U | ug/L |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Pyrene | | 0.283 | U | ug/L |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Trichlorobenzene, 1,2,4- | | 1.89 | U | ug/L |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Trichlorophenol, 2,4,5- | | 1.89 | U | ug/L |
| WW008 | 2069I-3 | 27-Oct-10 | 089603-004 | Trichlorophenol, 2,4,6- | | 1.89 | U | ug/L |
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Acenaphthene | | 0.292 | U | ug/L |
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Acenaphthylene | | 0.189 | U | ug/L |
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Anthracene | | 0.189 | U | ug/L |
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Benzo(a)anthracene | | 0.189 | U | ug/L |
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Benzo(a)pyrene | | 0.189 | U | ug/L |
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Benzo(b)fluoranthene | | 0.189 | U | ug/L |
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Benzo(ghi)perylene | | 0.189 | U | ug/L |
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Benzo(k)fluoranthene | | 0.189 | U | ug/L |
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Bromophenyl phenyl ether, 4- | | 1.89 | U | ug/L |
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Butylbenzyl phthalate | | 1.89 | U | ug/L |
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Carbazole | | 0.189 | U | ug/L |
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Chloro-3-methylphenol, 4- | | 1.89 | U | ug/L |
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Chlorobenzenamine, 4- | | 1.89 | U | ug/L |
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Chloroethoxy)methane, bis(2- | | 2.83 | U | ug/L |
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Chloroethyl)ether, bis(2- | | 1.89 | U | ug/L |
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Chloroisopropyl ether, bis- | | 1.89 | U | ug/L |
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Chloronaphthalene, 2- | | 0.283 | U | ug/L |
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Chlorophenol, 2- | | 1.89 | U | ug/L |
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Chlorophenyl phenyl ether, 4- | | 1.89 | U | ug/L |
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Chrysene | | 0.189 | U | ug/L |

TABLE A-10.  Summary of Sanitary Outfalls of Semi-Volitile Organic Compounds, October 2010

| Station | Permit Number | Date Collected | Sample ID | Analyte | Result | MDL | Lab Data Qualifier | Units |
|---|---|---|---|---|---|---|---|---|
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Cresol, m,p- | | 2.83 | U | ug/L |
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Cresol, o- | | 1.89 | U | ug/L |
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Di-n-butyl phthalate | | 1.89 | U | ug/L |
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Di-n-octyl phthalate | | 2.83 | U | ug/L |
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Dibenz[a,h]anthracene | | 0.189 | U | ug/L |
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Dibenzofuran | | 1.89 | U | ug/L |
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Dichlorobenzene, 1,2- | | 1.89 | U | ug/L |
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Dichlorobenzene, 1,3- | | 1.89 | U | ug/L |
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Dichlorobenzene, 1,4- | | 1.89 | U | ug/L |
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Dichlorobenzidine, 3,3'- | | 1.89 | U | ug/L |
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Dichlorophenol, 2,4- | | 1.89 | U | ug/L |
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Diethylphthalate | | 1.89 | U | ug/L |
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Dimethylphenol, 2,4- | | 1.89 | U | ug/L |
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Dimethylphthalate | | 1.89 | U | ug/L |
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Dinitro-o-cresol | | 2.83 | U | ug/L |
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Dinitrophenol, 2,4- | | 4.72 | U | ug/L |
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Dinitrotoluene, 2,4- | | 1.89 | U | ug/L |
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Dinitrotoluene, 2,6- | | 1.89 | U | ug/L |
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Diphenyl amine | | 2.83 | U | ug/L |
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Ethylhexyl)phthalate, bis(2- | | 1.89 | U | ug/L |
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Fluoranthene | | 0.189 | U | ug/L |
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Fluorene | | 0.189 | U | ug/L |
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Hexachlorobenzene | | 1.89 | U | ug/L |
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Hexachlorobutadiene | | 1.89 | U | ug/L |
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Hexachlorocyclopentadiene | | 2.83 | U | ug/L |
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Hexachloroethane | | 1.89 | U | ug/L |
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Indeno(1,2,3-c,d)pyrene | | 0.189 | U | ug/L |
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Isophorone | | 2.83 | U | ug/L |
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Methylnaphthalene, 2- | | 0.283 | U | ug/L |
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Naphthalene | | 0.283 | U | ug/L |
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Nitro-benzene | | 2.83 | U | ug/L |
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Nitroaniline, 2- | | 1.89 | U | ug/L |
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Nitroaniline, 3- | | 1.89 | U | ug/L |
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Nitroaniline, 4- | | 2.83 | U | ug/L |

## TABLE A-10.  Summary of Sanitary Outfalls of Semi-Volitile Organic Compounds, October 2010

| Station | Permit Number | Date Collected | Sample ID | Analyte | Result | MDL | Lab Data Qualifier | Units |
|---|---|---|---|---|---|---|---|---|
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Nitrophenol, 2- | | 1.89 | U | ug/L |
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Nitrophenol, 4- | | 1.89 | U | ug/L |
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Nitrosodipropylamine, n- | | 1.89 | U | ug/L |
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Pentachlorophenol | | 1.89 | U | ug/L |
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Phenanthrene | | 0.189 | U | ug/L |
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Phenol | | 0.943 | U | ug/L |
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Pyrene | | 0.283 | U | ug/L |
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Trichlorobenzene, 1,2,4- | | 1.89 | U | ug/L |
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Trichlorophenol, 2,4,5- | | 1.89 | U | ug/L |
| WW011 | 2069-K | 27-Oct-10 | 089604-004 | Trichlorophenol, 2,4,6- | | 1.89 | U | ug/L |

**NOTES:**

**MDA = Method detection limit.**

**J = Estimated value, the analyte concentration fell above the effective MDL limit and below the effective (PQL) practical quantitation limit.**

**ug/L = micrograms per liter.**

**U = The analyte was analyzed for, but not detected. For organic and inorganic analytes the result is less than the effective MDL concentration.**

SANDIA REPORT
Unlimited Release
SAND2011-5781P
Printed September 2011

Calendar Year 2010

# Annual Groundwater Monitoring Report

Prepared by
Sandia National Laboratories, Albuquerque, New Mexico

Sandia National Laboratories is a multi-program laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

**SANDIA REPORT**
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# Annual Groundwater Monitoring Report
## Calendar Year 2010

## Groundwater Protection Program
### Sandia National Laboratories, New Mexico
### September 2011

**Prepared by:**
**Long Term Stewardship Department (4142) and**
**Environmental Programs (4143)**
**Groundwater Protection Program (GWPP) in coordination with**
**Environmental Restoration (ER) Operations (6234)**

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# Acknowledgments

The production of this document is a joint effort between the Sandia National Laboratories, New Mexico (SNL/NM) Groundwater Protection Program (GWPP) and Environmental Restoration (ER) Operations.

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**Abstract**

Sandia National Laboratories, New Mexico (SNL/NM) is a government-owned/contractor-operated laboratory. Sandia Corporation (Sandia), a wholly-owned subsidiary of Lockheed Martin Corporation, manages and operates SNL/NM for the U.S. Department of Energy (DOE), National Nuclear Security Administration (NNSA). The DOE/NNSA Sandia Site Office administers the contract and oversees contractor operations at the site. Sandia conducts general groundwater surveillance monitoring at SNL/NM on a site-wide basis as part of the SNL/NM Groundwater Protection Program (GWPP) and site-specific groundwater monitoring at Environmental Restoration (ER) Operations sites with ongoing groundwater investigations. This annual groundwater monitoring report summarizes GWPP and ER Operations data collected during groundwater monitoring events conducted at the following SNL/NM sites through December 31, 2010: Chemical Waste Landfill; Mixed Waste Landfill; Technical Area V study area; Tijeras Arroyo Groundwater study area; and Burn Site Groundwater study area. Environmental monitoring and surveillance programs are required by DOE Order 450.1A, *Environmental Protection Program,* and DOE Manual 231-1A, *Environmental, Safety, and Health Reporting Manual*.

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***Chapter Tables***

***Chapter Tables (continued)***



***Chapter Figures***

***Chapter Figures (continued)***

***Abbreviations and Acronyms***

| | |
|---|---|
| Airport | Albuquerque International Sunport |
| amsl | above mean sea level |
| AOC | area of concern |
| AOP | Administrative Operating Procedure |
| ARG | Ancestral Rio Grande |
| bgs | below ground surface |
| BSG | Burn Site Groundwater |
| CFR | Code of Federal Regulations |
| CME | Corrective Measures Evaluation |
| CMI | Corrective Measures Implementation |
| CMIP | Corrective Measures Implementation Plan |
| CMS | Corrective Measures Study |
| COA | City of Albuquerque |
| COC | constituent of concern |
| CWL | Chemical Waste Landfill |
| CY | Calendar Year |
| DI | deionized |
| DO | dissolved oxygen |
| DOE | U.S. Department of Energy |
| DRO | diesel range organics |
| DSS | Drain and Septic System |
| EB | equipment blank |
| EDMS | Environmental Data Management System |
| EPA | U.S. Environmental Protection Agency |
| ER | Environmental Restoration |
| ET | evapotranspirative |
| FB | field blank |
| FOP | Field Operating Procedure |
| FSO | Field Support Operations |
| FY | Fiscal Year |
| GEL | GEL Laboratories, Inc. |
| GRO | gasoline range organics |
| GWPP | Groundwater Protection Program |
| HE | high explosive(s) |
| HPT | High Performance Team |
| HSWA | Hazardous and Solid Waste Amendments |
| HWB | Hazardous Waste Bureau |
| IMWP | Interim Measures Work Plan |
| IRP | Installation Restoration Program (U.S. Air Force) |
| "J" | data qualifier (indicating an estimated constituent concentration that was detected but is below the laboratory practical quantitation limit) |

***Abbreviations and Acronyms (continued)***

| | |
|---|---|
| KAFB | Kirtland Air Force Base |
| LCS | laboratory control sample |
| LE | Landfill Excavation |
| LWDS | Liquid Waste Disposal System |
| Ma | Mega Annum |
| MAC | maximum allowable concentration (established by the NMED) |
| MCL | maximum contaminant level |
| MDA | minimum detectable activity |
| MDL | method detection limit |
| MWL | Mixed Waste Landfill |
| NAD83 | North American Datum of 1983 |
| NAVD88 | North American Vertical Datum of 1988 |
| NMAC | New Mexico Administrative Code |
| NMED | New Mexico Environment Department |
| NMWQCC | New Mexico Water Quality Control Commission |
| NNSA | National Nuclear Security Administration |
| NOD | Notice of Disapproval |
| NPN | nitrate plus nitrite |
| OB | Oversight Bureau |
| ORP | oxidation-reduction potential |
| PCB | polychlorinated biphenyl |
| PCE | tetrachloroethene |
| PGWS | perched groundwater system |
| PQL | practical quantitation limit |
| PVC | polyvinyl chloride |
| QC | quality control |
| QED™ | MicroPurge, low-flow sampling method |
| RCRA | Resource Conservation and Recovery Act |
| RDX | hexahydro-trinitro-triazine |
| RFI | RCRA Facility Investigation |
| RPD | relative percent difference |
| Sandia | Sandia Corporation |
| SAP | Sampling and Analysis Plan |
| SC | specific conductance |
| SDWA | Safe Drinking Water Act |
| SMO | Sample Management Office |
| SNL/NM | Sandia National Laboratories, New Mexico |
| SVOC | semivolatile organic compound |
| SWMU | Solid Waste Management Unit |
| TA | Technical Area |
| TAG | Tijeras Arroyo Groundwater (Investigation) |
| TAL | Target Analyte List |
| TB | trip blank |
| TCE | trichloroethene (equivalent to trichloroethylene) |

***<u>Abbreviations and Acronyms (concluded)</u>***

| | |
|---|---|
| TOX | total organic halogens |
| TPH | total petroleum hydrocarbons |
| USAF | U.S. Air Force |
| USGS | U.S. Geological Survey |
| VA | Veterans Administration |
| VCM | Voluntary Corrective Measure |
| VE | Vapor Extraction |
| VOC | volatile organic compound |

***Monitoring Well Location Descriptions***

| | | | |
|---|---|---|---|
| AVN-# | Area V (North) | STW-# | Solar Tower (West) |
| CTF-# | Coyote Test Field | SWTA-# | Southwest Technical Area III |
| CWL-# | Chemical Waste Landfill | TA1-W-# | Technical Area I (Well) |
| CYN-# | Lurance Canyon | TA2-NW-# | Technical Area II (Northwest) |
| LWDS-# | Liquid Waste Disposal | TA2-SW-# | Technical Area II (Southwest) |
| MP-# | Montessa Park | TA2-W-# | Technical Area II (Well) |
| MRN-# | Magazine Road North | TAV-# | Technical Area V |
| MVMWJ | Mountain View Monitoring Well J | TJA-# | Tijeras Arroyo |
| MVMWK | Mountain View Monitoring Well K | TRE-# | Thunder Road East |
| MWL-# | Mixed Waste Landfill | TRN-# | Target Road North |
| NMED-# | New Mexico Environment Department | TRS-# | Target Road South |
| NWTA3-# | Northwest Technical Area III | TSA-# | Transportation Safeguards Academy |
| PGS-# | Parade Ground South | WYO-# | Wyoming |
| PL-# | Power Line Road | 12AUP-# | ER Site 12A Underflow Piezometer |
| SFR-# | South Fence Road | | |

**** Meteorological Towers***

| | | | |
|---|---|---|---|
| * SC1 | School House | * A-36 | TA-III and TA-V |
| * A-21 | TA-I | | |

***Units***

| | | | |
|---|---|---|---|
| °C | degree Celsius | mg/L | milligram(s) per liter |
| µg/L | microgram(s) per liter | mL | milliliter(s) |
| µmhos/cm | microhm(s) per centimeter (unit of specific conductance) | mrem/yr | millirem per year |
| ac-ft | acre feet | mV | millivolt(s) |
| ft | foot (feet) | NTU | nephelometric turbidity units |
| $ft^3$ | cubic feet | pCi/g | picocuries per gram |
| $ft^3$/yr | cubic feet per year | pCi/L | picocuries per liter |
| ft/ft | feet/foot | pH | potential of hydrogen |
| ft/yr | feet per year | ppb | part(s) per billion, equivalent to µg/L in water |
| gal. | gallon(s) | ppbv | part(s) per billion by volume |
| gpm | gallons per minute | sq km | square kilometer(s) |
| in./yr | inches per year | sq mi | square mile(s) |
| m | meter(s) | yr | year(s) |

# Annual Groundwater Monitoring Report

## Executive Summary

Sandia Corporation (Sandia) conducts general groundwater surveillance monitoring at Sandia National Laboratories, New Mexico (SNL/NM) on a site-wide basis as part of the SNL/NM Groundwater Protection Program (GWPP) and site-specific groundwater monitoring at Environmental Restoration (ER) Operations sites with an ongoing groundwater investigation. The SNL/NM facility is located on Kirtland Air Force Base (KAFB).

Sandia National Laboratories is a multi-program laboratory managed and operated by Sandia, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's (DOE) National Nuclear Security Administration under contract DE-AC04-94AL85000.

This Annual Groundwater Monitoring Report documents the results of Sandia's groundwater monitoring activities for Calendar Year (CY) 2010. This report is being prepared to meet the environmental reporting requirements for the CY 2010 Annual Site Environmental Report, reporting to regulators and outside agencies as well as a valuable tool to inform the public about the groundwater quality at SNL/NM. This report includes both water quality sampling results and water level measurements. Separate chapters focus on the investigation activities at each of the following monitoring networks maintained by Sandia: GWPP site-wide surveillance (Chapter 2.0); Chemical Waste Landfill (CWL) (Chapter 3.0); Mixed Waste Landfill (MWL) (Chapter 4.0); Technical Area (TA)-V (Chapter 5.0); Tijeras Arroyo Groundwater (TAG) (Chapter 6.0); and Burn Site Groundwater (BSG) (Chapter 7.0).

Chapter 1.0 provides the general site description for the SNL/NM facility and describes the regulatory criteria for SNL/NM groundwater monitoring tasks. The regional aquifer supplying the City of Albuquerque (COA) and KAFB is located within the Albuquerque Basin. The regional aquifer is mostly contained within the upper unit and, to some extent, the middle unit of the Santa Fe Group. The edge of the basin on the east side is defined by the Sandia, Manzanita, and Manzano Mountains, which have uplifted along normal faults. KAFB straddles the east side of the basin and is divided approximately in half by bounding faults. On KAFB, the basin is primarily defined by the north-south–trending Sandia fault and the Hubbell Springs fault. The Tijeras fault, a strike-slip fault that trends northeast-southwest, intersects the Sandia and Hubbell Springs faults forming a system of faults collectively referred to as the Tijeras fault complex. The faults form a distinct hydrogeological boundary between the regional aquifer within the basin (approximately 500 feet [ft] below ground surface [bgs]) and the more shallow bedrock aquifer systems within the uplifted areas (generally between 50 to 325 ft bgs).

Currently there are five ER Operations groundwater monitoring networks: (1) TA-V; (2) TAG; (3) CWL; (4) MWL; and (5) BSG. At SNL/NM, solid waste management units (SWMUs) are regulated under the Hazardous and Solid Waste Amendment (HSWA) module of the Resource Conservation and Recovery (RCRA) Permit. In the HSWA module, a SWMU is defined as "any discernible unit at which solid wastes have been placed at any time, irrespective of whether the unit was intended for the management of solid or hazardous waste." Monitoring and/or corrective action requirements generally are determined on a SWMU-specific basis following a site investigation. Monitoring performed at the MWL and the three ER Operations groundwater investigations (TA-V, TAG, and BSG Study Areas) are subject to the direction provided by the Compliance Order on Consent (the Order) between the New Mexico Environment Department (NMED), the DOE, and Sandia (NMED April 2004). The CWL is an interim status landfill that has undergone closure in accordance with 20.4.1.600 New Mexico Administrative Code (NMAC), incorporating 40 Code of Federal Regulations (CFR) 265, Subpart G, and the CWL Closure Plan (SNL December 1992, as amended).

**Groundwater Quality Monitoring Activities and Results**

During CY 2010, groundwater samples were collected from GWPP, CWL, MWL, TA-V, TAG, and BSG monitoring wells. The analytical results for samples from all monitoring wells were compared with maximum contaminant levels (MCLs) established by the U.S. Environmental Protection Agency (EPA). The results for GWPP monitoring wells were also compared with NMED maximum allowable concentrations (MACs) promulgated for groundwater by the State of New Mexico Water Quality Control Commission (NMWQCC). The results are summarized in the following sections, and the data are presented in the attachments following each chapter.

**Groundwater Protection Program**

Chapter 2.0 documents the results of the CY 2010 groundwater surveillance monitoring activities conducted as part of the SNL/NM GWPP. The surveillance activities include the annual collection and analysis of groundwater samples from 16 monitoring wells and 1 surface water sample from a spring. Water levels were measured at 78 monitoring wells. Water level measurements were obtained either monthly or quarterly depending on the response characteristics of the groundwater system at each well location to pumping or other stresses. Annual sampling of groundwater was conducted during March 2010. Samples collected from all locations were analyzed for Safe Drinking Water Act list volatile organic compounds (VOCs); total organic halogens; total phenols; total alkalinity; nitrate plus nitrite (NPN); total cyanide; major anions; Target Analyte List (TAL) metals plus uranium-234, uranium-235, and uranium-238; mercury; gamma spectroscopy; gross alpha/beta activity; radium-226; and radium-228. Additional samples were collected at selected monitoring wells for analysis of high explosives (HE) and isotopic uranium.

The analytical results for the groundwater samples are similar to the results reported for previous years. No analytical parameters exceed established MCLs or MACs, except for arsenic, beryllium, fluoride, and combined radium-226 and radium-228.

No VOCs or HE compounds were detected above established MCLs or MACs. The HE compound RDX [hexahydro-trinitro-triazine] was detected in the groundwater sample from monitoring well CTF-MW2 at a concentration of 0.170 micrograms per liter (µg/L).

Fluoride was detected above the NMWQCC groundwater protection MAC of 1.6 milligrams per liter (mg/L) at four sampling locations. The concentrations range from 1.62 to 2.44 mg/L. The EPA MCL for fluoride is 4.0 mg/L. Arsenic was detected above the MCL of 0.01 mg/L in the groundwater sample from CTF-MW2 at a concentration of 0.0535 mg/L. Beryllium was detected in the surface water sample from Coyote Springs at a concentration of 0.00713 mg/L. The MCL for beryllium is 0.004 mg/L. Beryllium has been consistently detected in the surface water samples from the springs and is considered to be of natural origin.

Combined radium-226 and radium-228 activity levels in the CTF-MW2 sample exceed the MCL of 5.0 pCi/L. Activity for radium-226 was reported in the sample from CTF-MW2 at 2.16 ± 0.0854 pCi/L and for radium-228 at 7.94 ± 2.10 pCi/L.

Water table elevation measurements were obtained throughout CY 2010 at 78 locations on a monthly and quarterly basis. Water level elevation measurements obtained from 32 representative monitoring wells located west of both the Tijeras fault zone and Sandia fault at KAFB and vicinity were used to construct contours of water table elevation. The contours display a pattern that reflects the impact of the groundwater withdrawal by water supply wells located in the northwestern portion of KAFB and COA wells located north of the base. A contour map of the differences in the regional water table elevations between the same periods for CY 2010 and CY 2009 indicate the area of greatest decline is in the southeast quadrant of the mapped area.

Water level elevations were also obtained from 19 wells completed in the perched groundwater system (PGWS) to construct a water level elevation contour map. The contours indicate groundwater flow in the PGWS is from the northwest to southeast. Water levels are declining in the northwest and increasing slightly in the east presumably due to the drainage of the system to the east and perhaps some additional recharge from the Tijeras Arroyo.

**Chemical Waste Landfill**

Chapter 3.0 discusses the CWL semiannual groundwater monitoring activities performed during April and in November and December 2010. Groundwater samples were collected from six monitoring wells in April (CWL-MW2BL, CWL-MW4, CWL-MW5L, CWL-MW5U, CWL-MW6L, and CWL-MW6U) and from four new wells in November and December (CWL-BW5, CWL-MW9, CWL-MW10, CWL-MW11). The samples were analyzed for Title 40, CFR, Section 264, Appendix IX VOCs and total metals plus iron. The NMED DOE Oversight Bureau (OB) participated in both April and November-December 2010 sampling events and received split samples from three CWL monitoring wells (CWL-MW2BL, CWL-MW4, and CWL-MW5U) in April, and from three monitoring wells (CWL-MW9, CWL-MW10, and CWL-MW11) in November and December. Additional samples were collected for total aluminum, calcium, magnesium, manganese, potassium, and sodium at selected well locations to duplicate the NMED DOE OB analyses. No analytes were detected at concentrations exceeding the associated EPA MCLs in any CWL groundwater samples. The analytical results are comparable to historical values.

The negotiations on the NMED Draft Post-Closure Care Permit for the CWL were completed on October 15, 2009, and documented in the settlement agreement and *Final Order In the Matter of Application for a Post-Closure Care Hazardous Waste Permit for the Chemical Waste Landfill, Sandia National Laboratories No. NM5890110518* (Final Order). On October 16, 2009, the NMED issued a *Notice of Approval, Final Remedy and Closure Plan Amendment, Chemical Waste Landfill*. The NMED approval covers the CWL Closure Plan amendment that addresses the replacement of four groundwater monitoring wells (two of which are dual completion wells), the CWL Post-Closure Care Permit, and the CWL Final Remedy. As agreed to in the negotiations and documented in the NMED-approved CWL Closure Plan amendment, monitoring wells CWL-MW4, CWL-MW5L, CWL-MW5U, CWL-MW6L, CWL-MW6U, and CWL-BW4A were decommissioned and new monitoring wells CWL-MW9, CWL-MW10, CWL-MW11, and CWL-BW5 were installed in 2010.

The CWL Post-Closure Care Permit takes effect and supersedes the CWL Closure Plan (SNL December 1992) immediately upon NMED approval of the Final CWL RCRA Closure Report. All future groundwater monitoring will be performed in accordance with the requirements in the approved Permit. As defined in Title 20.4.1.500, NMAC, incorporating 40 CFR 264.117(a)(1), the post-closure care period is 30 years. The NMED may shorten or extend this period under 20.4.1.500 NMAC, incorporating 40 CFR 264.117(a)(2).

**Mixed Waste Landfill**

Chapter 4.0 discusses the MWL quarterly and annual groundwater sampling activities conducted in January, April, and July 2010. Groundwater samples were collected from seven monitoring wells and analyzed for volatile organic compounds (VOCs), Target Analyte List (TAL) metals plus uranium, anions (as bromide, chloride, fluoride, and sulfate), total alkalinity, nitrate plus nitrite (NPN), gamma spectroscopy, gross alpha, gross beta, and tritium. Additional samples were collected and analyzed for SVOCs (January and April), low-level tritium (April), and isotopic uranium and radon-222 (July). The NMED DOE OB participated in all sampling events and received split samples that were submitted to a different laboratory for analysis. During April, the NMED DOE OB requested additional samples for low-level tritium analysis at each location except MWL-BW2. Additional samples were collected for low-level tritium at selected well locations to duplicate the NMED DOE OB analyses. No analytes were detected at concentrations exceeding the associated EPA MCLs in any MWL groundwater samples. The analytical results are comparable to historical values.

Wells MWL-MW7, MWL-MW8, MWL-MW9, and MWL-BW2 were considered new wells and, as required by the Compliance Order on Consent (the Order) (NMED 2004), were sampled a minimum of eight consecutive quarters for a defined suite of parameters in addition to sampling for perchlorate for at least four consecutive quarters. The four consecutive quarters of perchlorate sampling were completed in CY 2009 with no detections at or above the screening level of 4 micrograms per liter (µg/L); therefore, these wells have been removed from the perchlorate monitoring network. The required eight quarterly sampling events were completed in CY 2010. Wells MWL-MW4, MWL-MW5, and MWL-MW6 are preexisting wells and are sampled on an annual basis. All MWL wells are now being sampled annually as required by the Order.

In April 2010 the DOE and Sandia received a letter from the NMED entitled *Toluene Detections in Groundwater*, which required further investigation to determine the source of very low toluene concentrations in some MWL 2008 through early 2010 groundwater samples, including conducting a purging/sampling study of the groundwater along with any other studies necessary to determine the source. DOE/Sandia submitted the *MWL Toluene Investigation Report* in August 2010 and received an NOD with two comments from the NMED in September 2010. The DOE/Sandia NOD response submitted in October 2010 included a revised version of the report and was approved by NMED in January 2011.

The MWL Corrective Measures Implementation (CMI) Report documents the construction of the MWL ET cover and was submitted to the NMED on January 26, 2010. After NMED approval of the CMI Report, DOE and Sandia will revise the 2007 MWL Long-Term Monitoring and Maintenance Plan and submit the revised plan to the NMED for review and approval. The plan will define the long-term monitoring, maintenance, inspection, and repair requirements for the MWL.

**Technical Area V Study Area**

Chapter 5.0 discusses the TA-V groundwater monitoring activities conducted during CY 2010. Trichloroethene (TCE) and nitrate have been identified as constituents of concern (COCs) in groundwater at the TA-V Groundwater Investigation study area based on detections above the EPA MCL in samples collected from monitoring wells. Currently 12 wells in the TA-V study area are being monitored for water quality and water levels. Table XI-1 of the Order specifies that the sampling frequency for groundwater monitoring at TA-V is quarterly. Unique features of the TA-V study area include low concentrations of TCE and nitrate in a deep alluvial aquifer.

The conceptual site model of contaminant transport at TA-V includes release from the source term, migration through the vadose zone, and movement in groundwater. The potential sources of TCE and/or nitrate in the TA-V study area include wastewater disposal systems and seepage pits. Based on the historical use and disposal of chlorinated solvents, the extent of TCE in groundwater is probably associated with multiple aqueous releases of solvents and subsequent vapor-phase transport through the vadose zone. The slow rate of groundwater flow (4 to 20 ft/yr) is responsible for the present distribution of TCE in the aquifer.

Only NPN and TCE were detected above MCLs in the TA-V study area wells. NPN concentrations exceed the MCL of 10 mg/L in samples from LWDS-MW1 and TAV-MW10, with a maximum concentration of 13.7 mg/L in the sample collected from TAV-MW10 in October 2010.

During CY 2010, TCE exceeded the MCL of 5 µg/L in samples from three wells (LWDS-MW1, TAV-MW6, and TAV-MW10). The maximum concentration of TCE detected during this reporting period is 18.6 µg/L in the sample collected from LWDS-MW1 in October 2010.

The analytical results for this reporting period are consistent with historical concentrations. The current conceptual site model for the TA-V study area does not require modification based on the sampling results for CY 2010.

The following activities took place for the TA-V study area during CY 2010:

- Monthly water level measurements were obtained for all TA-V wells.

- Quarterly groundwater sampling events were conducted at 12 wells in February 2010, May 2010, August/September 2010, and October 2010.

- Quarterly perchlorate screening groundwater sampling and reporting were performed for LWDS-MW1 in February 2010.

- Installed groundwater monitoring wells TAV-MW11, TAV-MW12, TAV-MW13, and TAV-MW14.

**Tijeras Arroyo Groundwater Study Area**

Chapter 6.0 addresses groundwater monitoring activities conducted during CY 2010 at the TAG study area. Currently, 21 wells in the TAG study area are being monitored for water quality, and 27 wells are monitored for water levels. Two groundwater systems are present in the TAG study area: the PGWS at approximately 220 to 330 ft bgs, and the regional aquifer groundwater system at approximately 440 to 570 ft bgs. Groundwater monitoring wells are completed either in the PGWS or regional aquifer. Unique features of the TAG area include low concentrations of TCE at scattered locations in the PGWS, and low concentrations of nitrate at scattered locations in the PGWS and regional aquifer.

For CY 2010, wells were sampled in January/February, May, July/August, and October/November. The samples were analyzed for VOCs, NPN, anions, perchlorate, TAL metals (plus uranium), gross alpha/beta activity, tritium, and radionuclides by gamma spectroscopy. Depending on their locations and historical concentrations of COCs, wells were sampled quarterly, semiannually, or annually during this reporting period.

Both TCE and nitrate have been identified as COCs in groundwater at the TAG study area based on historical groundwater monitoring results. Only NPN and TCE were detected above MCLs in samples from TAG study area wells. In CY 2010, NPN concentrations exceeded the MCL of 10 mg/L in samples from TA2-SW1-320, TJA-4, and TJA-7 during all sampling events, with a maximum concentration of 33.3 mg/L in the sample from TJA-7 collected during the October/November 2010 sampling event. NPN concentrations occasionally exceeded the MCL in samples from TJA-2 and TA2-W-19.

During CY 2010, TCE exceeded the MCL of 5 µg/L in one PGWS well, WYO-4. The maximum concentration of TCE detected during this reporting period is 8.94 µg/L in the sample from WYO-4 collected during the October/November 2010 sampling event. TCE concentrations in samples from WYO-4 have slightly exceeded the MCL, and trends are level to slightly increasing over time.

The analytical results for this reporting period are consistent with historical concentrations. The current conceptual site model for the TAG study area does not require modification based on the sampling results for CY 2010.

The following activities took place for the TAG study area during CY 2010:

- Monthly water level measurements were obtained from TAG wells.
- Quarterly groundwater sampling events were conducted at seven wells (TA2-SW1-320, TA2-W-19, TA2-W-26, TJA-2, TJA-4, TJA-7, and WYO-4) in January/February 2010, May 2010, July/August 2010, and October/November 2010.
- Semiannual groundwater sampling was conducted at four wells (TA2-W-01, TA2-W-27, TJA-3, and TJA-6) in January/February 2010 and July/August 2010.
- Annual groundwater sampling was conducted at nine wells (PGS-2, TA1-W-01, TA1-W-02, TA1-W-04, TA1-W-05, TA1-W-06, TA1-W-08, TA2-NW1-595, and WYO-3) in July/August 2010.
- Quarterly perchlorate screening groundwater sampling was conducted at up to five wells (TA1-W-03, TA1-W-06, TA1-W-08, TA2-W-01, and TA2-W-27) in January/February 2010, May 2010, July/August 2010, and October/November 2010.

**Burn Site Groundwater Study Area**

Chapter 7.0 discusses the groundwater monitoring activities conducted during CY 2010 at the BSG study area, which is located around the active Lurance Canyon Burn Site facility. Groundwater investigations were initiated in 1997 at the request of the NMED after elevated nitrate levels were discovered in the Burn Site Well (a nonpotable production well used for fire suppression). The study area consists of 10 monitoring wells, and samples were collected and analyzed for VOCs, total petroleum hydrocarbons (TPH)-diesel range organics, TPH-gasoline range organics, anions, NPN, TAL metals (plus uranium), gross alpha/beta activity, tritium, and radionuclides by gamma spectroscopy. As required by the NMED, semiannual sampling for perchlorate was conducted at CYN-MW6, and quarterly sampling for perchlorate was conducted at CYN-MW9, CYN-MW10, CYN-MW11, and CYN-MW12.

Only NPN was detected above MCLs in samples from study area wells. NPN results exceed the MCL of 10 mg/L in samples from CYN-MW1D, CYN-MW3, CYN-MW6, CYN-MW9, CYN-MW10, CYN-MW11, and CYN-MW12, with a maximum concentration of 36.6 mg/L in the sample from CYN-MW9 collected during the October 2010 sampling event.

Perchlorate was detected above the MDL of 4 µg/L only in samples collected from CYN-MW6. Perchlorate concentrations range from 4.59 to 6.14 µg/L, with all results qualified with "J" by the laboratory as estimated concentrations. Currently, no MCL is established for perchlorate but it is considered a COC because it exceeds the specified screening level/MDL of 4 µg/L in samples from CYN-MW6 (NMED April 2004)

The analytical results for this reporting period are consistent with historical concentrations. The current conceptual site model does not require modification based on the sampling results for CY 2010.

The following activities took place for the BSG study area during CY 2010:

- Quarterly groundwater sampling events were conducted at four wells (CYN-MW9, CYN-MW10, CYN-MW11, and CYN-MW12) in September 2010 and October/November 2010.

- Semiannual groundwater sampling was conducted at six wells (CYN-MW1D, CYN-MW3, CYN-MW4, CYN-MW6, CYN-MW7, and CYN-MW8) in February/March 2010, May/June 2010, and September 2010.

- Soil sampling activities were completed in July 2010 at 10 deep soil boring locations to determine contaminant sources.

- Four groundwater monitoring wells (CYN-MW9, CYN-MW10, CYN-MW11, CYN-MW12) were installed in July 2010 to determine the extent of groundwater contamination.

**Future Groundwater Monitoring Events**

The groundwater monitoring events conducted on a site-wide basis as part of the SNL/NM GWPP and at site-specific ER Operations sites will continue on a quarterly, semiannual, annual, and biannual basis during CY 2011, as specified by regulatory guidance. The results for these monitoring events will be presented in the Annual Groundwater Monitoring Report for CY 2011.

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# 1.0 Introduction

Sandia Corporation (Sandia) conducts general groundwater surveillance monitoring at Sandia National Laboratories, New Mexico (SNL/NM) on a site-wide basis as part of the SNL/NM Groundwater Protection Program (GWPP) and site-specific groundwater monitoring at Environmental Restoration (ER) Operations (formerly ER Project) sites with ongoing groundwater investigations. The purpose of this document is to report to regulators and other stakeholders the results of Sandia's groundwater monitoring activities for Calendar Year 2010. Separate chapters focus on the investigation activities at each of the following monitoring networks maintained by Sandia: GWPP site-wide surveillance (Chapter 2.0); Chemical Waste Landfill (CWL) (Chapter 3.0); Mixed Waste Landfill (MWL) (Chapter 4.0), Technical Area (TA)-V (Chapter 5.0), Tijeras Arroyo Groundwater (TAG) (Chapter 6.0), and the Burn Site Groundwater (BSG) (Chapter 7.0).

## 1.1 Site Description

The SNL/NM facility is located on Kirtland Air Force Base (KAFB), New Mexico. KAFB is a 51,559-acre military installation that includes 20,486 acres withdrawn from the Cibola National Forest through an agreement with the U.S. Forest Service. Located at the foot of the Manzanita Mountains, KAFB has a mean elevation of 5,384 feet (ft) above mean sea level (amsl) and a maximum elevation of 7,986 ft amsl. KAFB and SNL/NM are located adjacent to the City of Albuquerque (COA), which borders KAFB on its north, northeast, west, and southwest boundaries (Figure 1-1).

SNL/NM is a multi-program laboratory managed and operated by Sandia, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's (DOE) National Nuclear Security Administration (NNSA) under contract DE-AC04-94AL85000.

### 1.1.1 Climate

The Albuquerque area is characterized by low precipitation and wide temperature extremes that are typical of high-altitude, dry, continental climates. The average annual precipitation measured at Albuquerque International Sunport is 9.47 inches (National Oceanic and Atmospheric Administration National Weather Service station); half of this precipitation occurs from June through August in the form of brief but intense thunderstorms. Because of the low humidity and generally warm temperatures, the evaporation potential is high.

### 1.1.2 Geologic Setting

SNL/NM is located near the east-central edge of the Albuquerque Basin on KAFB. The Albuquerque Basin (also known as the Middle Rio Grande Basin) is one of a series of north-south–trending basins that was formed during the extension of the Rio Grande Rift. The basin is approximately 3,000 square miles (sq mi) in area. Rift formation initiated in the late Oligocene and continued into the early Pleistocene, with the primary period of extension occurring between 30 and 5 Mega Annum (Ma). Tectonic activity, which began uplifting the Sandia, Manzanita, and Manzano Mountains, was most prevalent from about 15 to 5 Ma (Thorn et al. 1993). The rift today extends from southern Colorado to northern Mexico. The vertical displacement between the rock units exposed at the top of Sandia Crest and the equivalent units located at the bottom of the basin is more than 3 miles. As shown in Figure 1-1, the structural boundaries of the Albuquerque Basin are as follows:

- Colorado Plateau on the west
- Nacimiento Uplift and the Jemez Mountains to the north
- La Bajada Escarpment to the northeast

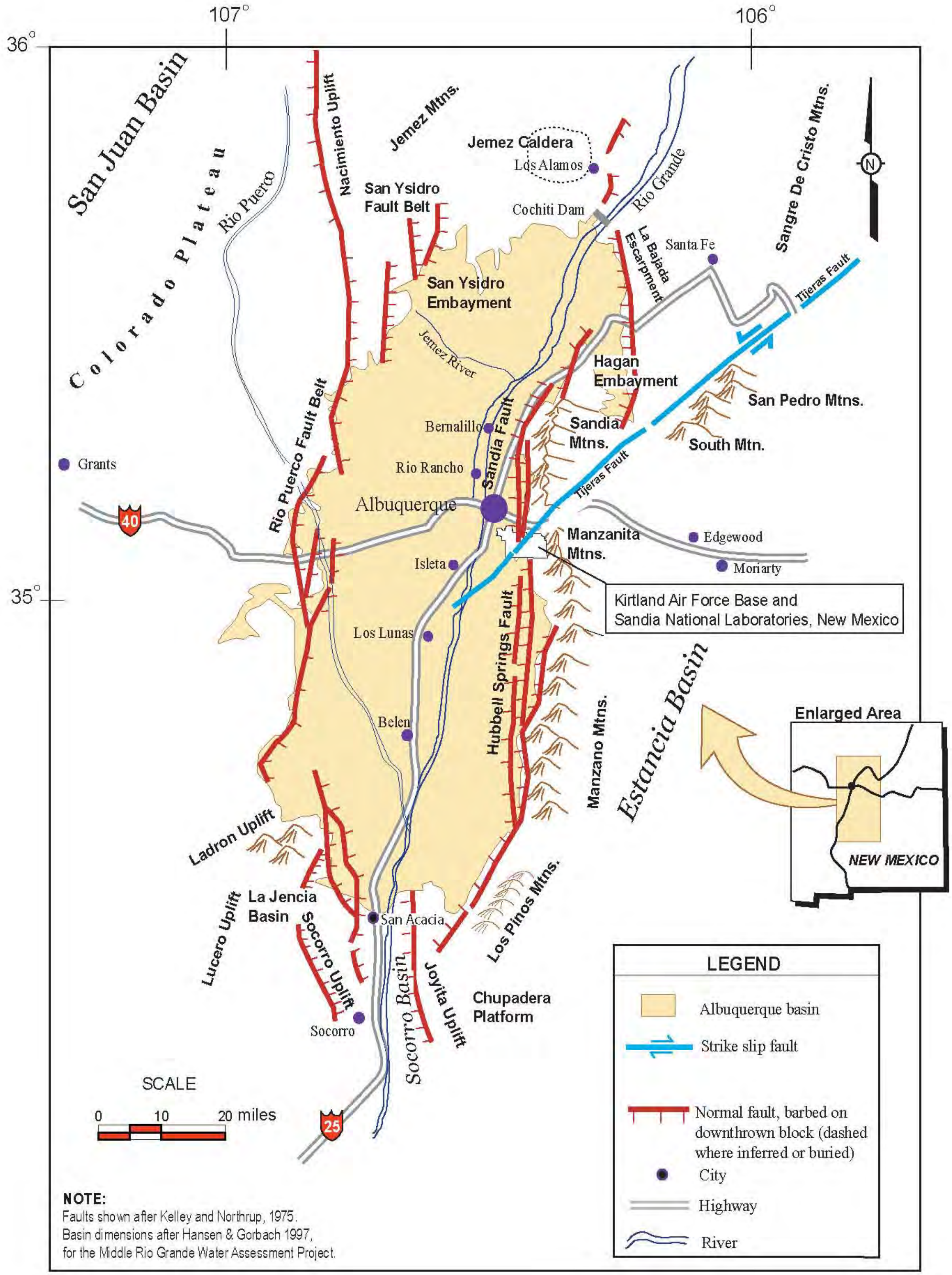


**Figure 1-1. Albuquerque Basin, North-Central New Mexico**

- Sandia, Manzanita, Manzano, and Los Pinos mountains to the east
- Joyita and Socorro uplifts to the south
- Ladron and Lucero uplifts to the southwest

As the Rio Grande Rift continued to expand, the Albuquerque Basin subsided. Over the last 30 Ma, the Ancestral Rio Grande meandered across the valley formed by the subsidence and deposited sediments in broad stream channels and floodplains derived from sources to the north. The basin also filled with eolian deposits and alluvial materials shed from surrounding uplifts (Hawley and Haase 1992). This sequence of sediments is called the Santa Fe Group. The thickness of the Santa Fe Group is up to 16,400 ft (5,000 meters [m]) at the deepest part of the basin (Lozinsky, 1994). The entire sequence consists of unconsolidated sediments, which thin toward the edge of the basin and are truncated by normal faults at the bounding uplifts. Units overlying the Santa Fe Group include Pliocene Ortiz gravel and Rio Grande fluvial deposits, which are interbedded with Tertiary and Quaternary basaltic and pyroclastic materials.

As shown in Figures 1-2 and 1-3, the four primary faults on the east side of KAFB are (1) the Sandia fault, (2) the West Sandia fault, (3) the Hubbell Springs fault, and (4) the Tijeras fault. The Sandia fault is thought to be the primary boundary between the Sandia Mountains and the Albuquerque Basin. The Hubbell Springs fault extends northward from Socorro County and terminates on KAFB in the vicinity of the Tijeras fault. The Sandia and the Hubbell Springs faults are north-south–trending, down-to-the-west, en-echelon normal faults bounding the east side of the Albuquerque Basin.

The Tijeras fault is an ancient strike-slip fault that developed in the Precambrian or early Paleozoic (approximately 600 Ma) and was reactivated in association with the Laramide Orogeny during the Cretaceous period (Kelley 1977). The fault also demonstrates Quaternary movement (Kelson et al. 1999; GRAM 1995). This fault has been traced at least as far north as Madrid, New Mexico, and continues into the Sangre de Cristo Mountains as the Cañoncito fault. Preferential erosion along the fault formed Tijeras Canyon, which divides the Sandia and Manzanita Mountains. The fault trends southwest from Tijeras Canyon, intersects the northeast boundary of KAFB, and crosses KAFB east of Manzano Base. Manzano Base occupies an uplift of four peaks defined by the Tijeras fault on the east side and the Sandia fault on the west side. Strike-slip motion along the Tijeras fault is thought to be expressed by southwesterly movement of the northern block (left lateral). The Sandia, Hubbell Springs, and Tijeras faults converge near the southeast end of TA-III. This complicated system of faults, defining the east edge of the basin, is referred to collectively as the Tijeras fault complex.

### 1.1.3 Hydrogeology

Figure 1-3 shows three different hydrogeologic regions for the KAFB area: (1) the Albuquerque Basin, (2) the Tijeras fault complex, and (3) the foothills and canyons region. The primary division is between the east and west sides of the Tijeras fault complex, which is the transitional zone. This division marks the boundary between the two regional aquifer systems. It is important to note that the boundaries shown on the map are somewhat arbitrary but identify the approximate hydrologic settings. A deep aquifer is present within the Albuquerque Basin where the regional water table lies at approximately 500 ft (152 m) below ground surface (bgs). A perched groundwater system (perched system) also lies above the regional aquifer in the vicinity of TA-I, TA-II, and TA-IV in the TAG area of concern (AOC). The perched system extends south to the KAFB Golf Course area, north to portions of TA-I, west of TA-II, and east of the KAFB Landfill. Possible explanations for the existence of a perched system are inter-arroyo recharge, irrigation of the golf course and other vegetated areas, water leakage from utility distribution lines, and infiltration from an unlined sewage lagoon system (SNL 1998).

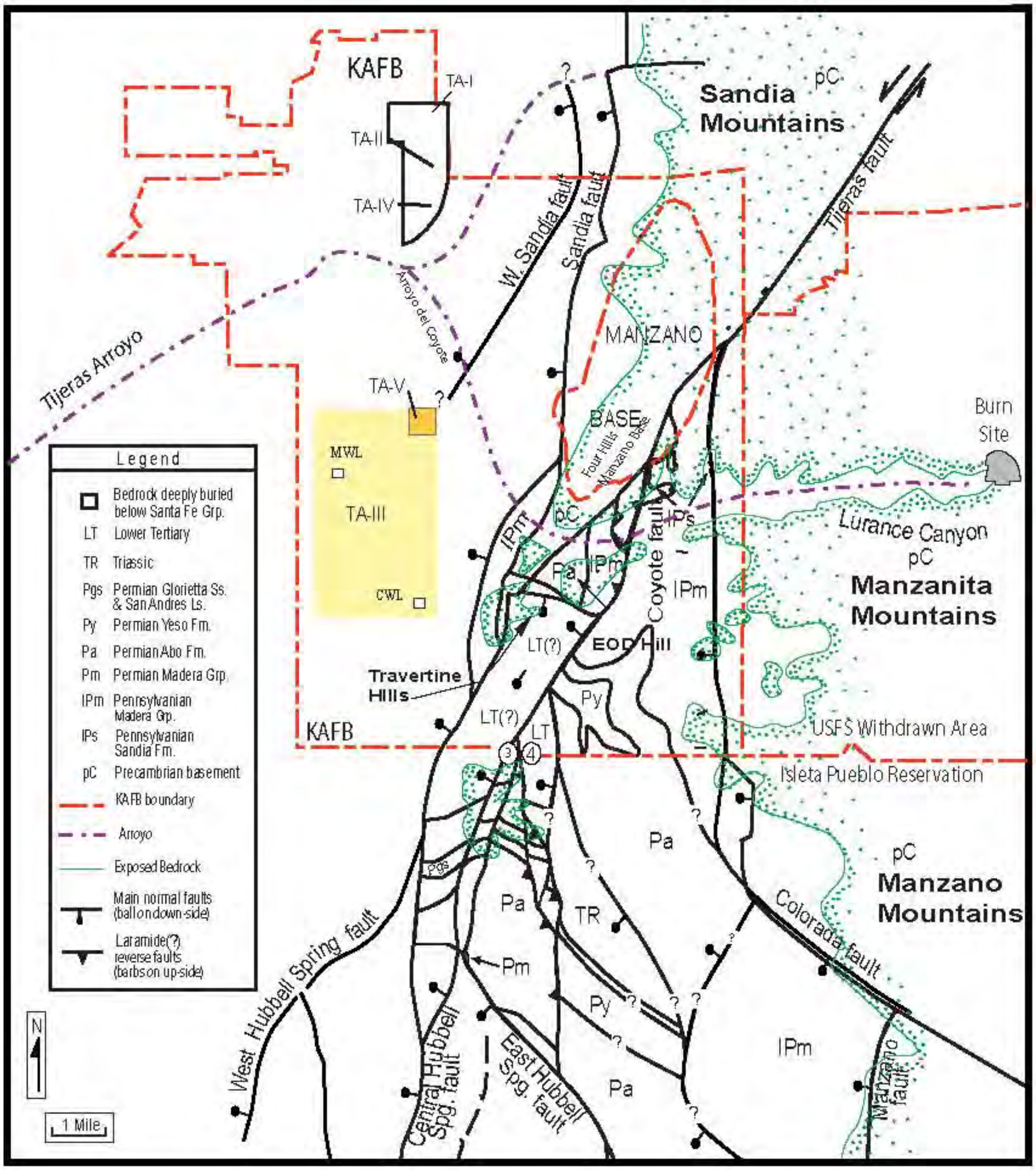


**Figure 1-2. Generalized Geology in the Vicinity of SNL/NM and KAFB (Van Hart 2003)**

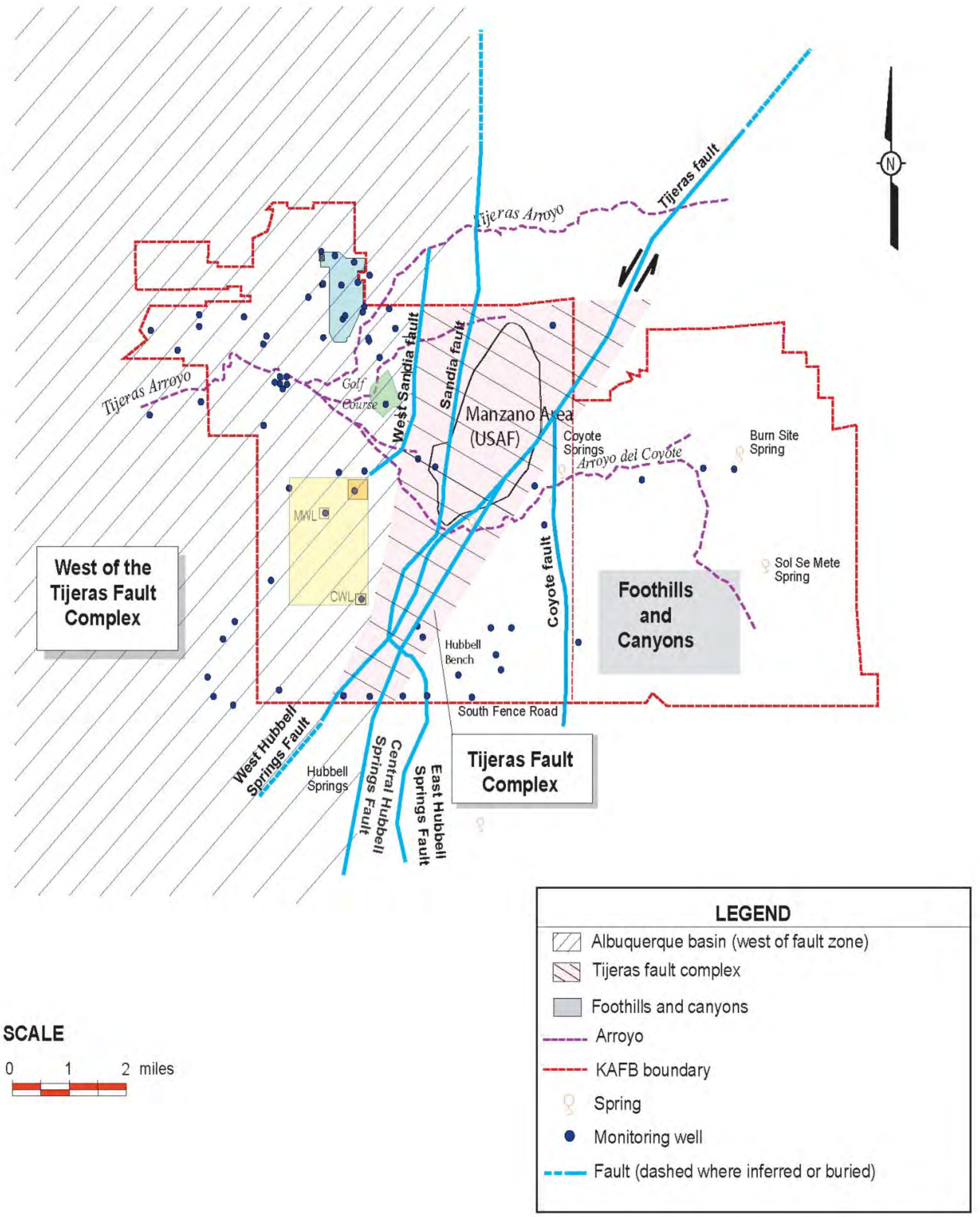


**Figure 1-3. Hydrogeologically Distinct Areas Primarily Controlled by Faults (Modified from SNL 1995)**

East of the Tijeras fault complex, a thin layer of alluvium covers the bedrock. The hydrogeology in this area is poorly understood due to the complex geology created by the fault systems. On the east side of the Tijeras fault complex the depth to groundwater ranges from about 45 to 325 ft (14 to 99 m) bgs. Most of the water supply and monitoring wells east of the faults are completed in fractured bedrock at relatively shallow depths and produce modest yields of groundwater.

Groundwater in the bedrock aquifers on the east side of KAFB generally flows west out of the canyons toward the Tijeras fault complex. The groundwater gradient is relatively steep, 0.03 feet per foot (ft/ft), in crossing the Tijeras fault complex from east to west. The elevation change in the water levels is 350 ft (106 m) over 15,840 ft (4,828 m). The steep gradient suggests that westward groundwater flow is retarded by the Tijeras fault complex. Within the sediments of the Albuquerque Basin, the gradient flattens out quickly to about 0.005 ft/ft. The historic direction of regional groundwater flow within the basin was westward from the mountains toward the Rio Grande. However, due to groundwater pumping by KAFB and COA, a depression in the water table has created a broad trough originating at the well fields in the northwest end of KAFB. The impact of the seasonal variation in water production by both KAFB and COA wells can be observed as fluctuations in the water levels of some SNL/NM and KAFB monitoring wells as far east and south as TA-III.

### 1.1.4 Surface Water Hydrology

The Rio Grande, located approximately 8 miles west of KAFB, is the major surface hydrologic feature in central New Mexico. The Rio Grande originates in the San Juan Mountains of Colorado and terminates at the Gulf of Mexico, near Brownsville, Texas. The Rio Grande has a total length of 1,760 miles (2,832 kilometers) and is the third longest river system in North America. Surface water (with the exception of several springs) within the boundaries of KAFB is found only as ephemeral streams that flow for short periods from runoff after storm events or during the spring melt of mountain snow packs. The primary surface water feature that drains the eastern foothills on KAFB is the Tijeras Arroyo. The Arroyo del Coyote joins Tijeras Arroyo just south of TA-IV (about 1 mile west of the golf course [Figure 1-3]). Both Tijeras Arroyo and Arroyo del Coyote carry significant runoff after heavy storms that usually occur from June through August. The Tijeras Arroyo, above the confluence with Arroyo del Coyote, drains about 80 sq mi (207 square kilometer [sq km]), while Arroyo del Coyote drains about 39 sq mi (101 sq km) (USACE 1979). The total watershed for the Tijeras Arroyo, which includes the Sandia and Manzanita Mountains and portions of KAFB, is approximately 126 sq mi (336 sq km). All active SNL/NM facilities are located outside the 100-year floodplain of both Tijeras Arroyo and Arroyo del Coyote (USACE 1979).

Several springs on KAFB are associated with the uplifts on the east side of the basin: (1) Coyote Springs and G-Spring within Arroyo del Coyote, (2) Burn Site Spring in Lurance Canyon, and (3) Sol se Mete Spring within the Manzanita Mountains. Coyote Springs and Sol se Mete are perennial springs (continuously flowing), while the others are ephemeral springs. Hubbell Springs (a perennial spring) is located just south of KAFB on Isleta Pueblo. The wetland areas created by these springs, though very limited in extent, provide a unique ecological niche in an otherwise arid habitat.

Groundwater recharge in the vicinity of KAFB is primarily derived from the eastern mountain front and within the major arroyos. However, the amount of recharge occurring in the foothills and canyons is not well characterized. The estimated recharge for that portion of Tijeras Arroyo on KAFB is estimated to be up to 2.2 million cubic feet per year ($ft^3$/yr) (50 acre ft [ac-ft]/yr) (SNL 1998). The best estimate for the groundwater recharge associated with Arroyo del Coyote is 0.4 million $ft^3$/yr (9.2 ac-ft/yr). Infiltration studies conducted by the ER Site-Wide Hydrogeologic Characterization Project determined that recharge is negligible due to the high rate of evapotranspiration for most other areas on KAFB, generally alluvial slopes and flat areas within the basin (SNL 1998).

## 1.2 Groundwater Monitoring

Extensive groundwater monitoring is conducted at KAFB. The U.S. Air Force (USAF) Installation Restoration Program has a large monitoring well network associated with several closed landfills and a closed sewage lagoon. Additional KAFB wells are sited to monitor and characterize several nitrate plumes and an extensive jet fuel/aviation gasoline plume on the base. Sandia monitors groundwater on KAFB at locations associated with DOE-owned facilities and sites permitted by the USAF for DOE use. Groundwater monitoring by Sandia is conducted by ER Operations and the GWPP. Figure 1-4 illustrates the extensive monitoring well network at KAFB. Table 1-1 lists the CY 2010 sampling events conducted at the GWPP and ER Operations monitoring networks maintained at SNL/NM.

**Table 1-1. Sample Collection Events for Groundwater Quality Monitoring at SNL/NM from January through December 2010**

| Sampling Event | GWPP | CWL | MWL | TA-V | TAG | BSG |
|---|---|---|---|---|---|---|
| Jan 10 | | | √ | | √ | |
| Feb 10 | | | | √ | √ | √ |
| Mar 10 | √ | | | | | √ |
| Apr 10 | | √ | √ | | | |
| May 10 | | | | | √ | √ |
| Jun 10 | | | | √ | | √ |
| Jul 10 | | | √ | | √ | |
| Aug 10 | | | | √ | √ | |
| Sep 10 | | | | √ | | √ |
| Oct 10 | | | | √ | | √ |
| Nov 10 | | √ | | | √ | √ |
| Dec 10 | | √ | | | | |

**NOTES:**

BSG = Burn Site Groundwater.
CWL = Chemical Waste Landfill.
GWPP = Groundwater Protection Program.
MWL = Mixed Waste Landfill.
SNL/NM = Sandia National Laboratories, New Mexico.
TA-V = Technical Area Five.
TAG = Tijeras Area Groundwater.

Water quality and groundwater analytical results for the GWPP and SNL/NM ER Operations monitoring activities are summarized in Table 1-2. Detected analytes that exceed the EPA drinking water regulatory criteria for samples collected by SNL/NM personnel during groundwater monitoring activities in CY 2010 are listed in Table 1-3.

### 1.2.1 Environmental Restoration Operations Monitoring

SNL/NM ER Operations conducts groundwater monitoring where groundwater contamination is documented or in areas where the potential exists for groundwater contamination from legacy surface or near-surface contamination. Currently there are five ER Operations groundwater monitoring networks: (1) CWL; (2) MWL; (3) TA-V; (4) TAG; and (5) BSG. The ER Operations groundwater monitoring wells are located upgradient and downgradient of known legacy surface contamination sites with associated groundwater contamination.

### 1.2.2 Groundwater Protection Program Monitoring

The SNL/NM GWPP conducts groundwater surveillance monitoring through a network of wells on KAFB, most of which are located in areas near SNL/NM operational test facilities. Groundwater surveillance monitoring allows the detection and evaluation of the impacts (if any) of SNL/NM operations on groundwater.

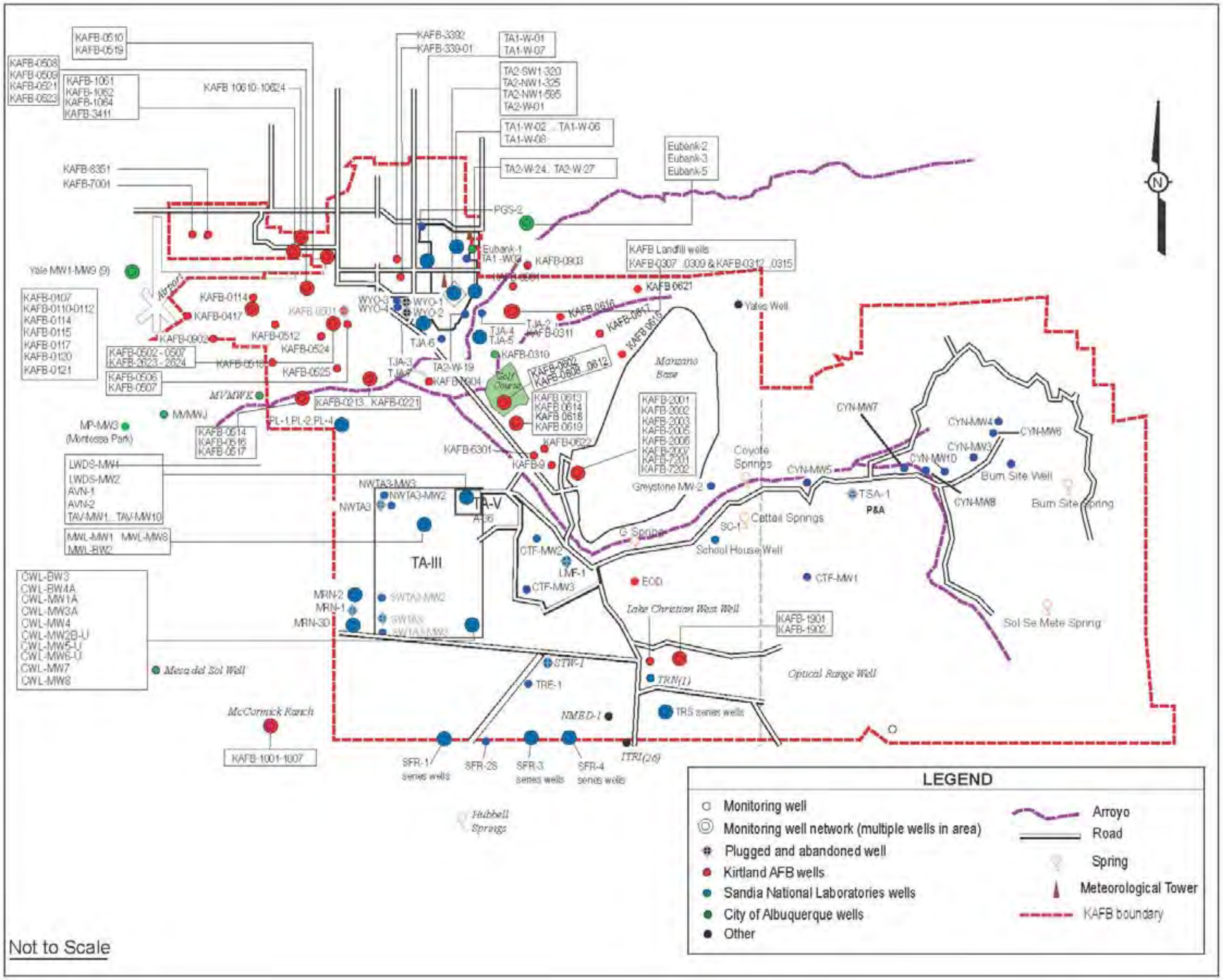


Figure 1-4. Wells and Springs within SNL/NM and KAFB

## Table 1-2. Summary of SNL/NM Groundwater Monitoring Results during CY 2010

| | SNL/NM Groundwater Monitoring |
|---|---|
| Number of Active Wells Monitored | 76 |
| Number of Analyses Performed | 13,038 |
| Percent of Nondetected Results | 81.45 % |

| Analyte | Number of Detects | Number of Non-Detects | Minimum Detected Value | Maximum Detected Value | Mean Detected Value | Standard Deviation for Detected Values | MCL |
|---|---|---|---|---|---|---|---|
| ***Summary of Field Water Quality Parameters (units as indicated below)*** | | | | | | | |
| pH in SU | 171 | 0 | 5.95 | 8.98 | 7.39 | 0.3496 | NE |
| Specific Conductivity in μmhos/cm | 171 | 0 | 379 | 4274 | 768.1 | 498.1 | NE |
| Temperature in °C | 171 | 0 | 12.09 | 25.66 | 18.97 | 2.779 | NE |
| Turbidity in NTU | 171 | 0 | 0.07 | 132 | 3.25 | 14.75 | NE |
| ***Detected Organic Compounds in μg/L*** | | | | | | | |
| Acetone | 1 | 163 | 7.91 | 7.91 | 7.91 | N/A | NE |
| Bromodichloromethane | 1 | 183 | 0.530 | 0.530 | 0.530 | N/A | NE |
| Carbon disulfide | 2 | 166 | 1.58 | 2.00 | 1.79 | 0.297 | NE |
| Chloroform | 10 | 174 | 0.250 | 0.730 | 0.479 | 0.1777 | NE |
| Chloromethane | 9 | 175 | 0.320 | 31.8 | 3.87 | 10.47 | NE |
| Dibromochloromethane | 1 | 183 | 0.390 | 0.390 | 0.390 | N/A | NE |
| 1,1-Dichloroethane | 11 | 173 | 0.390 | 1.17 | 0.667 | 0.2769 | NE |
| 1,1-Dichloroethene | 1 | 183 | 0.640 | 0.640 | 0.640 | N/A | 7.0 |
| cis-1,2-Dichloroethene | 33 | 138 | 0.310 | 3.63 | 1.79 | 0.963 | 70 |
| Gasoline Range Organics | 5 | 30 | 17.6 | 27.6 | 21.3 | 4.48 | NE |
| RDX | 1 | 16 | 0.170 | 0.170 | 0.170 | N/A | NE |
| Tetrachloroethene | 9 | 175 | 0.320 | 1.23 | 0.804 | 0.2896 | 5.0 |
| Toluene | 9 | 175 | 0.250 | 1.45 | 0.539 | 0.429 | 1,000 |
| Trichloroethene | 66 | 118 | 0.353 | 18.6 | 5.62 | 5.815 | 5.0 |

Refer to footnotes at end of table.

**Table 1-2. Summary of SNL/NM Groundwater Monitoring Results during CY 2010** *(Continued)*

| Analyte | Number of Detects | Number of Non-Detects | Minimum Detected Value | Maximum Detected Value | Mean Detected Value | Standard Deviation for Detected Values | MCL |
|---|---|---|---|---|---|---|---|
| ***Detected Metals in mg/L*** | | | | | | | |
| Aluminum | 36 | 78 | 0.0103 | 0.505 | 0.0458 | 0.0872 | NE |
| Antimony | 6 | 115 | 0.000617 | 0.00372 | 0.00159 | 0.001353 | 0.006 |
| Arsenic | 12 | 109 | 0.00151 | 0.0535 | 0.00647 | 0.01482 | 0.010 |
| Barium | 121 | 0 | 0.010 | 0.311 | 0.0832 | 0.04410 | 2.0 |
| Beryllium | 2 | 119 | 0.00011 | 0.00713 | 0.00362 | 0.00497 | 0.004 |
| Cadmium | 7 | 114 | 0.000124 | 0.000417 | 0.000256 | 0.000097 | 0.005 |
| Calcium | 124 | 0 | 36.4 | 384 | 92.86 | 59.85 | NE |
| Chromium | 19 | 102 | 0.00253 | 0.0263 | 0.00616 | 0.00666 | 0.100 |
| Cobalt | 64 | 57 | 0.0001 | 0.0102 | 0.000653 | 0.001578 | NE |
| Copper | 58 | 63 | 0.000471 | 0.00762 | 0.00150 | 0.001406 | NE |
| Iron | 113 | 8 | 0.045 | 8.36 | 0.348 | 0.8195 | NE |
| Lead | 2 | 119 | 0.00052 | 0.000578 | 0.000549 | 0.000041 | NE |
| Magnesium | 124 | 0 | 4.03 | 93.0 | 23.69 | 13.11 | NE |
| Manganese | 52 | 60 | 0.0010 | 3.08 | 0.137 | 0.4828 | NE |
| Nickel | 112 | 9 | 0.00073 | 0.252 | 0.00544 | 0.02409 | NE |
| Potassium | 124 | 0 | 1.56 | 43.0 | 4.56 | 4.460 | NE |
| Selenium | 84 | 37 | 0.00104 | 0.0304 | 0.00472 | 0.006071 | 0.050 |
| Silver | 1 | 120 | 0.00193 | 0.00193 | 0.00193 | N/A | NE |
| Sodium | 124 | 0 | 1.02 | 1180 | 58.67 | 109.65 | NE |
| Thallium | 3 | 118 | 0.000508 | 0.00124 | 0.000840 | 0.000371 | 0.002 |
| Uranium | 108 | 0 | 0.000295 | 0.0258 | 0.00595 | 0.003835 | 0.030 |
| Vanadium | 25 | 96 | 0.00304 | 0.0111 | 0.00560 | 0.002309 | NE |
| Zinc | 62 | 59 | 0.0028 | 0.735 | 0.0333 | 0.1036 | NE |

Refer to footnotes at end of table.

## Table 1-2. Summary of SNL/NM Groundwater Monitoring Results during CY 2010 *(Concluded)*

| Analyte | Number of Detects | Number of Non-Detects | Minimum Detected Value | Maximum Detected Value | Mean Detected Value | Standard Deviation for Detected Values | MCL |
|---|---|---|---|---|---|---|---|
| ***Detected Inorganic Parameters in mg/L*** | | | | | | | |
| Nitrate plus nitrite as N | 167 | 7 | 0.149 | 36.6 | 7.84 | 7.808 | 10 |
| Bromide | 88 | 2 | 0.138 | 3.32 | 0.620 | 0.6343 | NE |
| Chloride | 90 | 0 | 9.51 | 489 | 64.71 | 76.61 | NE |
| Fluoride | 90 | 0 | 0.227 | 2.44 | 0.846 | 0.4413 | 4.0 |
| Sulfate | 90 | 0 | 13.8 | 1810 | 118.4 | 214.5 | NE |
| Total Organic Halogens | 4 | 16 | 0.00868 | 0.0567 | 0.0306 | 0.01975 | NE |
| Total phenols | 5 | 15 | 0.00176 | 0.0036 | 0.00232 | 0.000759 | NE |
| Perchlorate | 2 | 25 | 0.00459 | 0.00614 | 0.00537 | 0.001096 | NE |
| Alkalinity as CACO3 | 63 | 0 | 69.0 | 1490 | 221.6 | 211.6 | NE |
| Alkalinity, Bicarbonate | 12 | 0 | 72.9 | 296 | 230.3 | 53.3 | NE |
| ***Detected Radiochemistry Activities in pCi/L*** | | | | | | | |
| Alpha, gross (uncorrected) | 79 | 10 | 1.59 | 76.2 | 9.40 | 10.62 | 15.0 |
| Beta, gross | 77 | 12 | 1.47 | 50.9 | 5.85 | 6.071 | 4 mrem/yr |
| Potassium-40 | 5 | 83 | 40.3 | 93.9 | 58.8 | 20.60 | NE |
| Radium-226 | 9 | 11 | 0.319 | 2.16 | 0.703 | 0.581 | 5.0 |
| Radium-228 | 11 | 9 | 0.472 | 7.94 | 1.37 | 2.235 | 5.0 |
| Radon-222 | 11 | 2 | 82.0 | 2100 | 532 | 558 | NE |
| Uranium-233/234 | 25 | 0 | 0.510 | 56.2 | 14.11 | 12.65 | NE |
| Uranium-235/236 | 23 | 2 | 0.0413 | 0.721 | 0.261 | 0.1572 | NE |
| Uranium-238 | 25 | 0 | 0.110 | 8.59 | 2.98 | 1.692 | NE |

**NOTES:**

| | |
|---|---|
| °C | = Degree(s) Celsius. |
| µg/L | = Microgram(s) per liter. |
| µmhos/cm | = Micromhos per centimeter. |
| 4 mrem/yr | = Any combination of beta- and/or gamma-emitting radionuclides (as dose rate). |
| CACO3 | = Calcium as carbon carbonate. |
| MCL | = Maximum contaminant level. Established by the U.S. Environmental Protection Agency Primary Water Regulations (40 CFR 141.11(b)), National Primary Drinking Water Standards (EPA, July 2010). |
| mg/L | = Milligram(s) per liter. |
| N | = Nitrogen. |
| N/A | = Not applicable. |
| NE | = Not established. |
| NTU | = Nephelometric turbidity units. |
| pCi/L | = Picocurie(s) per liter. |
| pH | = Potential of hydrogen (negative logarithm of the hydrogen ion concentration). |
| uncorrected | = Gross alpha results reported as uncorrected values (result includes the uranium and radon activities). |
| RDX | = Hexahydro-trinitro-triazine. |
| SNL/NM | = Sandia National Laboratories, New Mexico. |
| SU | = Standard Unit(s). |

**Table 1-3. Summary of Exceedances for SNL/NM Groundwater Monitoring Wells Sampled from January through December 2010**

| Analyte | Well | Exceedance | Date |
|---|---|---|---|
| **Arsenic** MCL = 0.010 mg/L | CTF-MW2 | 0.0535 mg/L | March 2010 |
| **Beryllium** MCL = 0.004 mg/L | Coyote Springs | 0.00713 mg/L | March 2010 |
| **Nitrate plus Nitrite (as Nitrogen)** MCL = 10.0 mg/L | CYN-MW1D | 13.4 mg/L | February 2010 |
| | | 12.2 mg/L | September 2010 |
| | CYN-MW1D (Reanalysis) | 12.4 mg/L | February 2010 |
| | CYN-MW3 | 10.4 mg/L | March 2010 |
| | | 12.0 mg/L | September 2010 |
| | CYN-MW6 | 35.2 mg/L | March 2010 |
| | | 29.9 mg/L | September 2010 |
| | CYN-MW9 | 30.1 mg/L | September 2010 |
| | | 36.6 mg/L | October 2010 |
| | CYN-MW9 (Duplicate) | 30.1 mg/L | September 2010 |
| | CYN-MW10 | 11.0 mg/L | September 2010 |
| | | 11.4 mg/L | November 2010 |
| | CYN-MW10 (Duplicate) | 11.4 mg/L | November 2010 |
| | CYN-MW11 | 10.6 mg/L | November 2010 |
| | CYN-MW12 | 12.2 mg/L | September 2010 |
| | | 14.4 mg/L | October 2010 |
| | LWDS-MW1 | 10.9 mg/L | February 2010 |
| | | 11.0 mg/L | June 2010 |
| | | 11.0 mg/L | September 2010 |
| | | 12.0 mg/L | October 2010 |
| | LWDS-MW1 (Duplicate) | 12.1 mg/L | October 2010 |
| | TA2-SW1-320 | 21.6 mg/L | January 2010 |
| | | 23.0 mg/L | May 2010 |
| | | 21.4 mg/L | July 2010 |
| | | 22.4 mg/L | November 2010 |
| | TA2-W-19 | 10.1 mg/L | May 2010 |
| | | 10.5 mg/L | August 2010 |
| | | 10.1 mg/L | November 2010 |
| | TA2-W-19 (Duplicate) | 10.6 mg/L | August 2010 |
| | TJA-2 | 10.5 mg/L | January 2010 |
| | | 10.4 mg/L | May 2010 |
| | | 10.8 mg/L | August 2010 |
| | TJA-4 | 29.5 mg/L | January 2010 |
| | | 28.0 mg/L | May 2010 |
| | | 27.7 mg/L | August 2010 |
| | TJA-4 (Duplicate) | 29.2 mg/L | January 2010 |
| | | 28.4 mg/L | May 2010 |
| | TJA-7 | 21.0 mg/L | January 2010 |
| | | 23.7 mg/L | May 2010 |
| | | 22.9 mg/L | August 2010 |
| | TJA-7 (Duplicate) | 33.3 mg/L | November 2010 |
| | TAV-MW10 | 10.1 mg/L | February 2010 |
| | | 10.5 mg/L | June 2010 |
| | | 10.4 mg/L | September 2010 |
| | | 13.7 mg/L | October 2010 |
| | TAV-MW10 (Duplicate) | 10.8 mg/L | June 2010 |

Refer to footnotes at end of table.

### Table 1-3. Summary of Exceedances for SNL/NM Groundwater Monitoring Wells Sampled from January through December 2010 *(Concluded)*

| Analyte | Well | Exceedance | Date |
|---|---|---|---|
| **Trichloroethene** MCL = 5.0 µg/L | LWDS-MW1 | 16.9 µg/L | February 2010 |
| | | 14.4 µg/L | June 2010 |
| | | 12.6 µg/L | September 2010 |
| | | 18.5 µg/L | October 2010 |
| | LWDS-MW1 (Duplicate) | 18.6 µg/L | October 2010 |
| | TAV-MW6 | 12.6 µg/L | February 2010 |
| | | 11.9 µg/L | June 2010 |
| | | 12.0 µg/L | September 2010 |
| | | 11.8 µg/L | October 2010 |
| | TAV-MW10 | 14.8 µg/L | February 2010 |
| | | 14.7 µg/L | June 2010 |
| | | 14.9 µg/L | September 2010 |
| | | 13.1 µg/L | October 2010 |
| | TAV-MW10 (Duplicate) | 14.7 µg/L | February 2010 |
| | | 14.7 µg/L | June 2010 |
| | WYO-4 | 8.34 µg/L | January 2010 |
| | | 6.47 µg/L | May 2010 |
| | | 8.80 µg/L | August 2010 |
| | | 8.94 µg/L | November 2010 |
| **Radium-226/228** MCL = 5.0 pCi/L | CTF-MW2 | 10.10 pCi/L | March 2010 |

**NOTES:**
µg/L = Microgram(s) per liter.
mg/L = Milligram(s) per liter.
MCL = Maximum contaminant level.
pCi/L = Picocuries per liter.
SNL/NM = Sandia National Laboratories, New Mexico.

### 1.2.3 Groundwater Monitoring Regulatory Criteria and DOE Orders

Groundwater monitoring performed by GWPP and ER Operations are directed based on three different sets of regulations and requirements. Groundwater surveillance conducted by the GWPP is directed by DOE Order 450.1A, *Environmental Protection Program* (DOE 2008) and DOE Manual 231.1A, *Environmental, Safety, and Health Reporting Manual* (DOE 2004). Groundwater monitoring results for both GWPP and ER Operations are compared with federal and state water quality standards and DOE drinking water guidelines, where established.

In addition to the DOE Directives, ER sites at SNL/NM are identified, characterized, and remediated (if required) under the Resource Conservation and Recovery Act (RCRA) regulations. In 1984, RCRA was supplemented by the Hazardous and Solid Waste Amendments (HSWA), which specifically addressed remediation of legacy contamination including groundwater at solid waste management units (SWMUs).

At SNL/NM, SWMUs are regulated under the HSWA module of the RCRA permit. In the HSWA module, a SWMU is defined as “any discernible unit at which solid wastes have been placed at any time, irrespective of whether the unit was intended for the management of solid or hazardous waste.” Monitoring and/or corrective action requirements generally are determined on a SWMU-specific basis following a site investigation. Monitoring performed at the MWL and other groundwater monitoring activities (e.g., TA-V, TAG, and BSG investigations) are currently performed in compliance with the requirements of the Order.

The CWL is being closed as a regulated unit that operated under an interim RCRA permit. Groundwater monitoring at the CWL is currently conducted according to the requirements of the New Mexico Environment Department (NMED)-approved closure plan for the unit.

Three of the ER Operations groundwater investigations are under the direction of the Compliance Order on Consent (the Order) between the NMED, Sandia, and the DOE (NMED 2004). The three AOCs (TA-V, TAG, and BSG) must comply with requirements set forth in the Order for site characterization and the development of a Corrective Measures Evaluation (CME) for each of these sites. The Order also contains schedules that define dates for the delivery of plans and reports related to the TA-V, TAG, and BSG AOCs, and, accordingly, the DOE/NNSA and Sandia were required to complete CME Reports for the TA-V, TAG, and BSG AOCs by September 30, 2005. The NMED is the regulatory agency responsible for enforcing the requirements identified in the Order for each of the three CMEs. During Fiscal Year 2004, CME Work Plans were submitted to the NMED for each of these three sites that summarize prior work, identify potential source areas, and conduct screening of technologies that result in identification of remedial alternatives that will undergo a full evaluation during the CME process (SNL 2004a, 2004b, and 2004c). The Order also extends NMED regulatory jurisdiction to the siting and installation of new groundwater monitoring wells and the abandonment of existing wells at SNL/NM.

### 1.3 References


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|---|---|
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# 2.0 Groundwater Protection Program

## 2.1 Introduction

This chapter documents the results of the Calendar Year (CY) 2010 groundwater surveillance monitoring activities conducted as part of the Sandia National Laboratories, New Mexico (SNL/NM) Groundwater Protection Program (GWPP). The surveillance activities include the annual collection and analysis of groundwater samples from 16 monitoring wells and 1 surface water sample from a spring. Water levels were measured at 78 monitoring wells. Water level measurements were obtained either monthly or quarterly depending on the response characteristics of the groundwater system at each well location to pumping or other stresses.

The purpose of the GWPP is to protect groundwater resources at SNL/NM and the surrounding area by identifying potential sources of contamination, working with other SNL/NM organizations to prevent groundwater contamination, implementing effective groundwater surveillance to detect contamination if it should occur, and initiating abatement or remedial action where necessary. To accomplish this mission, the GWPP performs the following tasks:

- Determines the effects of SNL/NM operations on groundwater through groundwater quality sampling and analysis and water level measurements.
- Records and maintains groundwater data in a database.
- Maintains GWPP documents and records and ensures that all necessary reports are submitted to the appropriate agencies in a timely manner.
- Prepares and maintains Administrative (AOP) and Field Operating Procedures (FOPs) for groundwater monitoring activities.
- Provides assistance to well owners in the areas of well installation, well inspection and maintenance, and well plugging and abandonment.
- Establishes requirements for well registration and well construction data tracking.
- Coordinates with the surface Discharge Program to prevent groundwater contamination.
- Develops groundwater education and community outreach programs.
- Provides stakeholders an annual update of groundwater data at SNL/NM through the *Annual Groundwater Monitoring Report*.

The groundwater surveillance monitoring involves completing the following objectives:

- Establishing baseline water quality and groundwater flow information for the groundwater system at SNL/NM.
- Determining the impact, if any, of SNL/NM's operations on the quality and quantity of groundwater.
- Demonstrating compliance with all federal, state, and local groundwater requirements.

The GWPP is responsible for tracking information on all wells operated by Sandia Corporation (Sandia), including Environmental Restoration (ER) Operations (formerly ER Project) monitoring wells and characterization boreholes. The GWPP Well Registry and Oversight Task were established to ensure that all wells operated by Sandia are properly constructed and maintained to protect groundwater resources (NMOSE 2005). The GWPP Project Lead works with well owners to review new well installation plans, record construction information, track well ownership and maintenance records, perform annual well inspections, and consult with owners when plugging and abandoning or replacing of a well or borehole is required. The goal is to provide full life-cycle management of monitoring wells and boreholes. Additional information for the GWPP is provided in the SNL/NM GWPP Plan (SNL 2009a)

## 2.2 Regulatory Criteria

Sandia is required by U.S. Department of Energy (DOE) Order 450.1A to develop and implement a site-wide Groundwater Protection Management Program (DOE 2008). Groundwater surveillance is one element within DOE's overall Environmental Protection Program. The implementation of a successful GWPP includes all elements of the Integrated Safety Management System and relevant elements of the facilities Environmental Management System to ensure that:

- Possible sources of current and future groundwater contamination are identified and the potential for future contamination is evaluated.
- All applicable federal, state, and DOE requirements are met.
- Appropriate groundwater protection goals are established for all affected or potentially affected groundwater consistent with water quality and current or likely future use.
- Strategies for predicting and preventing future contamination and for controlling existing contamination are developed.
- The history of GWPP activities is documented for future site management.
- The quality of ambient groundwater and vadose zone conditions at the site are documented.
- Environmental monitoring with surveillance program elements for the groundwater and the vadose zone, including ambient subsurface conditions, are described.
- The way the monitoring program provides the information needed to predict and respond to potential contamination associated with significant site aspects and to achieve groundwater protection goals is prescribed.

In April 2004, a Compliance Order on Consent (the Order) (NMED 2004) became effective between the DOE, Sandia and the New Mexico Environment Department (NMED). Among other requirements primarily affecting ER sites, the Order mandates four continuous quarters of sampling and analysis for perchlorate for newly constructed monitoring wells. The protocol establishes a screening level/method detection limit (MDL) of 4 micrograms per liter (µg/L). If the sampling results indicate the presence of perchlorate either at or greater than 4 µg/L, then the DOE and Sandia are required to evaluate the nature and extent of perchlorate contamination and report the results in a Resource Conservation and Recovery Act Corrective Measures Evaluation. Sampling and analysis of the noncompliant well will continue on a quarterly basis until at least four consecutive nondetections are obtained (NMED 2004).

The NMED DOE Oversight Bureau (OB) splits groundwater samples collected by the GWPP. The samples are analyzed by laboratories under contract to the NMED DOE OB. The NMED DOE OB provides independent verification of environmental monitoring results obtained by Sandia on behalf of the DOE Sandia Site Office. Additional requirements associated with groundwater quality regulations are presented in Table 2-1.

**Table 2-1. Groundwater Quality Regulations**

| Regulation/Requirements | Standards and Guides | Regulating Agency |
|---|---|---|
| National Primary Drinking Water Regulations (40 CFR 141) | MCL | EPA |
| NMWQCC[1] Standards for Groundwater (20 6.2.3103A NMAC Human Health Standards) (NMED 2001) | MAC | NMWQCC |
| DOE Drinking Water Guidelines for Radioisotopes[2] (DOE Order 5400.5) | DCG | DOE (1993) |

**NOTES:** [1] MACs for Human Health and Domestic Water Supply Standards are identified in the analytical results tables in Attachment 2A. Domestic water supply standards are based on aesthetic considerations, not on direct human health risks.

[2] DOE drinking water guidelines set allowable radionuclide levels in drinking water (DOE, 1993, *Drinking Water Guidelines for Radioisotopes*). The levels are calculated based on published DCGs and correspond to a 4 mrem/yr dose from chronic exposures. This is equivalent to 4 percent of the DCG for ingestion, which is based on an exposure of 100 mrem/yr. These may be different than EPA's standards, where established.

CFR = Code of Federal Regulations.
DCG = Derived concentration guide.
DOE = U.S. Department of Energy.
EPA = U.S. Environmental Protection Agency.
MAC = Maximum allowable concentration.
MCL = Maximum contaminant level.
mrem/yr = Millirem per year.
NMAC = New Mexico Administrative Code.
NMED = New Mexico Environment Department.
NMWQCC = New Mexico Water Quality Control Commission.

## 2.3 Scope of Activities

### 2.3.1 Groundwater Quality Surveillance Monitoring

Annual sampling of groundwater was conducted during the period from March 5 to March 29, 2010. Samples were collected from 16 wells and 1 spring. Groundwater surveillance samples were collected from the following monitoring wells: CTF-MW1, CTF-MW2, CTF-MW3, Eubank-1, Greystone-MW2, MRN-2, MRN-3D, NWTA3-MW3D, PL-2, PL-4, SFR-2S, SFR-4T, SWTA3-MW2, SWTA3-MW3, SWTA3-MW4, and TRE-1. A water sample was collected from Coyote Springs. The analytical results for the groundwater samples are presented in Attachment 2A. Well locations are shown in Figure 2B-1 (Attachment 2B).

Samples collected from all locations were analyzed for the following analytes:

- Safe Drinking Water Act (SDWA) list volatile organic compounds (VOCs)
- Total organic halogens (TOX)
- Total phenols
- Total alkalinity
- Nitrate plus nitrite (NPN)
- Total cyanide

- Major anions (chloride, bromide, fluoride, and sulfate)
- Target Analyte List (TAL) metals plus uranium-234, uranium-235, and uranium-238
- Mercury
- Gamma spectroscopy
- Gross alpha and beta activity
- Radium-226 and radium-228
- Isotopic uranium (U-234, U-235, and U-238), selected wells only
- Radon 222, selected wells only

Analysis for high explosive (HE) compounds was conducted on groundwater samples collected from wells CTF-MW2, CTF-MW3, SFR-2S, SWTA3-MW3, SWTA3-MW4, and TRE-1. These wells are associated with the Dynamic Explosives Test Site located in the Coyote Canyon Test Field. All samples were filtered in the field using in-line filters of 0.45-micron pore size, except those for VOCs, HE, and mercury fractions. Duplicate samples were submitted for all analyses from NWTA3-MW3D and SWTA3-MW3.

The NMED DOE OB collected split samples with Sandia at Coyote Springs, CTF-MW2, SFR-2S, and TRE-1. The NMED DOE OB analytical results are not reported in this document but are available through the DOE/Sandia Site Office.

Groundwater level monitoring is a means to assess the physical changes of the groundwater system over time. This includes changes in the local water table, the quantity of water available, as well as the direction and speed of groundwater movement. The GWPP gathers groundwater level measurements from a large network of wells within and around Kirtland Air Force Base (KAFB). In addition to wells owned by the DOE, data is solicited for U.S. Air Force (USAF) Installation Restoration Program (IRP), City of Albuquerque (COA), and U.S. Geological Service (USGS) wells (Figure 1-4). Water levels in wells were measured quarterly or monthly during CY 2010, depending on the data source and well characteristics.

The water table elevation provides a direct measure of the amount of water in storage in the aquifer. Changing water table elevations reflect the difference between recharge and withdrawal from the aquifer. In addition, the rate of change of water levels at a monitoring well screened across the water table provides a reliable measure of the useful lifetime of the well.

Groundwater recharge is difficult to measure directly. Precipitation can be used as an indirect measure of recharge potential. Available precipitation also impacts demand on groundwater withdrawal. Water quantities pumped by the KAFB and COA water supply wells represent the primary groundwater withdrawal from the regional aquifer at this location. Water level elevation data collected during a common time period at a group of representative wells are analyzed, and the data are interpolated and plotted as groundwater elevation contours. From this water table map, groundwater flow directions can be identified and horizontal gradients can be determined. Specific results for annual precipitation, water production, and the impact on the water table are discussed in Section 2.6.2.

### 2.3.2 Monitoring Well Installation

No new monitoring wells were installed by the GWPP during CY 2010.

## 2.4 Field Methods and Measurements

### 2.4.1 Groundwater Sampling

The GWPP monitoring procedures, as required by the Groundwater Surveillance Task, are consistent with procedures identified in the U.S. Environmental Protection Agency (EPA) technical enforcement guidance document (EPA 1986). The EPA procedures are included in the GWPP Sampling and Analysis Plan (SAP) (SNL 2006), which provides general requirements for data quality objectives, field operations, sample documentation and custody, quality control (QC), reporting, and data management. Specific sampling instructions for the annual surveillance monitoring event are conveyed to the SNL/NM Field Support Operations (FSO) and Sample Management Office (SMO) as provided in the Mini-SAP (SNL 2010). The Mini-SAP is prepared by the Sampling Coordinator at the request of the GWPP Project Lead and provides detailed information on the wells to be sampled, the analyses to be conducted, the methods to be used, and any special conditions that may apply.

### 2.4.2 Sample Collection, Handling, and Analysis

Groundwater samples are collected using a nitrogen gas-powered, portable, piston pump (Bennett™). Surface water samples from Coyote Springs are collected using a peristaltic pump. With the exception of samples collected for HE compound, VOC, and mercury analyses, samples are filtered through a 0.45-micron cartridge filter inserted into the pump discharge line. Samples are filtered to determine dissolved constituents in the groundwater to compare with New Mexico Water Quality Control Commission (NMWQCC) groundwater standards, which are based on dissolved contaminants (Section 20.6.2, New Mexico Administrative Code). Sampling is conducted annually. Sample collection is conducted according to the instructions and requirements specified in FOP 05-01, *Long-Term Environmental Stewardship Groundwater Monitoring Well Sampling and Field Analytical Measurements* (SNL 2007a).

The SNL/NM SMO processes environmental samples collected by both the GWPP and ER Operations. The SMO orders sample containers, issues sample control and tracking numbers, tracks the chain-of-custody, and reviews analytical results returned from the laboratories for laboratory contract compliance (SNL 2007b). All groundwater samples are analyzed by off-site laboratories using EPA-specified protocols.

### 2.4.3 Field Water Quality Measurements

Field water quality measurements are obtained at the time of sample collection. Groundwater is pumped to the surface and into a flow-through cell containing measurement probes for various field instruments. Table 2-2 lists the field parameters. Consecutive measurements of temperature, pH, turbidity, and specific conductance (SC) are collected until these values are within the acceptance range of the stabilization parameters shown in Table 2-2. Stability of the measured parameters indicates sufficient water has been removed from the well to replace water that may have stagnated in the well bore with formation water, and a representative groundwater sample can be collected. In addition to groundwater stability measurements, other field parameters measured include alkalinity, dissolved oxygen (DO), and oxidation-reduction potential (ORP). All purge water is placed into 55-gallon containers and stored at the FSO facility waste accumulation area pending analysis of groundwater samples and subsequent determination of the appropriate disposal path for the water.

### 2.4.4 Water Level Measurements

Water level measurements are conducted at a frequency of monthly or quarterly for a network of 78 SNL/NM monitoring wells located on DOE property and on permitted land from KAFB. Sampling frequency for each well is determined by the response of the local water table to well pumping or other temporal stresses. Where seasonal pumping stresses impose a periodic response on the local water table, the measurement frequency is monthly. If the water table is relatively stable, the measurement frequency for wells is quarterly. Water level measurements are conducted according to the instructions and requirements specified in FOP 03-02, *Groundwater Level Data Acquisition and Management*, Rev. 02 (SNL 2007c)

**Table 2-2. Field Water Quality Parameters Measured at GWPP Monitoring Wells**

| Field Parameter | Comments |
|---|---|
| pH | Stability measure: Four consecutive measures within 0.1 pH units |
| Temperature (°C) | Stability measure: Four consecutive measures within 1°C |
| Specific Conductance (µmhos/cm) | Stability measure: Four consecutive measurements within 5%. |
| Turbidity (NTU) | Stability measure: Four consecutive measurements within 10% or < 5 NTU. |
| Alkalinity[1] | Measured in mL $CaCO_3$. Alkalinity titrations are performed in the field at the time of sample collection. |
| Sample Flow Rate | Measured in gpm |
| Dissolved Oxygen | Percentage of saturation value and/or measured in mg/L |
| Oxidation-Reduction Potential | Measured in mV |

**NOTE:** [1]Alkalinity results for field measurements are provided in Attachment 2A, Table 2A-8, and laboratory-derived alkalinity values are reported in Table 2A-3 for comparison.

°C = Degree(s) Celsius.
$CaCO_3$ = Calcium carbonate.
gpm = Gallon(s) per minute.
GWPP = Groundwater Protection Program.
µmhos/cm = Microhm(s) per centimeter.
mg/L = Milligram(s) per liter.
mL = Milliliter(s).
mV = Millivolt(s).
NTU = Nephelometric turbidity units.

## 2.5 Analytical Methods

Analytical methods for groundwater samples are identified in the Mini-SAP for the specific analytes for the CY 2010 sampling event (SNL 2010). The methods are defined in EPA SW-846, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,* Update IV of the Third Edition (EPA 2008). Other analyses are conducted using methods developed by the EPA Office of Groundwater and Drinking Water. The SMO provides oversight of the contract laboratories to ensure that proper methods are applied within SMO-specified performance criteria (SNL 2007b).

## 2.6 Summary of Monitoring Results

### 2.6.1 Analytical Results

Groundwater and surface water samples were submitted to GEL Laboratories, Inc. (GEL) for both chemical and radiological analysis. In addition, SNL/NM FSO personnel performed field alkalinity measurements. Samples submitted to GEL were analyzed in accordance with applicable EPA analytical methods. Groundwater sampling results are compared with EPA maximum contaminant levels (MCLs) for drinking water supplies and NMED maximum allowable concentrations (MACs) for human health standards of groundwater as promulgated by the NMWQCC (NMED 2001). Analytical reports from GEL, including certificates of analyses, analytical methods, MDLs, practical quantitation limits (PQLs), minimal detectable activity (MDA) values, critical levels, dates of analyses, results of QC analyses, and data validation findings are filed in the SNL/NM Customer Funded Records Center. Analytical results, laboratory QC qualifiers, and third-party validation qualifiers are posted to the Environmental Data Management System (EDMS) electronic database.

Table 2A-1 (Attachment 2A) summarizes detected VOC and HE compound results for groundwater samples collected in March 2010. No VOCs or HE compounds were detected at concentrations above established MCLs or MACs in any groundwater sample. Chloroform, chloromethane, bromodichloromethane, and dibromochloromethane were the only VOCs detected above the laboratory

MDLs but below reporting limits or PQLs. Consequently the concentration values reported by the laboratory are qualified with “J” as estimated concentrations.

Chloroform was detected at a concentration of 0.730 µg/L in the sample from CTF-MW3 and at 0.600 µg/L in the sample from TRE-1. Chloromethane was detected in the PL-4 and SWTA3-MW3 samples at concentrations of 0.320 and 0.400 µg/L, respectively. The duplicate sample from PL-4 contained no chloromethane at a detectable level. Toluene was qualified as not detected during data validation in samples from Coyote Springs, PL-4, and SFR-2S due to the presence of toluene in associated laboratory method blank samples. Therefore, a validation qualifier of “U” is assigned to the data.

The only HE compound detected was hexahydro-trinitro-triazine (RDX). The concentration of RDX detected in the sample from CTF-MW2 was reported at 0.170 µg/L; however, this value was qualified as estimated with “J” as detected but not reliably quantifiable. Table 2A-2 (Attachment 2A) lists the laboratory MDLs for VOC and HE compounds associated with the applied analytical methods.

Table 2A-3 (Attachment 2A) summarizes alkalinity, major anions (as bromide, chloride, fluoride, and sulfate), NPN, TOX, total phenols, and total cyanide results. None of the analytes listed were detected above established MCLs or MACs, except fluoride. Fluoride was detected above the MAC of 1.6 milligrams per liter (mg/L) in samples from Coyote Springs, CTF-MW2, CTF-MW3, and SFR-4T at concentrations ranging from 1.62 to 2.44 mg/L. Elevated fluoride concentrations are routinely observed in monitoring wells in the eastern half of KAFB. This is an area of shallow groundwater and elevated bedrock containing fluoride-bearing minerals. The time trend plots for wells exceeding the MCL for fluoride concentrations are presented in Figures 2B-2 through 2B-5 (Attachment 2B).

Detections of TOX were reported in samples from six wells and Coyote Springs. The results for TOX were qualified during data validation as not detected in samples from three of the wells due to contamination in initial calibration and continuing calibration blank samples. The surviving validated TOX detections occurred in Coyote Springs, CTF-MW2, Greystone-MW2, and SFR-4T samples at concentrations of 0.0567, 0.0289, 0.00868, and 0.0283 mg/L respectively. The result for the Greystone-MW2 sample is “J” qualified because the concentration is less than the PQL but greater than the MDL.

Total phenol was detected in the samples from Eubank-1, Greystone-MW2, MRN-3D, SWTA3-MW2, and TRE-1 at “J” level concentrations. The results for PL-4 were qualified as not detected during data validation due to contamination in the associated equipment blank sample. NPN was detected in all the well samples above associated MDLs, except for the sample obtained from CTF-MW2. The NPN results for SWTA3-MW3 were qualified as not detected during data validation because the associated equipment blank (EB) was found to be contaminated. None of the well samples yielded detections for total cyanide.

Samples from GWPP monitoring wells were analyzed for TAL metals plus uranium. No metal parameters, other than arsenic and beryllium, were detected above established regulatory limits in any groundwater sample. Arsenic was detected above the MCL of 0.01 mg/L in the sample from CTF-MW2 at a concentration of 0.0535 mg/L. The time trend plot for arsenic concentrations in well CTF-MW2 is shown in Figure 2B-6 (Attachment 2B). Beryllium was detected above the MCL of 0.004 mg/L in the sample from Coyote Springs at a concentration of 0.00713 mg/L. The time trend plot for beryllium concentrations in Coyote Springs is shown in Figure 2B-7 (Attachment 2B). Dissolved TAL metal results are summarized in Table 2A-4 (Attachment 2A). Both the arsenic result for CTF-MW2 and the beryllium result for Coyote Springs are consistent with prior years of monitoring data as is demonstrated in the trend plots.

Mercury was analyzed from unfiltered samples and reported as total mercury. Mercury was not detected above associated laboratory MDLs in any groundwater sample. Total mercury results are summarized in Table 2A-5 (Attachment 2A).

Gamma spectroscopy results for short-list of gamma radiation emitting radioisotopes (americium-241, cesium-137, cobalt-60, and potassium-40) are summarized in Table 2A-6 (Attachment 2A). All isotope activities are less than associated MDA values, except for potassium-40. Potassium-40 was reported above the MDA in the samples from CTF-MW1, CTF-MW3, PL-4 (duplicate), and SFR-2S at activities of 56.4 ± 24.7, 54.7 ± 18.6, 48.8 ± 22.7, and 93.9 ± 26.8 picoCuries/liter (pCi/L).

Radioisotopic results are summarized in Table 2A-7 (Attachment 2A). Analyses for alpha- and beta-emitting radioisotopes included gross alpha and gross beta activity, radium-226, radium-228, and radon-222. Isotopic uranium (U-233/234, U-235/236, and U-238) analysis was conducted on those samples from wells that previously had high gross alpha activity or are located where groundwater is in contact with bedrock which contains minerals that are high in naturally occurring radioisotopes. The MCL value of 15 pCi/L does not include the contribution of the uranium or radon activity. The analytical procedure removes the radon from the sample; hence, the laboratory-reported gross alpha result must be corrected by removing only the uranium activity in the sample. For wells where isotopic uranium activity was measured, the activity value was subtracted directly to correct the gross alpha results. For other wells, the uranium concentration obtained from the TAL metal analysis was converted to uranium activity using a conversion factor of 670 picocuries per milligram (EPA 2000). The corrected gross alpha activity results are all below the MCL of 15 pCi/L, with a maximum value of 10.76 pCi/L. Gross beta activity results do not exceed established MCLs. Combined radium-226 and radium-228 activity results from the CTF-MW2 sample exceed the MCL of 5.0 pCi/L. Activity for radium-226 was reported at 2.16 ± 0.0854 pCi/L and for radium-228 at 7.94 ± 2.10 pCi/L in the sample from CTF-MW2. Figure 2B-8 (Attachment 2B) shows the time trend plot for radium-226 and radium-228 activity levels in CTF-MW2.

The NMED DOE OB representatives collected additional samples for isotopic uranium at Coyote Springs and monitoring wells CTF-MW2, SFR-2S, and TRE-1 at the same time SNL/NM personnel collected samples from these wells. SNL/NM personnel collected samples for isotopic uranium at these wells to ensure a consistent level of quality with the NMED DOE OB.

Table 2A-8 (Attachment 2A) summarizes field water quality measurements collected prior to sampling and field alkalinity titration results. Field water quality measurements include water level, turbidity, pH, temperature, SC, ORP, and DO. The water level was measured with a Solinst® water level indicator. Groundwater temperature, SC, ORP, DO, and pH were measured using an YSI™ Model 620 water quality meter. Turbidity was measured with a HACH™ Model 2100P portable turbidity meter.

### 2.6.2 Water Level Measurements

During CY 2010, water levels were measured in 189 monitoring wells; SNL/NM GWPP personnel measured levels in 78 of these wells. Data were provided by the USAF IRP, the COA, and the USGS for the remainder of the wells. The water level data are maintained in the EDMS. Water level data for CY 2010 for SNL/NM wells is provided in Table 2A-9 (Attachment 2A). The total number of wells represented in the database, listed by the respective organization, is provided in Table 2-3.

**Table 2-3. Water Levels Measured in Monitoring Wells by SNL/NM and Other Organizations**

| Total Wells | Measuring Agency | Well Owner | Location |
|---|---|---|---|
| 78 | SNL/NM GWPP | DOE/NNSA | Site-wide surveillance network wells, CWL, MWL, TA-V, TAG Investigation, and Burn Site Groundwater Area |
| 101 | USAF IRP Program | KAFB | IRP Long-term Monitoring Program |
| 7 | COA | COA | Eubank Landfill north of KAFB and Yale Avenue Landfill west of KAFB |
| 1 | SNL/NM GWPP | COA | Eubank 1, West of Eubank Landfill |
| 1 | USGS | New Mexico State Engineer's Office | Mesa del Sol well |
| 1 | USGS | COA | MP-MW3 (Montessa Park) well |

**NOTES:**

| | |
|---|---|
| COA | = City of Albuquerque. |
| CWL | = Chemical Waste Landfill. |
| DOE | = U.S. Department of Energy. |
| GWPP | = Groundwater Protection Program. |
| IRP | = Installation Restoration Program. |
| KAFB | = Kirtland Air Force Base. |
| MWL | = Mixed Waste Landfill. |
| NNSA | = National Nuclear Security Administration. |
| SNL/NM | = Sandia National Laboratories, New Mexico. |
| TA-V | = Technical Area V. |
| TAG | = Tijeras Arroyo Groundwater. |
| USAF | = U.S. Air Force. |
| USGS | = U.S. Geological Survey. |

### 2.6.2.1 Groundwater Recharge and Withdrawal

Factors influencing water level elevation changes include potential recharge from precipitation and groundwater withdrawal by production wells.

#### Annual Precipitation

The regional climate for the Albuquerque Basin area is semiarid. Long-term average precipitation ranges from 9.0 inches per year (in./yr) (30-year norm) at Albuquerque International Sunport (Airport) up to 35 in./yr at the crest of the Sandia Mountains. The normal seasonal distribution of precipitation in the Albuquerque area is for the majority to occur during the months of June through August. For CY 2010, the wettest months were June through October. Precipitation data relevant to KAFB hydrogeology are available from four locations. Three meteorological towers are used to measure on-site precipitation at KAFB: the A21 tower located in Technical Area (TA)-II; the A36 tower located in TA-III; and the SC1 tower located near Schoolhouse Well in the foothills of the Manzanita Mountains (Figure 1-4). The fourth source is the National Weather Service station at the Airport, adjacent to KAFB.

Annual precipitation during CY 2010 at the four sites is shown in Table 2-4. Data for CY 2009 is also presented for comparison. The 8.96 inches of precipitation measured at the Airport during CY 2010 is 2.29 inches greater than the corresponding period for the previous year; it is also 0.51 inches below the 30-year norm of 9.47 inches. Monthly distribution of precipitation during CY 2010 at the four locations is shown in Figure 2C-1 (Attachment 2C). Figure 2C-2 shows the annual distribution of precipitation at these four locations for the period from January 2002 to December 2010.

**Table 2-4. CY 2009–CY 2010 Precipitation Data at KAFB**

| Site | A21 | A36 | SC1 | Airport |
|---|---|---|---|---|
| CY09 | 6.83 | 7.97 | 9.24 | 6.67 |
| CY10 | 9.47 | 9.67 | 11.17 | 8.96 |

**NOTES:** Data are in inches of rainfall.
Airport = Albuquerque International Sunport.
CY = Calendar Year.
KAFB = Kirtland Air Force Base.

**Groundwater Withdrawal**

KAFB production wells are screened over a depth from about 500 to 2,000 feet (ft) below ground surface (bgs) and extract groundwater from the upper and middle unit of the Santa Fe Group. During CY 2010, KAFB pumped groundwater primarily from seven water supply wells.

KAFB supplies all the water for SNL/NM and other DOE facilities located on KAFB. Figure 2C-3 (Attachment 2C) shows the CY 2010 monthly production for KAFB water supply wells. The highest level of production was in July at 124,551,000 gallons (gal.); the lowest occurred in February at 34,537,000 gal. The variability in production in response to demand is reflected in the cyclic fluctuation of water levels in monitoring wells within the region of influence of these pumping wells and is evident when shown in hydrographs. Figure 2C-4 shows the CY 2010 monthly production for each KAFB water supply well. Figure 2C-5 shows the trend of total annual groundwater production at KAFB for all wells, starting with 2001. Table 2-5 provides a comparison of water pumped during CY 2010 to the previous year.

**Table 2-5. Total KAFB Groundwater Well Production**

| Units | CY 2009 | CY 2010 |
|---|---|---|
| Million gal. | 890 | 900 |
| ac-ft | 2,731 | 2,763 |

**NOTES:**
ac-ft = 325,851 gal.
CY = Calendar Year.
gal. = Gallon(s).
KAFB = Kirtland Air Force Base.

### 2.6.2.2 Water Table Elevations

**Construction of Regional Water Table Elevation Contour Map**

Water level data for monitoring wells installed by the DOE and Sandia, USAF IRP, COA, and the State of New Mexico were used to construct the CY 2010 regional water table elevation contour map shown in Figure 2C-6 (Attachment 2C). The extent of the contoured area was constructed using September through October 2010 static water level elevation data from 32 wells completed in the regional aquifer underlying the western portion of KAFB. These wells are screened across the regional water table in the upper unit of the Santa Fe Group. The West Sandia Fault and the Tijeras fault complex (Figures 1-2 and 1-3) approximate the eastern boundary of the area in Figure 2C-6. These bounding faults are assumed to act as barriers to groundwater flow into the central basin from foothills to the east. The contours are developed using Surfer software (Golden 2002). The wells and the relevant data used to construct the contour map are listed in Table 2C-1 in Attachment 2C. Four-year hydrographs for these wells are provided in Figures 2C-8 through 2C-10.

**Regional Groundwater Flow System**

In general, the open-to-the-north, U-shaped contour lines depicted in Figure 2C-6 (Attachment 2C) define an elongated depression in the water table with a north-south orientation. This depression or trough extends as far south as Isleta Pueblo Reservation. The KAFB and COA Ridgecrest production well fields are located near the northern boundary of KAFB. The depression of the water table is the result of the withdrawal of groundwater by the water supply wells. The contour line gradient indicates groundwater flow towards these supply wells. The flat gradient in the middle of the trough is characteristic of flow through the highly permeable sediments of the Ancestral Rio Grande fluvial deposits, which are the most productive aquifer material in this area. The contours define the collective zones of influence of these large well fields. The direction of groundwater flow in the vicinity of KAFB (west of the Tijeras fault complex), as inferred from the contour lines, is toward the center of the trough and then to the north.

The relatively steep gradients in the water table along the eastern edge of the map are partially due to increased ground surface elevation defining the eastern extent of the Albuquerque Basin and the presence of faults, shown in Figures 1-2 and 1-3. The faults also present a hydrologic barrier to the westward movement of groundwater. The dashed contour lines in the southeast corner of Figure 2C-6 are inferred contours of groundwater elevations impacted by the Tijeras fault zone, which intersects the map at this location. Very little change is apparent when comparing the contours mapped in CY 2009 to those of the current reporting year, CY 2010.

Figure 2C-7 (Attachment 2C) maps contours of changes in water level elevations in the regional aquifer observed during CY 2010 from the same period of measurement in CY 2009. Areas of greatest declines in the water table are in the southeast quadrant of the mapped area. The water level decline over the past year in monitoring well CWL-BW3 was 1.26 ft. The four-year trend for this well is approximately 0.58 ft/year (ft/yr) as determined from the hydrograph presented in Figure 2C-8. The wells in the northern and western portions of KAFB in Figure 2C-7 show an increase in groundwater elevation. The area of increasing water levels has expanded significantly from the previous year. In the northeast, the water level in well Eubank-5 is up 1.49 ft from the corresponding period in CY 2009 (Figure 2C-9). This increase may be attributed to recharge from Tijeras Arroyo or resulting from draining of the perched groundwater system (PGWS) described in the following section. In the northwest, the water level in monitoring well KAFB-0118 is up 1.37 ft over the level measured in October 2009. The four-year trend for this well shows a decrease of 0.47 ft/yr.

**Perched Groundwater System**

During monitoring well installation for groundwater characterization at TA-II in 1993, a shallow water-bearing zone was encountered at a depth of 300 ft bgs. This was 200 ft above the regional water table at this location. The installation of additional wells completed in this shallow water-bearing zone defined the boundaries of the extent of the PGWS, which is approximately 3.5 square miles. The western extent is to the west side of the former KAFB sewage lagoons. The northern limits coincide with the northern edge of TA-I. To the east, the PGWS has been confirmed in the USAF IRP monitoring wells east of the KAFB Landfill. The southern extent appears to be south of the golf course along the north side of Pennsylvania Avenue.

The elevation data to the first water level of the PGWS are contoured in Figure 2C-11 (Attachment 2C). The contour map was constructed using data from 19 monitoring wells (Table 2C-2) completed in the defined area. The contours indicate a gradient in the PGWS to the east-southeast. Correlation of lithologic information obtained from boreholes drilled during monitoring well installations indicates a layer of fine sediments that dips to the southeast (Van Hart 2001) and may serve as the perching horizon.

Figure 2C-12 (Attachment 2C) illustrates the change in water level elevations in the PGWS during the period of CY 2010. In general water levels appear to be decreasing throughout the PGWS except for a slight increase in the southeast area. The changes in water level are dominated by the effects in monitoring wells TA1-W-03 and WYO-4. The drop in water level in TA1-W-03 was 2.4 ft during CY 2010. The majority of the decrease occurred in the first quarter of the year. The decrease coincides with the redevelopment of the well during February 2010. The hydrograph (Figure 2C-13) indicates the water level in the well did not recover to the predevelopment level. The four-year trend in the well is 0.69 ft/yr, although the decrease in water level elevation appears to have accelerated during the last half of CY 2010. The water level elevation decrease in WYO-4 is 1.4 ft during the current year. Based on the hydrograph, the rate of decline in water level elevation in the well has slowed beginning in early CY 2009. In Figure 2C-12, the solid-line contours represent water level elevation decreases over the course of CY 2010; the dashed lines in the southeast half of the map represent increasing water levels.

**Monitoring Well Hydrographs**

This section discusses recent trends in water levels in the vicinity of SNL/NM, as demonstrated in the hydrographs for wells used to construct the regional water table contours in Figure 2C-6 and the PGWS contours in Figure 2C-11 (Attachment 2C). The wells are listed in Tables 2C-1 and 2C-2. The water level data for these wells are representative of water levels at KAFB west of the Tijeras fault zone and the Sandia fault. Hydrographs represent graphical plots of water levels at a monitoring location over time. Data from quarterly and monthly water level measurements are used to construct the hydrographs. These hydrographs illustrate water level changes over the time period from 2007 through 2010. Figures 2C-8 through 2C-10 depict the hydrographs of wells representing the regional aquifer, and Figures 2C-13 and 2C-14 show the hydrographs for the PGWS.

## 2.7 Quality Control Results

The QC samples are collected in the field at the time of environmental sample collection. Field QC samples include duplicate, trip blank (TB), EB, and field blank (FB) samples. Field QC samples are used to monitor the sampling process. EB samples are used to verify sampling equipment decontamination procedures. Duplicate samples are used to measure the precision of the sampling process. FB samples are used to assess whether contamination of the samples resulted from ambient field conditions. TB samples are used to determine whether VOCs contaminated the sample during preparation, transportation, and handling prior to receipt by the analytical laboratory.

### 2.7.1 Field Quality Control Samples

#### 2.7.1.1 Duplicate Environmental Samples

Duplicate environmental samples were collected from NWTA-MW3D, PL-4, and SWTA3-MW3 and analyzed for all parameters in order to estimate the overall reproducibility of the sampling and analytical process. The duplicate sample was collected immediately after the original environmental sample, in order to reduce variability caused by time and/or sampling mechanics.

Relative percent difference calculations of environmental samples and duplicate samples were performed for detected chemical analytes only.

#### 2.7.1.2 Trip Blank Samples

The TB samples were submitted whenever samples were collected for VOC analysis to assess whether contamination of the samples had occurred during shipment and storage. The TBs consist of laboratory reagent grade water with hydrochloric acid preservative contained in 40-milliliter (mL) volatile organic analysis vials prepared by the analytical laboratory, which accompany the empty sample containers supplied by the laboratory. TBs were brought to the field and accompanied each sample shipment. A total of 20 TB samples were submitted with the March 2010 samples. No VOCs were detected above MDLs in any TB sample, except for toluene. Toluene was detected in four TB samples; however, the results were qualified as not detected during data validation due to associated laboratory method blank contamination.

#### 2.7.1.3 Equipment Blank Samples

The sampling pump and tubing bundle were decontaminated prior to insertion into monitoring wells. The following solutions were pumped through the sampling system: 5 gallons of deionized (DI) water mixed with 20 mL of nonphosphate laboratory detergent; 5 gallons of DI water; 5 gallons of DI water mixed with 20 mL reagent grade nitric acid; and 15 gallons of DI water. In addition, the outside of the pump tubing was rinsed with DI water. The EB or rinsate samples are collected to verify the effectiveness of the equipment decontamination process.

EB samples were collected prior to well purging and sampling at NWTA3-MW3D, PL-4, and SWTA3-MW3. Samples were analyzed for both chemical and radiological parameters. Various VOCs and metals, total alkalinity, chloride, NPN, total phenol, and radium-228 were detected in EB samples. No corrective action was required for the detected organic compounds as these compounds were not detected in the associated environmental samples. No corrective action was required for chloride, alkalinity, calcium, magnesium, sodium, thallium, zinc, or radium as these parameters either were not detected in the associated environmental samples or were detected at concentrations greater than five times the EB result. Total phenol, NPN, and copper were detected at concentrations less than five times the associated environmental sampling results. The associated environmental sampling results were qualified as not detected during data validation for total phenol in the PL-4 samples, NPN in the SWTA3-MW3 samples, and copper in the NWTA3-MW3D samples.

#### 2.7.1.4 Field Blank Samples

Three FB samples were collected for VOCs to assess whether contamination of the samples resulted from ambient conditions during sample collection. Field samples were prepared by pouring DI water into sample containers at the MRN-2, SWTA3-MW2, and SWTA3-MW4 sampling points to simulate the transfer of environmental samples from the sampling system to the sample container. No VOCs were detected in any FB sample, except for bromodichloromethane, bromoform, chloroform, and dibromochloromethane. No corrective action was necessary as these compounds were not detected above laboratory MDLs in the associated environmental samples.

### 2.7.2 Laboratory Quality Control Samples

QC samples are also prepared at the laboratory to determine whether contaminant chemicals are introduced into laboratory processes and procedures. These include method blanks, laboratory control samples, matrix spike, matrix spike duplicate, and surrogate spike samples. Table 2-6 shows the types of QC samples that accompany groundwater quality samples in the sampling and analysis process. Reported laboratory analytical and QC data are reviewed against quality assurance requirements specified in AOP-003, *Data Validation Procedure for Chemical and Radiochemical Data* (SNL 2007d). Quality assurance validation is conducted on all laboratory-reported data by a third-party consultant. The validation process evaluates the laboratory analytical processes and laboratory QC results for consistency with the specified analytical methods and contract requirements.

**Table 2-6. QC Sample Types for Groundwater Sampling and Analysis**

| QC Sample Type | Description |
|---|---|
| **Field QC** | |
| Equipment blanks[1] | Determine the effectiveness of the decontamination process of the portable sampling pump (Bennett™) to ensure that cross-contamination did not occur between wells. |
| Duplicate samples | Establish the precision of sampling process. |
| Trip blanks | Determine whether contamination by VOCs occurred during sample handling, shipment, or storage by submitting deionized water samples with environmental samples for VOC analysis. |
| Field Blanks | Assess whether contamination of the VOC samples had resulted from ambient field conditions. |
| **Laboratory QC** | |
| Method blanks | Determine contaminants introduced during the sample preparation and handling process in the laboratory. |
| LCS | Monitor the accuracy and precision of the laboratory's analytical method using laboratory-prepared samples spiked with a known concentration of an analyte. These samples are analyzed in the same batch with the groundwater samples. LCS results are reported as a percent recovery. |
| Batch matrix spike and matrix spike duplicate samples | Measure the effects of chemical spikes added to an existing sample to determine the sample matrix effect. (The matrix is groundwater.) |

**NOTE:** [1]Equipment blanks are collected for selected wells only.
LCS = Laboratory control sample.
QC = Quality control.
VOC = Volatile organic compound.

## 2.8 Variances and Nonconformances

No variances occurred during the CY 2010 annual groundwater surveillance monitoring event.

## 2.9 Summary and Conclusions

The annual groundwater surveillance monitoring sampling event was conducted during March 2010. Groundwater samples were collected from 16 monitoring wells and 1 spring. The analytical results for the groundwater samples are similar to the results reported for previous years. No VOCs or HE compounds were detected above established MCLs or MACs. The HE compound RDX was detected in the groundwater sample from monitoring well CTF-MW2 at a concentration of 0.170 µg/L.

Fluoride was detected above the NMWQCC groundwater protection standard of 1.6 mg/L (NMED 2001). The elevated fluoride concentrations were detected in samples from wells CTF-MW2, CTF-MW3, SFR-4T, and SWTA3-MW4. The water sample from Coyote Springs also contained elevated fluoride levels. The concentrations range from 1.62 to 2.44 mg/L. The EPA SDWA-regulated MCL for fluoride is 4.0 mg/L.

Arsenic was detected above the MCL of 0.01 mg/L in the groundwater sample from CTF-MW2 at a concentration of 0.0535 mg/L. Beryllium was detected in the surface water sample from Coyote Springs at a concentration of 0.00713 mg/L. The MCL for beryllium is 0.004 mg/L. Beryllium has been consistently detected in the surface water samples from the springs and is considered to be of natural origin.

Upon applying the appropriate correction for uranium to the gross alpha results, none of the samples exceeded the MCL of 15 pCi/L. Combined radium-226 and radium-228 activities from the CTF-MW2 sample exceeded the MCL of 5.0 pCi/L. Radium-226 was reported in the sample from CTF-MW2 at 2.16 ± 0.0854 pCi/L and radium-228 at 7.94 ± 2.10 pCi/L.

Water table elevation measurements were obtained throughout CY 2010 at 78 locations on a monthly and quarterly basis. Water level elevation measurements obtained from 32 representative monitoring wells west of the Tijeras fault zone and west of the Sandia fault at KAFB and vicinity were used to construct contours of water table elevation. The contours display a pattern that reflects the impact of the groundwater withdrawal by water supply wells located in the northwestern portion of KAFB and COA wells north of the base. A contour map of the differences in the regional water table between the same periods in CY 2010 and CY 2009 indicate the area of greatest decline is in the southeast quadrant of the mapped area. The water level decline over the past year in monitoring well CWL-BW3 is 1.26 ft. The area of increasing water levels has expanded significantly from the previous year. In the northeast, the water level in well Eubank-5 is up 1.49 ft from the corresponding period in CY 2009 (Figure 2C-7). In the northwest, the water level in monitoring well KAFB-0118 is up 1.37 ft over the level measured in October 2009 (Figure 2C-7).

Water level elevations were also obtained for wells completed in the PGWS. Nineteen wells were used to construct a water level elevation contour map for the PGWS. The contours indicate groundwater flow in the PGWS is from the northwest to the southeast. Water levels are declining in the northwest and increasing slightly in the east (Figure 2C-12) presumably due to the drainage of the system to the east and perhaps some additional recharge from the Tijeras Arroyo.

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# Attachment 2A
# Groundwater Protection Program
# Analytical Results Tables

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# Attachment 2A Tables

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# Table 2A-1
# Summary of Detected Volatile Organic and High Explosive Compounds, Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Well ID | Analyte | Result[a] (µg/L) | MDL[b] (µg/L) | PQL[c] (µg/L) | MCL/MAC[d] (µg/L) | | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| **Coyote Spring** 29-Mar-10 | Toluene | 0.440 | 0.250 | 1.00 | 1000 | 750 | B, J | 1.0U | 088545-001 | SW846-8260 |
| **CTF-MW2** 15-Mar-10 | RDX | 0.170 | 0.104 | 0.325 | NE | NE | J | J+ | 088516-024 | SW846-8330 |
| **CTF-MW3** 10-Mar-10 | Bromodichloromethane | 0.530 | 0.250 | 1.00 | NE | NE | J | | 088507-001 | SW846-8260 |
| | Chloroform | 0.730 | 0.250 | 1.00 | NE | 100 | J | | 088507-001 | SW846-8260 |
| | Dibromochloromethane | 0.390 | 0.300 | 1.00 | NE | NE | J | | 088507-001 | SW846-8260 |
| **PL-4** 11-Mar-10 | Chloromethane | 0.320 | 0.300 | 1.00 | NE | NE | J | | 088511-001 | SW846-8260 |
| | Toluene | 0.430 | 0.250 | 1.00 | 1000 | 750 | B, J | 1.0U | 088511-001 | SW846-8260 |
| **PL-4** (Duplicate) 11-Mar-10 | Toluene | 0.360 | 0.250 | 1.00 | 1000 | 750 | B, J | 1.0U | 088512-001 | SW846-8260 |
| **SFR-2S** 08-Mar-10 | Toluene | 0.360 | 0.250 | 1.00 | 1000 | 750 | B, J | 1.0U | 088503-001 | SW846-8260 |
| **SWTA3-MW3** 16-Mar-10 | Chloromethane | 0.400 | 0.300 | 1.00 | NE | NE | J | | 088520-001 | SW846-8260 |
| **TRE-1** 09-Mar-10 | Chloroform | 0.600 | 0.250 | 1.00 | NE | 100 | J | | 088505-001 | SW846-8260 |

Refer to footnotes on page 2A-47.

# Table 2A-2
## Method Detection Limits for Volatile Organic and High Explosive Compounds, Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Analyte | Method Detection Limit (μg/L) | Analytical Method[g] | Analyte | Method Detection Limit (μg/L) | Analytical Method[g] |
|---|---|---|---|---|---|
| 1,1,1,2-Tetrachloroethane | 0.300 | SW846-8260 | Dibromomethane | 0.300 | SW846-8260 |
| 1,1,1-Trichloroethane | 0.325 | SW846-8260 | Dichlorodifluoromethane | 0.300 | SW846-8260 |
| 1,1,2,2-Tetrachloroethane | 0.250 | SW846-8260 | Ethyl benzene | 0.250 | SW846-8260 |
| 1,1,2-Trichloroethane | 0.250 | SW846-8260 | Hexachlorobutadiene | 0.300 | SW846-8260 |
| 1,1-Dichloroethane | 0.300 | SW846-8260 | Isopropylbenzene | 0.250 | SW846-8260 |
| 1,1-Dichloroethene | 0.300 | SW846-8260 | Methylene chloride | 3.00 | SW846-8260 |
| 1,1-Dichloropropene | 0.250 | SW846-8260 | Naphthalene | 0.250 | SW846-8260 |
| 1,2,3-Trichlorobenzene | 0.332 | SW846-8260 | Styrene | 0.250 | SW846-8260 |
| 1,2,3-Trichloropropane | 0.300 | SW846-8260 | Tert-butyl methyl ether | 0.250 | SW846-8260 |
| 1,2,4-Trichlorobenzene | 0.300 | SW846-8260 | Tetrachloroethene | 0.300 | SW846-8260 |
| 1,2,4-Trimethylbenzene | 0.250 | SW846-8260 | Toluene | 0.250 | SW846-8260 |
| 1,2-Dibromo-3-chloropropane | 0.300 | SW846-8260 | Trichloroethene | 0.250 | SW846-8260 |
| 1,2-Dibromoethane | 0.250 | SW846-8260 | Trichlorofluoromethane | 0.300 | SW846-8260 |
| 1,2-Dichlorobenzene | 0.250 | SW846-8260 | Vinyl acetate | 1.50 | SW846-8260 |
| 1,2-Dichloroethane | 0.250 | SW846-8260 | Vinyl chloride | 0.500 | SW846-8260 |
| 1,2-Dichloropropane | 0.250 | SW846-8260 | cis-1,2-Dichloroethene | 0.300 | SW846-8260 |
| 1,3,5-Trimethylbenzene | 0.250 | SW846-8260 | cis-1,3-Dichloropropene | 0.250 | SW846-8260 |
| 1,3-Dichlorobenzene | 0.250 | SW846-8260 | m-, p-Xylene | 0.500 | SW846-8260 |
| 1,3-Dichloropropane | 0.300 | SW846-8260 | n-Butylbenzene | 0.250 | SW846-8260 |
| 1,4-Dichlorobenzene | 0.250 | SW846-8260 | n-Propylbenzene | 0.250 | SW846-8260 |
| 2,2-Dichloropropane | 0.300 | SW846-8260 | o-Xylene | 0.300 | SW846-8260 |
| 2-Butanone | 1.25 | SW846-8260 | sec-Butylbenzene | 0.250 | SW846-8260 |
| 2-Chlorotoluene | 0.250 | SW846-8260 | tert-Butylbenzene | 0.250 | SW846-8260 |
| 2-Hexanone | 1.25 | SW846-8260 | trans-1,2-Dichloroethene | 0.300 | SW846-8260 |
| 4-Chlorotoluene | 0.250 | SW846-8260 | trans-1,3-Dichloropropene | 0.250 | SW846-8260 |
| 4-Isopropyltoluene | 0.250 | SW846-8260 | 1,3,5-Trinitrobenzene | 0.104 | SW846-8321A |
| 4-Methyl-, 2-Pentanone | 1.25 | SW846-8260 | 1,3-Dinitrobenzene | 0.104 | SW846-8321A |
| Benzene | 0.300 | SW846-8260 | 2,4,6-Trinitrotoluene | 0.104 | SW846-8321A |
| Bromobenzene | 0.250 | SW846-8260 | 2,4-Dinitrotoluene | 0.104 | SW846-8321A |
| Bromochloromethane | 0.300 | SW846-8260 | 2,6-Dinitrotoluene | 0.0779 | SW846-8321A |
| Bromodichloromethane | 0.250 | SW846-8260 | 2-Amino-4,6-dinitrotoluene | 0.104 | SW846-8321A |
| Bromoform | 0.250 | SW846-8260 | 2-Nitrotoluene | 0.104 | SW846-8321A |
| Bromomethane | 0.300 | SW846-8260 | 3-Nitrotoluene | 0.104 | SW846-8321A |

Refer to footnotes on page 2A-47.

**Table 2A-2** *(Concluded)*
**Method Detection Limits for Volatile Organic Compounds and High Explosives, Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Analyte | Method Detection Limit (µg/L) | Analytical Method[g] | Analyte | Method Detection Limit (µg/L) | Analytical Method[g] |
|---|---|---|---|---|---|
| Carbon disulfide | 1.25 | SW846-8260 | 4-Amino-2,6-dinitrotoluene | 0.104 | SW846-8321A |
| Carbon tetrachloride | 0.300 | SW846-8260 | 4-Nitrotoluene | 0.104 | SW846-8321A |
| Chlorobenzene | 0.250 | SW846-8260 | HMX | 0.104 | SW846-8321A |
| Chloroethane | 0.300 | SW846-8260 | Nitro-benzene | 0.104 | SW846-8321A |
| Chloroform | 0.250 | SW846-8260 | Pentaerythritol tetranitrate | 0.130 | SW846-8321A |
| Chloromethane | 0.300 | SW846-8260 | RDX | 0.104 | SW846-8321A |
| Dibromochloromethane | 0.300 | SW846-8260 | Tetryl | 0.130 | SW846-8321A |

Refer to footnotes on page 2A-47.

# Table 2A-3
## Summary of Alkalinity, Anions, Nitrate plus Nitrate, Total Organic Halogens, Total Phenols, and Total Cyanide Results, Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL/MAC[d] (mg/L) | | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| **Coyote Spring** | Alkalinity as CaCO3 | 1030 | 0.725 | 1.00 | NE | NE | B | | 088545-016 | SM 2320B |
| 29-Mar-10 | Bromide | 2.07 | 0.066 | 0.200 | NE | NE | | | 088545-016 | SW846 9056 |
| | Chloride | 489 | 3.30 | 10.0 | NE | NE | | | 088545-016 | SW846 9056 |
| | Fluoride | **1.62** | 0.033 | 0.100 | 4.00 | 1.60 | | | 088545-016 | SW846 9056 |
| | Sulfate | 129 | 5.00 | 20.0 | NE | NE | | | 088545-016 | SW846 9056 |
| | Nitrate plus nitrite | 0.414 | 0.050 | 0.250 | 10.0 | 10.0 | | | 088545-018 | EPA 353.2 |
| | Total Organic Halogens | 0.0567 | 0.00312 | 0.010 | NE | NE | | | 088545-003 | SW846 9020 |
| | Total Phenol | ND | 0.0016 | 0.005 | NE | NE | U | UJ | 088545-026 | SW846 9066 |
| | Total Cyanide | ND | 0.0017 | 0.005 | 0.200 | 0.200 | U | | 088545-027 | SW846 9012 |
| **CTF-MW1** | Alkalinity as CaCO3 | 193 | 0.725 | 1.00 | NE | NE | B | | 088526-016 | SM 2320B |
| 18-Mar-10 | Bromide | 0.626 | 0.066 | 0.200 | NE | NE | | | 088526-016 | SW846 9056 |
| | Chloride | 37.2 | 0.660 | 2.00 | NE | NE | | | 088526-016 | SW846 9056 |
| | Fluoride | 1.29 | 0.033 | 0.100 | 4.00 | 1.60 | | | 088526-016 | SW846 9056 |
| | Sulfate | 74.6 | 1.00 | 4.00 | NE | NE | | | 088526-016 | SW846 9056 |
| | Nitrate plus nitrite | 7.58 | 0.250 | 1.25 | 10.0 | 10.0 | | | 088526-018 | EPA 353.2 |
| | Total Organic Halogens | ND | 0.00312 | 0.010 | NE | NE | U | | 088526-003 | SW846 9020 |
| | Total Phenol | ND | 0.0017 | 0.005 | NE | NE | U | UJ | 088526-026 | SW846 9066 |
| | Total Cyanide | ND | 0.00166 | 0.005 | 0.200 | 0.200 | U | | 088526-027 | SW846 9012 |
| **CTF-MW2** | Alkalinity as CaCO3 | 1490 | 0.725 | 1.00 | NE | NE | B | | 088516-016 | SM 2320B |
| 15-Mar-10 | Bromide | 0.291 | 0.066 | 0.200 | NE | NE | | | 088516-016 | SW846 9056 |
| | Chloride | 403 | 3.30 | 10.0 | NE | NE | | J | 088516-016 | SW846 9056 |
| | Fluoride | **1.71** | 0.033 | 0.100 | 4.00 | 1.60 | | | 088516-016 | SW846 9056 |
| | Sulfate | 150 | 5.00 | 20.0 | NE | NE | | J | 088516-016 | SW846 9056 |
| | Nitrate plus nitrite | ND | 0.050 | 0.250 | 10.0 | 10.0 | U | | 088516-018 | EPA 353.2 |
| | Total Organic Halogens | 0.0289 | 0.00312 | 0.010 | NE | NE | | | 088516-003 | SW846 9020 |
| | Total Phenol | ND | 0.0017 | 0.005 | NE | NE | U | UJ | 088516-026 | SW846 9066 |
| | Total Cyanide | ND | 0.00166 | 0.005 | 0.200 | 0.200 | U | | 088516-027 | SW846 9012 |
| **CTF-MW3** | Alkalinity as CaCO3 | 345 | 0.725 | 1.00 | NE | NE | | | 088507-016 | SM 2320B |
| 10-Mar-10 | Bromide | 1.14 | 0.066 | 0.200 | NE | NE | | | 088507-016 | SW846 9056 |
| | Chloride | 110 | 6.60 | 20.0 | NE | NE | | J | 088507-016 | SW846 9056 |
| | Fluoride | **2.21** | 0.033 | 0.100 | 4.00 | 1.60 | | | 088507-016 | SW846 9056 |
| | Sulfate | 452 | 10.0 | 40.0 | NE | NE | | J | 088507-016 | SW846 9056 |
| | Nitrate plus nitrite | 5.54 | 0.100 | 0.500 | 10.0 | 10.0 | | | 088507-018 | EPA 353.2 |
| | Total Organic Halogens | 0.0101 | 0.00312 | 0.010 | NE | NE | | 0.018UJ | 088507-003 | SW846 9020 |
| | Total Phenol | ND | 0.0017 | 0.005 | NE | NE | U | | 088507-026 | SW846 9066 |
| | Total Cyanide | ND | 0.00166 | 0.005 | 0.200 | 0.200 | U | UJ | 088507-027 | SW846 9012 |

Refer to footnotes on page 2A-47.

# Table 2A-3 *(Continued)*
## Summary of Alkalinity, Anions, Nitrate plus Nitrate, Total Organic Halogens, Total Phenols, and Total Cyanide Results, Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL/MAC[d] (mg/L) | | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| **Eubank-1** | Alkalinity as CaCO3 | 176 | 0.725 | 1.00 | NE | NE | | | 088501-016 | SM 2320B |
| 05-Mar-10 | Bromide | 0.206 | 0.066 | 0.200 | NE | NE | | | 088501-016 | SW846 9056 |
| | Chloride | 12.1 | 0.066 | 0.200 | NE | NE | | | 088501-016 | SW846 9056 |
| | Fluoride | 0.416 | 0.033 | 0.100 | 4.00 | 1.60 | | | 088501-016 | SW846 9056 |
| | Sulfate | 67.5 | 1.00 | 4.00 | NE | NE | | | 088501-016 | SW846 9056 |
| | Nitrate plus nitrite | 2.14 | 0.050 | 0.250 | 10.0 | 10.0 | | | 088501-018 | EPA 353.2 |
| | Total Organic Halogens | ND | 0.00312 | 0.010 | NE | NE | U | | 088501-003 | SW846 9020 |
| | Total Phenol | 0.00176 | 0.0017 | 0.005 | NE | NE | J | | 088501-026 | SW846 9066 |
| | Total Cyanide | ND | 0.00166 | 0.005 | 0.200 | 0.200 | U | UJ | 088501-027 | SW846 9012 |
| **Greystone-MW2** | Alkalinity as CaCO3 | 441 | 0.725 | 1.00 | NE | NE | | | 088531-016 | SM 2320B |
| 22-Mar-10 | Bromide | 0.651 | 0.066 | 0.200 | NE | NE | | | 088531-016 | SW846 9056 |
| | Chloride | 106 | 0.660 | 2.00 | NE | NE | | | 088531-016 | SW846 9056 |
| | Fluoride | 0.776 | 0.033 | 0.100 | 4.00 | 1.60 | | | 088531-016 | SW846 9056 |
| | Sulfate | 47.2 | 1.00 | 4.00 | NE | NE | | | 088531-016 | SW846 9056 |
| | Nitrate plus nitrite | 4.30 | 0.250 | 1.25 | 10.0 | 10.0 | | | 088531-018 | EPA 353.2 |
| | Total Organic Halogens | 0.00868 | 0.00312 | 0.010 | NE | NE | J | | 088531-003 | SW846 9020 |
| | Total Phenol | 0.00206 | 0.0016 | 0.005 | NE | NE | J | NJ- | 088531-026 | SW846 9066 |
| | Total Cyanide | ND | 0.00166 | 0.005 | 0.200 | 0.200 | U | | 088531-027 | SW846 9012 |
| **MRN-2** | Alkalinity as CaCO3 | 151 | 0.725 | 1.00 | NE | NE | | | 088535-016 | SM 2320B |
| 24-Mar-10 | Bromide | 0.200 | 0.066 | 0.200 | NE | NE | J | | 088535-016 | SW846 9056 |
| | Chloride | 13.8 | 0.066 | 0.200 | NE | NE | | | 088535-016 | SW846 9056 |
| | Fluoride | 0.581 | 0.033 | 0.100 | 4.00 | 1.60 | | | 088535-016 | SW846 9056 |
| | Sulfate | 47.9 | 0.500 | 2.00 | NE | NE | | | 088535-016 | SW846 9056 |
| | Nitrate plus nitrite | 4.30 | 0.250 | 1.25 | 10.0 | 10.0 | | | 088535-018 | EPA 353.2 |
| | Total Organic Halogens | ND | 0.00312 | 0.010 | NE | NE | U | | 088535-003 | SW846 9020 |
| | Total Phenol | ND | 0.0016 | 0.005 | NE | NE | U | UJ | 088535-026 | SW846 9066 |
| | Total Cyanide | ND | 0.00166 | 0.005 | 0.200 | 0.200 | U | | 088535-027 | SW846 9012 |
| **MRN-3D** | Alkalinity as CaCO3 | 161 | 0.725 | 1.00 | NE | NE | | | 088538-016 | SM 2320B |
| 25-Mar-10 | Bromide | 0.241 | 0.066 | 0.200 | NE | NE | | | 088538-016 | SW846 9056 |
| | Chloride | 14.6 | 0.066 | 0.200 | NE | NE | | | 088538-016 | SW846 9056 |
| | Fluoride | 0.469 | 0.033 | 0.100 | 4.00 | 1.60 | | | 088538-016 | SW846 9056 |
| | Sulfate | 69.9 | 0.500 | 2.00 | NE | NE | | | 088538-016 | SW846 9056 |
| | Nitrate plus nitrite | 1.79 | 0.100 | 0.500 | 10.0 | 10.0 | | | 088538-018 | EPA 353.2 |
| | Total Organic Halogens | ND | 0.00312 | 0.010 | NE | NE | U | | 088538-003 | SW846 9020 |
| | Total Phenol | 0.00179 | 0.0016 | 0.005 | NE | NE | J | NJ- | 088538-026 | SW846 9066 |
| | Total Cyanide | ND | 0.00166 | 0.005 | 0.200 | 0.200 | U | | 088538-027 | SW846 9012 |

Refer to footnotes on page 2A-47.

**Table 2A-3** *(Continued)*
**Summary of Alkalinity, Anions, Nitrate plus Nitrate,**
**Total Organic Halogens, Total Phenols, and Total Cyanide Results,**
**Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL/MAC[d] (mg/L) | | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| **NWTA3-MW3D** | Alkalinity as CaCO3 | 132 | 0.725 | 1.00 | NE | NE | B, H | | 088542-016 | SM 2320B |
| 26-Mar-10 | Bromide | 0.158 | 0.066 | 0.200 | NE | NE | J | | 088542-016 | SW846 9056 |
| | Chloride | 11.0 | 0.066 | 0.200 | NE | NE | | | 088542-016 | SW846 9056 |
| | Fluoride | 0.720 | 0.033 | 0.100 | 4.00 | 1.60 | | | 088542-016 | SW846 9056 |
| | Sulfate | 51.7 | 0.200 | 0.800 | NE | NE | | | 088542-016 | SW846 9056 |
| | Nitrate plus nitrite | 1.01 | 0.050 | 0.250 | 10.0 | 10.0 | | | 088542-018 | EPA 353.2 |
| | Total Organic Halogens | ND | 0.00312 | 0.010 | NE | NE | U | | 088542-003 | SW846 9020 |
| | Total Phenol | ND | 0.0016 | 0.005 | NE | NE | U | UJ | 088542-026 | SW846 9066 |
| | Total Cyanide | ND | 0.0017 | 0.005 | 0.200 | 0.200 | U | | 088542-027 | SW846 9012 |
| **NWTA3-MW3D** (Duplicate) | Alkalinity as CaCO3 | 131 | 0.725 | 1.00 | NE | NE | B, H | | 088543-016 | SM 2320B |
| 26-Mar-10 | Bromide | 0.160 | 0.066 | 0.200 | NE | NE | J | | 088543-016 | SW846 9056 |
| | Chloride | 11.0 | 0.066 | 0.200 | NE | NE | | | 088543-016 | SW846 9056 |
| | Fluoride | 0.793 | 0.033 | 0.100 | 4.00 | 1.60 | | | 088543-016 | SW846 9056 |
| | Sulfate | 51.6 | 0.200 | 0.800 | NE | NE | | | 088543-016 | SW846 9056 |
| | Nitrate plus nitrite | 1.01 | 0.050 | 0.250 | 10.0 | 10.0 | | | 088543-018 | EPA 353.2 |
| | Total Organic Halogens | ND | 0.00312 | 0.010 | NE | NE | U | | 088543-003 | SW846 9020 |
| | Total Phenol | ND | 0.0016 | 0.005 | NE | NE | U | UJ | 088543-026 | SW846 9066 |
| | Total Cyanide | ND | 0.0017 | 0.005 | 0.200 | 0.200 | U | | 088543-027 | SW846 9012 |
| **PL-2** | Alkalinity as CaCO3 | 146 | 0.725 | 1.00 | NE | NE | B | | 088514-016 | SM 2320B |
| 12-Mar-10 | Bromide | 0.213 | 0.066 | 0.200 | NE | NE | | | 088514-016 | SW846 9056 |
| | Chloride | 14.3 | 0.066 | 0.200 | NE | NE | | | 088514-016 | SW846 9056 |
| | Fluoride | 0.513 | 0.033 | 0.100 | 4.00 | 1.60 | | | 088514-016 | SW846 9056 |
| | Sulfate | 64.1 | 0.500 | 2.00 | NE | NE | | | 088514-016 | SW846 9056 |
| | Nitrate plus nitrite | 2.55 | 0.100 | 0.500 | 10.0 | 10.0 | | | 088514-018 | EPA 353.2 |
| | Total Organic Halogens | ND | 0.00312 | 0.010 | NE | NE | U | | 088514-003 | SW846 9020 |
| | Total Phenol | ND | 0.0017 | 0.005 | NE | NE | U | UJ | 088514-026 | SW846 9066 |
| | Total Cyanide | ND | 0.00166 | 0.005 | 0.200 | 0.200 | U | | 088514-027 | SW846 9012 |
| **PL-4** | Alkalinity as CaCO3 | 170 | 0.725 | 1.00 | NE | NE | | | 088511-016 | SM 2320B |
| 11-Mar-10 | Bromide | 0.236 | 0.066 | 0.200 | NE | NE | | | 088511-016 | SW846 9056 |
| | Chloride | 16.0 | 0.066 | 0.200 | NE | NE | | | 088511-016 | SW846 9056 |
| | Fluoride | 0.416 | 0.033 | 0.100 | 4.00 | 1.60 | | | 088511-016 | SW846 9056 |
| | Sulfate | 57.8 | 1.00 | 4.00 | NE | NE | | | 088511-016 | SW846 9056 |
| | Nitrate plus nitrite | 3.52 | 0.100 | 0.500 | 10.0 | 10.0 | | | 088511-018 | EPA 353.2 |
| | Total Organic Halogens | ND | 0.00312 | 0.010 | NE | NE | U | | 088511-003 | SW846 9020 |
| | Total Phenol | 0.0025 | 0.0017 | 0.005 | NE | NE | J | 0.013U | 088511-026 | SW846 9066 |
| | Total Cyanide | ND | 0.00166 | 0.005 | 0.200 | 0.200 | U | UJ | 088511-027 | SW846 9012 |

Refer to footnotes on page 2A-47.

## **Table 2A-3** *(Continued)*
## Summary of Alkalinity, Anions, Nitrate plus Nitrate, Total Organic Halogens, Total Phenols, and Total Cyanide Results, Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL/MAC[d] (mg/L) | | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| **PL-4** (Duplicate) | Alkalinity as CaCO3 | 168 | 0.725 | 1.00 | NE | NE | | | 088512-016 | SM 2320B |
| 11-Mar-10 | Bromide | 0.233 | 0.066 | 0.200 | NE | NE | | | 088512-016 | SW846 9056 |
| | Chloride | 16.0 | 0.066 | 0.200 | NE | NE | | | 088512-016 | SW846 9056 |
| | Fluoride | 0.420 | 0.033 | 0.100 | 4.00 | 1.60 | | | 088512-016 | SW846 9056 |
| | Sulfate | 59.8 | 1.00 | 4.00 | NE | NE | | | 088512-016 | SW846 9056 |
| | Nitrate plus nitrite | 3.51 | 0.100 | 0.500 | 10.0 | 10.0 | | | 088512-018 | EPA 353.2 |
| | Total Organic Halogens | ND | 0.00312 | 0.010 | NE | NE | U | | 088512-003 | SW846 9020 |
| | Total Phenol | 0.00623 | 0.0017 | 0.005 | NE | NE | | 0.013U | 088512-026 | SW846 9066 |
| | Total Cyanide | ND | 0.00166 | 0.005 | 0.200 | 0.200 | U | UJ | 088512-027 | SW846 9012 |
| **SFR-2S** | Alkalinity as CaCO3 | 389 | 0.725 | 1.00 | NE | NE | | | 088503-016 | SM 2320B |
| 08-Mar-10 | Bromide | ND | 0.660 | 2.00 | NE | NE | U | | 088503-016 | SW846 9056 |
| | Chloride | 117 | 0.660 | 2.00 | NE | NE | | | 088503-016 | SW846 9056 |
| | Fluoride | 1.43 | 0.033 | 0.100 | 4.00 | 1.60 | | | 088503-016 | SW846 9056 |
| | Sulfate | 65.0 | 1.00 | 4.00 | NE | NE | | | 088503-016 | SW846 9056 |
| | Nitrate plus nitrite | 0.890 | 0.050 | 0.250 | 10.0 | 10.0 | | | 088503-018 | EPA 353.2 |
| | Total Organic Halogens | 0.0114 | 0.00312 | 0.010 | NE | NE | | 0.018UJ | 088503-003 | SW846 9020 |
| | Total Phenol | ND | 0.0017 | 0.005 | NE | NE | U | | 088503-026 | SW846 9066 |
| | Total Cyanide | ND | 0.00166 | 0.005 | 0.200 | 0.200 | U | UJ | 088503-027 | SW846 9012 |
| **SFR-4T** | Alkalinity as CaCO3 | 104 | 0.725 | 1.00 | NE | NE | | | 088533-016 | SM 2320B |
| 23-Mar-10 | Bromide | 1.50 | 0.066 | 0.200 | NE | NE | | | 088533-016 | SW846 9056 |
| | Chloride | 168 | 6.60 | 20.0 | NE | NE | | J | 088533-016 | SW846 9056 |
| | Fluoride | **2.44** | 0.033 | 0.100 | 4.00 | 1.60 | | | 088533-016 | SW846 9056 |
| | Sulfate | 1810 | 10.0 | 40.0 | NE | NE | | J | 088533-016 | SW846 9056 |
| | Nitrate plus nitrite | 0.250 | 0.050 | 0.250 | 10.0 | 10.0 | J | | 088533-018 | EPA 353.2 |
| | Total Organic Halogens | 0.0283 | 0.00312 | 0.010 | NE | NE | | | 088533-003 | SW846 9020 |
| | Total Phenol | ND | 0.0016 | 0.005 | NE | NE | U | UJ | 088533-026 | SW846 9066 |
| | Total Cyanide | ND | 0.00166 | 0.005 | 0.200 | 0.200 | U | | 088533-027 | SW846 9012 |
| **SWTA3-MW2** | Alkalinity as CaCO3 | 164 | 0.725 | 1.00 | NE | NE | | | 088528-016 | SM 2320B |
| 19-Mar-10 | Bromide | 0.211 | 0.066 | 0.200 | NE | NE | | | 088528-016 | SW846 9056 |
| | Chloride | 13.3 | 0.066 | 0.200 | NE | NE | | | 088528-016 | SW846 9056 |
| | Fluoride | 0.922 | 0.033 | 0.100 | 4.00 | 1.60 | | | 088528-016 | SW846 9056 |
| | Sulfate | 51.9 | 0.500 | 2.00 | NE | NE | | | 088528-016 | SW846 9056 |
| | Nitrate plus nitrite | 0.780 | 0.050 | 0.250 | 10.0 | 10.0 | | | 088528-018 | EPA 353.2 |
| | Total Organic Halogens | ND | 0.00312 | 0.010 | NE | NE | U | | 088528-003 | SW846 9020 |
| | Total Phenol | 0.0036 | 0.0016 | 0.005 | NE | NE | J | NJ- | 088528-026 | SW846 9066 |
| | Total Cyanide | ND | 0.00166 | 0.005 | 0.200 | 0.200 | U | | 088528-027 | SW846 9012 |

Refer to footnotes on page 2A-47.

**Table 2A-3** *(Concluded)*
**Summary of Alkalinity, Anions, Nitrate plus Nitrate, Total Organic Halogens, Total Phenols, and Total Cyanide Results, Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL/MAC[d] (mg/L) | | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| **SWTA3-MW3** | Alkalinity as CaCO3 | 160 | 0.725 | 1.00 | NE | NE | B | | 088520-016 | SM 2320B |
| 16-Mar-10 | Bromide | 0.192 | 0.066 | 0.200 | NE | NE | J | | 088520-016 | SW846 9056 |
| | Chloride | 13.6 | 0.066 | 0.200 | NE | NE | | | 088520-016 | SW846 9056 |
| | Fluoride | 1.19 | 0.033 | 0.100 | 4.00 | 1.60 | | | 088520-016 | SW846 9056 |
| | Sulfate | 59.8 | 0.500 | 2.00 | NE | NE | | | 088520-016 | SW846 9056 |
| | Nitrate plus nitrite | 0.580 | 0.050 | 0.250 | 10.0 | 10.0 | | 0.32U | 088520-018 | EPA 353.2 |
| | Total Organic Halogens | ND | 0.00312 | 0.010 | NE | NE | U | | 088520-003 | SW846 9020 |
| | Total Phenol | ND | 0.0017 | 0.005 | NE | NE | U | UJ | 088520-026 | SW846 9066 |
| | Total Cyanide | ND | 0.00166 | 0.005 | 0.200 | 0.200 | U | | 088520-027 | SW846 9012 |
| **SWTA3-MW3** (Duplicate) | Alkalinity as CaCO3 | 156 | 0.725 | 1.00 | NE | NE | B | | 088521-016 | SM 2320B |
| 16-Mar-10 | Bromide | 0.195 | 0.066 | 0.200 | NE | NE | J | | 088521-016 | SW846 9056 |
| | Chloride | 13.6 | 0.066 | 0.200 | NE | NE | | | 088521-016 | SW846 9056 |
| | Fluoride | 1.21 | 0.033 | 0.100 | 4.00 | 1.60 | | | 088521-016 | SW846 9056 |
| | Sulfate | 58.2 | 0.500 | 2.00 | NE | NE | | | 088521-016 | SW846 9056 |
| | Nitrate plus nitrite | 0.570 | 0.050 | 0.250 | 10.0 | 10.0 | | 0.32U | 088521-018 | EPA 353.2 |
| | Total Organic Halogens | ND | 0.00312 | 0.010 | NE | NE | U | | 088521-003 | SW846 9020 |
| | Total Phenol | ND | 0.0017 | 0.005 | NE | NE | U | UJ | 088521-026 | SW846 9066 |
| | Total Cyanide | ND | 0.00166 | 0.005 | 0.200 | 0.200 | U | | 088521-027 | SW846 9012 |
| **SWTA3-MW4** | Alkalinity as CaCO3 | 170 | 0.725 | 1.00 | NE | NE | B | | 088523-016 | SM 2320B |
| 17-Mar-10 | Bromide | 0.189 | 0.066 | 0.200 | NE | NE | J | | 088523-016 | SW846 9056 |
| | Chloride | 14.9 | 0.066 | 0.200 | NE | NE | | | 088523-016 | SW846 9056 |
| | Fluoride | 1.56 | 0.033 | 0.100 | 4.00 | 1.60 | | | 088523-016 | SW846 9056 |
| | Sulfate | 47.3 | 0.500 | 2.00 | NE | NE | | | 088523-016 | SW846 9056 |
| | Nitrate plus nitrite | 1.23 | 0.100 | 0.500 | 10.0 | 10.0 | | | 088523-018 | EPA 353.2 |
| | Total Organic Halogens | ND | 0.00312 | 0.010 | NE | NE | U | | 088523-003 | SW846 9020 |
| | Total Phenol | ND | 0.0017 | 0.005 | NE | NE | U | UJ | 088523-026 | SW846 9066 |
| | Total Cyanide | ND | 0.00166 | 0.005 | 0.200 | 0.200 | U | | 088523-027 | SW846 9012 |
| **TRE-1** | Alkalinity as CaCO3 | 485 | 0.725 | 1.00 | NE | NE | | | 088505-016 | SM 2320B |
| 09-Mar-10 | Bromide | ND | 0.660 | 2.00 | NE | NE | U | | 088505-016 | SW846 9056 |
| | Chloride | 131 | 0.660 | 2.00 | NE | NE | | | 088505-016 | SW846 9056 |
| | Fluoride | 1.37 | 0.033 | 0.100 | 4.00 | 1.60 | | | 088505-016 | SW846 9056 |
| | Sulfate | 95.1 | 1.00 | 4.00 | NE | NE | | | 088505-016 | SW846 9056 |
| | Nitrate plus nitrite | 2.16 | 0.050 | 0.250 | 10.0 | 10.0 | | | 088505-018 | EPA 353.2 |
| | Total Organic Halogens | 0.00928 | 0.00312 | 0.010 | NE | NE | J | 0.018UJ | 088505-003 | SW846 9020 |
| | Total Phenol | 0.00238 | 0.0017 | 0.005 | NE | NE | J | | 088505-026 | SW846 9066 |
| | Total Cyanide | ND | 0.00166 | 0.005 | 0.200 | 0.200 | U | UJ | 088505-027 | SW846 9012 |

Refer to footnotes on page 2A-47.

## Table 2A-4
## Summary of Dissolved (Filtered) Metal Results,
## Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL/MAC[d] (mg/L) | | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| **Coyote Spring** | Aluminum | 0.224 | 0.010 | 0.030 | NE | NE | B | 0.054U | 088545-009 | SW846 6020 |
| 29-Mar-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | NE | U | | 088545-009 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | 0.100 | U | | 088545-009 | SW846 6020 |
| | Barium | 0.0422 | 0.0005 | 0.002 | 2.00 | 1.00 | B | | 088545-009 | SW846 6020 |
| | Beryllium | **0.00713** | 0.0001 | 0.0005 | 0.004 | NE | | | 088545-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | 0.010 | U | | 088545-009 | SW846 6020 |
| | Calcium | 290 | 0.200 | 2.00 | NE | NE | B | J | 088545-009 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | 0.050 | U | | 088545-009 | SW846 6020 |
| | Cobalt | 0.0102 | 0.0001 | 0.001 | NE | NE | | J+ | 088545-009 | SW846 6020 |
| | Copper | 0.0018 | 0.0003 | 0.001 | NE | NE | | J+ | 088545-009 | SW846 6020 |
| | Iron | 1.31 | 0.010 | 0.100 | NE | NE | | | 088545-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | 0.050 | U | | 088545-009 | SW846 6020 |
| | Magnesium | 70.8 | 0.050 | 0.150 | NE | NE | | J | 088545-009 | SW846 6020 |
| | Manganese | 1.51 | 0.010 | 0.050 | NE | NE | | | 088545-009 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | 0.002 | U | | 088545-009 | SW846 7470 |
| | Nickel | 0.0319 | 0.0005 | 0.002 | NE | NE | | J+ | 088545-009 | SW846 6020 |
| | Potassium | 27.9 | 0.080 | 0.300 | NE | NE | | | 088545-009 | SW846 6020 |
| | Selenium | ND | 0.001 | 0.005 | 0.050 | 0.050 | U | UJ | 088545-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | 0.050 | U | | 088545-009 | SW846 6020 |
| | Sodium | 449 | 0.800 | 2.50 | NE | NE | | | 088545-009 | SW846 6020 |
| | Thallium | 0.00124 | 0.0003 | 0.001 | 0.002 | NE | | | 088545-009 | SW846 6020 |
| | Uranium | 0.00655 | 0.00005 | 0.0002 | 0.030 | 5.00 | | | 088545-009 | SW846 6020 |
| | Uranium-234 | ND | 0.00001 | 0.00005 | NE | NE | U | | 088545-009 | SW846 6020 |
| | Uranium-235 | 0.000045 | 0.00001 | 0.00007 | NE | NE | J | J+ | 088545-009 | SW846 6020 |
| | Uranium-238 | 0.0065 | 0.00005 | 0.0002 | NE | NE | | | 088545-009 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | NE | U | | 088545-009 | SW846 6020 |
| | Zinc | 0.0458 | 0.0026 | 0.010 | NE | NE | | J+ | 088545-009 | SW846 6020 |

Refer to footnotes on page 2A-47.

## Table 2A-4 *(Continued)*
## Summary of Dissolved (Filtered) Metal Results,
## Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL/MAC[d] (mg/L) | | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| **CTF-MW1** | Aluminum | 0.0112 | 0.010 | 0.030 | NE | NE | J | | 088526-009 | SW846 6020 |
| 18-Mar-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | NE | U | | 088526-009 | SW846 6020 |
| | Arsenic | 0.00224 | 0.0015 | 0.005 | 0.010 | 0.100 | J | | 088526-009 | SW846 6020 |
| | Barium | 0.0479 | 0.0005 | 0.002 | 2.00 | 1.00 | B | | 088526-009 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | NE | U | | 088526-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | 0.010 | U | | 088526-009 | SW846 6020 |
| | Calcium | 96.6 | 0.400 | 4.00 | NE | NE | B | | 088526-009 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | 0.050 | U | | 088526-009 | SW846 6020 |
| | Cobalt | 0.000373 | 0.0001 | 0.001 | NE | NE | B, J | 0.00052U | 088526-009 | SW846 6020 |
| | Copper | 0.000623 | 0.0003 | 0.001 | NE | NE | B, J | 0.0016U | 088526-009 | SW846 6020 |
| | Iron | 0.262 | 0.010 | 0.100 | NE | NE | B | | 088526-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | 0.050 | U | | 088526-009 | SW846 6020 |
| | Magnesium | 19.2 | 0.005 | 0.015 | NE | NE | B | | 088526-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | NE | U | | 088526-009 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | 0.002 | U | | 088526-009 | SW846 7470 |
| | Nickel | 0.00257 | 0.0005 | 0.002 | NE | NE | | | 088526-009 | SW846 6020 |
| | Potassium | 1.72 | 0.080 | 0.300 | NE | NE | | | 088526-009 | SW846 6020 |
| | Selenium | 0.00427 | 0.001 | 0.005 | 0.050 | 0.050 | J | | 088526-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | 0.050 | U | | 088526-009 | SW846 6020 |
| | Sodium | 33.8 | 0.080 | 0.250 | NE | NE | | | 088526-009 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | NE | U | | 088526-009 | SW846 6020 |
| | Uranium | 0.00965 | 0.00005 | 0.0002 | 0.030 | 5.00 | | | 088526-009 | SW846 6020 |
| | Uranium-234 | ND | 0.00001 | 0.00005 | NE | NE | U | | 088526-009 | SW846 6020 |
| | Uranium-235 | 0.000068 | 0.00001 | 0.00007 | NE | NE | J | | 088526-009 | SW846 6020 |
| | Uranium-238 | 0.00958 | 0.00005 | 0.0002 | NE | NE | | | 088526-009 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | NE | U | | 088526-009 | SW846 6020 |
| | Zinc | 0.00279 | 0.0026 | 0.010 | NE | NE | B, J | 0.018U | 088526-009 | SW846 6020 |

Refer to footnotes on page 2A-47.

## Table 2A-4 *(Continued)*
## Summary of Dissolved (Filtered) Metal Results, Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL/MAC[d] (mg/L) | | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| **CTF-MW2** | Aluminum | 0.0942 | 0.010 | 0.030 | NE | NE | | | 088516-009 | SW846 6020 |
| 15-Mar-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | NE | U | | 088516-009 | SW846 6020 |
| | Arsenic | **0.0535** | 0.0015 | 0.005 | 0.010 | 0.100 | | | 088516-009 | SW846 6020 |
| | Barium | 0.0747 | 0.0005 | 0.002 | 2.00 | 1.00 | B | | 088516-009 | SW846 6020 |
| | Beryllium | 0.00191 | 0.0001 | 0.0005 | 0.004 | NE | | 0.0026U | 088516-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | 0.010 | U | | 088516-009 | SW846 6020 |
| | Calcium | 384 | 0.400 | 4.00 | NE | NE | B | | 088516-009 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | 0.050 | U | | 088516-009 | SW846 6020 |
| | Cobalt | 0.00718 | 0.0001 | 0.001 | NE | NE | B | | 088516-009 | SW846 6020 |
| | Copper | 0.0011 | 0.0003 | 0.001 | NE | NE | B | 0.0016U | 088516-009 | SW846 6020 |
| | Iron | 2.29 | 0.010 | 0.100 | NE | NE | B | | 088516-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | 0.050 | U | | 088516-009 | SW846 6020 |
| | Magnesium | 93.0 | 0.100 | 0.300 | NE | NE | B | J | 088516-009 | SW846 6020 |
| | Manganese | 3.08 | 0.020 | 0.100 | NE | NE | | | 088516-009 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | 0.002 | U | | 088516-009 | SW846 7470 |
| | Nickel | 0.0182 | 0.0005 | 0.002 | NE | NE | | | 088516-009 | SW846 6020 |
| | Potassium | 43.0 | 0.080 | 0.300 | NE | NE | | | 088516-009 | SW846 6020 |
| | Selenium | ND | 0.001 | 0.005 | 0.050 | 0.050 | U | | 088516-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | 0.050 | U | | 088516-009 | SW846 6020 |
| | Sodium | 1.02 | 0.080 | 0.250 | NE | NE | | | 088516-009 | SW846 6020 |
| | Thallium | 0.00109 | 0.0003 | 0.001 | 0.002 | NE | | 0.0018U | 088516-009 | SW846 6020 |
| | Uranium | 0.0258 | 0.00005 | 0.0002 | 0.030 | 5.00 | | | 088516-009 | SW846 6020 |
| | Uranium-234 | 0.00001 | 0.00001 | 0.00005 | NE | NE | J | | 088516-009 | SW846 6020 |
| | Uranium-235 | 0.000181 | 0.00001 | 0.00007 | NE | NE | | | 088516-009 | SW846 6020 |
| | Uranium-238 | 0.0256 | 0.00005 | 0.0002 | NE | NE | | | 088516-009 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | NE | U | | 088516-009 | SW846 6020 |
| | Zinc | 0.00994 | 0.0026 | 0.010 | NE | NE | B, J | 0.018U | 088516-009 | SW846 6020 |

Refer to footnotes on page 2A-47.

## Table 2A-4 *(Continued)*
## Summary of Dissolved (Filtered) Metal Results,
## Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL/MAC[d] (mg/L) | | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| **CTF-MW3** | Aluminum | ND | 0.050 | 0.150 | NE | NE | U | | 088507-009 | SW846 6020 |
| 10-Mar-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | NE | U | | 088507-009 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | 0.100 | U | | 088507-009 | SW846 6020 |
| | Barium | 0.0296 | 0.0005 | 0.002 | 2.00 | 1.00 | | | 088507-009 | SW846 6020 |
| | Beryllium | ND | 0.0005 | 0.0025 | 0.004 | NE | U | | 088507-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | 0.010 | U | | 088507-009 | SW846 6020 |
| | Calcium | 192 | 0.100 | 1.00 | NE | NE | B | | 088507-009 | SW846 6020 |
| | Chromium | ND | 0.0125 | 0.050 | 0.100 | 0.050 | U | | 088507-009 | SW846 6020 |
| | Cobalt | ND | 0.0005 | 0.005 | NE | NE | U | | 088507-009 | SW846 6020 |
| | Copper | ND | 0.0015 | 0.005 | NE | NE | U | | 088507-009 | SW846 6020 |
| | Iron | 0.277 | 0.050 | 0.500 | NE | NE | J | | 088507-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | 0.050 | U | | 088507-009 | SW846 6020 |
| | Magnesium | 49.7 | 0.025 | 0.075 | NE | NE | | J | 088507-009 | SW846 6020 |
| | Manganese | ND | 0.005 | 0.025 | NE | NE | U | | 088507-009 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | 0.002 | U | UJ | 088507-009 | SW846 7470 |
| | Nickel | 0.00337 | 0.0025 | 0.010 | NE | NE | J | J+ | 088507-009 | SW846 6020 |
| | Potassium | 11.6 | 0.400 | 1.50 | NE | NE | | | 088507-009 | SW846 6020 |
| | Selenium | 0.0218 | 0.001 | 0.005 | 0.050 | 0.050 | | | 088507-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | 0.050 | U | | 088507-009 | SW846 6020 |
| | Sodium | 177 | 0.400 | 1.25 | NE | NE | | | 088507-009 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | NE | U | | 088507-009 | SW846 6020 |
| | Uranium | 0.00872 | 0.00005 | 0.0002 | 0.030 | 5.00 | | | 088507-009 | SW846 6020 |
| | Uranium-234 | ND | 0.00001 | 0.00005 | NE | NE | U | | 088507-009 | SW846 6020 |
| | Uranium-235 | 0.000062 | 0.00001 | 0.00007 | NE | NE | J | | 088507-009 | SW846 6020 |
| | Uranium-238 | 0.00866 | 0.00005 | 0.0002 | NE | NE | | | 088507-009 | SW846 6020 |
| | Vanadium | ND | 0.015 | 0.050 | NE | NE | U | UJ | 088507-009 | SW846 6020 |
| | Zinc | 0.00465 | 0.0026 | 0.010 | NE | NE | J | J+ | 088507-009 | SW846 6020 |

Refer to footnotes on page 2A-47.

**Table 2A-4** *(Continued)*
**Summary of Dissolved (Filtered) Metal Results,**
**Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL/MAC[d] (mg/L) | | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| **Eubank-1** | Aluminum | ND | 0.050 | 0.150 | NE | NE | U | | 088501-009 | SW846 6020 |
| 05-Mar-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | NE | U | | 088501-009 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | 0.100 | U | | 088501-009 | SW846 6020 |
| | Barium | 0.0445 | 0.0005 | 0.002 | 2.00 | 1.00 | | | 088501-009 | SW846 6020 |
| | Beryllium | ND | 0.0005 | 0.0025 | 0.004 | NE | U | | 088501-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | 0.010 | U | | 088501-009 | SW846 6020 |
| | Calcium | 75.5 | 0.100 | 1.00 | NE | NE | B | | 088501-009 | SW846 6020 |
| | Chromium | ND | 0.0125 | 0.050 | 0.100 | 0.050 | U | | 088501-009 | SW846 6020 |
| | Cobalt | ND | 0.0005 | 0.005 | NE | NE | U | | 088501-009 | SW846 6020 |
| | Copper | 0.00377 | 0.0015 | 0.005 | NE | NE | B, J | | 088501-009 | SW846 6020 |
| | Iron | 0.109 | 0.050 | 0.500 | NE | NE | J | | 088501-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | 0.050 | U | | 088501-009 | SW846 6020 |
| | Magnesium | 10.7 | 0.025 | 0.075 | NE | NE | | J | 088501-009 | SW846 6020 |
| | Manganese | ND | 0.005 | 0.025 | NE | NE | U | | 088501-009 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | 0.002 | U | UJ | 088501-009 | SW846 7470 |
| | Nickel | 0.00563 | 0.0025 | 0.010 | NE | NE | J | | 088501-009 | SW846 6020 |
| | Potassium | 1.73 | 0.400 | 1.50 | NE | NE | | | 088501-009 | SW846 6020 |
| | Selenium | 0.00234 | 0.001 | 0.005 | 0.050 | 0.050 | J | | 088501-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | 0.050 | U | | 088501-009 | SW846 6020 |
| | Sodium | 25.3 | 0.400 | 1.25 | NE | NE | | | 088501-009 | SW846 6020 |
| | Thallium | 0.000394 | 0.0003 | 0.001 | 0.002 | NE | J | 0.0018U | 088501-009 | SW846 6020 |
| | Uranium | 0.00266 | 0.00005 | 0.0002 | 0.030 | 5.00 | | | 088501-009 | SW846 6020 |
| | Uranium-234 | ND | 0.00001 | 0.00005 | NE | NE | U | | 088501-009 | SW846 6020 |
| | Uranium-235 | 0.000019 | 0.00001 | 0.00007 | NE | NE | J | | 088501-009 | SW846 6020 |
| | Uranium-238 | 0.00264 | 0.00005 | 0.0002 | NE | NE | | | 088501-009 | SW846 6020 |
| | Vanadium | ND | 0.015 | 0.050 | NE | NE | U | UJ | 088501-009 | SW846 6020 |
| | Zinc | 0.00452 | 0.0026 | 0.010 | NE | NE | J | J+ | 088501-009 | SW846 6020 |

Refer to footnotes on page 2A-47.

## Table 2A-4 *(Continued)*
## Summary of Dissolved (Filtered) Metal Results,
## Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL/MAC[d] (mg/L) | | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| **Greystone-MW2** | Aluminum | ND | 0.010 | 0.030 | NE | NE | U | | 088531-009 | SW846 6020 |
| 22-Mar-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | NE | U | | 088531-009 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | 0.100 | U | | 088531-009 | SW846 6020 |
| | Barium | 0.144 | 0.0005 | 0.002 | 2.00 | 1.00 | | | 088531-009 | SW846 6020 |
| | Beryllium | 0.000105 | 0.0001 | 0.0005 | 0.004 | NE | J | | 088531-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | 0.010 | U | | 088531-009 | SW846 6020 |
| | Calcium | 144 | 0.100 | 1.00 | NE | NE | | | 088531-009 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | 0.050 | U | | 088531-009 | SW846 6020 |
| | Cobalt | 0.000737 | 0.0001 | 0.001 | NE | NE | J | | 088531-009 | SW846 6020 |
| | Copper | 0.000924 | 0.0003 | 0.001 | NE | NE | J | | 088531-009 | SW846 6020 |
| | Iron | 0.474 | 0.010 | 0.100 | NE | NE | | | 088531-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | 0.050 | U | | 088531-009 | SW846 6020 |
| | Magnesium | 26.6 | 0.005 | 0.015 | NE | NE | | J | 088531-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | NE | U | | 088531-009 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | 0.002 | U | | 088531-009 | SW846 7470 |
| | Nickel | 0.0044 | 0.0005 | 0.002 | NE | NE | | | 088531-009 | SW846 6020 |
| | Potassium | 5.30 | 0.080 | 0.300 | NE | NE | | | 088531-009 | SW846 6020 |
| | Selenium | 0.00283 | 0.001 | 0.005 | 0.050 | 0.050 | J | | 088531-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | 0.050 | U | | 088531-009 | SW846 6020 |
| | Sodium | 92.4 | 0.400 | 1.25 | NE | NE | | | 088531-009 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | NE | U | | 088531-009 | SW846 6020 |
| | Uranium | 0.0077 | 0.00005 | 0.0002 | 0.030 | 5.00 | | | 088531-009 | SW846 6020 |
| | Uranium-234 | ND | 0.00001 | 0.00005 | NE | NE | U | | 088531-009 | SW846 6020 |
| | Uranium-235 | 0.000054 | 0.00001 | 0.00007 | NE | NE | J | | 088531-009 | SW846 6020 |
| | Uranium-238 | 0.00765 | 0.00005 | 0.0002 | NE | NE | | | 088531-009 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | NE | U | | 088531-009 | SW846 6020 |
| | Zinc | ND | 0.0026 | 0.010 | NE | NE | U | | 088531-009 | SW846 6020 |

Refer to footnotes on page 2A-47.

## Table 2A-4 *(Continued)*
## Summary of Dissolved (Filtered) Metal Results,
## Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL/MAC[d] (mg/L) | | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| **MRN-2** | Aluminum | ND | 0.010 | 0.030 | NE | NE | U | | 088535-009 | SW846 6020 |
| 24-Mar-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | NE | U | | 088535-009 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | 0.100 | U | | 088535-009 | SW846 6020 |
| | Barium | 0.0558 | 0.0005 | 0.002 | 2.00 | 1.00 | | | 088535-009 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | NE | U | | 088535-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | 0.010 | U | | 088535-009 | SW846 6020 |
| | Calcium | 46.1 | 0.020 | 0.200 | NE | NE | | | 088535-009 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | 0.050 | U | | 088535-009 | SW846 6020 |
| | Cobalt | 0.00206 | 0.0001 | 0.001 | NE | NE | | | 088535-009 | SW846 6020 |
| | Copper | 0.000883 | 0.0003 | 0.001 | NE | NE | J | | 088535-009 | SW846 6020 |
| | Iron | 0.210 | 0.010 | 0.100 | NE | NE | | | 088535-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | 0.050 | U | | 088535-009 | SW846 6020 |
| | Magnesium | 15.5 | 0.005 | 0.015 | NE | NE | | J | 088535-009 | SW846 6020 |
| | Manganese | 0.00361 | 0.001 | 0.005 | NE | NE | J | | 088535-009 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | 0.002 | U | | 088535-009 | SW846 7470 |
| | Nickel | 0.00174 | 0.0005 | 0.002 | NE | NE | J | | 088535-009 | SW846 6020 |
| | Potassium | 3.60 | 0.080 | 0.300 | NE | NE | | | 088535-009 | SW846 6020 |
| | Selenium | 0.00166 | 0.001 | 0.005 | 0.050 | 0.050 | J | | 088535-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | 0.050 | U | | 088535-009 | SW846 6020 |
| | Sodium | 22.4 | 0.080 | 0.250 | NE | NE | | | 088535-009 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | NE | U | | 088535-009 | SW846 6020 |
| | Uranium | 0.00361 | 0.00005 | 0.0002 | 0.030 | 5.00 | | | 088535-009 | SW846 6020 |
| | Uranium-234 | ND | 0.00001 | 0.00005 | NE | NE | U | | 088535-009 | SW846 6020 |
| | Uranium-235 | 0.000024 | 0.00001 | 0.00007 | NE | NE | J | | 088535-009 | SW846 6020 |
| | Uranium-238 | 0.00358 | 0.00005 | 0.0002 | NE | NE | | | 088535-009 | SW846 6020 |
| | Vanadium | 0.00495 | 0.003 | 0.010 | NE | NE | J | | 088535-009 | SW846 6020 |
| | Zinc | 0.00285 | 0.0026 | 0.010 | NE | NE | J | | 088535-009 | SW846 6020 |

Refer to footnotes on page 2A-47.

## **Table 2A-4** *(Continued)*
## Summary of Dissolved (Filtered) Metal Results,
## Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL/MAC[d] (mg/L) | | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| **MRN-3D** | Aluminum | ND | 0.010 | 0.030 | NE | NE | U | | 088538-009 | SW846 6020 |
| 25-Mar-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | NE | U | | 088538-009 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | 0.100 | U | | 088538-009 | SW846 6020 |
| | Barium | 0.119 | 0.0005 | 0.002 | 2.00 | 1.00 | | | 088538-009 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | NE | U | | 088538-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | 0.010 | U | | 088538-009 | SW846 6020 |
| | Calcium | 61.2 | 0.100 | 1.00 | NE | NE | | | 088538-009 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | 0.050 | U | | 088538-009 | SW846 6020 |
| | Cobalt | 0.000277 | 0.0001 | 0.001 | NE | NE | J | | 088538-009 | SW846 6020 |
| | Copper | 0.00148 | 0.0003 | 0.001 | NE | NE | | | 088538-009 | SW846 6020 |
| | Iron | 0.223 | 0.010 | 0.100 | NE | NE | | | 088538-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | 0.050 | U | | 088538-009 | SW846 6020 |
| | Magnesium | 13.9 | 0.005 | 0.015 | NE | NE | | J | 088538-009 | SW846 6020 |
| | Manganese | 0.0762 | 0.001 | 0.005 | NE | NE | | | 088538-009 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | 0.002 | U | | 088538-009 | SW846 7470 |
| | Nickel | 0.00261 | 0.0005 | 0.002 | NE | NE | | | 088538-009 | SW846 6020 |
| | Potassium | 4.66 | 0.080 | 0.300 | NE | NE | | | 088538-009 | SW846 6020 |
| | Selenium | 0.00185 | 0.001 | 0.005 | 0.050 | 0.050 | J | | 088538-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | 0.050 | U | | 088538-009 | SW846 6020 |
| | Sodium | 28.0 | 0.400 | 1.25 | NE | NE | | | 088538-009 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | NE | U | | 088538-009 | SW846 6020 |
| | Uranium | 0.00365 | 0.00005 | 0.0002 | 0.030 | 5.00 | | | 088538-009 | SW846 6020 |
| | Uranium-234 | ND | 0.00001 | 0.00005 | NE | NE | U | | 088538-009 | SW846 6020 |
| | Uranium-235 | 0.000027 | 0.00001 | 0.00007 | NE | NE | J | | 088538-009 | SW846 6020 |
| | Uranium-238 | 0.00362 | 0.00005 | 0.0002 | NE | NE | | | 088538-009 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | NE | U | | 088538-009 | SW846 6020 |
| | Zinc | 0.300 | 0.0026 | 0.010 | NE | NE | | | 088538-009 | SW846 6020 |

Refer to footnotes on page 2A-47.

**Table 2A-4** *(Continued)*
**Summary of Dissolved (Filtered) Metal Results,**
**Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL/MAC[d] (mg/L) | | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| **NWTA3-MW3D** | Aluminum | 0.0136 | 0.010 | 0.030 | NE | NE | B, J | 0.054U | 088542-009 | SW846 6020 |
| 26-Mar-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | NE | U | | 088542-009 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | 0.100 | U | | 088542-009 | SW846 6020 |
| | Barium | 0.0878 | 0.0005 | 0.002 | 2.00 | 1.00 | B | | 088542-009 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | NE | U | | 088542-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | 0.010 | U | | 088542-009 | SW846 6020 |
| | Calcium | 36.9 | 0.020 | 0.200 | NE | NE | B | J | 088542-009 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | 0.050 | U | | 088542-009 | SW846 6020 |
| | Cobalt | 0.000112 | 0.0001 | 0.001 | NE | NE | J | | 088542-009 | SW846 6020 |
| | Copper | 0.000812 | 0.0003 | 0.001 | NE | NE | J | 0.0063U | 088542-009 | SW846 6020 |
| | Iron | 0.167 | 0.010 | 0.100 | NE | NE | | | 088542-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | 0.050 | U | | 088542-009 | SW846 6020 |
| | Magnesium | 7.98 | 0.005 | 0.015 | NE | NE | | J | 088542-009 | SW846 6020 |
| | Manganese | 0.00103 | 0.001 | 0.005 | NE | NE | J | | 088542-009 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | 0.002 | U | | 088542-009 | SW846 7470 |
| | Nickel | 0.00139 | 0.0005 | 0.002 | NE | NE | J | | 088542-009 | SW846 6020 |
| | Potassium | 3.47 | 0.080 | 0.300 | NE | NE | | | 088542-009 | SW846 6020 |
| | Selenium | 0.00123 | 0.001 | 0.005 | 0.050 | 0.050 | J | | 088542-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | 0.050 | U | | 088542-009 | SW846 6020 |
| | Sodium | 39.0 | 0.080 | 0.250 | NE | NE | | | 088542-009 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | NE | U | | 088542-009 | SW846 6020 |
| | Uranium | 0.00354 | 0.00005 | 0.0002 | 0.030 | 5.00 | | | 088542-009 | SW846 6020 |
| | Uranium-234 | ND | 0.00001 | 0.00005 | NE | NE | U | | 088542-009 | SW846 6020 |
| | Uranium-235 | 0.000025 | 0.00001 | 0.00007 | NE | NE | J | J+ | 088542-009 | SW846 6020 |
| | Uranium-238 | 0.00352 | 0.00005 | 0.0002 | NE | NE | | | 088542-009 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | NE | U | | 088542-009 | SW846 6020 |
| | Zinc | 0.0193 | 0.0026 | 0.010 | NE | NE | | | 088542-009 | SW846 6020 |

Refer to footnotes on page 2A-47.

## Table 2A-4 *(Continued)*
## Summary of Dissolved (Filtered) Metal Results,
## Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL/MAC[d] (mg/L) | | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| **NWTA3-MW3D** (Duplicate) 26-Mar-10 | Aluminum | 0.0113 | 0.010 | 0.030 | NE | NE | B, J | | 088543-009 | SW846 6020 |
| | Antimony | ND | 0.0005 | 0.003 | 0.006 | NE | U | | 088543-009 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | 0.100 | U | | 088543-009 | SW846 6020 |
| | Barium | 0.0835 | 0.0005 | 0.002 | 2.00 | 1.00 | B | | 088543-009 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | NE | U | | 088543-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | 0.010 | U | | 088543-009 | SW846 6020 |
| | Calcium | 36.4 | 0.020 | 0.200 | NE | NE | B | J | 088543-009 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | 0.050 | U | | 088543-009 | SW846 6020 |
| | Cobalt | 0.0001 | 0.0001 | 0.001 | NE | NE | J | | 088543-009 | SW846 6020 |
| | Copper | 0.000804 | 0.0003 | 0.001 | NE | NE | J | 0.0063U | 088543-009 | SW846 6020 |
| | Iron | 0.175 | 0.010 | 0.100 | NE | NE | | | 088543-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | 0.050 | U | | 088543-009 | SW846 6020 |
| | Magnesium | 7.82 | 0.005 | 0.015 | NE | NE | | J | 088543-009 | SW846 6020 |
| | Manganese | 0.0011 | 0.001 | 0.005 | NE | NE | J | | 088543-009 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | 0.002 | U | | 088543-009 | SW846 7470 |
| | Nickel | 0.0014 | 0.0005 | 0.002 | NE | NE | J | | 088543-009 | SW846 6020 |
| | Potassium | 3.57 | 0.080 | 0.300 | NE | NE | | | 088543-009 | SW846 6020 |
| | Selenium | 0.00121 | 0.001 | 0.005 | 0.050 | 0.050 | J | | 088543-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | 0.050 | U | | 088543-009 | SW846 6020 |
| | Sodium | 33.7 | 0.080 | 0.250 | NE | NE | | | 088543-009 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | NE | U | | 088543-009 | SW846 6020 |
| | Uranium | 0.00338 | 0.00005 | 0.0002 | 0.030 | 5.00 | | | 088543-009 | SW846 6020 |
| | Uranium-234 | ND | 0.00001 | 0.00005 | NE | NE | U | | 088543-009 | SW846 6020 |
| | Uranium-235 | 0.000023 | 0.00001 | 0.00007 | NE | NE | J | J+ | 088543-009 | SW846 6020 |
| | Uranium-238 | 0.00336 | 0.00005 | 0.0002 | NE | NE | | | 088543-009 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | NE | U | | 088543-009 | SW846 6020 |
| | Zinc | 0.0206 | 0.0026 | 0.010 | NE | NE | | | 088543-009 | SW846 6020 |

Refer to footnotes on page 2A-47.

## Table 2A-4 *(Continued)*
## Summary of Dissolved (Filtered) Metal Results,
## Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL/MAC[d] (mg/L) | | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| **PL-2** | Aluminum | ND | 0.010 | 0.030 | NE | NE | U | | 088514-009 | SW846 6020 |
| 12-Mar-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | NE | U | | 088514-009 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | 0.100 | U | | 088514-009 | SW846 6020 |
| | Barium | 0.082 | 0.0005 | 0.002 | 2.00 | 1.00 | B | | 088514-009 | SW846 6020 |
| | Beryllium | 0.000132 | 0.0001 | 0.0005 | 0.004 | NE | J | 0.0026U | 088514-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | 0.010 | U | | 088514-009 | SW846 6020 |
| | Calcium | 67.2 | 0.400 | 4.00 | NE | NE | B | | 088514-009 | SW846 6020 |
| | Chromium | 0.00297 | 0.0025 | 0.010 | 0.100 | 0.050 | J | | 088514-009 | SW846 6020 |
| | Cobalt | 0.000116 | 0.0001 | 0.001 | NE | NE | B, J | 0.00052U | 088514-009 | SW846 6020 |
| | Copper | 0.000811 | 0.0003 | 0.001 | NE | NE | B, J | 0.0016U | 088514-009 | SW846 6020 |
| | Iron | 0.141 | 0.010 | 0.100 | NE | NE | B | 0.15U | 088514-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | 0.050 | U | | 088514-009 | SW846 6020 |
| | Magnesium | 10.3 | 0.005 | 0.015 | NE | NE | B | | 088514-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | NE | U | | 088514-009 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | 0.002 | U | | 088514-009 | SW846 7470 |
| | Nickel | 0.00477 | 0.0005 | 0.002 | NE | NE | | | 088514-009 | SW846 6020 |
| | Potassium | 3.32 | 0.080 | 0.300 | NE | NE | | | 088514-009 | SW846 6020 |
| | Selenium | 0.00222 | 0.001 | 0.005 | 0.050 | 0.050 | J | | 088514-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | 0.050 | U | | 088514-009 | SW846 6020 |
| | Sodium | 30.0 | 0.080 | 0.250 | NE | NE | | | 088514-009 | SW846 6020 |
| | Thallium | 0.000502 | 0.0003 | 0.001 | 0.002 | NE | J | 0.0018U | 088514-009 | SW846 6020 |
| | Uranium | 0.00333 | 0.00005 | 0.0002 | 0.030 | 5.00 | | | 088514-009 | SW846 6020 |
| | Uranium-234 | ND | 0.00001 | 0.00005 | NE | NE | U | | 088514-009 | SW846 6020 |
| | Uranium-235 | 0.000022 | 0.00001 | 0.00007 | NE | NE | J | | 088514-009 | SW846 6020 |
| | Uranium-238 | 0.00331 | 0.00005 | 0.0002 | NE | NE | | | 088514-009 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | NE | U | | 088514-009 | SW846 6020 |
| | Zinc | 0.0126 | 0.0026 | 0.010 | NE | NE | B | 0.018U | 088514-009 | SW846 6020 |

Refer to footnotes on page 2A-47.

## Table 2A-4 *(Continued)*
## Summary of Dissolved (Filtered) Metal Results,
## Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL/MAC[d] (mg/L) | | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| **PL-4** | Aluminum | ND | 0.050 | 0.150 | NE | NE | U | | 088511-009 | SW846 6020 |
| 11-Mar-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | NE | U | | 088511-009 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | 0.100 | U | | 088511-009 | SW846 6020 |
| | Barium | 0.070 | 0.0005 | 0.002 | 2.00 | 1.00 | | | 088511-009 | SW846 6020 |
| | Beryllium | ND | 0.0005 | 0.0025 | 0.004 | NE | U | | 088511-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | 0.010 | U | | 088511-009 | SW846 6020 |
| | Calcium | 66.1 | 0.100 | 1.00 | NE | NE | B | | 088511-009 | SW846 6020 |
| | Chromium | ND | 0.0125 | 0.050 | 0.100 | 0.050 | U | | 088511-009 | SW846 6020 |
| | Cobalt | ND | 0.0005 | 0.005 | NE | NE | U | | 088511-009 | SW846 6020 |
| | Copper | ND | 0.0015 | 0.005 | NE | NE | U | | 088511-009 | SW846 6020 |
| | Iron | 0.0944 | 0.050 | 0.500 | NE | NE | J | | 088511-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | 0.050 | U | | 088511-009 | SW846 6020 |
| | Magnesium | 11.9 | 0.025 | 0.075 | NE | NE | | J | 088511-009 | SW846 6020 |
| | Manganese | 0.125 | 0.005 | 0.025 | NE | NE | | | 088511-009 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | 0.002 | U | UJ | 088511-009 | SW846 7470 |
| | Nickel | ND | 0.0025 | 0.010 | NE | NE | U | | 088511-009 | SW846 6020 |
| | Potassium | 4.88 | 0.400 | 1.50 | NE | NE | | | 088511-009 | SW846 6020 |
| | Selenium | 0.00107 | 0.001 | 0.005 | 0.050 | 0.050 | J | | 088511-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | 0.050 | U | | 088511-009 | SW846 6020 |
| | Sodium | 24.9 | 0.400 | 1.25 | NE | NE | | | 088511-009 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | NE | U | | 088511-009 | SW846 6020 |
| | Uranium | 0.00315 | 0.00005 | 0.0002 | 0.030 | 5.00 | | | 088511-009 | SW846 6020 |
| | Uranium-234 | ND | 0.00001 | 0.00005 | NE | NE | U | | 088511-009 | SW846 6020 |
| | Uranium-235 | 0.000022 | 0.00001 | 0.00007 | NE | NE | J | | 088511-009 | SW846 6020 |
| | Uranium-238 | 0.00313 | 0.00005 | 0.0002 | NE | NE | | | 088511-009 | SW846 6020 |
| | Vanadium | ND | 0.015 | 0.050 | NE | NE | U | UJ | 088511-009 | SW846 6020 |
| | Zinc | ND | 0.0026 | 0.010 | NE | NE | U | | 088511-009 | SW846 6020 |

Refer to footnotes on page 2A-47.

## Table 2A-4 *(Continued)*
## Summary of Dissolved (Filtered) Metal Results,
## Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL/MAC[d] (mg/L) | | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| **PL-4** (Duplicate) 11-Mar-10 | Aluminum | ND | 0.050 | 0.150 | NE | NE | U | | 088512-009 | SW846 6020 |
| | Antimony | ND | 0.0005 | 0.003 | 0.006 | NE | U | | 088512-009 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | 0.100 | U | | 088512-009 | SW846 6020 |
| | Barium | 0.0717 | 0.0005 | 0.002 | 2.00 | 1.00 | | | 088512-009 | SW846 6020 |
| | Beryllium | ND | 0.0005 | 0.0025 | 0.004 | NE | U | | 088512-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | 0.010 | U | | 088512-009 | SW846 6020 |
| | Calcium | 53.5 | 0.100 | 1.00 | NE | NE | B | | 088512-009 | SW846 6020 |
| | Chromium | ND | 0.0125 | 0.050 | 0.100 | 0.050 | U | | 088512-009 | SW846 6020 |
| | Cobalt | ND | 0.0005 | 0.005 | NE | NE | U | | 088512-009 | SW846 6020 |
| | Copper | ND | 0.0015 | 0.005 | NE | NE | U | | 088512-009 | SW846 6020 |
| | Iron | 0.0811 | 0.050 | 0.500 | NE | NE | J | | 088512-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | 0.050 | U | | 088512-009 | SW846 6020 |
| | Magnesium | 10.7 | 0.025 | 0.075 | NE | NE | | J | 088512-009 | SW846 6020 |
| | Manganese | 0.102 | 0.005 | 0.025 | NE | NE | | | 088512-009 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | 0.002 | U | UJ | 088512-009 | SW846 7470 |
| | Nickel | ND | 0.0025 | 0.010 | NE | NE | U | | 088512-009 | SW846 6020 |
| | Potassium | 4.21 | 0.400 | 1.50 | NE | NE | | | 088512-009 | SW846 6020 |
| | Selenium | 0.0015 | 0.001 | 0.005 | 0.050 | 0.050 | J | | 088512-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | 0.050 | U | | 088512-009 | SW846 6020 |
| | Sodium | 20.4 | 0.400 | 1.25 | NE | NE | | | 088512-009 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | NE | U | | 088512-009 | SW846 6020 |
| | Uranium | 0.00325 | 0.00005 | 0.0002 | 0.030 | 5.00 | | | 088512-009 | SW846 6020 |
| | Uranium-234 | ND | 0.00001 | 0.00005 | NE | NE | U | | 088512-009 | SW846 6020 |
| | Uranium-235 | 0.000022 | 0.00001 | 0.00007 | NE | NE | J | | 088512-009 | SW846 6020 |
| | Uranium-238 | 0.00323 | 0.00005 | 0.0002 | NE | NE | | | 088512-009 | SW846 6020 |
| | Vanadium | ND | 0.015 | 0.050 | NE | NE | U | UJ | 088512-009 | SW846 6020 |
| | Zinc | 0.00302 | 0.0026 | 0.010 | NE | NE | J | J+ | 088512-009 | SW846 6020 |

Refer to footnotes on page 2A-47.

## Table 2A-4 *(Continued)*
## Summary of Dissolved (Filtered) Metal Results,
## Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL/MAC[d] (mg/L) | | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| **SFR-2S** | Aluminum | 0.0916 | 0.050 | 0.150 | NE | NE | B, J | 0.63U | 088503-009 | SW846 6020 |
| 08-Mar-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | NE | U | | 088503-009 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | 0.100 | U | | 088503-009 | SW846 6020 |
| | Barium | 0.0575 | 0.0005 | 0.002 | 2.00 | 1.00 | | | 088503-009 | SW846 6020 |
| | Beryllium | ND | 0.0005 | 0.0025 | 0.004 | NE | U | | 088503-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | 0.010 | U | | 088503-009 | SW846 6020 |
| | Calcium | 128 | 0.100 | 1.00 | NE | NE | B | | 088503-009 | SW846 6020 |
| | Chromium | ND | 0.0125 | 0.050 | 0.100 | 0.050 | U | | 088503-009 | SW846 6020 |
| | Cobalt | 0.00076 | 0.0005 | 0.005 | NE | NE | J | | 088503-009 | SW846 6020 |
| | Copper | 0.00362 | 0.0015 | 0.005 | NE | NE | B, J | J+ | 088503-009 | SW846 6020 |
| | Iron | 0.172 | 0.050 | 0.500 | NE | NE | J | | 088503-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | 0.050 | U | | 088503-009 | SW846 6020 |
| | Magnesium | 36.8 | 0.025 | 0.075 | NE | NE | | J | 088503-009 | SW846 6020 |
| | Manganese | 0.00582 | 0.005 | 0.025 | NE | NE | J | J+ | 088503-009 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | 0.002 | U | UJ | 088503-009 | SW846 7470 |
| | Nickel | 0.0433 | 0.0025 | 0.010 | NE | NE | | J+ | 088503-009 | SW846 6020 |
| | Potassium | 7.82 | 0.400 | 1.50 | NE | NE | | | 088503-009 | SW846 6020 |
| | Selenium | 0.00197 | 0.001 | 0.005 | 0.050 | 0.050 | J | | 088503-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | 0.050 | U | | 088503-009 | SW846 6020 |
| | Sodium | 75.9 | 0.400 | 1.25 | NE | NE | | | 088503-009 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | NE | U | | 088503-009 | SW846 6020 |
| | Uranium | 0.0154 | 0.00005 | 0.0002 | 0.030 | 5.00 | | | 088503-009 | SW846 6020 |
| | Uranium-234 | ND | 0.00001 | 0.00005 | NE | NE | U | | 088503-009 | SW846 6020 |
| | Uranium-235 | 0.000109 | 0.00001 | 0.00007 | NE | NE | | | 088503-009 | SW846 6020 |
| | Uranium-238 | 0.0153 | 0.00005 | 0.0002 | NE | NE | | | 088503-009 | SW846 6020 |
| | Vanadium | ND | 0.015 | 0.050 | NE | NE | U | UJ | 088503-009 | SW846 6020 |
| | Zinc | 0.00561 | 0.0026 | 0.010 | NE | NE | J | J+ | 088503-009 | SW846 6020 |

Refer to footnotes on page 2A-47.

**Table 2A-4** *(Continued)*
**Summary of Dissolved (Filtered) Metal Results,**
**Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL/MAC[d] (mg/L) | | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| **SFR-4T** | Aluminum | ND | 0.010 | 0.030 | NE | NE | U | | 088533-009 | SW846 6020 |
| 23-Mar-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | NE | U | | 088533-009 | SW846 6020 |
| | Arsenic | 0.00194 | 0.0015 | 0.005 | 0.010 | 0.100 | J | | 088533-009 | SW846 6020 |
| | Barium | 0.010 | 0.0005 | 0.002 | 2.00 | 1.00 | | | 088533-009 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | NE | U | | 088533-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | 0.010 | U | | 088533-009 | SW846 6020 |
| | Calcium | 65.8 | 0.100 | 1.00 | NE | NE | | | 088533-009 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | 0.050 | U | | 088533-009 | SW846 6020 |
| | Cobalt | 0.00025 | 0.0001 | 0.001 | NE | NE | J | | 088533-009 | SW846 6020 |
| | Copper | 0.00762 | 0.0003 | 0.001 | NE | NE | | | 088533-009 | SW846 6020 |
| | Iron | 0.236 | 0.010 | 0.100 | NE | NE | | | 088533-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | 0.050 | U | | 088533-009 | SW846 6020 |
| | Magnesium | 4.03 | 0.005 | 0.015 | NE | NE | | J | 088533-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | NE | U | | 088533-009 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | 0.002 | U | | 088533-009 | SW846 7470 |
| | Nickel | 0.00424 | 0.0005 | 0.002 | NE | NE | | | 088533-009 | SW846 6020 |
| | Potassium | 2.84 | 0.080 | 0.300 | NE | NE | | | 088533-009 | SW846 6020 |
| | Selenium | 0.00282 | 0.001 | 0.005 | 0.050 | 0.050 | J | | 088533-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | 0.050 | U | | 088533-009 | SW846 6020 |
| | Sodium | 1180 | 4.00 | 12.5 | NE | NE | | J | 088533-009 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | NE | U | | 088533-009 | SW846 6020 |
| | Uranium | 0.000295 | 0.00005 | 0.0002 | 0.030 | 5.00 | | | 088533-009 | SW846 6020 |
| | Uranium-234 | ND | 0.00001 | 0.00005 | NE | NE | U | | 088533-009 | SW846 6020 |
| | Uranium-235 | ND | 0.00001 | 0.00007 | NE | NE | U | | 088533-009 | SW846 6020 |
| | Uranium-238 | 0.000295 | 0.00005 | 0.0002 | NE | NE | | | 088533-009 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | NE | U | | 088533-009 | SW846 6020 |
| | Zinc | 0.0225 | 0.0026 | 0.010 | NE | NE | | | 088533-009 | SW846 6020 |

Refer to footnotes on page 2A-47.

## **Table 2A-4** *(Continued)*
## Summary of Dissolved (Filtered) Metal Results, Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL/MAC[d] (mg/L) | | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| **SWTA3-MW2** | Aluminum | ND | 0.010 | 0.030 | NE | NE | U | | 088528-009 | SW846 6020 |
| 19-Mar-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | NE | U | | 088528-009 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | 0.100 | U | | 088528-009 | SW846 6020 |
| | Barium | 0.074 | 0.0005 | 0.002 | 2.00 | 1.00 | | | 088528-009 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | NE | U | | 088528-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | 0.010 | U | | 088528-009 | SW846 6020 |
| | Calcium | 41.4 | 0.020 | 0.200 | NE | NE | | | 088528-009 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | 0.050 | U | | 088528-009 | SW846 6020 |
| | Cobalt | 0.000212 | 0.0001 | 0.001 | NE | NE | J | | 088528-009 | SW846 6020 |
| | Copper | 0.000965 | 0.0003 | 0.001 | NE | NE | J | | 088528-009 | SW846 6020 |
| | Iron | 0.174 | 0.010 | 0.100 | NE | NE | | | 088528-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | 0.050 | U | | 088528-009 | SW846 6020 |
| | Magnesium | 14.0 | 0.005 | 0.015 | NE | NE | | J | 088528-009 | SW846 6020 |
| | Manganese | 0.00135 | 0.001 | 0.005 | NE | NE | J | | 088528-009 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | 0.002 | U | | 088528-009 | SW846 7470 |
| | Nickel | 0.00165 | 0.0005 | 0.002 | NE | NE | J | | 088528-009 | SW846 6020 |
| | Potassium | 4.39 | 0.080 | 0.300 | NE | NE | | | 088528-009 | SW846 6020 |
| | Selenium | 0.00159 | 0.001 | 0.005 | 0.050 | 0.050 | J | | 088528-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | 0.050 | U | | 088528-009 | SW846 6020 |
| | Sodium | 35.1 | 0.080 | 0.250 | NE | NE | | | 088528-009 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | NE | U | | 088528-009 | SW846 6020 |
| | Uranium | 0.00332 | 0.00005 | 0.0002 | 0.030 | 5.00 | | | 088528-009 | SW846 6020 |
| | Uranium-234 | ND | 0.00001 | 0.00005 | NE | NE | U | | 088528-009 | SW846 6020 |
| | Uranium-235 | 0.000023 | 0.00001 | 0.00007 | NE | NE | J | | 088528-009 | SW846 6020 |
| | Uranium-238 | 0.00329 | 0.00005 | 0.0002 | NE | NE | | | 088528-009 | SW846 6020 |
| | Vanadium | 0.00312 | 0.003 | 0.010 | NE | NE | J | | 088528-009 | SW846 6020 |
| | Zinc | ND | 0.0026 | 0.010 | NE | NE | U | | 088528-009 | SW846 6020 |

Refer to footnotes on page 2A-47.

**Table 2A-4** *(Continued)*
**Summary of Dissolved (Filtered) Metal Results,**
**Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL/MAC[d] (mg/L) | | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| **SWTA3-MW3** | Aluminum | ND | 0.010 | 0.030 | NE | NE | U | | 088520-009 | SW846 6020 |
| 16-Mar-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | NE | U | | 088520-009 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | 0.100 | U | | 088520-009 | SW846 6020 |
| | Barium | 0.0599 | 0.0005 | 0.002 | 2.00 | 1.00 | B | | 088520-009 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | NE | U | | 088520-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | 0.010 | U | | 088520-009 | SW846 6020 |
| | Calcium | 39.2 | 0.020 | 0.200 | NE | NE | B | | 088520-009 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | 0.050 | U | | 088520-009 | SW846 6020 |
| | Cobalt | 0.000154 | 0.0001 | 0.001 | NE | NE | B, J | 0.00052U | 088520-009 | SW846 6020 |
| | Copper | 0.000571 | 0.0003 | 0.001 | NE | NE | B, J | 0.0016U | 088520-009 | SW846 6020 |
| | Iron | 0.135 | 0.010 | 0.100 | NE | NE | B | 0.15U | 088520-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | 0.050 | U | | 088520-009 | SW846 6020 |
| | Magnesium | 11.6 | 0.005 | 0.015 | NE | NE | B | | 088520-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | NE | U | | 088520-009 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | 0.002 | U | | 088520-009 | SW846 7470 |
| | Nickel | 0.00112 | 0.0005 | 0.002 | NE | NE | J | | 088520-009 | SW846 6020 |
| | Potassium | 4.60 | 0.080 | 0.300 | NE | NE | | | 088520-009 | SW846 6020 |
| | Selenium | 0.00116 | 0.001 | 0.005 | 0.050 | 0.050 | J | | 088520-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | 0.050 | U | | 088520-009 | SW846 6020 |
| | Sodium | 47.8 | 1.60 | 5.00 | NE | NE | | | 088520-009 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | NE | U | | 088520-009 | SW846 6020 |
| | Uranium | 0.00214 | 0.00005 | 0.0002 | 0.030 | 5.00 | | | 088520-009 | SW846 6020 |
| | Uranium-234 | ND | 0.00001 | 0.00005 | NE | NE | U | | 088520-009 | SW846 6020 |
| | Uranium-235 | 0.000014 | 0.00001 | 0.00007 | NE | NE | J | | 088520-009 | SW846 6020 |
| | Uranium-238 | 0.00212 | 0.00005 | 0.0002 | NE | NE | | | 088520-009 | SW846 6020 |
| | Vanadium | 0.00584 | 0.003 | 0.010 | NE | NE | J | | 088520-009 | SW846 6020 |
| | Zinc | 0.00331 | 0.0026 | 0.010 | NE | NE | B, J | 0.018U | 088520-009 | SW846 6020 |

Refer to footnotes on page 2A-47.

## Table 2A-4 *(Continued)*
## Summary of Dissolved (Filtered) Metal Results, Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL/MAC[d] (mg/L) | | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| **SWTA3-MW3** (Duplicate) | Aluminum | ND | 0.010 | 0.030 | NE | NE | U | | 088521-009 | SW846 6020 |
| 16-Mar-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | NE | U | | 088521-009 | SW846 6020 |
| | Arsenic | 0.00181 | 0.0015 | 0.005 | 0.010 | 0.100 | J | | 088521-009 | SW846 6020 |
| | Barium | 0.0589 | 0.0005 | 0.002 | 2.00 | 1.00 | B | | 088521-009 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | NE | U | | 088521-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | 0.010 | U | | 088521-009 | SW846 6020 |
| | Calcium | 41.3 | 0.400 | 4.00 | NE | NE | B | | 088521-009 | SW846 6020 |
| | Chromium | 0.00279 | 0.0025 | 0.010 | 0.100 | 0.050 | J | | 088521-009 | SW846 6020 |
| | Cobalt | ND | 0.0001 | 0.001 | NE | NE | U | | 088521-009 | SW846 6020 |
| | Copper | 0.000479 | 0.0003 | 0.001 | NE | NE | B, J | 0.0016U | 088521-009 | SW846 6020 |
| | Iron | 0.105 | 0.010 | 0.100 | NE | NE | B | 0.15U | 088521-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | 0.050 | U | | 088521-009 | SW846 6020 |
| | Magnesium | 11.3 | 0.005 | 0.015 | NE | NE | B | | 088521-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | NE | U | | 088521-009 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | 0.002 | U | | 088521-009 | SW846 7470 |
| | Nickel | 0.00114 | 0.0005 | 0.002 | NE | NE | J | | 088521-009 | SW846 6020 |
| | Potassium | 4.38 | 0.080 | 0.300 | NE | NE | | | 088521-009 | SW846 6020 |
| | Selenium | 0.00104 | 0.001 | 0.005 | 0.050 | 0.050 | J | | 088521-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | 0.050 | U | | 088521-009 | SW846 6020 |
| | Sodium | 48.6 | 1.60 | 5.00 | NE | NE | | | 088521-009 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | NE | U | | 088521-009 | SW846 6020 |
| | Uranium | 0.00222 | 0.00005 | 0.0002 | 0.030 | 5.00 | | | 088521-009 | SW846 6020 |
| | Uranium-234 | ND | 0.00001 | 0.00005 | NE | NE | U | | 088521-009 | SW846 6020 |
| | Uranium-235 | 0.000014 | 0.00001 | 0.00007 | NE | NE | J | | 088521-009 | SW846 6020 |
| | Uranium-238 | 0.00221 | 0.00005 | 0.0002 | NE | NE | | | 088521-009 | SW846 6020 |
| | Vanadium | ND | 0.060 | 0.200 | NE | NE | U | | 088521-009 | SW846 6020 |
| | Zinc | ND | 0.0026 | 0.010 | NE | NE | U | | 088521-009 | SW846 6020 |

Refer to footnotes on page 2A-47.

## Table 2A-4 *(Continued)*
## Summary of Dissolved (Filtered) Metal Results,
## Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL/MAC[d] (mg/L) | | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| **SWTA3-MW4** | Aluminum | ND | 0.010 | 0.030 | NE | NE | U | | 088523-009 | SW846 6020 |
| 17-Mar-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | NE | U | | 088523-009 | SW846 6020 |
| | Arsenic | 0.00195 | 0.0015 | 0.005 | 0.010 | 0.100 | J | | 088523-009 | SW846 6020 |
| | Barium | 0.0525 | 0.0005 | 0.002 | 2.00 | 1.00 | B | | 088523-009 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | NE | U | | 088523-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | 0.010 | U | | 088523-009 | SW846 6020 |
| | Calcium | 39.1 | 0.400 | 4.00 | NE | NE | B | | 088523-009 | SW846 6020 |
| | Chromium | 0.00337 | 0.0025 | 0.010 | 0.100 | 0.050 | J | | 088523-009 | SW846 6020 |
| | Cobalt | 0.000107 | 0.0001 | 0.001 | NE | NE | B, J | 0.00052U | 088523-009 | SW846 6020 |
| | Copper | 0.000473 | 0.0003 | 0.001 | NE | NE | B, J | 0.0016U | 088523-009 | SW846 6020 |
| | Iron | 0.107 | 0.010 | 0.100 | NE | NE | B | 0.15U | 088523-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | 0.050 | U | | 088523-009 | SW846 6020 |
| | Magnesium | 10.3 | 0.005 | 0.015 | NE | NE | B | | 088523-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | NE | U | | 088523-009 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | 0.002 | U | | 088523-009 | SW846 7470 |
| | Nickel | 0.00117 | 0.0005 | 0.002 | NE | NE | J | | 088523-009 | SW846 6020 |
| | Potassium | 4.45 | 0.080 | 0.300 | NE | NE | | | 088523-009 | SW846 6020 |
| | Selenium | 0.0011 | 0.001 | 0.005 | 0.050 | 0.050 | J | | 088523-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | 0.050 | U | | 088523-009 | SW846 6020 |
| | Sodium | 60.7 | 1.60 | 5.00 | NE | NE | | | 088523-009 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | NE | U | | 088523-009 | SW846 6020 |
| | Uranium | 0.00206 | 0.00005 | 0.0002 | 0.030 | 5.00 | | | 088523-009 | SW846 6020 |
| | Uranium-234 | ND | 0.00001 | 0.00005 | NE | NE | U | | 088523-009 | SW846 6020 |
| | Uranium-235 | 0.000014 | 0.00001 | 0.00007 | NE | NE | J | | 088523-009 | SW846 6020 |
| | Uranium-238 | 0.00205 | 0.00005 | 0.0002 | NE | NE | | | 088523-009 | SW846 6020 |
| | Vanadium | ND | 0.060 | 0.200 | NE | NE | U | | 088523-009 | SW846 6020 |
| | Zinc | 0.00487 | 0.0026 | 0.010 | NE | NE | B, J | 0.018U | 088523-009 | SW846 6020 |

Refer to footnotes on page 2A-47.

## Table 2A-4 *(Concluded)*
## Summary of Dissolved (Filtered) Metal Results,
## Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL/MAC[d] (mg/L) | | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| **TRE-1** | Aluminum | ND | 0.050 | 0.150 | NE | NE | U | | 088505-009 | SW846 6020 |
| 09-Mar-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | NE | U | | 088505-009 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | 0.100 | U | | 088505-009 | SW846 6020 |
| | Barium | 0.0452 | 0.0005 | 0.002 | 2.00 | 1.00 | | | 088505-009 | SW846 6020 |
| | Beryllium | ND | 0.0005 | 0.0025 | 0.004 | NE | U | | 088505-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | 0.010 | U | | 088505-009 | SW846 6020 |
| | Calcium | 166 | 0.100 | 1.00 | NE | NE | B | | 088505-009 | SW846 6020 |
| | Chromium | ND | 0.0125 | 0.050 | 0.100 | 0.050 | U | | 088505-009 | SW846 6020 |
| | Cobalt | ND | 0.0005 | 0.005 | NE | NE | U | | 088505-009 | SW846 6020 |
| | Copper | ND | 0.0015 | 0.005 | NE | NE | U | | 088505-009 | SW846 6020 |
| | Iron | 0.216 | 0.050 | 0.500 | NE | NE | J | | 088505-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | 0.050 | U | | 088505-009 | SW846 6020 |
| | Magnesium | 36.8 | 0.025 | 0.075 | NE | NE | | J | 088505-009 | SW846 6020 |
| | Manganese | ND | 0.005 | 0.025 | NE | NE | U | | 088505-009 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | 0.002 | U | UJ | 088505-009 | SW846 7470 |
| | Nickel | 0.00263 | 0.0025 | 0.010 | NE | NE | J | J+ | 088505-009 | SW846 6020 |
| | Potassium | 6.75 | 0.400 | 1.50 | NE | NE | | | 088505-009 | SW846 6020 |
| | Selenium | 0.00236 | 0.001 | 0.005 | 0.050 | 0.050 | J | | 088505-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | 0.050 | U | | 088505-009 | SW846 6020 |
| | Sodium | 109 | 0.400 | 1.25 | NE | NE | | | 088505-009 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | NE | U | | 088505-009 | SW846 6020 |
| | Uranium | 0.0166 | 0.00005 | 0.0002 | 0.030 | 5.00 | | | 088505-009 | SW846 6020 |
| | Uranium-234 | ND | 0.00001 | 0.00005 | NE | NE | U | | 088505-009 | SW846 6020 |
| | Uranium-235 | 0.000122 | 0.00001 | 0.00007 | NE | NE | | | 088505-009 | SW846 6020 |
| | Uranium-238 | 0.0165 | 0.00005 | 0.0002 | NE | NE | | | 088505-009 | SW846 6020 |
| | Vanadium | ND | 0.015 | 0.050 | NE | NE | U | UJ | 088505-009 | SW846 6020 |
| | Zinc | 0.0031 | 0.0026 | 0.010 | NE | NE | J | J+ | 088505-009 | SW846 6020 |

Refer to footnotes on page 2A-47.

# Table 2A-5
# Summary of Total (Unfiltered) Mercury Results (EPA Method[g] SW846-7470), Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Well ID | Sample Date | Mercury Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL/MAC[d] (mg/L) | | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. |
|---|---|---|---|---|---|---|---|---|---|
| **Coyote Spring** | 29-Mar-10 | ND | 0.000066 | 0.0002 | 0.002 | 0.002 | U | | 088545-010 |
| **CTF-MW1** | 18-Mar-10 | ND | 0.000066 | 0.0002 | 0.002 | 0.002 | U | | 088526-010 |
| **CTF-MW2** | 15-Mar-10 | ND | 0.000066 | 0.0002 | 0.002 | 0.002 | U | | 088516-010 |
| **CTF-MW3** | 10-Mar-10 | ND | 0.000066 | 0.0002 | 0.002 | 0.002 | U | UJ | 088507-010 |
| **Eubank-1** | 05-Mar-10 | ND | 0.000066 | 0.0002 | 0.002 | 0.002 | U | UJ | 088501-010 |
| **Greystone-MW2** | 22-Mar-10 | ND | 0.000066 | 0.0002 | 0.002 | 0.002 | U | | 088531-010 |
| **MRN-2** | 24-Mar-10 | ND | 0.000066 | 0.0002 | 0.002 | 0.002 | U | | 088535-010 |
| **MRN-3D** | 25-Mar-10 | ND | 0.000066 | 0.0002 | 0.002 | 0.002 | U | | 088538-010 |
| **NWTA3-MW3D** | 26-Mar-10 | ND | 0.000066 | 0.0002 | 0.002 | 0.002 | U | | 088542-010 |
| **NWTA3-MW3D** (Duplicate) | 26-Mar-10 | ND | 0.000066 | 0.0002 | 0.002 | 0.002 | U | | 088543-010 |
| **PL-2** | 12-Mar-10 | ND | 0.000066 | 0.0002 | 0.002 | 0.002 | U | | 088514-010 |
| **PL-4** | 11-Mar-10 | ND | 0.000066 | 0.0002 | 0.002 | 0.002 | U | UJ | 088511-010 |
| **PL-4** (Duplicate) | 11-Mar-10 | ND | 0.000066 | 0.0002 | 0.002 | 0.002 | U | UJ | 088512-010 |
| **SFR-2S** | 08-Mar-10 | ND | 0.000066 | 0.0002 | 0.002 | 0.002 | U | UJ | 088503-010 |
| **SFR-4T** | 23-Mar-10 | ND | 0.000066 | 0.0002 | 0.002 | 0.002 | U | | 088533-010 |
| **SWTA3-MW2** | 19-Mar-10 | ND | 0.000066 | 0.0002 | 0.002 | 0.002 | U | | 088528-010 |
| **SWTA3-MW3** | 16-Mar-10 | ND | 0.000066 | 0.0002 | 0.002 | 0.002 | U | | 088520-010 |
| **SWTA3-MW3** (Duplicate) | 16-Mar-10 | ND | 0.000066 | 0.0002 | 0.002 | 0.002 | U | | 088521-010 |
| **SWTA3-MW4** | 17-Mar-10 | ND | 0.000066 | 0.0002 | 0.002 | 0.002 | U | | 088523-010 |
| **TRE-1** | 09-Mar-10 | ND | 0.000066 | 0.0002 | 0.002 | 0.002 | U | UJ | 088505-010 |

Refer to footnotes on page 2A-47.

## Table 2A-6
## Summary of Gamma-Emitting Radionuclides/Short List (EPA Method[g] 901.0), Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Well ID | Analyte | Activity[a] (pCi/L) | MDA[b] (pCi/L) | Critical Level[c] (pCi/L) | MCL/MAC[d] (pCi/L) | | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. |
|---|---|---|---|---|---|---|---|---|---|
| **Coyote Spring** | Americium-241 | -0.0669 ± 5.81 | 9.43 | 4.72 | NE | NE | U | BD | 088545-033 |
| 29-Mar-10 | Cesium-137 | 0.120 ± 1.52 | 2.54 | 1.27 | NE | NE | U | BD | 088545-033 |
| | Cobalt-60 | 1.72 ± 1.71 | 3.03 | 1.52 | NE | NE | U | BD | 088545-033 |
| | Potassium-40 | 6.55 ± 36.7 | 42.3 | 21.1 | NE | NE | U | BD | 088545-033 |
| **CTF-MW1** | Americium-241 | -0.165 ± 5.32 | 8.93 | 4.47 | NE | NE | U | BD | 088526-033 |
| 18-Mar-10 | Cesium-137 | 0.829 ± 1.51 | 2.66 | 1.33 | NE | NE | U | BD | 088526-033 |
| | Cobalt-60 | 1.86 ± 1.70 | 3.01 | 1.51 | NE | NE | U | BD | 088526-033 |
| | Potassium-40 | 56.4 ± 24.7 | 25.6 | 12.8 | NE | NE | | J | 088526-033 |
| **CTF-MW2** | Americium-241 | -56.2 ± 20.2 | 27.3 | 13.7 | NE | NE | U | BD | 088516-033 |
| 15-Mar-10 | Cesium-137 | 1.15 ± 2.10 | 3.55 | 1.78 | NE | NE | U | BD | 088516-033 |
| | Cobalt-60 | 0.194 ± 2.09 | 3.46 | 1.73 | NE | NE | U | BD | 088516-033 |
| | Potassium-40 | 12.4 ± 45.7 | 54.8 | 27.4 | NE | NE | U | BD | 088516-033 |
| **CTF-MW3** | Americium-241 | 1.75 ± 5.32 | 9.00 | 4.51 | NE | NE | U | BD | 088507-033 |
| 10-Mar-10 | Cesium-137 | -1.72 ± 1.56 | 2.53 | 1.26 | NE | NE | U | BD | 088507-033 |
| | Cobalt-60 | 1.40 ± 1.67 | 2.92 | 1.46 | NE | NE | U | BD | 088507-033 |
| | Potassium-40 | 54.7 ± 18.6 | 54.7 | 18.1 | NE | NE | | J | 088507-033 |
| **Eubank-1** | Americium-241 | -4.41 ± 13.1 | 22.1 | 11.1 | NE | NE | U | BD | 088501-033 |
| 05-Mar-10 | Cesium-137 | 1.31 ± 1.91 | 3.35 | 1.67 | NE | NE | U | BD | 088501-033 |
| | Cobalt-60 | 0.507 ± 1.96 | 3.38 | 1.69 | NE | NE | U | BD | 088501-033 |
| | Potassium-40 | -34.9 ± 38.3 | 47.0 | 23.5 | NE | NE | U | BD | 088501-033 |
| **Greystone-MW2** | Americium-241 | -2.5 ± 4.02 | 4.36 | 2.18 | NE | NE | U | BD | 088531-033 |
| 22-Mar-10 | Cesium-137 | -4.96 ± 4.46 | 5.25 | 2.63 | NE | NE | U | BD | 088531-033 |
| | Cobalt-60 | -0.573 ± 3.46 | 3.66 | 1.83 | NE | NE | U | BD | 088531-033 |
| | Potassium-40 | 8.97 ± 39.2 | 44.2 | 22.1 | NE | NE | U | BD | 088531-033 |
| **MRN-2** | Americium-241 | -3.12 ± 4.95 | 5.13 | 2.57 | NE | NE | U | BD | 088535-033 |
| 24-Mar-10 | Cesium-137 | 0.0852 ± 2.48 | 4.06 | 2.03 | NE | NE | U | BD | 088535-033 |
| | Cobalt-60 | -1.11 ± 4.24 | 4.33 | 2.17 | NE | NE | U | BD | 088535-033 |
| | Potassium-40 | 27.3 ± 25.6 | 46.6 | 23.3 | NE | NE | U | BD | 088535-033 |
| **MRN-3D** | Americium-241 | 0.308 ± 5.39 | 9.05 | 4.53 | NE | NE | U | BD | 088538-033 |
| 25-Mar-10 | Cesium-137 | -0.151 ± 1.50 | 2.56 | 1.28 | NE | NE | U | BD | 088538-033 |
| | Cobalt-60 | 0.706 ± 1.67 | 2.83 | 1.42 | NE | NE | U | BD | 088538-033 |
| | Potassium-40 | 10.5 ± 36.1 | 36.5 | 18.3 | NE | NE | U | BD | 088538-033 |
| **NWTA3-MW3D** | Americium-241 | -10.5 ± 10.4 | 17.0 | 8.51 | NE | NE | U | BD | 088542-033 |
| 26-Mar-10 | Cesium-137 | -0.659 ± 2.08 | 3.44 | 1.72 | NE | NE | U | BD | 088542-033 |
| | Cobalt-60 | 1.05 ± 2.24 | 3.86 | 1.93 | NE | NE | U | BD | 088542-033 |
| | Potassium-40 | -16.8 ± 39.0 | 45.2 | 22.6 | NE | NE | U | BD | 088542-033 |

Refer to footnotes on page 2A-47.

## Table 2A-6 *(Continued)*
## Summary of Gamma-Emitting Radionuclides/Short List (EPA Method[g] 901.0), Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Activity[a] (pCi/L) | MDA[b] (pCi/L) | Critical Level[c] (pCi/L) | MCL/MAC[d] (pCi/L) | | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. |
|---|---|---|---|---|---|---|---|---|---|
| **NWTA3-MW3D** (Duplicate) | Americium-241 | 5.55 ± 13.3 | 22.9 | 11.5 | NE | NE | U | BD | 088543-033 |
| 26-Mar-10 | Cesium-137 | 0.0953 ± 1.83 | 3.13 | 1.57 | NE | NE | U | BD | 088543-033 |
| | Cobalt-60 | 0.161 ± 1.93 | 3.29 | 1.64 | NE | NE | U | BD | 088543-033 |
| | Potassium-40 | -37.4 ± 41.0 | 49.7 | 24.9 | NE | NE | U | BD | 088543-033 |
| **PL-2** | Americium-241 | -33.6 ± 11.6 | 17.7 | 8.84 | NE | NE | U | BD | 088514-033 |
| 12-Mar-10 | Cesium-137 | -0.982 ± 1.93 | 3.22 | 1.61 | NE | NE | U | BD | 088514-033 |
| | Cobalt-60 | 0.878 ± 1.81 | 3.17 | 1.59 | NE | NE | U | BD | 088514-033 |
| | Potassium-40 | -22.5 ± 42.9 | 43.9 | 22.0 | NE | NE | U | BD | 088514-033 |
| **PL-4** | Americium-241 | -32.1 ± 11.6 | 17.9 | 8.95 | NE | NE | U | BD | 088511-033 |
| 11-Mar-10 | Cesium-137 | 0.545 ± 2.01 | 3.46 | 1.73 | NE | NE | U | BD | 088511-033 |
| | Cobalt-60 | 0.775 ± 1.85 | 3.23 | 1.61 | NE | NE | U | BD | 088511-033 |
| | Potassium-40 | 15.6 ± 36.3 | 45.6 | 22.8 | NE | NE | U | BD | 088511-033 |
| **PL-4** (Duplicate) | Americium-241 | -6.14 ± 11.0 | 18.7 | 9.35 | NE | NE | U | BD | 088512-033 |
| 11-Mar-10 | Cesium-137 | -2.89 ± 3.77 | 4.00 | 2.00 | NE | NE | U | BD | 088512-033 |
| | Cobalt-60 | 0.603 ± 1.83 | 3.19 | 1.60 | NE | NE | U | BD | 088512-033 |
| | Potassium-40 | 48.8 ± 22.7 | 48.8 | 21.6 | NE | NE | | J | 088512-033 |
| **SFR-2S** | Americium-241 | -3.38 ± 6.20 | 9.04 | 4.52 | NE | NE | U | BD | 088503-033 |
| 08-Mar-10 | Cesium-137 | 0.097 ± 1.59 | 2.64 | 1.32 | NE | NE | U | BD | 088503-033 |
| | Cobalt-60 | 0.600 ± 1.71 | 2.91 | 1.46 | NE | NE | U | BD | 088503-033 |
| | Potassium-40 | 93.9 ± 26.8 | 25.5 | 12.8 | NE | NE | | | 088503-033 |
| **SFR-4T** | Americium-241 | -1.85 ± 7.69 | 12.9 | 6.46 | NE | NE | U | BD | 088533-033 |
| 23-Mar-10 | Cesium-137 | 0.319 ± 1.73 | 2.95 | 1.48 | NE | NE | U | BD | 088533-033 |
| | Cobalt-60 | 0.779 ± 1.82 | 3.14 | 1.57 | NE | NE | U | BD | 088533-033 |
| | Potassium-40 | -40.1 ± 35.5 | 42.8 | 21.4 | NE | NE | U | BD | 088533-033 |
| **SWTA3-MW2** | Americium-241 | -21.1 ± 7.63 | 11.7 | 5.85 | NE | NE | U | BD | 088528-033 |
| 19-Mar-10 | Cesium-137 | -0.538 ± 1.86 | 3.04 | 1.52 | NE | NE | U | BD | 088528-033 |
| | Cobalt-60 | 1.25 ± 1.84 | 3.24 | 1.62 | NE | NE | U | BD | 088528-033 |
| | Potassium-40 | -10.9 ± 38.2 | 43.5 | 21.8 | NE | NE | U | BD | 088528-033 |
| **SWTA3-MW3** | Americium-241 | 4.35 ± 11.3 | 19.7 | 9.87 | NE | NE | U | BD | 088520-033 |
| 16-Mar-10 | Cesium-137 | -3.32 ± 3.41 | 3.90 | 1.95 | NE | NE | U | BD | 088520-033 |
| | Cobalt-60 | 0.195 ± 2.01 | 3.45 | 1.73 | NE | NE | U | BD | 088520-033 |
| | Potassium-40 | -15 ± 37.5 | 42.1 | 21.1 | NE | NE | U | BD | 088520-033 |
| **SWTA3-MW3** (Duplicate) | Americium-241 | -15.1 ± 7.56 | 12.0 | 5.99 | NE | NE | U | BD | 088521-033 |
| 16-Mar-10 | Cesium-137 | 1.01 ± 1.91 | 3.25 | 1.62 | NE | NE | U | BD | 088521-033 |
| | Cobalt-60 | 1.52 ± 1.92 | 3.39 | 1.70 | NE | NE | U | BD | 088521-033 |
| | Potassium-40 | -2.18 ± 39.4 | 45.6 | 22.8 | NE | NE | U | BD | 088521-033 |

Refer to footnotes on page 2A-47.

## Table 2A-6 *(Concluded)*
## Summary of Gamma-Emitting Radionuclides/Short List (EPA Method[g] 901.0), Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Well ID | Analyte | Activity[a] (pCi/L) | MDA[b] (pCi/L) | Critical Level[c] (pCi/L) | MCL/MAC[d] (pCi/L) | | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. |
|---|---|---|---|---|---|---|---|---|---|
| **SWTA3-MW4** | Americium-241 | -3.8 ± 5.00 | 5.04 | 2.52 | NE | NE | U | BD | 088523-033 |
| 17-Mar-10 | Cesium-137 | -2.47 ± 3.66 | 3.98 | 1.99 | NE | NE | U | BD | 088523-033 |
| | Cobalt-60 | -1.49 ± 4.24 | 4.44 | 2.22 | NE | NE | U | BD | 088523-033 |
| | Potassium-40 | 6.62 ± 47.0 | 50.1 | 25.1 | NE | NE | U | BD | 088523-033 |
| **TRE-1** | Americium-241 | 3.05 ± 2.97 | 5.26 | 2.63 | NE | NE | U | BD | 088505-033 |
| 09-Mar-10 | Cesium-137 | -2.4 ± 4.27 | 3.95 | 1.98 | NE | NE | U | BD | 088505-033 |
| | Cobalt-60 | 1.07 ± 2.41 | 4.26 | 2.13 | NE | NE | U | BD | 088505-033 |
| | Potassium-40 | 33.5 ± 41.8 | 50.0 | 25.0 | NE | NE | U | BD | 088505-033 |

Refer to footnotes on page 2A-47.

## Table 2A-7
## Summary of Radioisotopic Results,
## Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Well ID | Analyte | Activity[a] (pCi/L) | MDA[b] (pCi/L) | Critical Level[c] (pCi/L) | MCL/MAC[d] (pCi/L) | | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| **Coyote Spring** | Gross Alpha | -1.16 | NA | NA | 15 | NE | NA | None | 088545-034 | EPA 900.0 |
| 29-Mar-10 | Gross Beta | 19.6 ± 4.88 | 4.77 | 2.26 | 4mrem/yr | NE | | | 088545-034 | EPA 900.0 |
| | Radium-226 | 0.112 ± 0.182 | 0.322 | 0.127 | 5 | 30 | U | BD | 088545-038 | EPA 903.1 |
| | Radium-228 | 0.529 ± 0.350 | 0.494 | 0.221 | 5 | 30 | | J | 088545-039 | EPA 904.0 |
| | Radon-222 | 45.7 ± 40.1 | 64.2 | 30.4 | NE | NE | U | BD | 088545-040 | SM 7500 Rn B |
| | Uranium-233/234 | 11.0 ± 1.67 | 0.0783 | 0.0332 | NE | NE | | | 088545-035 | DOE HASL-300 |
| | Uranium-235/236 | 0.109 ± 0.0525 | 0.0615 | 0.0234 | NE | NE | | BD | 088545-035 | DOE HASL-300 |
| | Uranium-238 | 2.35 ± 0.397 | 0.0554 | 0.0217 | NE | NE | | | 088545-035 | DOE HASL-300 |
| **CTF-MW1** | Gross Alpha | -2.24 | NA | NA | 15 | NE | NA | None | 088526-034 | EPA 900.0 |
| 18-Mar-10 | Gross Beta | 3.27 ± 0.970 | 0.998 | 0.467 | 4mrem/yr | NE | | | 088526-034 | EPA 900.0 |
| | Radium-226 | 0.348 ± 0.229 | 0.252 | 0.0954 | 5 | 30 | | J | 088526-038 | EPA 903.1 |
| | Radium-228 | 0.423 ± 0.319 | 0.463 | 0.202 | 5 | 30 | U | BD | 088526-039 | EPA 904.0 |
| | Radon-222 | 489 ± 121 | 61.6 | 29.1 | NE | NE | | | 088526-040 | SM 7500 Rn B |
| | Uranium-233/234 | 23.6 ± 3.35 | 0.0547 | 0.0232 | NE | NE | | | 088526-035 | DOE HASL-300 |
| | Uranium-235/236 | 0.281 ± 0.076 | 0.0429 | 0.0163 | NE | NE | | | 088526-035 | DOE HASL-300 |
| | Uranium-238 | 3.56 ± 0.540 | 0.0387 | 0.0152 | NE | NE | | | 088526-035 | DOE HASL-300 |
| **CTF-MW2** | Gross Alpha | 10.76 | NA | NA | 15 | NE | NA | None | 088516-034 | EPA 900.0 |
| 15-Mar-10 | Gross Beta | 50.9 ± 10.7 | 6.94 | 3.28 | 4mrem/yr | NE | | | 088516-034 | EPA 900.0 |
| | Radium-226 | **2.16 ± 0.0854** | 0.405 | 0.160 | 5 | 30 | | | 088516-038 | EPA 903.1 |
| | Radium-228 | **7.94 ± 2.10** | 0.555 | 0.267 | 5 | 30 | | | 088516-039 | EPA 904.0 |
| | Radon-222 | 81.5 ± 42.6 | 60.2 | 28.4 | NE | NE | | J | 088516-040 | SM 7500 Rn B |
| | Uranium-233/234 | 56.2 ± 8.04 | 0.0628 | 0.0266 | NE | NE | | | 088516-035 | DOE HASL-300 |
| | Uranium-235/236 | 0.654 ± 0.141 | 0.0493 | 0.0187 | NE | NE | | | 088516-035 | DOE HASL-300 |
| | Uranium-238 | 8.59 ± 1.27 | 0.0444 | 0.0174 | NE | NE | | | 088516-035 | DOE HASL-300 |
| **CTF-MW3** | Gross Alpha | -0.99 | NA | NA | 15 | NE | NA | None | 088507-034 | EPA 900.0 |
| 10-Mar-10 | Gross Beta | 12.4 ± 3.92 | 5.14 | 2.50 | 4mrem/yr | NE | | J | 088507-034 | EPA 900.0 |
| | Radium-226 | 0.349 ± 0.289 | 0.418 | 0.166 | 5 | 30 | U | BD | 088507-038 | EPA 903.1 |
| | Radium-228 | 2.19 ± 0.739 | 0.480 | 0.210 | 5 | 30 | | | 088507-039 | EPA 904.0 |
| | Radon-222 | 763 ± 180 | 64.7 | 30.7 | NE | NE | | | 088507-040 | SM 7500 Rn B |
| | Uranium-233/234 | 11.4 ± 1.64 | 0.0518 | 0.022 | NE | NE | | | 088507-035 | DOE HASL-300 |
| | Uranium-235/236 | 0.209 ± 0.0635 | 0.0406 | 0.0154 | NE | NE | | | 088507-035 | DOE HASL-300 |
| | Uranium-238 | 2.98 ± 0.456 | 0.0366 | 0.0144 | NE | NE | | | 088507-035 | DOE HASL-300 |

Refer to footnotes on page 2A-47.

**Table 2A-7** *(Continued)*
**Summary of Radioisotopic Results,**
**Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Activity[a] (pCi/L) | MDA[b] (pCi/L) | Critical Level[c] (pCi/L) | MCL/MAC[d] (pCi/L) | | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| **Eubank-1** | Gross Alpha | 2.22 | NA | NA | 15 | NE | NA | None | 088501-034 | EPA 900.0 |
| 05-Mar-10 | Gross Beta | 3.77 ± 1.23 | 1.65 | 0.804 | 4mrem/yr | NE | | J | 088501-034 | EPA 900.0 |
| | Radium-226 | 0.994 ± 0.540 | 0.618 | 0.252 | 5 | 30 | | J | 088501-038 | EPA 903.1 |
| | Radium-228 | 0.472 ± 0.327 | 0.464 | 0.205 | 5 | 30 | | J | 088501-039 | EPA 904.0 |
| **Greystone-MW2** | Gross Alpha | -2.83 | NA | NA | 15 | NE | NA | None | 088531-034 | EPA 900.0 |
| 22-Mar-10 | Gross Beta | 4.09 ± 1.41 | 1.81 | 0.862 | 4mrem/yr | NE | | J | 088531-034 | EPA 900.0 |
| | Radium-226 | 0.479 ± 0.259 | 0.241 | 0.0829 | 5 | 30 | | J | 088531-038 | EPA 903.1 |
| | Radium-228 | 0.344 ± 0.290 | 0.439 | 0.193 | 5 | 30 | U | BD | 088531-039 | EPA 904.0 |
| | Radon-222 | 2100 ± 468 | 64.0 | 30.4 | NE | NE | | | 088531-040 | SM 7500 Rn B |
| | Uranium-233/234 | 10.1 ± 1.46 | 0.054 | 0.0229 | NE | NE | | | 088531-035 | DOE HASL-300 |
| | Uranium-235/236 | 0.184 ± 0.0585 | 0.0424 | 0.0161 | NE | NE | | | 088531-035 | DOE HASL-300 |
| | Uranium-238 | 2.33 ± 0.366 | 0.0382 | 0.015 | NE | NE | | | 088531-035 | DOE HASL-300 |
| **MRN-2** | Gross Alpha | 2.84 | NA | NA | 15 | NE | NA | None | 088535-034 | EPA 900.0 |
| 24-Mar-10 | Gross Beta | 2.83 ± 0.838 | 0.998 | 0.479 | 4mrem/yr | NE | | J | 088535-034 | EPA 900.0 |
| | Radium-226 | 0.0982 ± 0.215 | 0.403 | 0.152 | 5 | 30 | U | BD | 088535-038 | EPA 903.1 |
| | Radium-228 | 0.404 ± 0.316 | 0.469 | 0.207 | 5 | 30 | U | BD | 088535-039 | EPA 904.0 |
| **MRN-3D** | Gross Alpha | -0.10 | NA | NA | 15 | NE | NA | None | 088538-034 | EPA 900.0 |
| 25-Mar-10 | Gross Beta | 4.51 ± 1.09 | 0.996 | 0.471 | 15 | NE | | | 088538-034 | EPA 900.0 |
| | Radium-226 | 0.445 ± 0.251 | 0.237 | 0.0814 | 5 | 30 | | J | 088538-038 | EPA 903.1 |
| | Radium-228 | 0.472 ± 0.318 | 0.453 | 0.204 | 5 | 30 | | J | 088538-039 | EPA 904.0 |
| **NWTA3-MW3D** | Gross Alpha | 2.12 | NA | NA | 15 | NE | NA | None | 088542-034 | EPA 900.0 |
| 26-Mar-10 | Gross Beta | 2.98 ± 0.895 | 0.996 | 0.467 | 15 | NE | | J | 088542-034 | EPA 900.0 |
| | Radium-226 | 0.0861 ± 0.181 | 0.330 | 0.133 | 5 | 30 | U | BD | 088542-038 | EPA 903.1 |
| | Radium-228 | 0.192 ± 0.285 | 0.484 | 0.215 | 5 | 30 | U | BD | 088542-039 | EPA 904.0 |
| **NWTA3-MW3D** (Duplicate) | Gross Alpha | 0.91 | NA | NA | 15 | NE | NA | None | 088543-034 | EPA 900.0 |
| 26-Mar-10 | Gross Beta | 2.81 ± 0.898 | 0.990 | 0.457 | 15 | NE | | J | 088543-034 | EPA 900.0 |
| | Radium-226 | 0.145 ± 0.167 | 0.267 | 0.0972 | 5 | 30 | U | BD | 088543-038 | EPA 903.1 |
| | Radium-228 | 0.477 ± 0.341 | 0.498 | 0.225 | 5 | 30 | U | BD | 088543-039 | EPA 904.0 |
| **PL-2** | Gross Alpha | 2.53 | NA | NA | 15 | NE | NA | None | 088514-034 | EPA 900.0 |
| 12-Mar-10 | Gross Beta | 2.45 ± 0.866 | 0.982 | 0.445 | 15 | NE | | J | 088514-034 | EPA 900.0 |
| | Radium-226 | 0.115 ± 0.189 | 0.333 | 0.132 | 5 | 30 | U | BD | 088514-038 | EPA 903.1 |
| | Radium-228 | 0.492 ± 0.318 | 0.419 | 0.177 | 5 | 30 | | J | 088514-039 | EPA 904.0 |

Refer to footnotes on page 2A-47.

## Table 2A-7 *(Continued)*
## Summary of Radioisotopic Results,
## Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Well ID | Analyte | Activity[a] (pCi/L) | MDA[b] (pCi/L) | Critical Level[c] (pCi/L) | MCL/MAC[d] (pCi/L) | | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| **PL-4** | Gross Alpha | 3.67 | NA | NA | 15 | NE | NA | None | 088511-034 | EPA 900.0 |
| 11-Mar-10 | Gross Beta | 7.39 ± 1.71 | 1.74 | 0.849 | 15 | NE | | | 088511-034 | EPA 900.0 |
| | Radium-226 | 0.245 ± 0.260 | 0.411 | 0.160 | 5 | 30 | U | BD | 088511-038 | EPA 903.1 |
| | Radium-228 | 0.609 ± 0.359 | 0.496 | 0.228 | 5 | 30 | | NJ+ | 088511-039 | EPA 904.0 |
| **PL-4** (Duplicate) | Gross Alpha | 3.07 | NA | NA | 15 | NE | NA | None | 088512-034 | EPA 900.0 |
| 11-Mar-10 | Gross Beta | 6.92 ± 1.67 | 1.80 | 0.880 | 15 | NE | | | 088512-034 | EPA 900.0 |
| | Radium-226 | 0.496 ± 0.335 | 0.366 | 0.133 | 5 | 30 | | J | 088512-038 | EPA 903.1 |
| | Radium-228 | 0.746 ± 0.388 | 0.470 | 0.207 | 5 | 30 | | NJ+ | 088512-039 | EPA 904.0 |
| **SFR-2S** | Gross Alpha | -1.29 | NA | NA | 15 | NE | NA | None | 088503-034 | EPA 900.0 |
| 08-Mar-10 | Gross Beta | 10.0 ± 2.99 | 3.68 | 1.79 | 4mrem/yr | NE | | J | 088503-034 | EPA 900.0 |
| | Radium-226 | 0.626 ± 0.408 | 0.504 | 0.203 | 5 | 30 | | J | 088503-038 | EPA 903.1 |
| | Radium-228 | 0.424 ± 0.319 | 0.474 | 0.215 | 5 | 30 | U | BD | 088503-039 | EPA 904.0 |
| | Radon-222 | 292 ± 81.8 | 64.8 | 30.7 | NE | NE | | J | 088503-040 | SM 7500 Rn B |
| | Uranium-233/234 | 20.2 ± 2.90 | 0.0571 | 0.0242 | NE | NE | | | 088503-035 | DOE HASL-300 |
| | Uranium-235/236 | 0.337 ± 0.086 | 0.0448 | 0.017 | NE | NE | | | 088503-035 | DOE HASL-300 |
| | Uranium-238 | 5.35 ± 0.798 | 0.0403 | 0.0158 | NE | NE | | | 088503-035 | DOE HASL-300 |
| **SFR-4T** | Gross Alpha | -1.46 | NA | NA | 15 | NE | NA | None | 088533-034 | EPA 900.0 |
| 23-Mar-10 | Gross Beta | 0.732 ± 3.32 | 5.78 | 2.74 | 4mrem/yr | NE | U | BD | 088533-034 | EPA 900.0 |
| | Radium-226 | 0.0262 ± 0.171 | 0.351 | 0.136 | 5 | 30 | U | BD | 088533-038 | EPA 903.1 |
| | Radium-228 | 0.356 ± 0.312 | 0.482 | 0.215 | 5 | 30 | U | BD | 088533-039 | EPA 904.0 |
| | Radon-222 | -41.6 ± 35.2 | 66.4 | 31.6 | NE | NE | U | BD | 088533-040 | SM 7500 Rn B |
| | Uranium-233/234 | 0.512 ± 0.110 | 0.0611 | 0.0259 | NE | NE | | | 088533-035 | DOE HASL-300 |
| | Uranium-235/236 | 0.017 ± 0.0168 | 0.048 | 0.0182 | NE | NE | U | BD | 088533-035 | DOE HASL-300 |
| | Uranium-238 | 0.110 ± 0.0412 | 0.0432 | 0.0169 | NE | NE | | J | 088533-035 | DOE HASL-300 |
| **SWTA3-MW2** | Gross Alpha | 1.68 | NA | NA | 15 | NE | NA | None | 088528-034 | EPA 900.0 |
| 19-Mar-10 | Gross Beta | 3.88 ± 0.992 | 0.993 | 0.472 | 4mrem/yr | NE | | | 088528-034 | EPA 900.0 |
| | Radium-226 | 0.464 ± 0.302 | 0.395 | 0.159 | 5 | 30 | | J | 088528-038 | EPA 903.1 |
| | Radium-228 | 0.288 ± 0.292 | 0.468 | 0.212 | 5 | 30 | U | BD | 088528-039 | EPA 904.0 |
| **SWTA3-MW3** | Gross Alpha | 2.43 | NA | NA | 15 | NE | NA | None | 088520-034 | EPA 900.0 |
| 16-Mar-10 | Gross Beta | 4.06 ± 1.08 | 0.996 | 0.458 | 4mrem/yr | NE | | | 088520-034 | EPA 900.0 |
| | Radium-226 | 0.0458 ± 0.191 | 0.370 | 0.151 | 5 | 30 | U | BD | 088520-038 | EPA 903.1 |
| | Radium-228 | 0.186 ± 0.249 | 0.419 | 0.179 | 5 | 30 | U | BD | 088520-039 | EPA 904.0 |

Refer to footnotes on page 2A-47.

## Table 2A-7 *(Concluded)*
## Summary of Radioisotopic Results,
## Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Well ID | Analyte | Activity[a] (pCi/L) | MDA[b] (pCi/L) | Critical Level[c] (pCi/L) | MCL/MAC[d] (pCi/L) | | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|---|
| **SWTA3-MW3** (Duplicate) 16-Mar-10 | Gross Alpha | 2.08 | NA | NA | 15 | NE | NA | None | 088521-034 | EPA 900.0 |
| | Gross Beta | 3.28 ± 0.975 | 0.984 | 0.450 | 15 | NE | | | 088521-034 | EPA 900.0 |
| | Radium-226 | -0.0674 ± 0.159 | 0.363 | 0.148 | 5 | 30 | U | BD | 088521-038 | EPA 903.1 |
| | Radium-228 | 0.514 ± 0.323 | 0.416 | 0.174 | 5 | 30 | | NJ+ | 088521-039 | EPA 904.0 |
| **SWTA3-MW4** 17-Mar-10 | Gross Alpha | 2.64 | NA | NA | 15 | NE | NA | None | 088523-034 | EPA 900.0 |
| | Gross Beta | 3.38 ± 0.977 | 0.981 | 0.451 | 4mrem/yr | NE | | | 088523-034 | EPA 900.0 |
| | Radium-226 | 0.119 ± 0.143 | 0.228 | 0.0783 | 5 | 30 | U | BD | 088523-038 | EPA 903.1 |
| | Radium-228 | 0.523 ± 0.325 | 0.413 | 0.173 | 5 | 30 | | J | 088523-039 | EPA 904.0 |
| **TRE-1** 09-Mar-10 | Gross Alpha | 1.28 | NA | NA | 15 | NE | NA | None | 088505-034 | EPA 900.0 |
| | Gross Beta | 11.4 ± 3.66 | 4.78 | 2.33 | 4mrem/yr | NE | | J | 088505-034 | EPA 900.0 |
| | Radium-226 | 0.319 ± 0.234 | 0.278 | 0.0955 | 5 | 30 | | J | 088505-038 | EPA 903.1 |
| | Radium-228 | 0.596 ± 0.348 | 0.489 | 0.229 | 5 | 30 | | J | 088505-039 | EPA 904.0 |
| | Radon-222 | 637 ± 154 | 67.0 | 31.7 | NE | NE | | J | 088505-040 | SM 7500 Rn B |
| | Uranium-233/234 | 22.1 ± 3.15 | 0.0546 | 0.0231 | NE | NE | | | 088505-035 | DOE HASL-300 |
| | Uranium-235/236 | 0.376 ± 0.0915 | 0.0429 | 0.0163 | NE | NE | | | 088505-035 | DOE HASL-300 |
| | Uranium-238 | 5.54 ± 0.820 | 0.0386 | 0.0151 | NE | NE | | | 088505-035 | DOE HASL-300 |

Refer to footnotes on page 2A-47.

## Table 2A-8
## Summary of Field Water Quality Measurements[h], Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/ New Mexico

## Calendar Year 2010

| Well ID | Sample Date | Sampling Type | Initial Depth to water (fbtoc) | Sampling Depth (fbtoc) | Purge Volume (gal) | Temperature ($^0$C) | Specific Conductivity (μmho/cm) | Oxidation Reduction Potential (mV) | pH | Turbidity (NTU) | Dissolved Oxygen (%Sat) | Alkalinity (mg/L $CaCO_3$ at 4.5 pH) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Coyote Spring** | 29-Mar-10 | n/a | n/a | n/a | n/a | 12.09 | 3175 | 243.7 | 5.95 | 1.09 | 20.0 | 1200 |
| **CTF-MW1** | 18-Mar-10 | Bennett Pump | 237.13 | 260 | 25 | 16.83 | 678 | 259.9 | 7.25 | 0.26 | 73.6 | 180 |
| **CTF-MW2** | 15-Mar-10 | Bennett Pump | 43.73 | 130 | 37 | 14.59 | 3601 | 99.8 | 6.01 | 1.09 | 0.7 | 1150 |
| **CTF-MW3** | 10-Mar-10 | Bennett Pump | 305.71 | 360 | 51 | 16.35 | 1711 | 246.8 | 6.84 | 0.42 | 74.5 | 270 |
| **Eubank-1** | 05-Mar-10 | Bennett Pump | 552.00 | 605 | 72 | 18.05 | 492 | 203.9 | 7.33 | 0.58 | 84.5 | 150 |
| **Greystone-MW2** | 22-Mar-10 | Bennett Pump | 51.86 | 80 | 37 | 15.36 | 1166 | 260.4 | 6.92 | 0.34 | 70.4 | 370 |
| **MRN-2** | 24-Mar-10 | Bennett Pump | 435.15 | 441 | 18 | 16.87 | 440 | 257.2 | 7.46 | 0.63 | 72.9 | 120 |
| **MRN-3D** | 25-Mar-10 | Bennett Pump | 435.79 | 680 | 41 | 19.10 | 472 | 128.2 | 7.42 | 2.64 | 43.7 | 130 |
| **NWTA3-MW3D** | 26-Mar-10 | Bennett Pump | 467.46 | 673 | 41 | 18.75 | 379 | 208.9 | 7.57 | 1.70 | 48.0 | 125 |
| **PL-2** | 12-Mar-10 | Bennett Pump | 469.84 | 597 | 41 | 17.97 | 450 | 242.1 | 7.63 | 0.51 | 64.6 | 130 |
| **PL-4** | 11-Mar-10 | Bennett Pump | 468.48 | 492 | 49 | 16.46 | 482 | 80.4 | 7.33 | 2.99 | 60.4 | 110 |
| **SFR-2S** | 08-Mar-10 | Bennett Pump | 99.57 | 118 | 28 | 13.16 | 1131 | 157.8 | 6.75 | 25.6 | 78.8 | 275 |
| **SFR-4T** | 23-Mar-10 | Bennett Pump | 147.77 | 359 | 48 | 15.37 | 4274 | 165.7 | 7.92 | 0.38 | 11.0 | 100 |
| **SWTA3-MW2** | 19-Mar-10 | Bennett Pump | 449.88 | 474 | 40 | 18.4 | 440 | 220.1 | 7.50 | 3.70 | 48.0 | 160 |
| **SWTA3-MW3** | 16-Mar-10 | Bennett Pump | 447.73 | 639 | 37 | 19.21 | 451 | 228.8 | 7.50 | 1.05 | 49.3 | 140 |
| **SWTA3-MW4** | 17-Mar-10 | Bennett Pump | 448.28 | 457 | 37 | 19.07 | 458 | 233.5 | 7.53 | 0.44 | 47.7 | 155 |
| **TRE-1** | 09-Mar-10 | Bennett Pump | 175.80 | 294 | 76 | 16.46 | 1345 | 255.7 | 6.59 | 0.27 | 72.1 | 350 |

Refer to footnotes on page 2A-47.

# Table 2A-9
# Calendar Year 2010 Groundwater Levels
# Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/ New Mexico

## Calendar Year 2010

| Well Name | Measurement Point* | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AVN-1 | 5440.27 | 520.99 | | | 521.21 | | | 521.40 | | | 521.57 | | |
| CTF-MW1 | 6079.96 | 236.95 | | | 237.07 | | | 237.20 | | | 237.37 | | |
| CTF-MW2 | 5575.93 | 43.76 | | | 43.72 | | | 43.73 | | | 43.75 | | |
| CTF-MW3 | 5520.15 | 305.94 | | | 305.95 | | | 306.14 | | | 306.36 | | |
| CWL-BW3 | 5430.23 | 504.20 | | 504.25 | | | | 504.69 | | | 505.21 | | |
| CWL-BW4A | 5431.36 | 504.84 | | 504.92 | | | | | | | | | |
| CWL-BW5 | 5432.12 | | | | | | | 508.11 | | | 508.63 | | |
| CWL-MW10 | 5421.91 | | | | | | | 497.67 | | | 498.03 | | |
| CWL-MW11 | 5420.57 | | | | | | | 496.91 | | | 497.47 | | |
| CWL-MW2BL | 5419.39 | 498.59 | | 498.72 | | | | 498.92 | | | 499.42 | | |
| CWL-MW2BU | 5419.42 | 494.04 | | | | | | | | | | | |
| CWL-MW4 | 5420.33 | 497.31 | | 497.4 | | | | | | | | | |
| CWL-MW5L | 5415.80 | 495.46 | | 495.53 | | | | | | | | | |
| CWL-MW5U | 5416.01 | 490.23 | | 490.37 | | | | | | | | | |
| CWL-MW6L | 5417.13 | 497.24 | | 497.36 | | | | | | | | | |
| CWL-MW6U | 5416.78 | 490.60 | | 490.68 | | | | | | | | | |
| CWL-MW7 | 5419.51 | 512.31 | | 512.45 | | | | 512.67 | | | 513.13 | | |
| CWL-MW8 | 5419.26 | 511.90 | | 512.04 | | | | 512.27 | | | 512.71 | | |
| CWL-MW9 | 5423.45 | | | | | | | 500.78 | | | 501.26 | | |
| CYN-MW10 | 6342.78 | | | | | | | | 121.08 | | | | |
| CYN-MW11 | 6371.74 | | | | | | | | 96.66 | | | | |
| CYN-MW12 | 6342.49 | | | | | | | | 205.78 | | | | |
| CYN-MW1D | 6239.69 | 324.69 | | | 324.87 | | | 325.08 | | | 325.31 | | |
| CYN-MW3 | 6313.26 | 125.93 | | | 126.79 | | | 127.17 | | | 127.5 | | |
| CYN-MW4 | 6455.91 | 218.03 | | | 218.79 | | | 219.58 | | | 220.29 | | |
| CYN-MW5 | 5981.56 | 107.00 | | | 106.87 | | | 107.19 | | | 107.24 | | |
| CYN-MW6 | 6343.37 | 147.49 | | | 148.41 | | | 148.76 | | | 149.33 | | |

Refer to footnote at end of table.

**Table 2A-9** *(Continued)*
**Calendar Year 2010 Groundwater Levels**
**Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/ New Mexico**

**Calendar Year 2010**

| Well Name | Measurement Point * | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CYN-MW7 | 6216.44 | 299.69 | | | 299.88 | | | 300.03 | | | 300.32 | | |
| CYN-MW8 | 6230.21 | 315.33 | | | 315.52 | | | 315.68 | | | 315.96 | | |
| CYN-MW9 | 6358.00 | | | | | | | | 163.63 | | | | |
| EUBANK-1 | 5457.35 | 551.96 | 551.89 | 551.76 | 551.74 | 551.64 | 551.83 | 551.92 | 551.86 | 551.76 | 551.88 | 551.79 | 551.53 |
| GREYSTONE-MW2 | 5811.53 | 52.32 | | | 51.83 | | | 52.63 | | | 53.4 | | |
| LWDS-MW1 | 5421.05 | 499.00 | | | 499.01 | | | 499.17 | | | 499.5 | | |
| LWDS-MW2 | 5409.68 | 488.13 | | | 488.24 | | | 488.47 | | | 488.57 | | |
| MRN-2 | 5305.51 | 435.09 | 435.13 | 435.09 | 435.1 | 434.94 | 435.16 | 435.22 | 435.36 | 435.37 | 435.53 | 435.75 | 435.5 |
| MRN-3D | 5306.67 | 435.63 | 435.64 | 435.58 | 435.58 | 435.44 | 435.75 | 435.83 | 435.95 | 435.97 | 436.12 | 436.29 | 435.97 |
| MWL-BW2 | 5388.35 | 477.99 | 477.94 | 477.99 | 477.95 | 478.03 | 478.03 | 478.24 | 478.17 | 478.19 | 478.28 | 478.36 | 478.34 |
| MWL-MW4 | 5389.03 | | | | 500.58 | | | 500.73 | | | 500.92 | | |
| MWL-MW5 | 5379.89 | 493.05 | | | 492.9 | | | 493.21 | | | 493.28 | | |
| MWL-MW6 | 5372.64 | 487.01 | | | 486.85 | | | 487.16 | | | 487.22 | | |
| MWL-MW7 | 5380.63 | 489.18 | 488.90 | 489.07 | 488.93 | 489.09 | 489.12 | 489.26 | 489.19 | 489.09 | 489.3 | 489.44 | 489.25 |
| MWL-MW8 | 5382.00 | 490.87 | 490.56 | 490.77 | 490.56 | 490.75 | 490.77 | 490.82 | 490.83 | 490.74 | 490.92 | 491.07 | 490.9 |
| MWL-MW9 | 5379.24 | 491.44 | 491.14 | 491.31 | 491.11 | 491.36 | 491.38 | 491.46 | 491.45 | 491.36 | 491.55 | 491.69 | 491.51 |
| NWTA3-MW2 | 5334.82 | 468.31 | 468.22 | 468.31 | 468.46 | 468.19 | 468.37 | 468.34 | 468.56 | 468.55 | 468.66 | 468.92 | 468.6 |
| NWTA3-MW3D | 5338.13 | 467.62 | 467.49 | 467.57 | 467.7 | 467.49 | 467.62 | 467.7 | 467.87 | 467.91 | 468.02 | 468.22 | 467.82 |
| PGS-2 | 5405.62 | 553.28 | 552.73 | 552.44 | 552.3 | 553.01 | 553.43 | 554.73 | 554.32 | 555.14 | 555.3 | 554.67 | 553.36 |
| PL-2 | 5333.34 | 469.77 | 468.57 | | 469.58 | | | 470.13 | | | 470.36 | | |
| PL-4 | 5332.31 | | | 468.46 | 468.48 | 468.39 | 468.5 | 468.75 | 468.7 | 468.6 | 468.99 | 468.57 | 468.93 |
| SCHOOL HOUSE WELL | 5793.66 | 95.47 | | | 95.4 | | | 95.36 | | | 95.65 | | |
| SFR-1D | 5396.46 | 138.99 | | | 139.09 | | | 139.15 | | | 139.23 | | |
| SFR-1S | 5396.49 | 89.37 | | | 89.44 | | | 89.49 | | | 89.55 | | |
| SFR-2S | 5430.10 | 99.50 | | | 99.69 | | | 99.7 | | | 99.93 | | |

Refer to footnote at end of table.

**Table 2A-9** *(Continued)*
**Calendar Year 2010 Groundwater Levels**
**Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/ New Mexico**

**Calendar Year 2010**

| Well Name | Measurement Point * | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SFR-3D | 5495.27 | 160.74 | | | 160.74 | | | 160.75 | | | 160.87 | | |
| SFR-3P | 5496.96 | 160.65 | | | 160.85 | | | 160.84 | | | 161.07 | | |
| SFR-3S | 5495.57 | 159.86 | | | 159.84 | | | 159.84 | | | 160.03 | | |
| SFR-3T | 5495.99 | 69.97 | | | 70.29 | | | 70.06 | | | 70.03 | | |
| SFR-4P | 5570.66 | 151.67 | | | 153.93 | | | 153.54 | | | 152.56 | | |
| SFR-4T | 5571.28 | 148.28 | | | 169.9 | | | 152.09 | | | 149.83 | | |
| SWTA3-MW2 | 5322.93 | 449.93 | 449.99 | 450.05 | 450.23 | 449.94 | 450.1 | 450.15 | 450.32 | 450.33 | 450.42 | 450.65 | 450.35 |
| SWTA3-MW3 | 5321.27 | 447.13 | 447.18 | 447.22 | 447.39 | 447.16 | 447.32 | 447.37 | 447.55 | 447.6 | 447.68 | 447.87 | 447.57 |
| SWTA3-MW4 | 5322.14 | 447.67 | 447.73 | 447.77 | 447.94 | 447.67 | 447.85 | 447.88 | 448.07 | 448.1 | 448.2 | 448.4 | 448.11 |
| TA1-W-01 | 5401.15 | 544.73 | 544.35 | 544.41 | 544.24 | 543.9 | 544.19 | 544.31 | 544.54 | 544.72 | 544.98 | 544.63 | 544.51 |
| TA1-W-02 | 5413.95 | 525.85 | | | 525.13 | | | 525.35 | | | 525.55 | | |
| TA1-W-03 | 5454.36 | 345.29 | | | 346.6 | | | 346.94 | | | 347.23 | | |
| TA1-W-04 | 5458.31 | 572.96 | 572.66 | 572.46 | 572.17 | 571.86 | 571.94 | 572.06 | 572.19 | 572.23 | 572.29 | 572.39 | 571.92 |
| TA1-W-05 | 5431.17 | 572.32 | 571.60 | 571.37 | 571.04 | 572.49 | 573.4 | 575.26 | 574.62 | 575.95 | 576 | 574.76 | 572.72 |
| TA1-W-06 | 5414.43 | 305.44 | | | 305.51 | | | 305.62 | | | 305.87 | | |
| TA1-W-07 | 5402.25 | 285.01 | 285.05 | 285.24 | 285.27 | 285.08 | 285.26 | 285.22 | 285.34 | 285.33 | 285.48 | 285.27 | 285.41 |
| TA1-W-08 | 5431.52 | 308.42 | | | 308.48 | | | 308.73 | | | 308.77 | | |
| TA2-NW1-325 | 5419.27 | | 315.84 | | 315.93 | | | 316.04 | | | 316.17 | | |
| TA2-NW1-595 | 5418.59 | 525.04 | | | 525.01 | | | 525.37 | | | 525.61 | | |
| TA2-SW1-320 | 5409.18 | 315.63 | | | 316.25 | | | 316.39 | | | 316.52 | | |
| TA2-W-01 | 5417.32 | 324.58 | | | 325.23 | | | 325.34 | | | | | |
| TA2-W-19 | 5348.54 | 269.56 | 269.43 | 269.56 | 269.78 | 269.67 | 269.79 | 269.9 | 269.88 | 269.88 | 269.9 | 270.08 | 269.96 |
| TA2-W-24 | 5360.99 | 444.72 | | | 444.49 | | | 444.66 | | | 444.45 | | |
| TA2-W-25 | 5372.19 | 472.31 | 472.00 | 472.09 | 471.8 | 471.74 | 471.95 | 472.2 | 472.09 | 472.05 | 472.16 | 472.16 | 471.76 |
| TA2-W-26 | 5373.10 | 283.65 | | | 283.64 | | | 284.03 | | | 284.16 | | |
| TA2-W-27 | 5360.18 | 277.14 | | | 277.55 | | | 277.8 | | | 277.83 | | |

Refer to footnote at end of table.

**Table 2A-9** *(Concluded)*
**Calendar Year 2010 Groundwater Levels**
**Groundwater Protection Program Groundwater Surveillance Task, Sandia National Laboratories/ New Mexico**

**Calendar Year 2010**

| Well Name | Measurement Point * | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TAV-MW10 | 5434.30 | 512.71 | 512.61 | 512.7 | 512.77 | 512.92 | 512.87 | 512.9 | 513.1 | 513.05 | 513.23 | 513.11 | 513.26 |
| TAV-MW2 | 5424.60 | 502.82 | | | 502.89 | | | 503.19 | | | 503.43 | | |
| TAV-MW3 | 5461.53 | 541.63 | | | 541.63 | | | 542.05 | | | 542.25 | | |
| TAV-MW4 | 5425.16 | 503.33 | | | 503.48 | | | 503.71 | | | 503.86 | | |
| TAV-MW5 | 5405.98 | 484.87 | | | 484.96 | | | 485.2 | | | 485.24 | | |
| TAV-MW6 | 5428.44 | 506.85 | | | 506.93 | | | 507.08 | | | 507.4 | | |
| TAV-MW7 | 5427.67 | 509.52 | | | 509.61 | | | 509.76 | | | 510.1 | | |
| TAV-MW8 | 5414.27 | 491.99 | | | 492.05 | | | 492.19 | | | 492.53 | | |
| TAV-MW9 | 5413.54 | 495.72 | | | 495.79 | | | 495.96 | | | 496.21 | | |
| TJA-2 | 5350.53 | 274.85 | | | 275.45 | | | 275.57 | | | 275.59 | | |
| TJA-3 | 5387.89 | 498.48 | | | 498.95 | | | 499.05 | | | 499.03 | | |
| TJA-4 | 5338.49 | 303.30 | | | 303.05 | | | 303.03 | | | 302.83 | | |
| TJA-5 | 5338.66 | 268.81 | | | 268.93 | | | 269.07 | | | 268.97 | | |
| TJA-6 | 5340.49 | 451.02 | 450.99 | 451.06 | 451.13 | 450.96 | 451.09 | 451.2 | 451.15 | 451.08 | 451.09 | 451.24 | 451.08 |
| TJA-7 | 5388.60 | 302.17 | | | 302.26 | | | 302.46 | | | 302.47 | | |
| TRE-1 | 5494.58 | 175.83 | | | 175.94 | | | 176.05 | | | 176.17 | | |
| TRN-1 | 5732.95 | 91.74 | | | 91.86 | | | 91.89 | | | 92.01 | | |
| TRS-1D | 5777.13 | 126.52 | | | 126.7 | | | 127.1 | | | 126.69 | | |
| TRS-1S | 5777.40 | 134.00 | | | 134.11 | | | 134.22 | | | 134.23 | | |
| TRS-2 | 5778.09 | 134.59 | | | 134.66 | | | 134.79 | | | 134.8 | | |
| WYO-3 | 5389.42 | 532.19 | 531.99 | 531.93 | 531.71 | 531.5 | 531.58 | 531.78 | 531.89 | 532.1 | 532.23 | 532.32 | 532.09 |
| WYO-4 | 5389.90 | 289.49 | | | 289.38 | | | 289.85 | | | 290.14 | | |

* Measurement point was mathematically converted to NAD27 using National Geodetic Survey approved software.

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## *Footnotes for Groundwater Protection Program Groundwater Surveillance Task Tables*

**[a]Result and/or Activity**

- Values in bold exceed the established MCL and/or MAC.
- ND = not detected (at method detection limit).
- Activities of zero or less are considered to be not detected.
- Gross alpha activity measurements were corrected by subtracting out the total uranium activity (40 CFR Parts 9, 141, and 142, Table 1-4)
- μg/L = micrograms per liter
- mg/L = milligrams per liter
- pCi/L = picocuries per liter

**[b]MDL or MDA**

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.

The 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

NA = not applicable for gross alpha activities. The MDA could not be calculated as the gross alpha activity was corrected by subtracting out the total uranium activity.

**[c]PQL or Critical Level**

Practical quantitation limit. The lowest concentration of analytes in a sample that can be reliably determined within specified limits of precision and accuracy by that indicated method under routine laboratory operating conditions.

The minimum activity that can be measured and reported with 99% confidence that the analyte is greater than zero; analyte is matrix specific

NA = not applicable for gross alpha activities. The critical level could not be calculated as the gross alpha activity was corrected by subtracting out the total uranium activity.

**[d]MCL/MAC**

- Maximum contaminant level. Established by the U.S. Environmental Protection Agency Primary Water Regulations (40 CFR 141.11, Supbart B), National Primary Drinking Water Standards, EPA, May 2009.
- Maximum Allowable Concentration in groundwater for the contaminants specified in 20 NMAC 6.2, Sec 3103, Human Health Standards.
- NE = not established.
- 15 pCi/L = Gross alpha particle activity, excluding total uranium (40 CFR Parts 9, 141, and 142, Table 1-4).
- 4 mrem/yr = any combination of beta and/or gamma emitting radionuclides (as dose rate).
- 5 pCi/L = combined radium-226 and radium-228 activities.
- 30 pCi/L = combined radium-226 and radium-228 activities.

**[e]Laboratory Qualifier**

B = Analyte is detected in associated laboratory method blank.
H = Analytical holding time was exceeded.
J = Amount detected is below the practical quantitation limit (PQL).
NA = Not applicable for gross alpha activities.
U = Analyte is absent or below the method detection limit.

**[f]Validation Qualifier**

If cell is blank, then all quality control samples meet acceptance criteria with respect to submitted samples.
BD = Below detection limit as used in radiochemistry to identify results that are not statistically different from zero.
J = The associate value is an estimated quantity.
J+ = The associated numerical value is an estimated quantity with suspected positive bias.

## *Footnotes for Groundwater Protection Program Groundwater Surveillance Task Tables* (Concluded)

**[f]Validation Qualifier (continued)**

| | | |
|---|---|---|
| None | = | No data validation for corrected gross alpha activity. |
| NJ+ | = | Presumptive evidence of the presence of the material at an estimated quantity with a suspected positive bias. |
| NJ- | = | Presumptive evidence of the presence of the material at an estimated quantity with a suspected negative bias. |
| 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. |

**[g]Analytical Method**

- EPA, 1979, *Methods for Chemical Analysis of Water and Wastes*, EPA-600/4-79-020, U.S. Environmental Protection Agency, Cincinnati, Ohio..
- EPA, 1980, *Prescribed Procedures for Measurement of Radioactivity in Drinking Water,* EPA-600/4-80-032, U.S. Environmental Protection Agency, Cincinnati, Ohio
- EPA, 2008, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*," SW-846, Update IV of 3rd ed., U.S. Environmental Protection Agency, Washington, D.C.
- U.S. Environmental Protection Agency, Washington, D.C.; or Clesceri, Greenburg, and Eaton, 1998, *Standard Methods for the Examination of Water and Wastewater*, $20^{th}$ ed., Method 2320B.
- U.S. Department of Energy, Environmental Measurements Laboratory, 1990, *EML Procedures Manual,* 27th ed., Vol. 1, Rev. 1992, HASL-300.
- Beckman, 1988, *Standard Methods for the Examination of Water and Wastewater,* 7500-Rn B Method, 20th eEd.,LS5000TD Liquid Scintillation System Operation Manual, May.

**[h]Field Water Quality Measurements**

- Field measurements collected prior to sampling.

| | | |
|---|---|---|
| °C | = | degrees Celsius. |
| % Sat | = | percent saturation. |
| fbtoc | = | feet below top of casing. |
| gal | = | gallons. |
| μmho/cm | = | micromhos per centimeter. |
| mg/L | = | milligrams per liter. |
| mV | = | millivolts. |
| NTU | = | nephelometric turbidity units. |
| pH | = | potential of hydrogen (negative logarithm of the hydrogen ion concentration). |

# Attachment 2B
# Groundwater Protection Program
# Monitoring Network Map and Plots

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# Attachment 2B Monitoring Network Map and Plots

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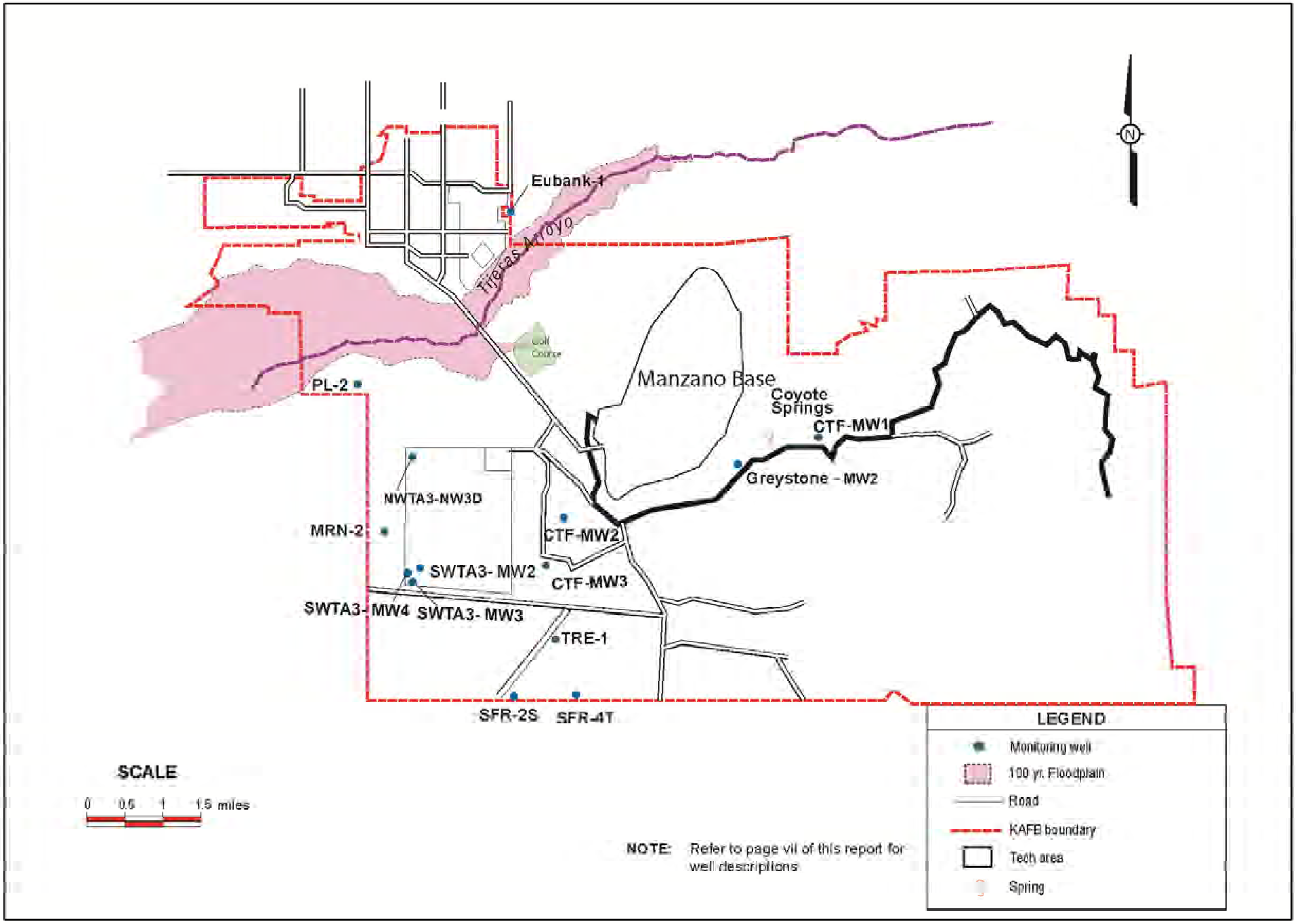


**Figure 2B-1. Groundwater Protection Program (GWPP) Water Quality Monitoring Network**

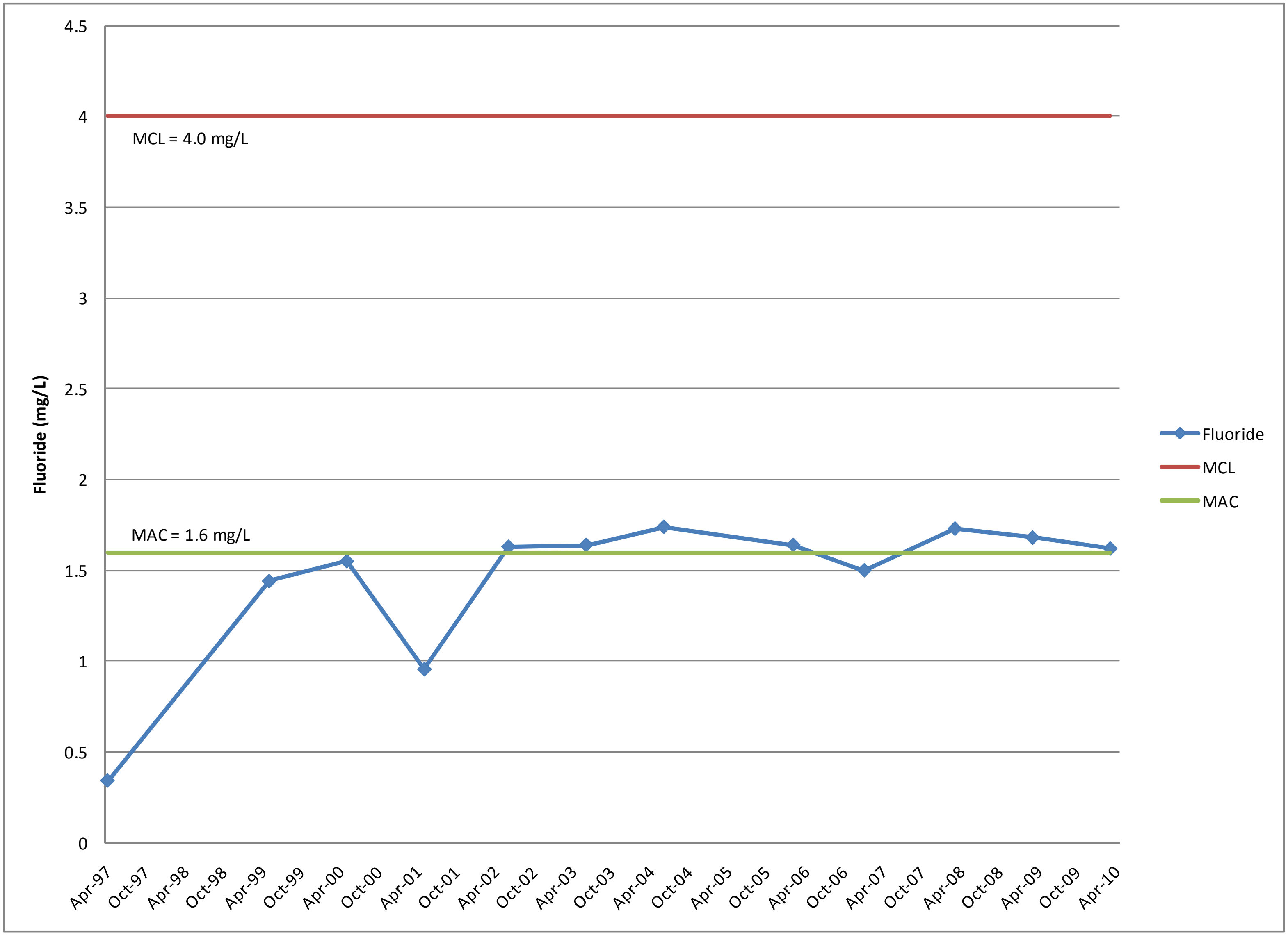


**Figure 2B-2. Fluoride Concentrations, Coyote Springs**

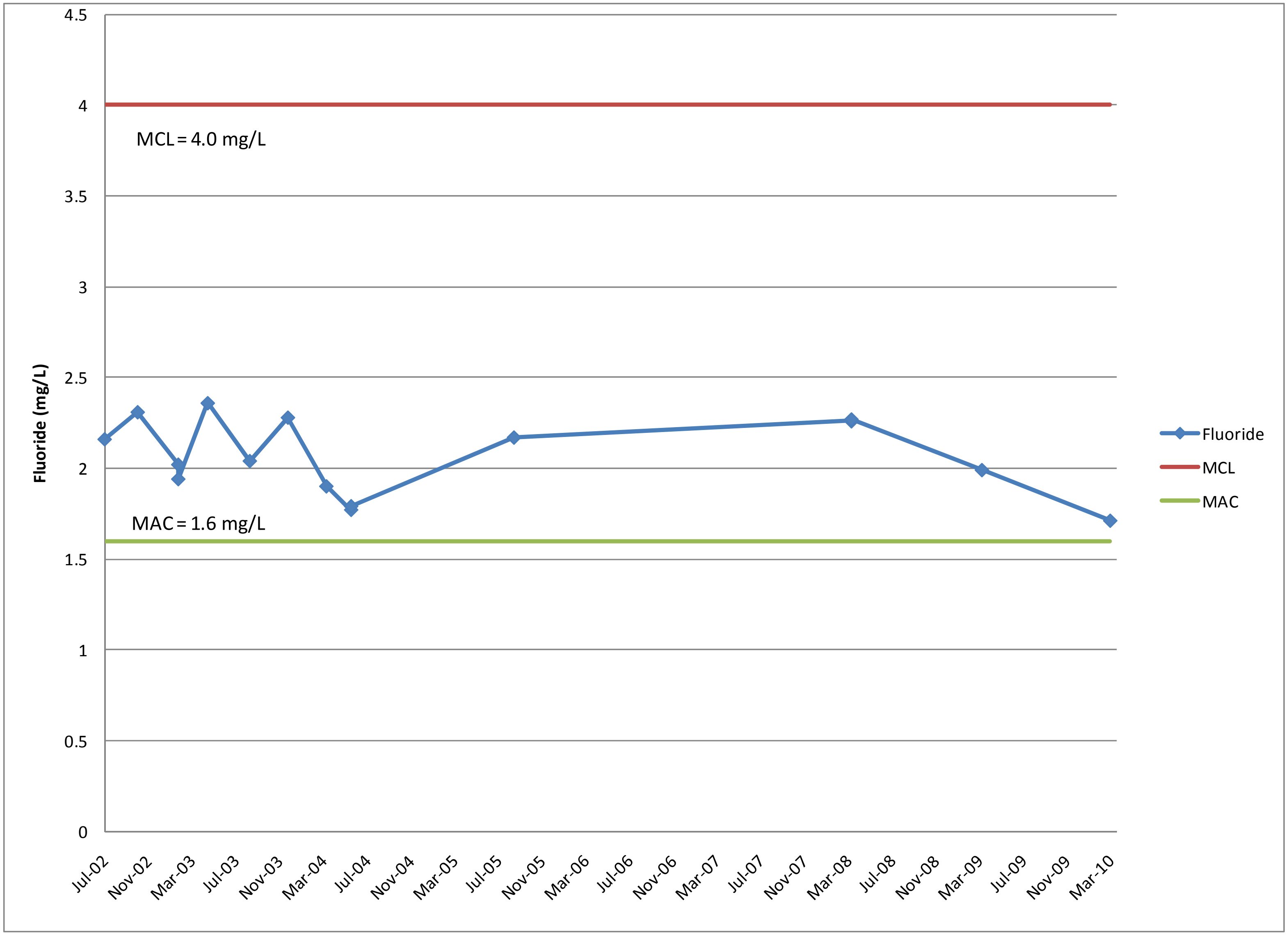


**Figure 2B-3. Fluoride Concentrations, CTF-MW2**

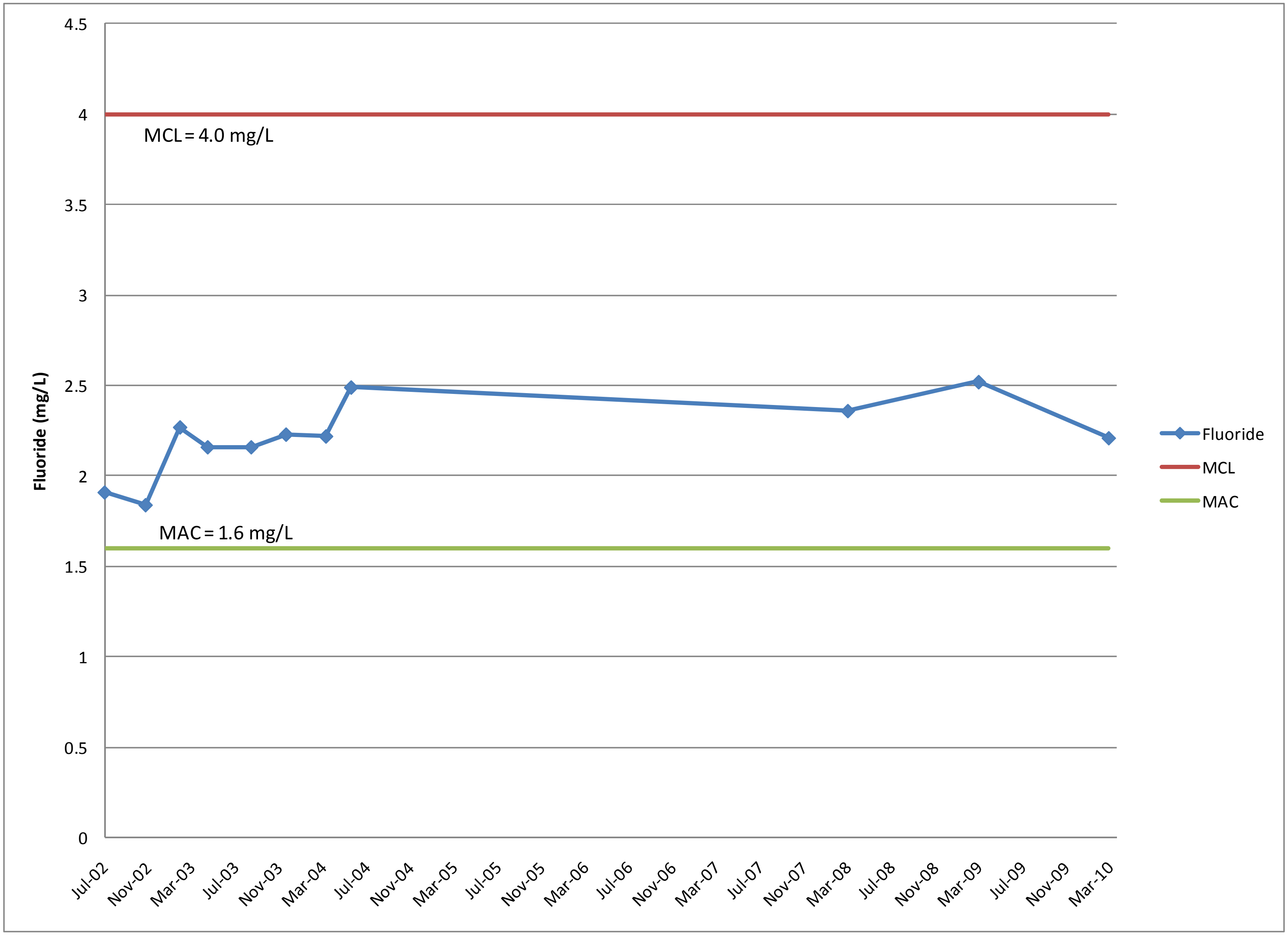


**Figure 2B-4. Fluoride Concentrations, CTF-MW3**

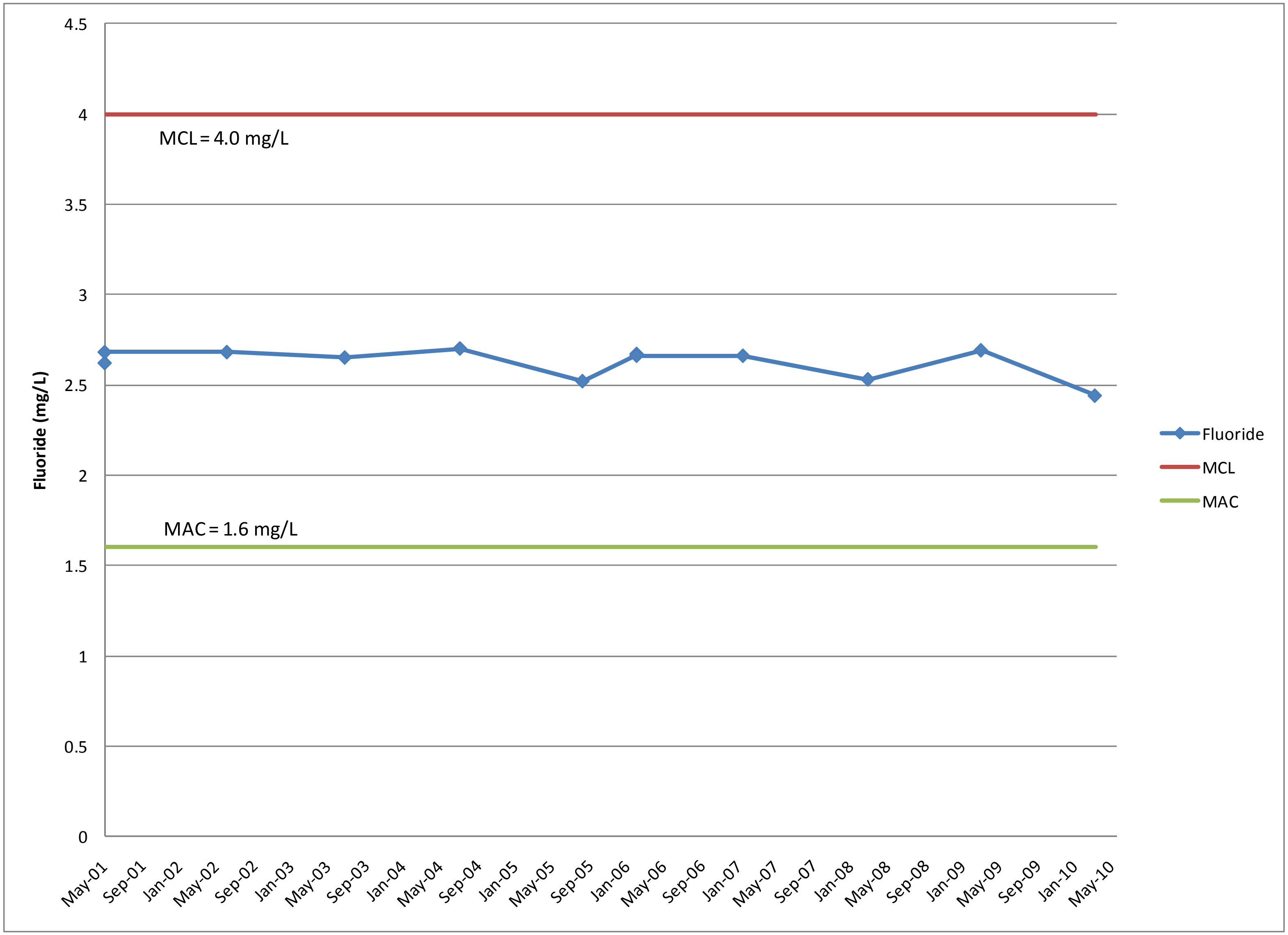


**Figure 2B-5. Fluoride Concentrations, SFR-4T**

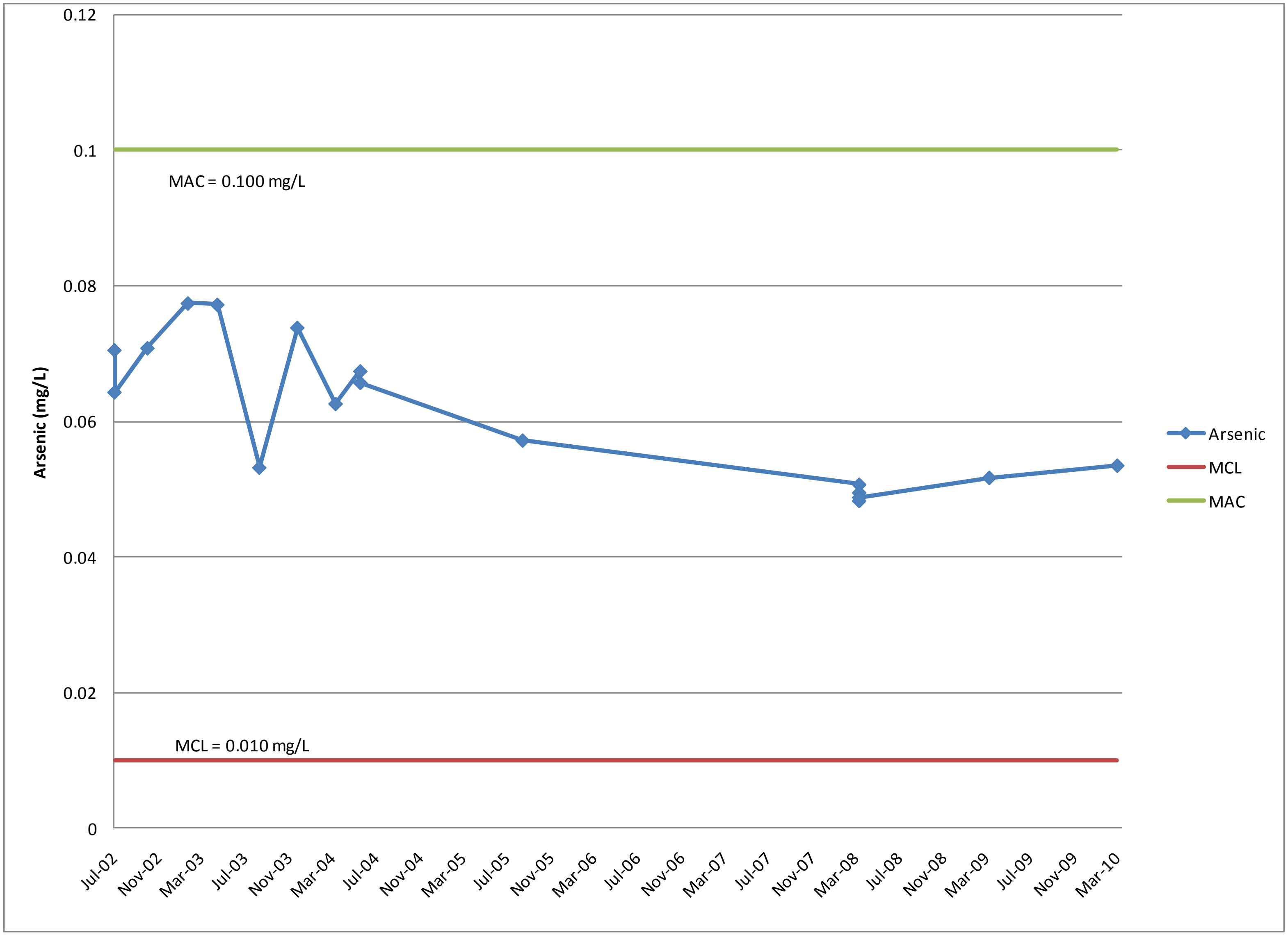


**Figure 2B-6. Arsenic Concentrations, CTF-MW2**

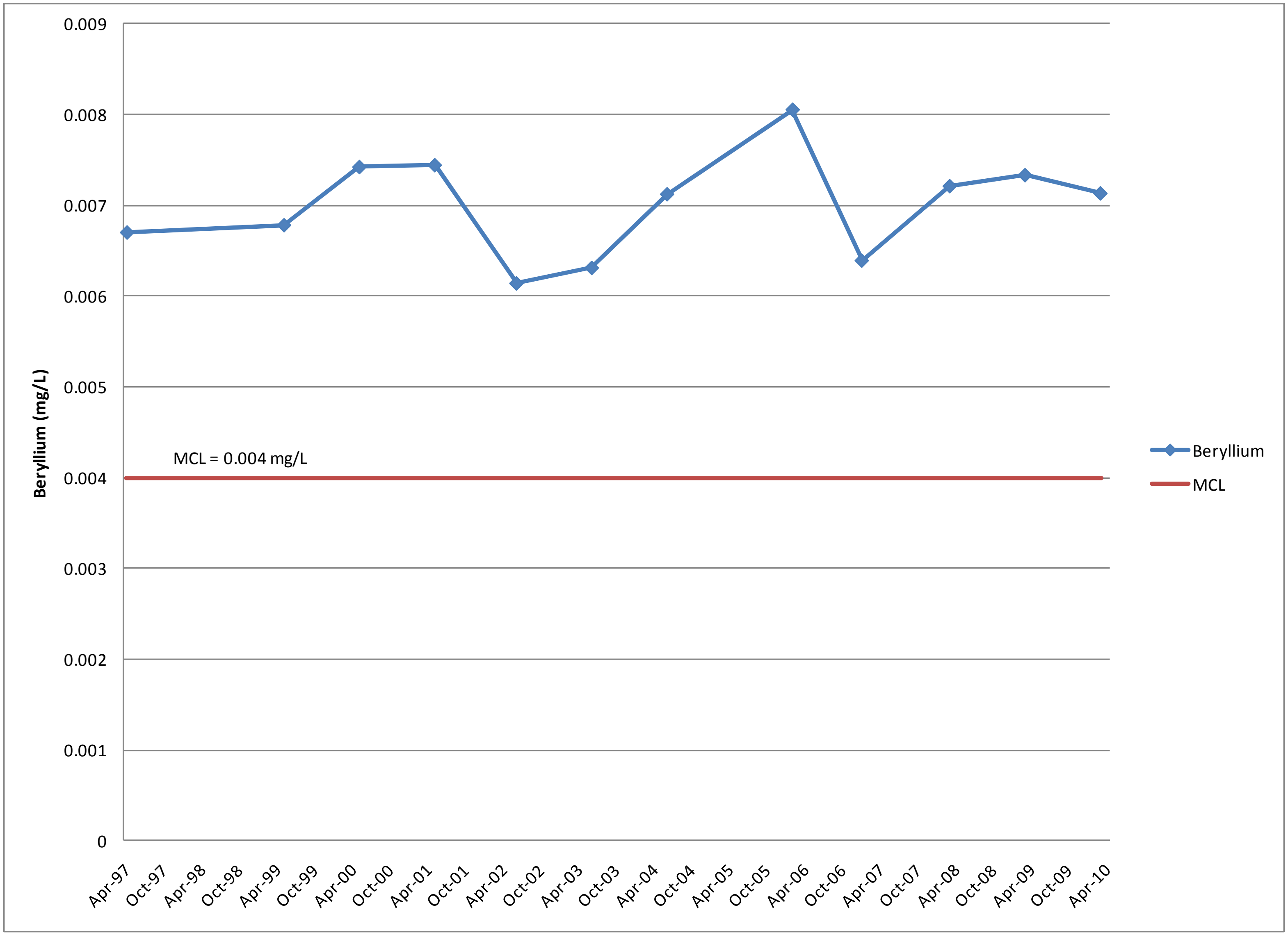


**Figure 2B-7. Beryllium Concentrations, Coyote Springs**

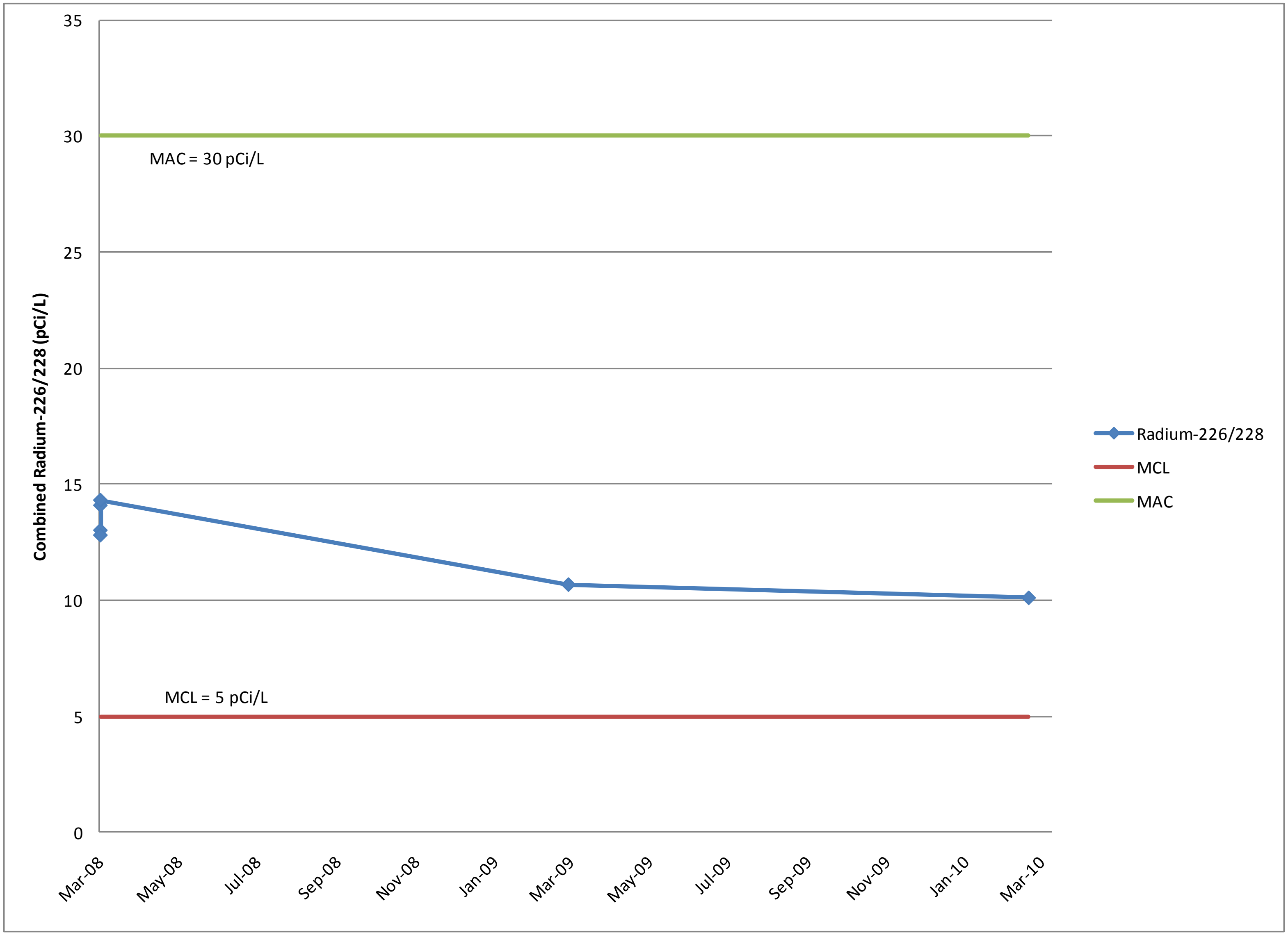


**Figure 2B-8. Radium-226/228 Activities, CTF-MW2**

# Attachment 2C
# Groundwater Protection Program
# Charts, Maps, and Hydrographs

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## Attachment 2C Charts, Maps, and Hydrographs



## Attachment 2C Tables

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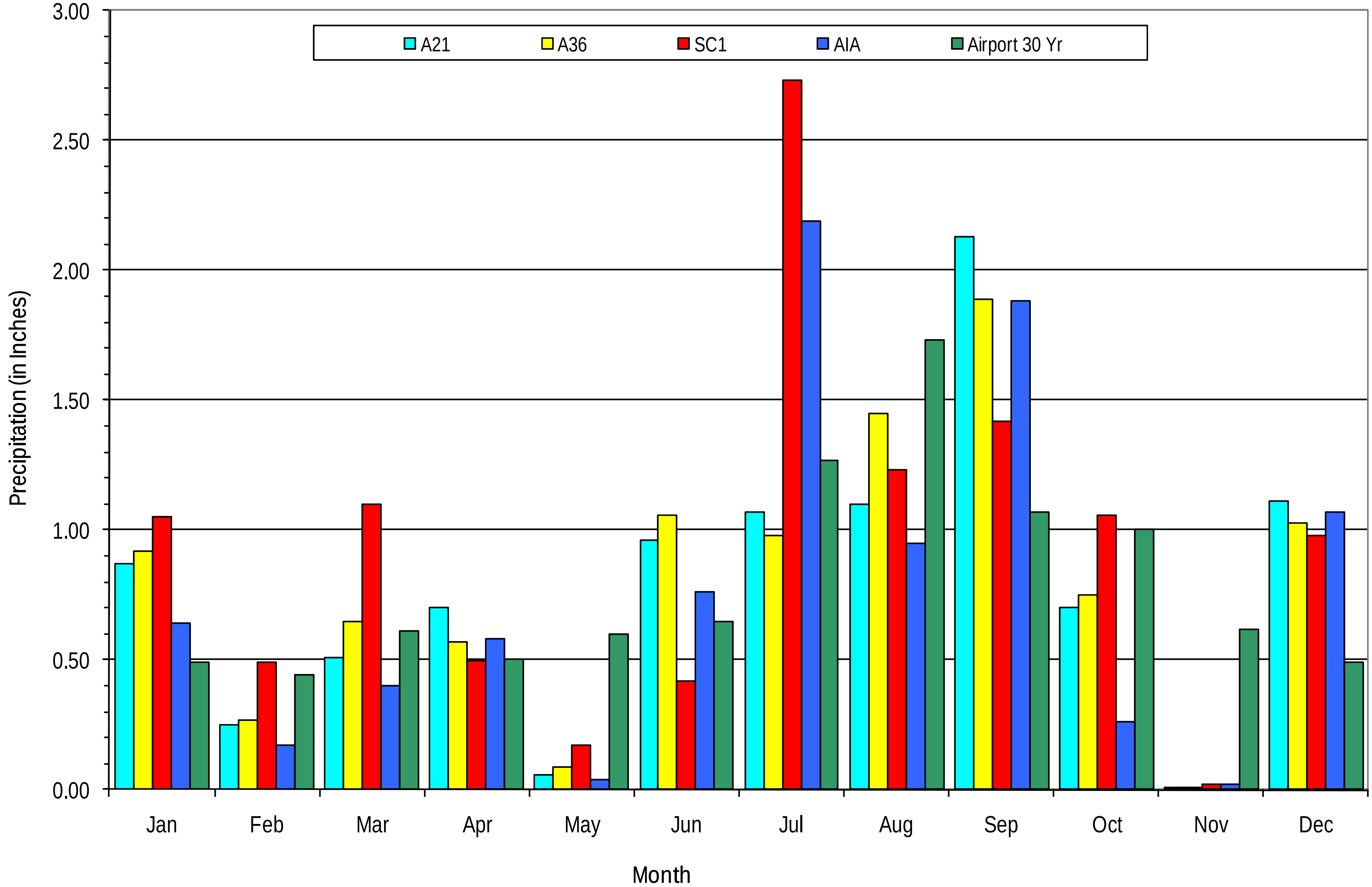


**Figure 2C-1. Precipitation Data for SNL/NM, CY10**

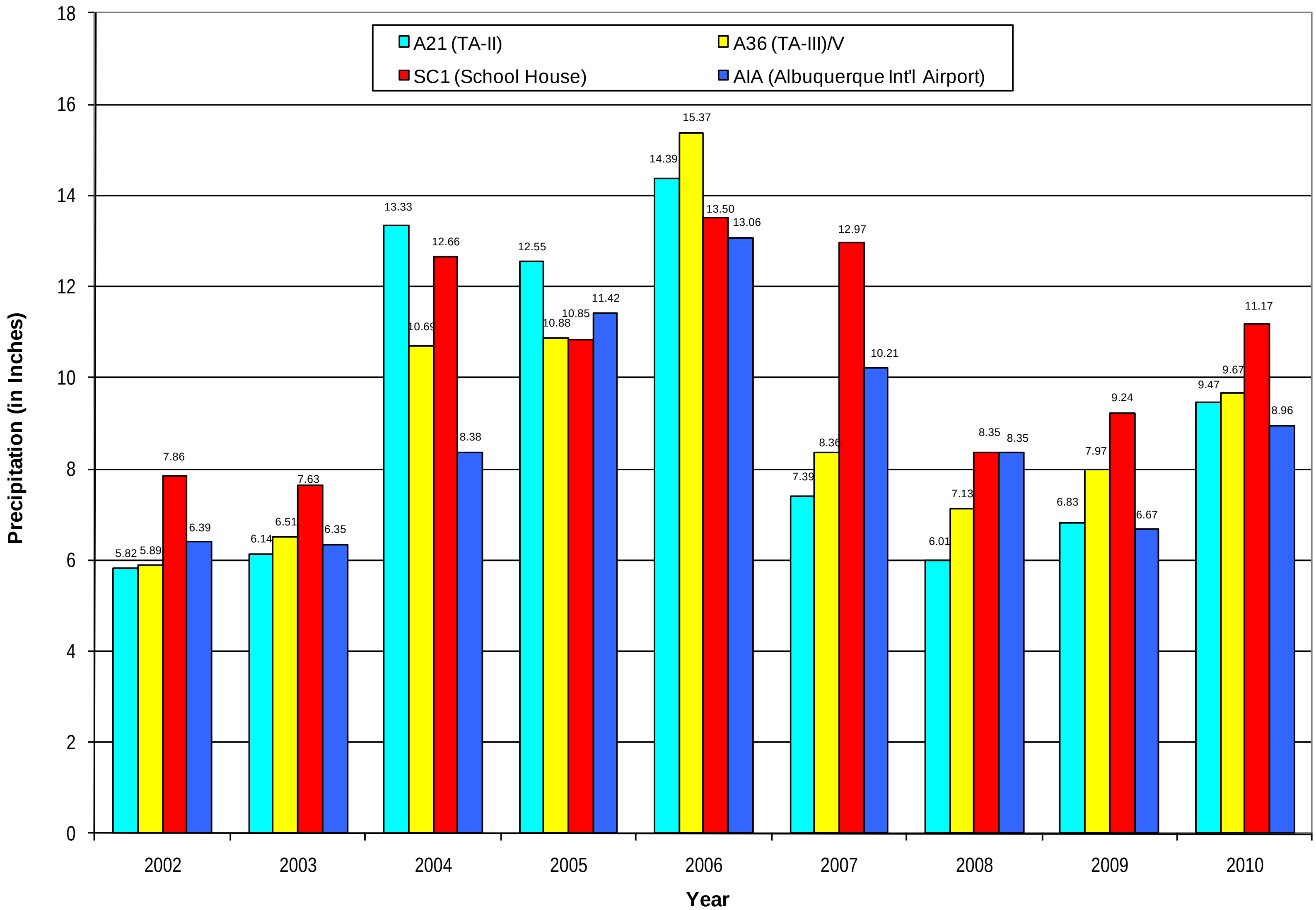


**Figure 2C-2. Annual Precipitation Data for SNL/NM, January 2002 to December 2010**

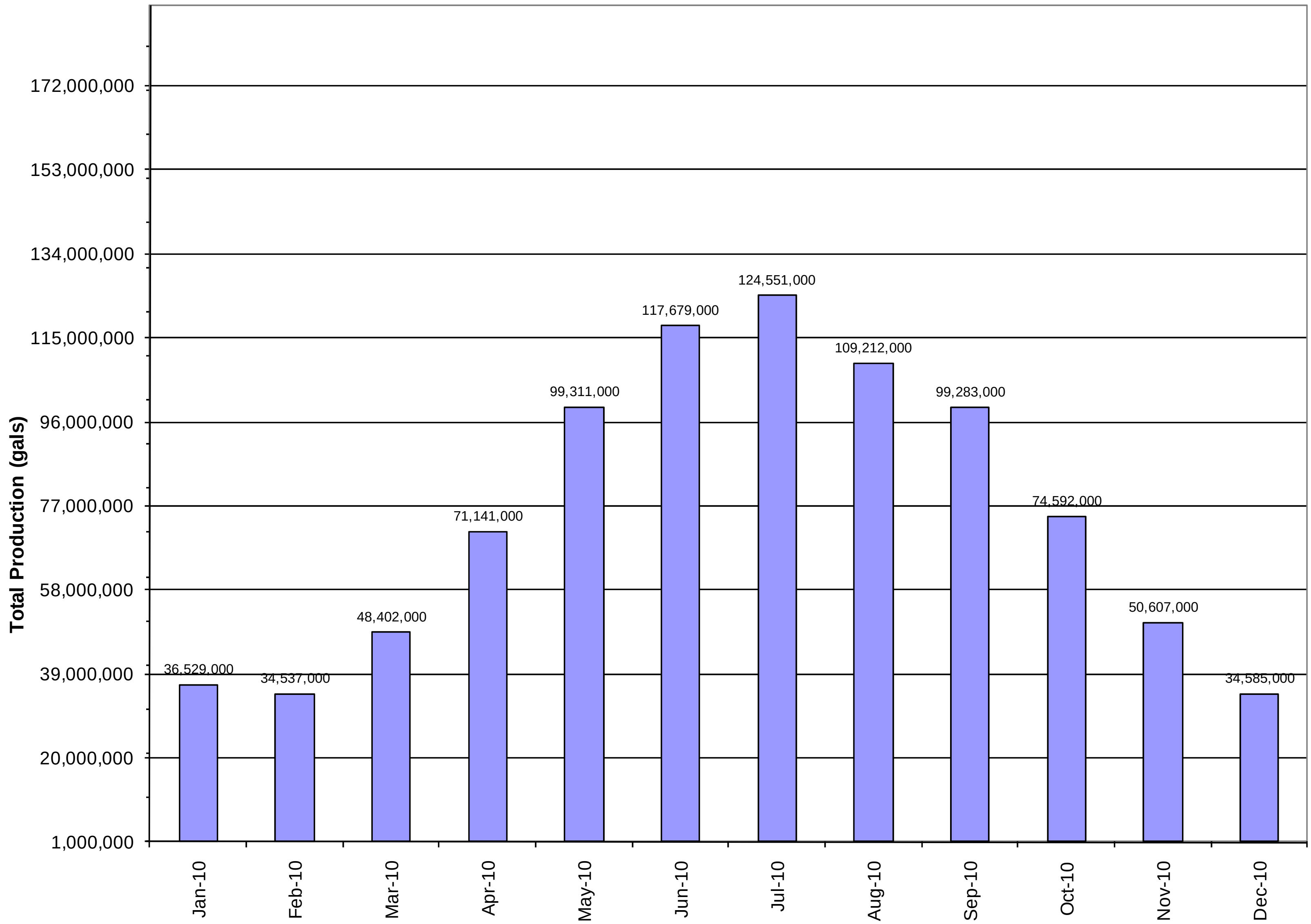


**Figure 2C-3. Monthly Groundwater Pumped by KAFB Water Supply Wells, CY10**

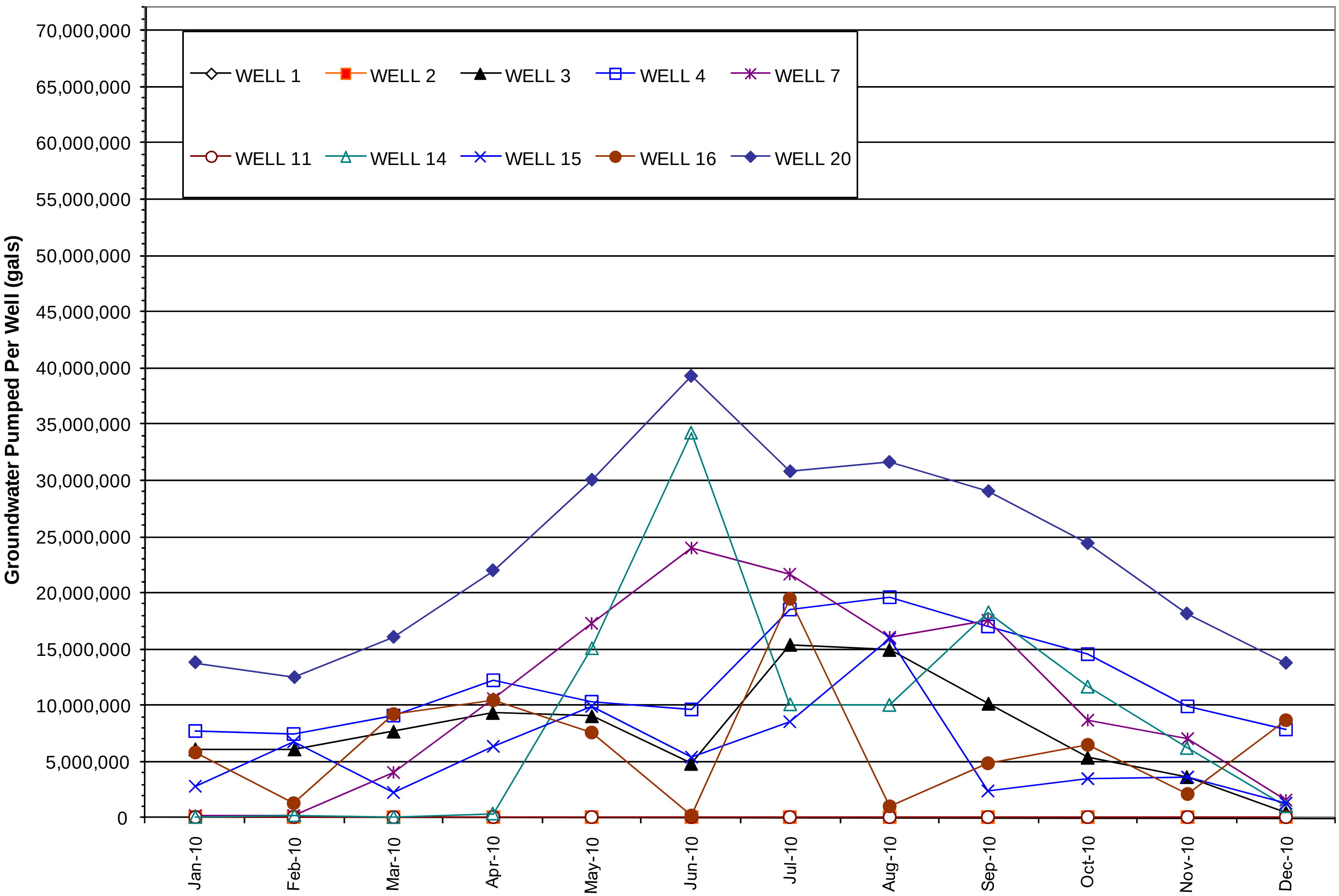


**Figure 2C-4. Groundwater Pumped by KAFB Water Supply Wells, CY10**

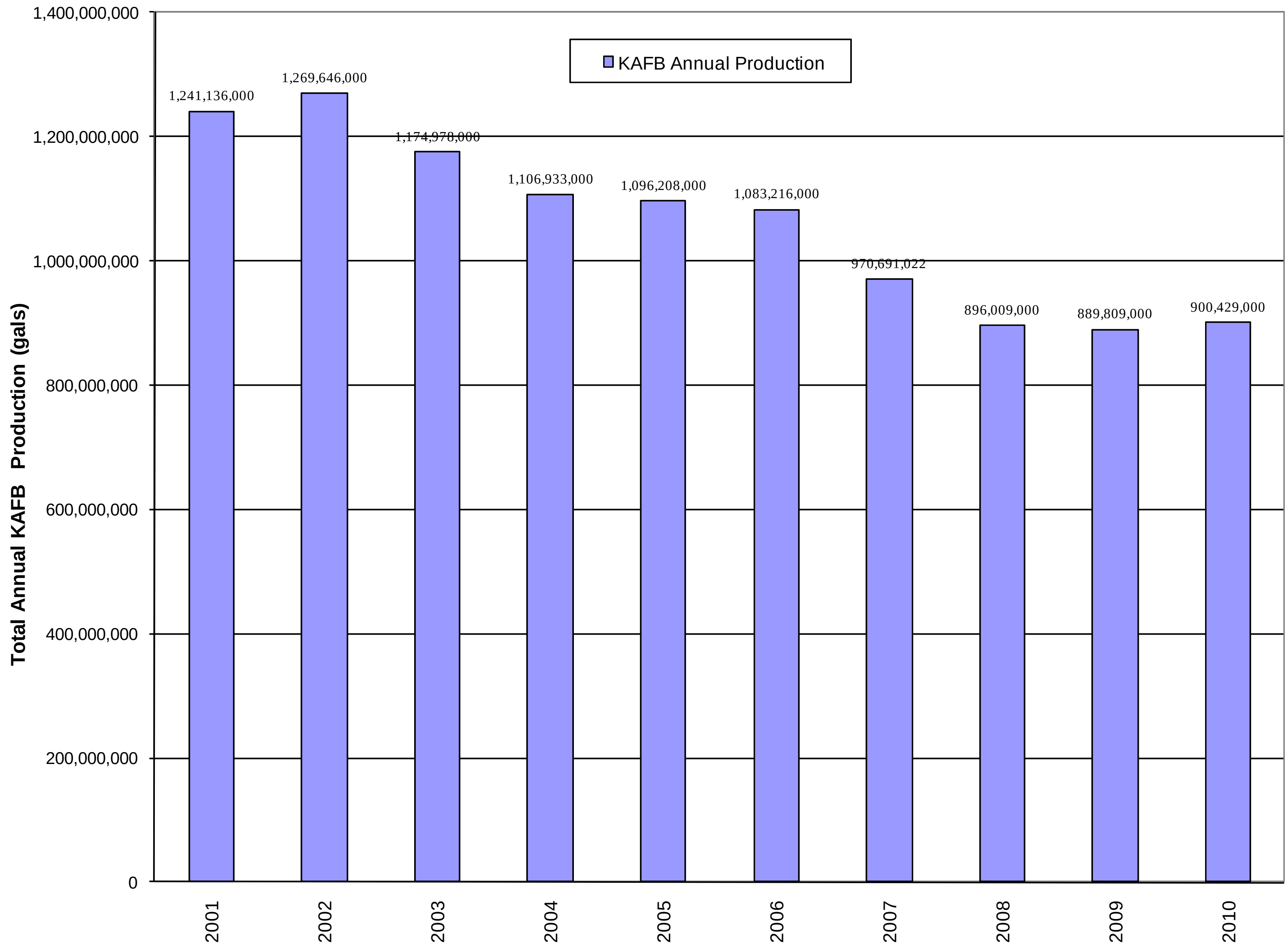


**Figure 2C-5. Annual Groundwater Pumped by KAFB Water Supply Wells, 2001 to 2010**

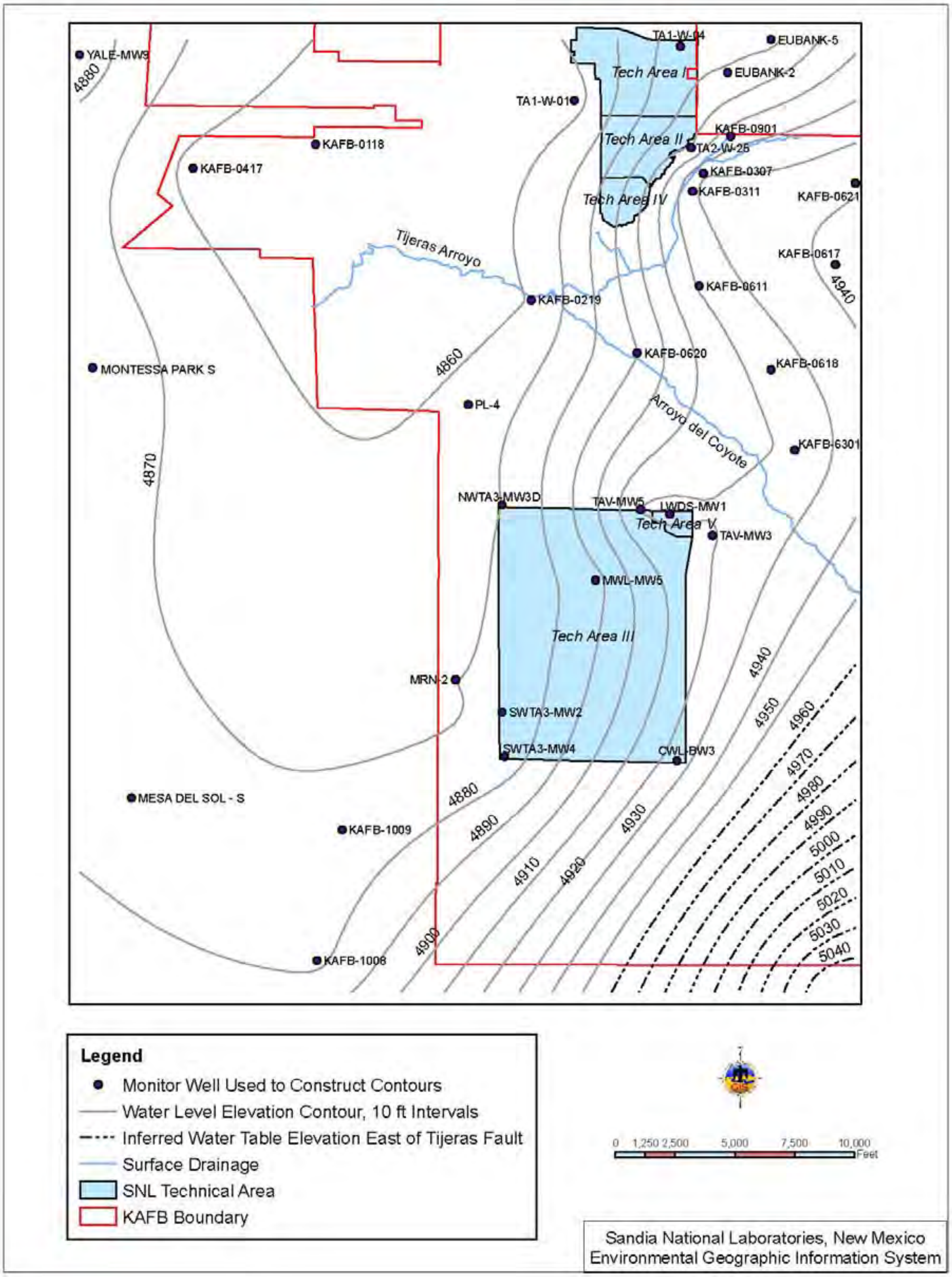


**Figure 2C-6. CY10 Regional Groundwater Water Table Elevations**

**Table 2C-1. Regional Groundwater Table Elevations, CY10**

| Well Name | X_EASTING | Y_NORTHING | Fall 2009 | Fall 2010 | CY 2010-<br>CY 2009 |
|---|---|---|---|---|---|
| CWL-BW3 | 414685.90 | 1444689.45 | 4,926.28 | 4,925.02 | -1.26 |
| EUBANK-2 | 416809.00 | 1473598.00 | 4,890.27 | 4,891.27 | 1.00 |
| EUBANK-5 | 418625.00 | 1474996.00 | 4,885.93 | 4,887.42 | 1.49 |
| KAFB-0118 | 399534.00 | 1470587.00 | 4,854.82 | 4,856.19 | 1.37 |
| KAFB-0219 | 408577.24 | 1464046.26 | 4,860.62 | 4,860.61 | -0.01 |
| KAFB-0307 | 415788.78 | 1469357.80 | 4,928.94 | 4,929.68 | 0.74 |
| KAFB-0311 | 415320.18 | 1468610.50 | 4,927.78 | 4,928.53 | 0.75 |
| KAFB-0417 | 394402.40 | 1469586.90 | 4,857.12 | 4,856.96 | -0.16 |
| KAFB-0617 | 421324.11 | 1465525.50 | 4,941.62 | 4,942.17 | 0.55 |
| KAFB-0901 | 416928.14 | 1470927.94 | 4,914.52 | 4,915.12 | 0.60 |
| KAFB-1008 | 399585.21 | 1436306.14 | 4,878.50 | 4,877.94 | -0.56 |
| KAFB-1009 | 400641.89 | 1441800.61 | 4,874.62 | 4,874.30 | -0.32 |
| KAFB-6301 | 419610.17 | 1457740.36 | 4,922.20 | 4,921.02 | -1.18 |
| LWDS-MW1 | 414375.03 | 1455057.43 | 4,922.42 | 4,921.55 | -0.87 |
| Mesa Del Sol-S | 391812.80 | 1443144.80 | 4,876.60 | 4,876.87 | 0.27 |
| Montessa Prk-S | 390193.5 | 1461202.5 | 4,877.50 | 4,877.79 | 0.29 |
| MRN-2 | 405393.35 | 1448095.73 | 4,870.68 | 4,869.98 | -0.70 |
| MWL-MW5 | 411261.94 | 1452294.82 | 4,887.07 | 4,886.61 | -0.46 |
| NWTA3-MW3D | 407349.625 | 1455450.75 | 4,870.62 | 4,870.11 | -0.51 |
| SWTA3-MW2 | 407487.74 | 1447230.54 | 4,873.06 | 4,872.51 | -0.55 |
| SWTA3-MW4 | 407465.86 | 1444885.57 | 4,874.46 | 4,873.94 | -0.52 |
| TA1-W-01 | 410373.39 | 1472422.88 | 4,856.17 | 4,856.17 | 0.00 |
| TA1-W-04 | 414813.45 | 1474707.30 | 4,884.90 | 4,886.02 | 1.12 |
| TA2-W-25 | 415262.01 | 1470439.03 | 4,899.74 | 4,900.03 | 0.29 |
| TAV-MW3 | 416156.07 | 1454168.25 | 4,920.57 | 4,919.28 | -1.29 |
| TAV-MW5 | 413141.76 | 1455269.73 | 4,921.76 | 4,920.74 | -1.02 |
| YALE-MW9 | 389646.00 | 1474349.00 | 4,885.84 | 4,885.56 | -0.28 |
| KAFB-0611 | 415618.6 | 1464643.94 | 4,921.67 | 4,921.41 | -0.26 |
| KAFB-0618 | 418616.36 | 1461129.44 | 4,923.87 | 4,923.96 | 0.09 |
| KAFB-0620 | 413010.94 | 1461828.18 | 4,889.58 | 4,889.67 | 0.09 |
| KAFB-0621 | 422157.5 | 1468963 | 4,937.53 | 4,938.66 | 1.13 |
| PL-4 | 405929.58 | 1459651.14 | 4,863.88 | 4,863.32 | -0.56 |

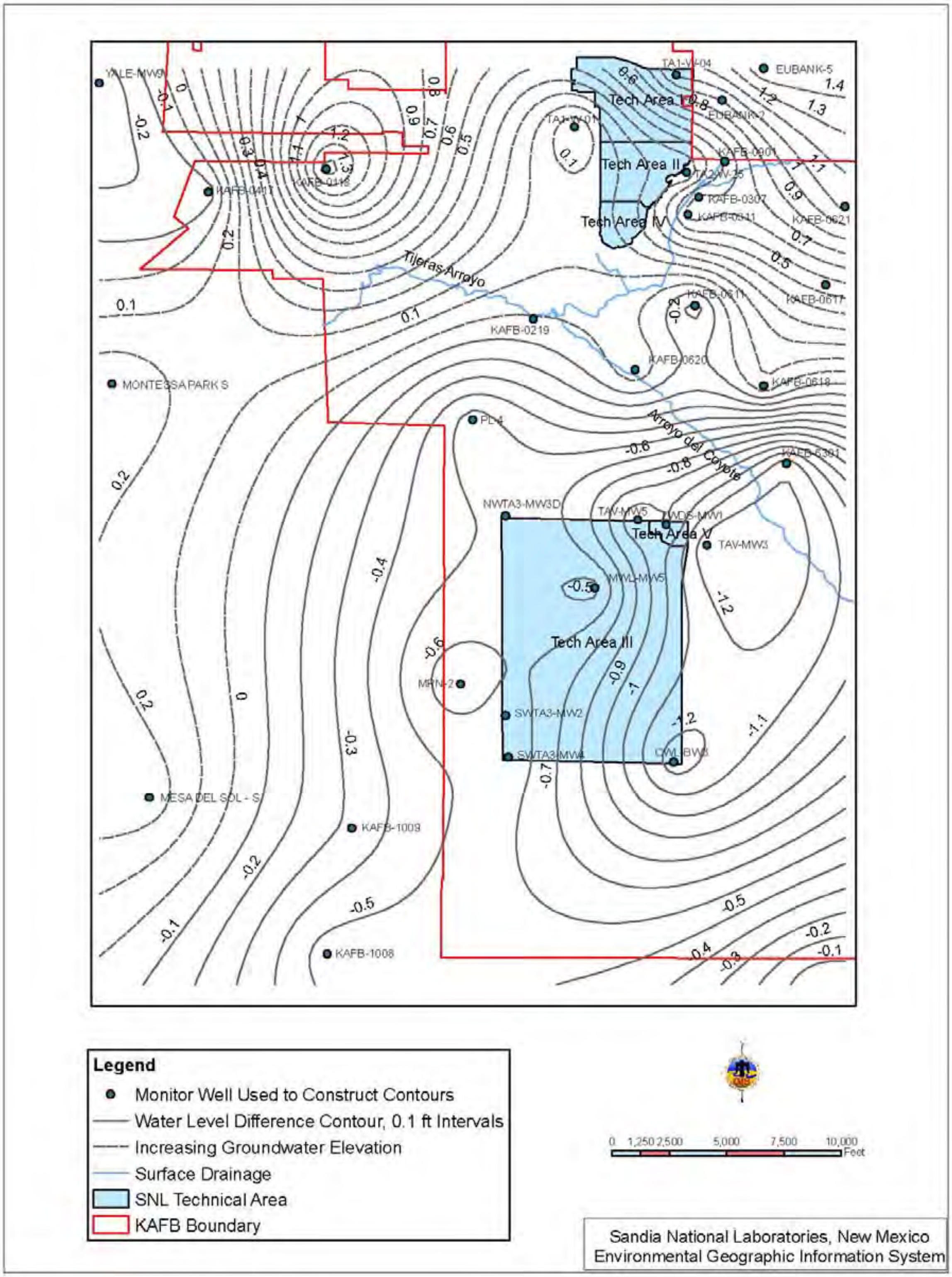


**Figure 2C-7. Regional Groundwater Table Elevation Difference, CY10–CY09**

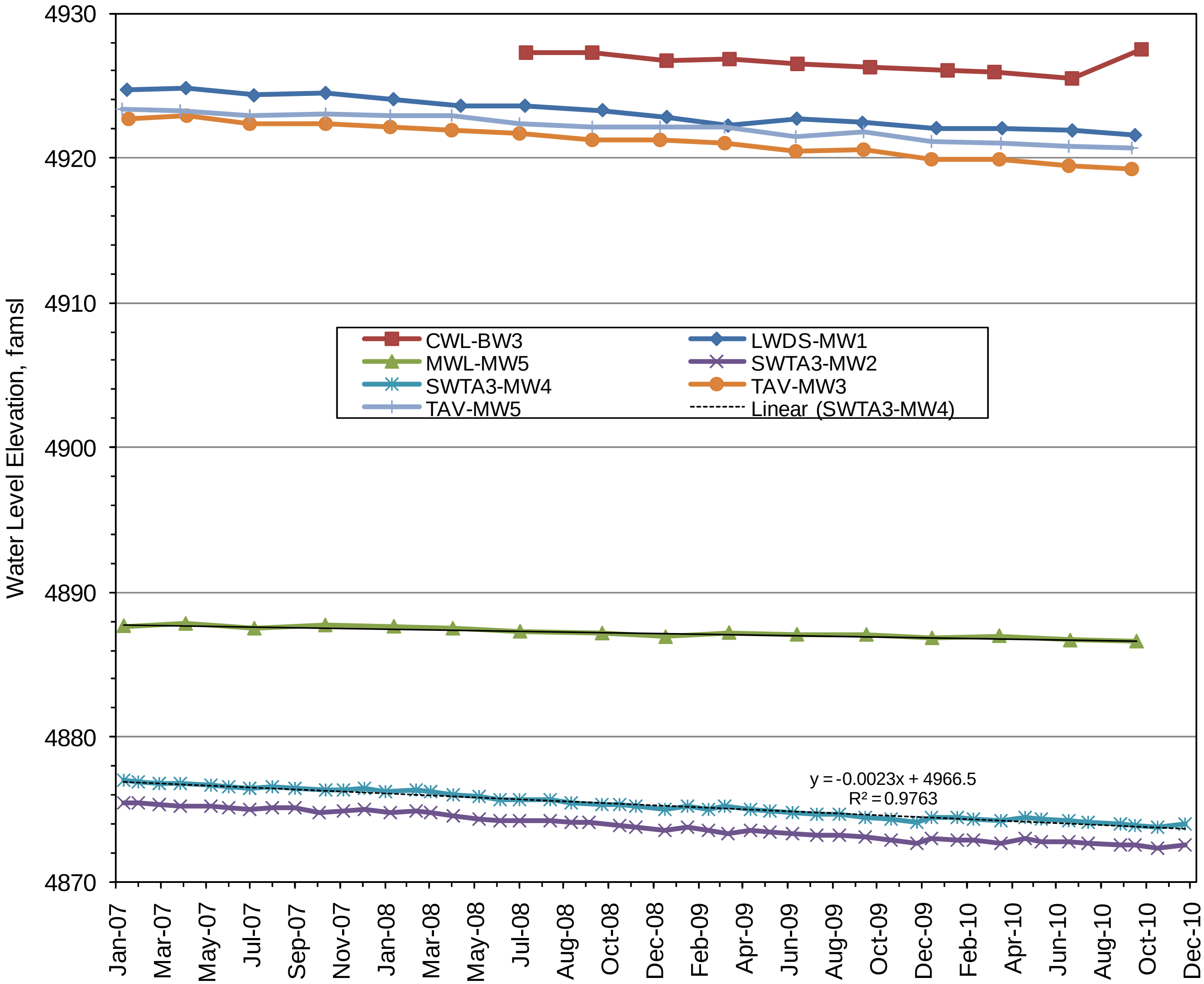


**Figure 2C-8. Regional Water Table Hydrographs – Southeast Wells**

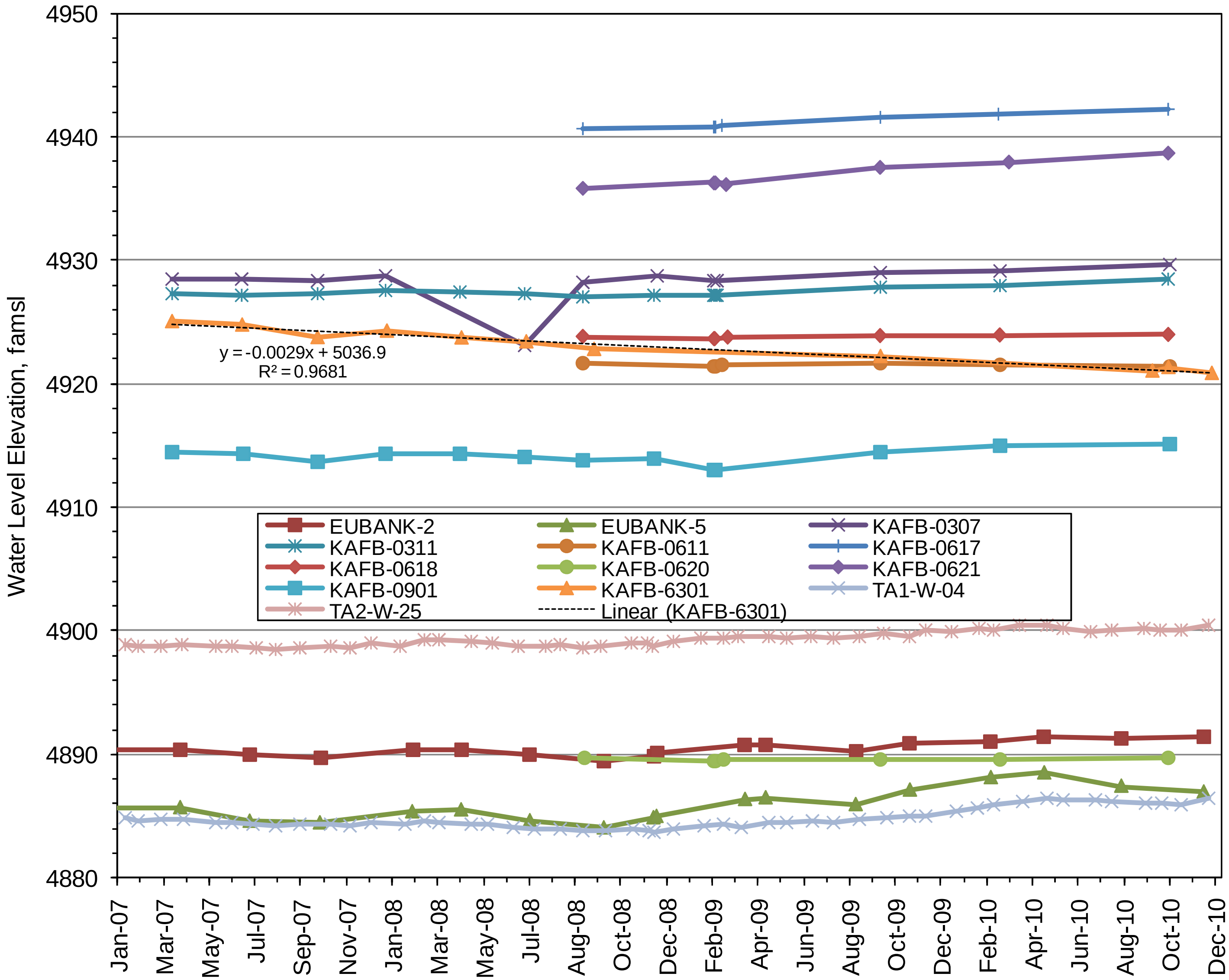


**Figure 2C-9. Regional Water Table Hydrographs – Northeast Wells**

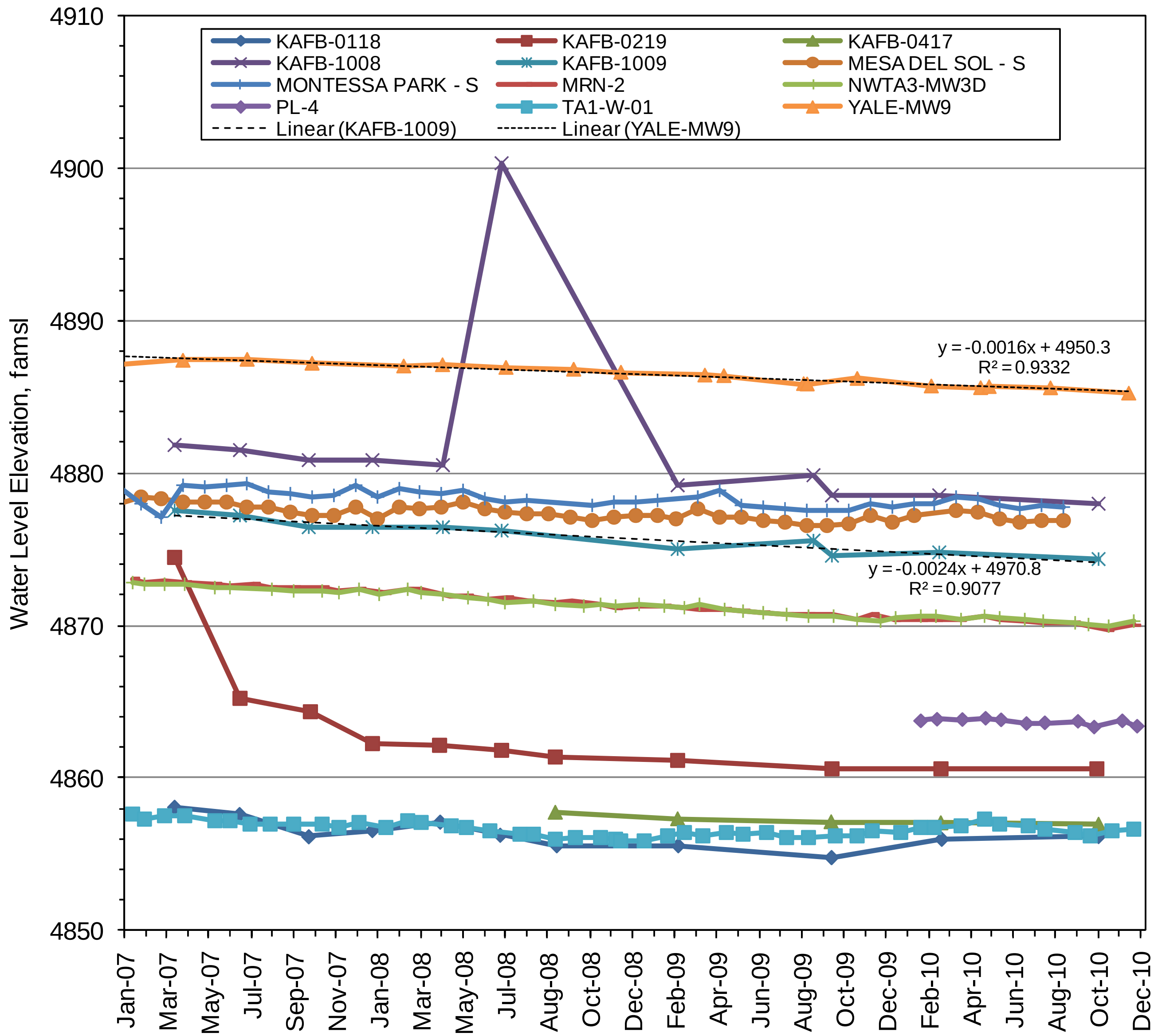


**Figure 2C-10. Regional Water Table Hydrographs – West Wells**

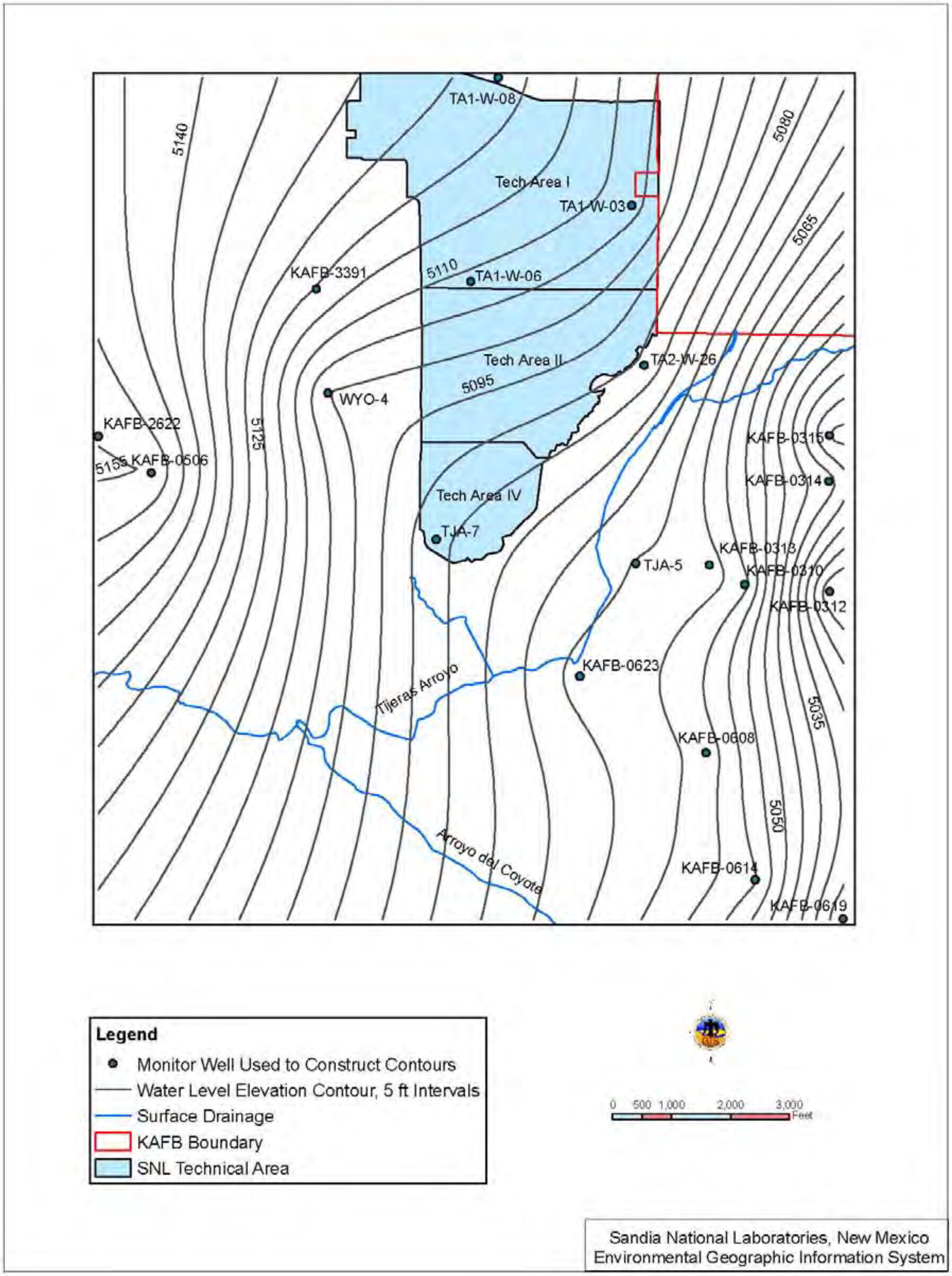


**Figure 2C-11. CY10 Perched Groundwater Zone Water Table Elevation**

**Table 2C-2. Perched Groundwater System Water Table Elevations, CY10**

| Well Name | X_EASTING | Y_NORTHING | Fall 2009 | Fall 2010 | CY 2010- CY 2009 |
|---|---|---|---|---|---|
| KAFB-0310 | 416967.67 | 1466775.83 | 5,062.79 | 5,062.26 | -0.53 |
| KAFB-0312 | 418411.09 | 1466654.48 | 5,009.70 | 5,010.20 | 0.50 |
| KAFB-0313 | 416371.23 | 1467106.12 | 5,067.22 | 5,066.85 | -0.37 |
| KAFB-0314 | 418395.37 | 1468521.17 | 5,037.88 | 5,037.69 | -0.19 |
| KAFB-0315 | 418413.54 | 1469305.61 | 5,023.53 | 5,023.80 | 0.27 |
| KAFB-0506 | 406914.23 | 1468667.94 | 5,155.40 | 5,154.95 | -0.45 |
| KAFB-0608 | 416325.83 | 1463923.85 | 5,063.30 | 5,062.80 | -0.50 |
| KAFB-0614 | 417143.96 | 1461770.43 | 5,056.17 | 5,055.83 | -0.34 |
| KAFB-0619 | 418641.29 | 1461099.95 | 5,019.30 | 5,020.04 | 0.74 |
| KAFB-0623 | 414174.38 | 1465223.89 | 5,067.79 | 5,067.77 | -0.02 |
| KAFB-2622 | 406006.59 | 1469291.34 | 5,154.79 | 5,154.62 | -0.17 |
| KAFB-3391 | 409710.21 | 1471788.31 | 5,120.13 | 5,119.66 | -0.47 |
| TA1-W-03 | 415058.11 | 1473207.18 | 5,109.53 | 5,107.13 | -2.40 |
| TA1-W-06 | 412331.38 | 1471918.6 | 5,109.24 | 5,108.56 | -0.68 |
| TA1-W-08 | 412787.13 | 1475374.24 | 5,123.48 | 5,122.75 | -0.73 |
| TA2-W-26 | 415265.37 | 1470489.1 | 5,089.76 | 5,088.88 | -0.88 |
| TJA-5 | 415129.026 | 1467136.269 | 5,070.29 | 5,069.57 | -0.72 |
| TJA-7 | 411737.38 | 1467543.6 | 5,087.22 | 5,086.23 | -0.99 |
| WYO-4 | 409912.58 | 1470025.17 | 5,101.16 | 5,099.76 | -1.40 |

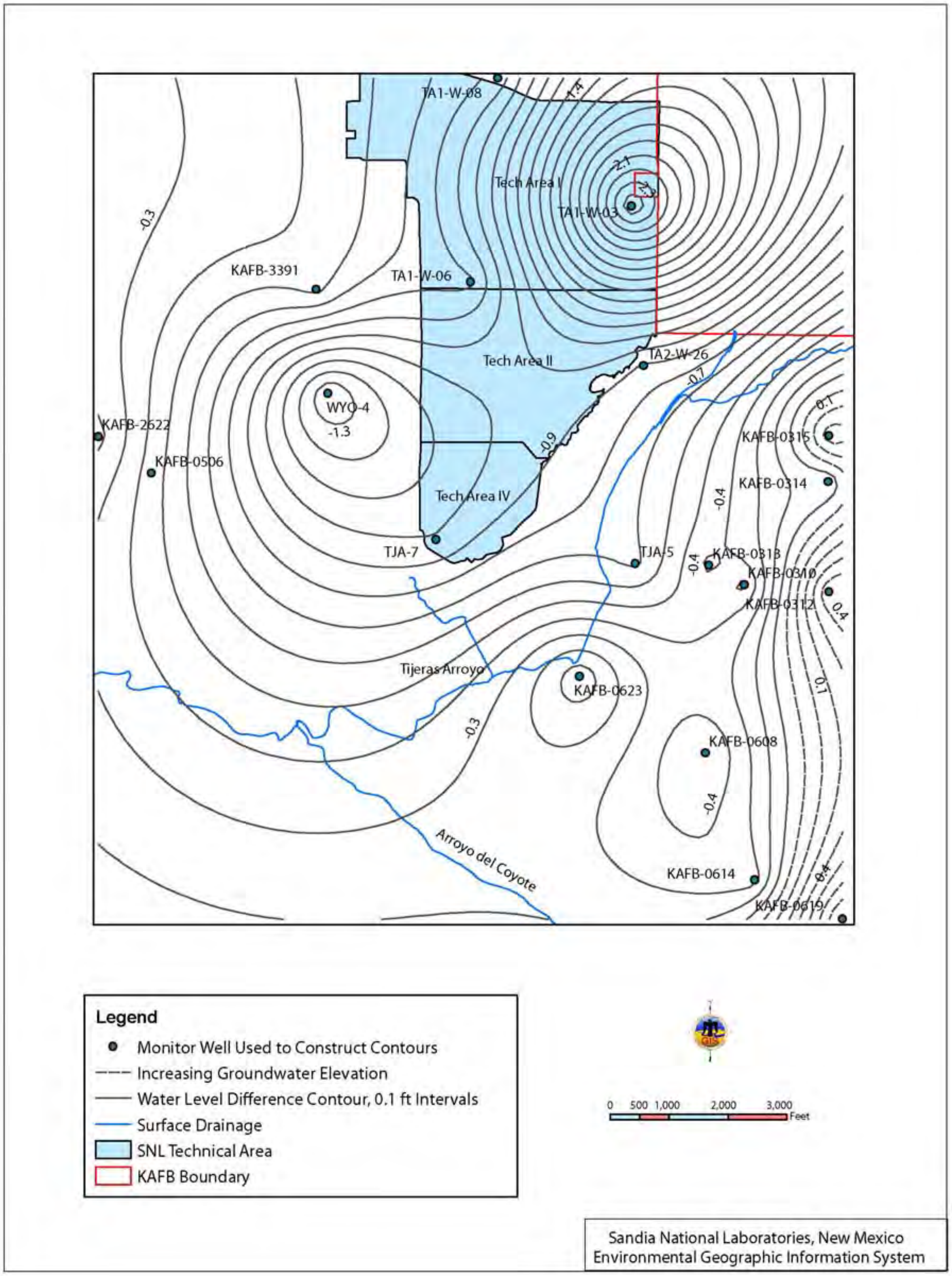


**Figure 2C-12. Perched Groundwater Zone Water Table Elevation Difference, CY10-CY09**

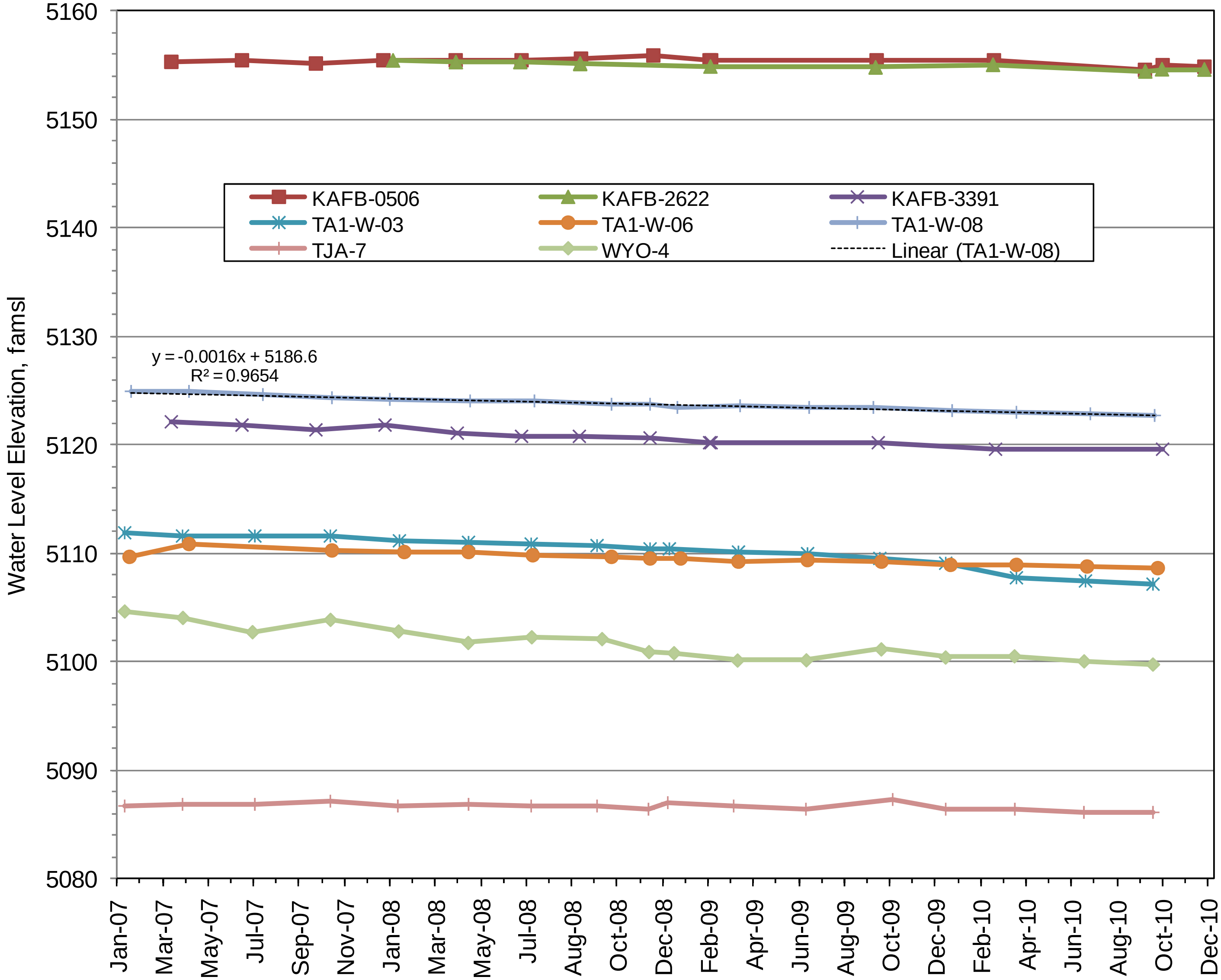


**Figure 2C-13. Perched Groundwater Water Table Hydrographs – Northwest Wells**

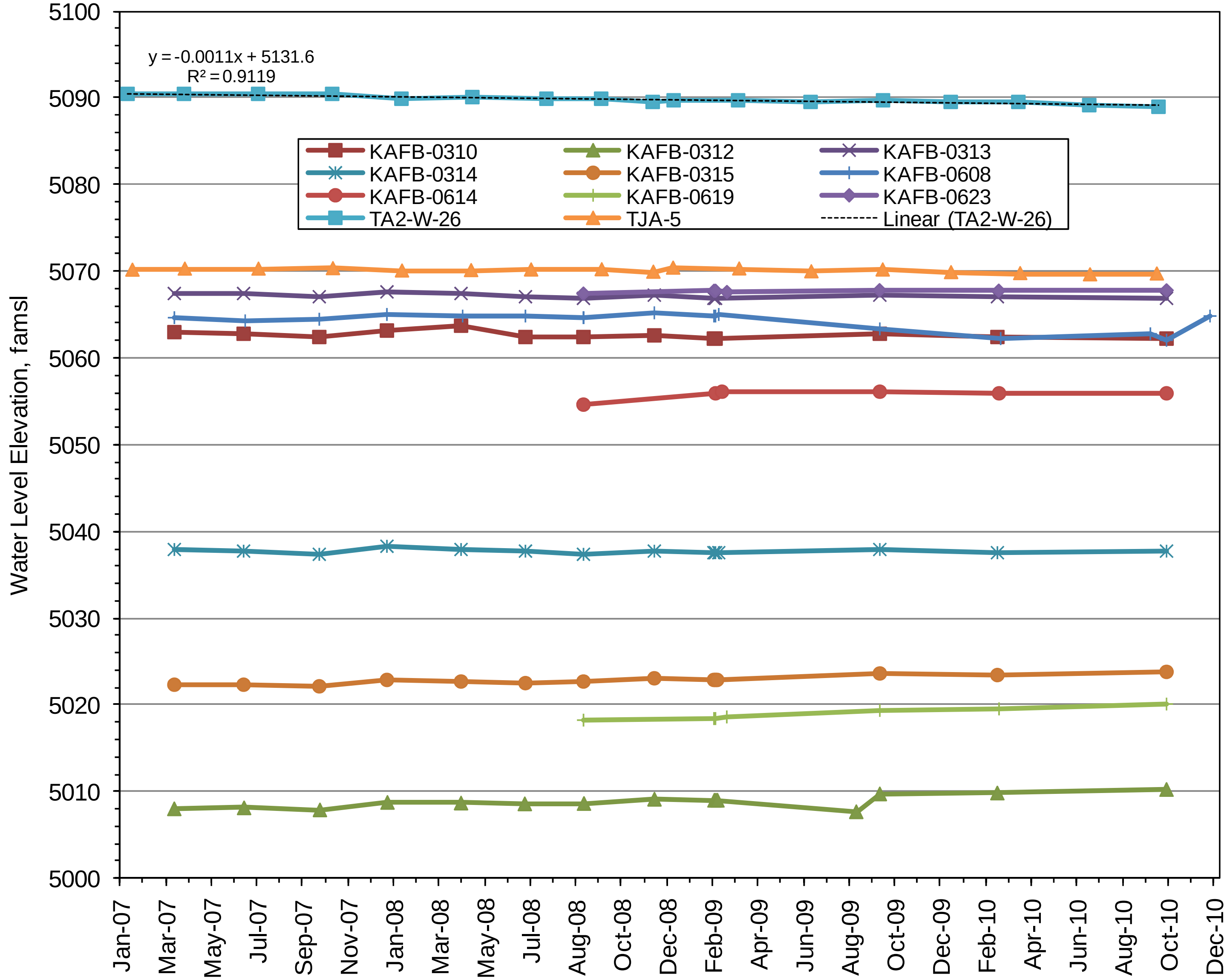


**Figure 2C-14. Perched Groundwater Water Table Hydrographs – Southeast Wells**

# 3.0 Chemical Waste Landfill

## 3.1 Introduction

The Chemical Waste Landfill (CWL) is a 1.9-acre former disposal site located in the southeastern corner of Technical Area III at Sandia National Laboratories, New Mexico (SNL/NM) (Figure 3-1). From 1962 until 1981, the CWL was used for the disposal of chemical, radioactive, and solid waste generated by SNL/NM research activities. From 1982 through 1985, only solid waste was disposed of at the CWL. In addition, the CWL was used as a hazardous waste drum storage facility from 1981 to 1989.

In 1990, trichloroethene (TCE) was identified in groundwater at a concentration exceeding the regulatory limit of 5 micrograms per liter (µg/L). This finding led to the development and incorporation of a corrective action program into the CWL Closure Plan (SNL December 1992). The SNL/NM Environmental Restoration (ER) Project implemented two voluntary corrective measures (VCMs), the Vapor Extraction (VE) and Landfill Excavation (LE) VCMs. As part of the VE VCM that was conducted from 1996 through 1998, the volatile organic compound (VOC) soil-gas plume was reduced and controlled, further degradation of groundwater beneath the CWL was prevented, and TCE concentrations in groundwater were reduced to levels below the regulatory limit. As part of the LE VCM, the CWL was excavated from September 1998 through February 2002. More than 52,000 cubic yards of contaminated soil and debris were removed from the former disposal area.

In April 2004, the U.S. Department of Energy (DOE) and Sandia Corporation (Sandia) requested approval to install an at-grade vegetative soil cover as an interim measure (Wagner April 2004) while New Mexico Environment Department (NMED) comments on the April 2003 CWL Corrective Measure Study (CMS) Report were being resolved. On September 22, 2004, the NMED approved this request with conditions (Kieling September 2004). The conditions of approval were addressed in the subsequent revised Remedial Action Proposal that was submitted as Annex I of the revised CWL CMS Report (SNL December 2004). Construction of the at-grade vegetative soil cover began in March 2005 and was completed in September 2005.

On May 21, 2007, the NMED issued the CWL CMS Report (SNL December 2004), Draft Post-Closure Care Permit (NMED 2007) and a Closure Plan amendment for a 60-day public comment period that was completed on August 20, 2007. The DOE and Sandia submitted comments to the NMED (Wagner July 2007) and requested a public hearing. Several citizens also provided comments and requested a public hearing. Informal negotiations were initiated by the NMED in August 2008 with all parties requesting a public hearing. The negotiations were completed on October 15, 2009, and documented in the settlement agreement and *Final Order In the Matter of Application for a Post-Closure Care Hazardous Waste Permit for the Chemical Waste Landfill, Sandia National Laboratories No. NM5890110518* (Final Order), which also included the final CWL Post-Closure Care Permit (NMED October 2009a). On October 16, 2009, the NMED issued a *Notice of Approval, Final Remedy and Closure Plan Amendment, Chemical Waste Landfill* (NMED October 2009b). The NMED-approved CWL Closure Plan amendment addressed changes to both Chapter 12 (closure process) and Appendix G (Groundwater Sampling and Analysis Plan [SAP]). Appendix G changes were established during the 2008 through 2009 informal negotiations and included the replacement of four groundwater monitoring wells and a reduction in the number of wells required for semiannual sampling.

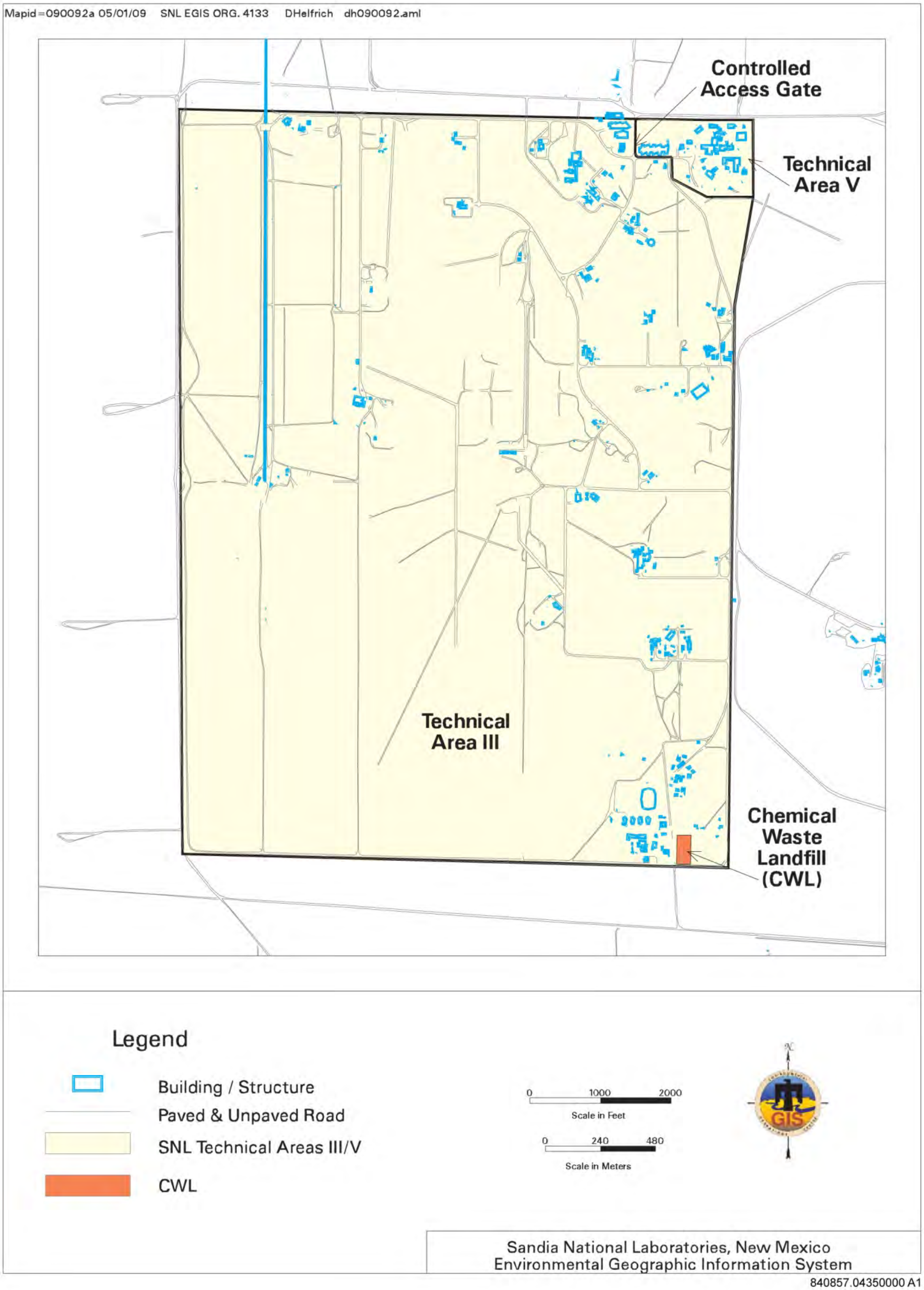


**Figure 3-1. Location of the Chemical Waste Landfill within Technical Area III**

From April through August 2010, monitoring wells CWL-MW4, CWL-MW5L, CWL-MW5U, CWL-MW6L, CWL-MW6U, and CWL-BW4A were decommissioned, and new monitoring wells CWL-MW9, CWL-MW10, CWL-MW11, and CWL-BW5 were installed. As documented in the Closure Plan amendment (NMED October 2009b), once the new monitoring wells were installed they became the exclusive groundwater monitoring network for the CWL. The Final Resource Conservation and Recovery Act (RCRA) Closure Report documenting closure in accordance with all CWL Closure Plan requirements was submitted to the NMED on September 27, 2010 (SNL September 2010a). The Well Installation and Decommissioning Report was submitted as an appendix to the CWL Final RCRA Closure Report. Approval of CWL closure will make the CWL Post-Closure Care Permit effective, superseding the CWL Closure Plan as the enforceable regulatory document.

### 3.1.1 Monitoring History

In 1985, groundwater monitoring began at the CWL (IT December 1985) as required by Section 20.4.1.600 of the New Mexico Administrative Code (NMAC), incorporating Title 40, Code of Federal Regulations (CFR), Part 265, Subpart F. In 1988, four additional monitoring wells were installed. In 1990, an additional downgradient well was installed. In 1994, seven more monitoring wells were installed. In response to a Notice of Violation from the NMED with regard to the inadequate design and construction of the 1985 wells, four of these wells were plugged and abandoned in 1997. To complete the ongoing chromium assessment, the NMED requested the installation of two additional deep monitoring wells to be monitored for eight quarters. These wells were installed in March and April 2003 with NMED direction regarding location, construction, and well screen placement in the regional aquifer. The results of the eight sampling events and completion of the chromium investigation were documented in the August 2005 CWL Quarterly Closure Progress Report (SNL August 2005). Monitoring well CWL-MW2A was plugged and abandoned in June 2004 due to well integrity issues (SNL July 2004). As discussed in the previous section, from April through August 2010 new monitoring wells CWL-MW9, CWL-MW10, CWL-MW11, and CWL-BW5 were installed and monitoring wells CWL-MW4, CWL-MW5L, CWL-MW5U, CWL-MW6L, CWL-MW6U, and CWL-BW4A were decommissioned based on agreements reached during Post-Closure Care Permit negotiations with NMED. Two of the decommissioned wells, CWL-MW5U/L and CWL-MW6U/L, were nested well pairs consisting of two wells installed in the same borehole.

Until 1990, all groundwater sampling at the CWL was conducted on a quarterly basis in accordance with 40 CFR 265.92(c)(1). In 1990, the NMED granted a reduction in the sampling frequency from quarterly to semiannually for groundwater contamination indicator parameters and annually for groundwater quality parameters, as allowed by 40 CFR 265.92(d)(2), as no contaminants had been detected above U.S. Environmental Protection Agency (EPA) drinking water standards in samples from any well. During the following sampling quarter in March 1990, TCE was detected above the drinking water standard of 5 µg/L in the sample from CWL-MW2A. Additionally, two indicator parameters (specific conductance [SC] and pH) also exceeded state guidelines. Two months later, resampling for VOCs confirmed the presence of TCE. The NMED reinstated the quarterly sampling requirement and, thereafter, all indicator parameters have been sampled in accordance with 40 CFR 265.93(c)(2).

In 1995, Appendix G of the CWL Closure Plan (SNL December 1992) was revised and updated as part of a Closure Plan Amendment Request submitted to the NMED on June 30, 1995. In May 2000, the NMED approved the following changes to Appendix G of the CWL Closure Plan (Bearzi May 2000):

- Biannual frequency (every other year) for agreed upon Appendix IX constituents including VOCs, semivolatile organic compounds, chlorinated herbicides, polychlorinated biphenyls, total cyanide, sulfides, dissolved chromium, and total metals plus iron.
- Semiannual frequency (twice a year) for Appendix IX VOCs and metals.

As part of its review of the CWL Corrective Measures Study (CMS) Report, the NMED presented general groundwater characterization requirements in December 2003 (Kieling December 2003). In March 2004, these requirements were further discussed, and it was agreed that seven sampling events using the conventional sampling method for all CWL monitoring wells with a large enough diameter to accommodate the conventional method equipment would be sufficient for the revised CMS Report. The original NMED comments and the negotiated agreements regarding the required number of events are documented in the CWL CMS Comment Response Document (SNL October 2004) and in the revised CWL CMS Report (SNL December 2004).

A comprehensive summary of the CWL disposal history is presented in the NMED-approved CWL Closure Plan (SNL December 1992) and the LE VCM Final Report (SNL April 2003). Groundwater and other site investigation results from 1992 through 1995 are documented in both the *Chemical Waste Landfill Unsaturated Zone Contaminant Characterization Report* (SNL November 1993) and the *CWL Groundwater Assessment Report* (SNL October 1995). A comprehensive investigation history of the CWL is presented and summarized in the CWL CMS Report (SNL December 2004), including pre-VCM, VCM, and post-VE VCM soil, soil-gas, and groundwater monitoring results that establish current conditions.

### 3.1.2 Monitoring Network

The groundwater monitoring network transitioned in Calendar Year (CY) 2010 from the older network comprised of 13 wells to the new network comprised of 11 wells. Of the remaining 11 wells, semiannual sampling is only required for the four new wells installed in 2010. All wells that were part of the CWL monitoring network in CY 2010 are shown in Figure 3-2 and listed in Table 3-1. During CY 2010, six wells were sampled in April (older monitoring network), and four wells were sampled in November-December (new monitoring network).

### 3.1.3 Summary of Activities

CWL semiannual groundwater monitoring activities were performed during April and in November and December 2010. Groundwater samples were collected from six monitoring wells in April and from the four new wells in November and December. The samples were analyzed for 40 CFR 264 (Appendix IX) VOCs and Appendix IX total metals plus iron. Additional samples for total aluminum, calcium, magnesium, manganese, potassium, and sodium were collected from three CWL wells during the April sampling event. The SNL/NM ER Project quarterly progress reports (SNL September 2010b and March 2011) provide a complete summary of each sampling event. Attachment 3A presents tables showing the analytical results for CWL monitoring wells sampled during CY 2010.

**Table 3-1. Monitoring Wells at the CWL**

| Well[(1)] | Installation Year | WQ | WL | Comments |
|---|---|---|---|---|
| Older Monitoring Well Network – April 2010 Sampling Event | | | | |
| CWL-MW1A | 1988 | | | Dry well (filled with sediment during VE VCM) |
| CWL-MW3A | 1988 | | | Dry well (filled with sediment during VE VCM) |
| CWL-BW3 | 1988 | | ✓ | Insufficient volume for representative sampling |
| CWL-MW4[(2)] | 1990 | ✓ | ✓ | Water table well |
| CWL-MW2BU | 1994 | | ✓ | Insufficient volume for representative sampling |
| CWL-MW2BL | 1994 | ✓ | ✓ | Lower section of nested well |
| CWL-MW5U[(2)] | 1994 | ✓ | ✓ | Upper section of nested well |
| CWL-MW5L[(2)] | 1994 | ✓ | ✓ | Lower section of nested well (2-inch-diameter well) |
| CWL-MW6U[(2)] | 1994 | ✓ | ✓ | Upper section of nested well |
| CWL-MW6L[(2)] | 1994 | ✓ | ✓ | Lower section of nested well (2-inch-diameter well) |
| CWL-BW4A[(2)] | 1994 | | | Insufficient volume for representative sampling |
| CWL-MW7 | 2003 | | ✓ | Deep monitoring well |
| CWL-MW8 | 2003 | | ✓ | Deep monitoring well |
| New Monitoring Well Network – November-December 2010 Sampling Event | | | | |
| CWL-BW5 | 2010 | ✓ | ✓ | Upgradient well – replaces CWL-BW4A |
| CWL-MW9 | 2010 | ✓ | ✓ | Downgradient well – new well |
| CWL-MW10 | 2010 | ✓ | ✓ | Downgradient well – new well |
| CWL-MW11 | 2010 | ✓ | ✓ | Downgradient well – new well |

**NOTES:**
[(1)] Refer to page xviii of this report for well descriptions.
**[(2)]** Well decommissioned after April 2010 sampling event.
Check marks in the WQ and WL columns indicate WQ sampling and WL measurements during the period from January to December 2010.
CWL = Chemical Waste Landfill.
VCM = Voluntary Corrective Measure.
VE = Vapor Extraction.
WL = Water level.
WQ = Water quality.

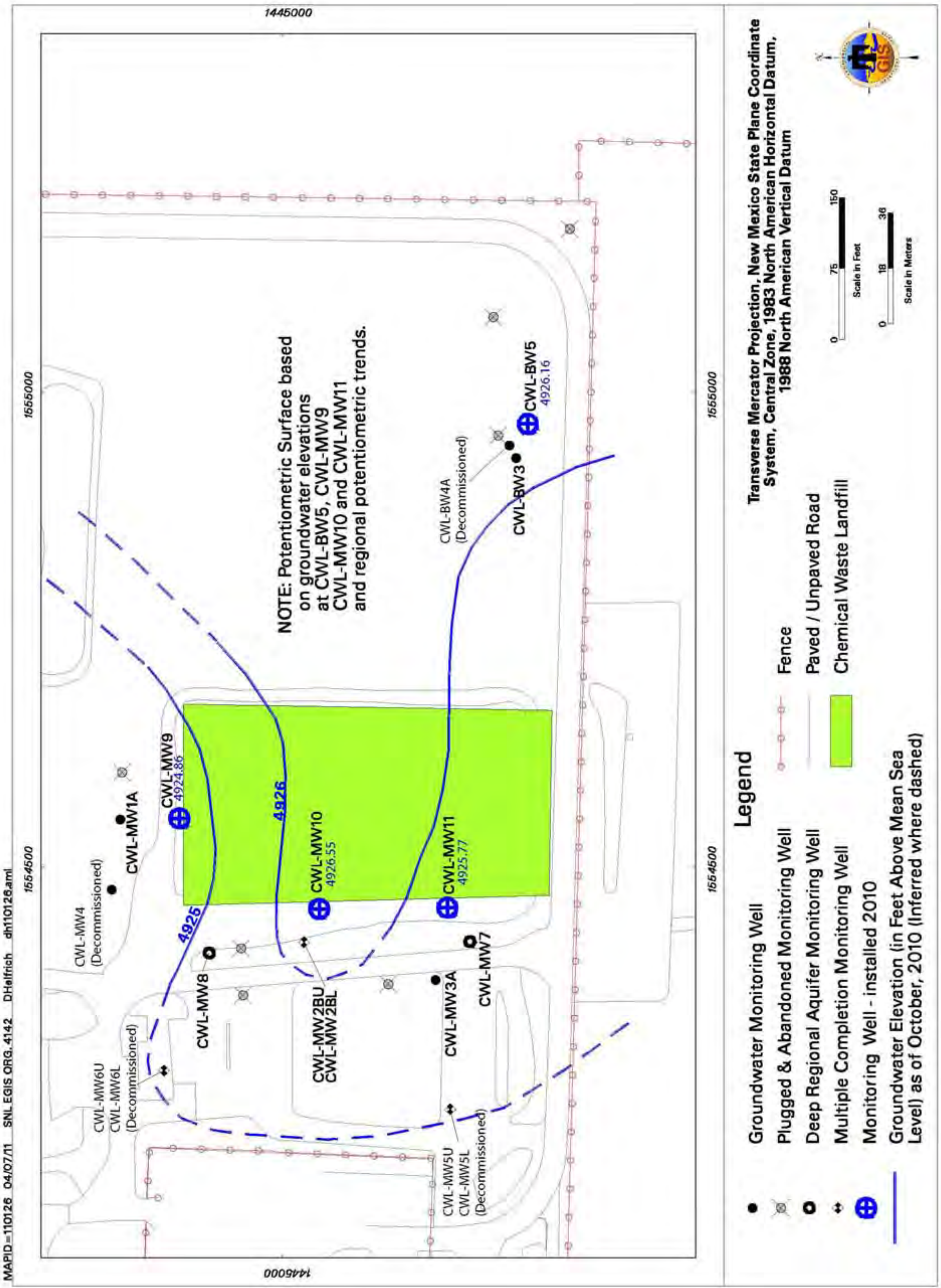


**Figure 3-2. Chemical Waste Landfill Monitoring Well Locations and Potentiometric Surface Map**

### 3.1.4 Summary of Future Activities

The NMED-approved CWL Post-Closure Care Permit (NMED October 2009a) supersedes the CWL Closure Plan (SNL December 1992) upon NMED approval of the Final CWL RCRA Closure Report. All future groundwater monitoring will be performed in accordance with the requirements in the Permit. Under the CWL Post-Closure Care Permit, groundwater sampling requirements for the four new monitoring wells (CWL-BW5, CWL-MW9, CWL-MW10, and CWL-MW11) changed. These changes include a reduction in the groundwater monitoring analyte reporting list and an annual report that is due on March 31 of each CY. The first annual report under the Permit will be submitted to NMED by March 31, 2012, and will cover monitoring conducted from June through December 2011. As required by 20.4.1.500 NMAC, incorporating 40 CFR 264.117(a)(1), the post-closure care period is 30 years. The NMED may shorten or extend this period under 20.4.1.500 NMAC, incorporating 40 CFR 264.117(a)(2).

### 3.1.5 Conceptual Site Model

As documented in the NMED-approved CWL Post-Closure Care Permit, TCE, chromium, and nickel are identified as the constituents of concern at the CWL (NMED October 2009a). A detailed conceptual site model is provided in Annex E of the CWL CMS Report (SNL December 2004).

The regional aquifer in the area of the CWL is located within the Santa Fe Group alluvial sediments at a depth of approximately 485 to 500 feet below ground surface. Regional groundwater beneath KAFB flows generally westward toward the Rio Grande, but local perturbations in the water table occur due to pumping wells and geologic (i.e., lithologic and structural) controls. Pumping by the City of Albuquerque and KAFB have profoundly modified the natural groundwater flow regime (Reeder et al. 1967 and Kues 1987) creating a trough in the water table in the western and northeastern portions of KAFB. Water levels at the CWL have been declining since October 2004 at an approximate average rate of 0.76 feet per year. Detailed hydrographs of specific CWL wells are presented in Attachment 3B (Figures 3B-1 and 3B-2) and in the CWL-MW2A Class 2 Closure Plan Amendment Request (SNL July 2004).

Historically, water levels have been measured quarterly at all CWL wells, with some exceptions. In CY 2010 water levels were measured in all wells on a quarterly basis. The potentiometric surface map of the CWL using October 2010 water level measurements (Figure 3-2) is consistent with the hydrogeologic conceptual model for the Kirtland Air Force Base (KAFB) area, which shows the local groundwater flow direction is generally to the west-northwest due to the regional gradient and influence of groundwater withdrawals by the City of Albuquerque and KAFB. As reflected in Figure 3-2, site-specific changes in the water table surface occur as a result of geologic controls (i.e., vertical and lateral lithologic changes in the saturated Santa Fe Group sediments). The trough in the regional aquifer described above is located to the west of the CWL. Groundwater travel times from the CWL to these KAFB and municipal water supply wells are on the order of hundreds to thousands of years (SNL February 2001).

## 3.2 Regulatory Criteria

The CWL is an interim status landfill that has undergone closure in accordance with 20.4.1.600 NMAC, incorporating 40 CFR 265 Subpart G, and the CWL Closure Plan (SNL December 1992, as amended). Monitoring details, such as specific analytes and sampling frequencies, are defined in Appendix G of the Closure Plan and subsequent amendments and revisions. When the NMED approves the CWL closure and the CWL Final RCRA Closure Report, all future monitoring will be conducted following the requirements stipulated in the CWL Post-Closure Care Permit (NMED October 2009a).

### 3.3 Scope of Activities

Groundwater monitoring performed during CY 2010 at the CWL is summarized in Section 3.1.3. The NMED DOE Oversight Bureau (OB) participated in both the April and November-December 2010 sampling events and received split samples from three CWL monitoring wells (CWL-MW2BL, CWL-MW4, and CWL-MW5U) in April, and from three monitoring wells (CWL-MW9, CWL-MW10, and CWL-MW11) in November and December. The split samples for both sampling events were submitted to a different laboratory for analysis of Appendix IX VOCs and metals. Additional samples for total aluminum, calcium, magnesium, manganese, potassium, and sodium were requested by the NMED DOE OB. To ensure a consistent level of quality assurance for these analyses, SNL/NM personnel also collected samples for total aluminum, calcium, magnesium, manganese, potassium, and sodium at the three CWL monitoring wells during the April sampling event. These additional analyses are not required by Appendix G of the CWL Closure Plan (SNL December 1992). The NMED DOE OB split sampling results are presented in a separate document and not included in this report. Table 3-2 lists the parameters and CWL monitoring wells sampled.

**Table 3-2. Analytical Parameters at CWL Monitoring Wells for Each Sampling Period**

| Parameter | April 2010 | November-December 2010 |
|---|---|---|
| **Appendix IX VOCs** | CWL-MW2BL, CWL-MW4, CWL-MW5L, CWL-MW5U, CWL-MW5U (dup), CWL-MW6L, CWL-MW6U, CWL-MW6U (dup) | CWL-BW5, CWL-MW9, CWL-MW9 (dup), CWL-MW10, CWL-MW11 |
| **Appendix IX Total Metals plus Iron** | CWL-MW2BL, CWL-MW4, CWL-MW5L, CWL-MW5U, CWL-MW5U (dup), CWL-MW6L, CWL-MW6U, CWL-MW6U (dup) | CWL-BW5, CWL-MW9, CWL-MW9 (dup), CWL-MW10, CWL-MW11 |

**NOTES:**
"U" and "L" denote upper and lower completions for nested wells in the same borehole.
CWL = Chemical Waste Landfill.
dup = Duplicate.
VOC = Volatile organic compound.

Groundwater samples collected for chemical analyses were submitted to GEL Laboratories, Inc. (GEL) in Charleston, South Carolina. All chemical analytical results are compared with EPA maximum contaminant levels (MCLs) for drinking water supplies. The analytical results are summarized in Attachment 3A, Tables 3A-1 through 3A-3.

Field and laboratory quality control (QC) samples were prepared to determine the accuracy of the methods used and to detect inadvertent sample contamination that may have occurred during the sampling and analysis process. Field QC samples included environmental duplicate, equipment blank, field blank (FB), and trip blank (TB) samples. Laboratory QC analyses performed included method blank, laboratory control sample (LCS), matrix spike, matrix spike duplicate, and surrogate spike analyses.

Water quality parameters for groundwater temperature, SC, and pH were measured using a YSI™ Model 620 Water Quality Meter. Turbidity was measured with a Hach™ Model 2100P portable turbidity meter. Field water quality measurements are presented in Attachment 3A, Table 3A-4.

### 3.4 Field Methods and Measurements

Groundwater sampling was conducted in conformance with procedures outlined in the *Sampling and Analysis Plan for Groundwater Assessment Monitoring at the Chemical Waste Landfill*, Appendix G, Revision 4 of the CWL Closure Plan (SNL December 1992). Groundwater elevation and water quality field measurements were obtained during groundwater sampling activities. Field water quality parameters are presented in Table 3A-4 (Attachment 3A). Depth-to-groundwater measurements were obtained using a Solinst™ depth-to-water well sounder prior to purging activities. Depth-to-groundwater measurements were performed in accordance with the Field Operating Procedure (FOP), *Long-Term Environmental Stewardship Groundwater Monitoring Well Sampling and Field Analytical Measurements*, FOP 05-01 (SNL August 2007). Groundwater elevation measurements at the CWL monitoring wells from CY 2007 through CY 2010 are presented in Attachment 3B, Figures 3B-1 and 3B-2.

A Bennett™ groundwater sampling system was used to collect groundwater samples from all wells, except small-diameter wells (2 inches or less). Wells CWL-MW5L and CWL-MW6L are small-diameter wells, and dedicated sampling systems manufactured by QED™ Environmental Systems, Inc. were used to collect samples from these wells. Prior to sample collection, each monitoring well was purged to remove stagnant well casing water. More than one day was required to complete purging and sampling at CWL-MW5U and CWL-MW6U in April, and at CWL-MW10 and CWL-MW11 in November and December, due to the slow recharge rate of the monitoring wells. Monitoring wells purged to dryness were allowed to recover before sampling to ensure the most representative groundwater sample possible given the low yield of these wells. Wells CWL-MW2BL and CWL-MW4 in April, and CWL-BW5 and CWL-MW9 in November-December, were purged a minimum of three well-bore volumes prior to sampling. Wells CWL-MW5L and CWL-MW6L in April were purged a minimum of two tubing water volumes prior to sampling.

Groundwater temperature, SC, and pH were measured using a YSI™ Model 620 water quality meter. Turbidity was measured with a Hach™ Model 2100P portable turbidity meter. Groundwater stability is considered acceptable when measurements are within 5 nephelometric turbidity units, 0.2 pH units, and 0.2 degrees Celsius (°C), and SC is within 1 percent or 10 microhms per centimeter (whichever is greater). During the purging of CWL-MW2BL and CWL-MW6L in April, the last two temperature measurements for both wells were within the 0.2°C range, but the previous measurement was slightly lower (approximately 0.4°C for CWL-MW6L and 0.25°C for CWL-MW2BL). Additional purging was not performed prior to sample collection.

Groundwater samples collected after the purging process were submitted to off-site laboratories (GEL) following analysis request/chain-of-custody protocol.

### 3.5 Analytical Methods

The analytical laboratory analyzed samples using EPA-approved analytical methods and specified performance criteria in accordance with the *SNL/NM Statement of Work for Analytical Laboratories* (SNL May 2009). The analytical laboratory provided appropriate sample containers prepared with the required sample preservative. Table 3-3 summarizes analytical requirements and EPA Methods (EPA 1986) applicable to groundwater sampling at the CWL during CY 2010.

### 3.6 Summary of Analytical Results

The analytical results and water quality parameters are presented in Attachment 3A, Tables 3A-1 through 3A-4. Analyses for aluminum, calcium, magnesium, manganese, potassium, and sodium were also conducted for three of the well samples collected in April. All results are compared with established EPA MCLs, where applicable; no constituents were detected above established MCLs during CY 2010. Data qualifiers from the data validation process are presented with the associated results in the Attachment 3A tables. Data validation and QC sample results associated with each sampling event are discussed in Section 3.7.

**Table 3-3. CWL Analyses, Methods, Sample Containers, Preservatives, and Holding Times**

| Analysis | Method[a] | Container Type/ Volume/Preservative | Holding Time |
|---|---|---|---|
| Appendix IX Volatile Organic Compounds | SW846-8260B | Glass; 3 x 40 mL; HCl; 4°C | 14 days |
| Appendix IX Total metals + iron[b] | SW846-6020/7470A | Polyethylene; 500 mL; $HNO_3$; 4°C | 28 days/180 days[c] |

**NOTES:**

[a]U.S. Environmental Protection Agency, November 1986. *Test Methods for Evaluating Solid, Physical/Chemical Methods,* 3rd ed., (and updates), SW-846, Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, D.C.

[b]For April 2010 samples collected from CWL-MW2BL, CWL-MW4, and CWL-MW5U, analyses for aluminum, calcium, magnesium, manganese, potassium, and sodium were also performed.

[c]Holding time for mercury is 28 days; all other metals are 180 days.

°C = Degree(s) Celsius.
CWL = Chemical Waste Landfill.
HCl = Hydrochloric acid.
$HNO_3$ = Nitric acid.
mL = Milliliter(s).

### 3.6.1 Volatile Organic Compounds

Detected VOCs are presented in Attachment 3A, Table 3A-1. No VOCs were detected above established MCLs during CY 2010. No VOCs were detected in any sample except for toluene, chloromethane, and TCE. Toluene and chloromethane were detected below the laboratory practical quantitation limits (PQLs). Toluene was detected below the MCL of 1,000 μg/L in one sample at a concentration of 0.330 μg/L. TCE was detected below the MCL of 5.0 μg/L at concentrations ranging from 0.450 to 2.75 μg/L; three of the five results were below the laboratory PQL of 1.00 μg/L. Associated laboratory method detection limits (MDLs) are presented in Attachment 3A, Table 3A-2.

### 3.6.2 Total Metals

As required by the NMED Hazardous Waste Bureau, all metal samples were analyzed for total metals. Metal results are presented in Attachment 3A, Table 3A-3. No total metal parameters were detected above established regulatory limits in any groundwater sample. Chromium was detected below the MCL of 0.10 milligrams per liter (mg/L) at concentrations ranging from 0.00253 to 0.00263 mg/L. Nickel was detected above the laboratory MDL in all environmental groundwater samples, except at CWL-MW5L. Detected nickel concentrations range from 0.00253 to 0.252 mg/L. No MCL is established for nickel. Additional samples were collected for total aluminum, calcium, magnesium, manganese, potassium, and sodium from CWL-MW2BL, CWL-MW4, and CWL-MW5U during the April sampling event to duplicate the analyses performed by the NMED DOE OB. No MCLs are established for these metals. Aluminum was not detected above the laboratory MDL. Reported concentrations for calcium ranged from 91.8 to 117 mg/L, magnesium from 25.3 to 36.5 mg/L, manganese at 0.0368 mg/L in the sample from CWL-MW4 only, potassium from 5.95 to 9.08 mg/L, and sodium from 74.0 to 83.0 mg/L.

### 3.6.3 Water Quality Parameters

Attachment 3A, Table 3A-4 summarizes field water quality measurements prior to sampling and includes temperature, SC, oxidation-reduction potential, pH, turbidity, and dissolved oxygen.

## 3.7 Quality Control Results

Field and laboratory QC samples were prepared to determine the accuracy of the methods used and to detect inadvertent sample contamination that may have occurred during the sampling and analysis process. All data were reviewed in accordance with AOP [Administrative Operating Procedure] 00-03, *Data Validation Procedure for Chemical and Radiochemical Data* (SNL July 2007). The results for each QC analysis and the impact on data quality are discussed in the following sections.

### 3.7.1 Field Quality Control Samples

Field QC samples included environmental duplicate, FB, and TB samples. TB samples are submitted whenever samples are collected for VOC analysis to assess whether contamination of the samples occurred during shipment and storage. FB samples provide a check for potential ambient sources of sample contamination during the sampling process and/or sampling error. EB samples are collected to verify the effectiveness of the sampling equipment decontamination process, and duplicate samples are collected immediately after the environmental sample to provide information about sampling variability and overall reproducibility. The field QC samples were submitted for analysis along with the groundwater samples in accordance with QC procedures specified in the SAP provided in Appendix G of the CWL Closure Plan (SNL December 1992). The following sections discuss the analytical results for each QC sample type.

#### 3.7.1.1 Duplicate Environmental Samples

Duplicate environmental samples were collected at CWL-MW5U, CWL-MW6U, and CWL-MW9 and analyzed for all detected parameters. Relative percent difference (RPD) calculations between duplicate samples were performed for all analytes. The results show that sampling and analysis precision was in conformance with the SAP (Appendix G of the CWL Closure Plan) requirements for all measured parameters, except selenium in the April sample from CWL-MW5U. The selenium RPD was calculated at 22 and is considered an estimated value because the sampling results reported were less than the laboratory PQL.

#### 3.7.1.2 Field Blank Samples

A total of seven FB samples were collected for VOCs to assess whether contamination of the samples resulted from ambient field conditions. During the April sampling event, an FB sample was collected at each monitoring well (six locations) because monitoring well drilling activities were being performed at the CWL during this sampling event. The FB samples were prepared by pouring deionized water into sample containers at the sample collection point to simulate the transfer of environmental samples from the sampling system into the sample container. VOCs detected above laboratory MDLs included bromodichloromethane, bromoform, chloroform, chloromethane, and dibromochloromethane. No corrective action was necessary for bromodichloromethane, bromoform, or dibromochloromethane as these compounds were not detected in the associated environmental samples. During data validation, the results for chloroform were qualified as not detected in samples from CWL-MW2BL and CWL-MW5L, and for chloromethane in the sample from CWL-MW5U because these compounds were detected at concentrations less than five times the blank concentration.

#### 3.7.1.3 Trip Blank Samples

TB samples consist of laboratory reagent-grade water with hydrochloric acid preservative contained in 40-milliliter volatile organic analysis vials prepared by the analytical laboratory, which accompany the empty sample containers supplied by the laboratory. The TBs were brought to the field and accompanied each sample shipment. A total of 13 TBs were submitted with the CY 2010 samples. No VOCs were detected above laboratory MDLs in any TB sample.

### 3.7.2 Laboratory Quality Control Samples

Internal laboratory QC samples, including method blanks and duplicate LCSs, were analyzed concurrently with the groundwater samples. Additionally, batch matrix spike, matrix spike duplicate, and surrogate spike samples were analyzed. All laboratory data were reviewed and qualified in accordance with AOP [Administrative Operating Procedure] 00-03, Revision 2, *Data Validation Procedure for Chemical and Radiochemical Data* (SNL July 2007).

Although some analytical results were qualified as not detected or as estimated values during the data validation process, no significant data quality problems were noted for any CWL groundwater sample, except aluminum and vanadium. Aluminum results for CWL-MW2BL and CWL-MW5U and vanadium results for CWL-MW2BL, CWL-MW5L, CWL-MW5U, and CWL-MW6L were qualified as unusable during data validation as the matrix spike percent recoveries did not meet acceptance criteria. SNL/NM requested that GEL reanalyze these metals in the samples. Results of the reanalysis (Sample 088581-R09) are reported in Table 3A-3 (Attachment 3A), and QC measures for the reanalysis are acceptable. Chromium in CWL-MW10 was qualified as not detected during data validation because chromium was detected at a concentration less than five times the detected laboratory method blank value. Data validation reports and findings associated with CWL groundwater monitoring are filed in the SNL/NM Customer Funded Records Center.

### 3.8 Variances and Nonconformances

Variances and nonconformances from requirements in the CWL SAP (SNL December 1992) are identified as follows:

- CWL-MW1A and CWL-MW3A are no longer sampled. Since 1998 these wells have contained no water. During the VE VCM, the wells partially filled with sediment and have not recovered. However, SNL/NM personnel lowered a water level meter to verify that these wells remain dry.

- No samples were collected from CWL-BW3, CWL-BW4A, or CWL-MW2BU. SNL/NM personnel notified the NMED that these wells did not produce sufficient water to collect a representative sample during the CY 2009 sampling events.

- There was a minor variance relative to the stability target range for temperature at monitoring wells CWL-MW2BL and CWL-MW6L during the purging process in April. The last two temperature measurements for both wells were within the stability target range of 0.2°C, but the previous measurements were slightly lower (approximately 0.4°C for CWL-MW6L and 0.25°C for CWL-MW2BL). After review of the field data and recognition of the variance, corrective action was not deemed necessary as the maximum temperature variation between the final three measurements for both wells was minimal, the last two readings met the stabilization requirement, and all other purging requirements had been met. The field sampling team was reminded of the CWL stability target range for temperature and in the future will continue purging until stability is achieved.

### 3.9 Summary and Conclusions

During CY 2010, samples were collected from 10 CWL monitoring wells (CWL-MW2BL, CWL-MW4, CWL-MW5L, CWL-MW5U, CWL-MW6L, and CWL-MW6U in April, and CWL-BW5, CWL-MW9, CWL-MW10, and CWL-MW11 in November and December) and analyzed for 40 CFR 264 (Appendix IX) VOCs and total metals plus iron. Analyses for aluminum, calcium, magnesium, manganese, potassium, and sodium were also performed on three of the well samples collected in April. No analytes were detected at concentrations exceeding the associated EPA MCLs in any CWL groundwater samples collected during CY 2010.

### 3.10 References


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# Attachment 3A
# Chemical Waste Landfill
# Analytical Results Tables

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# Attachment 3A Tables

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# Table 3A-1
## Summary of Detected Volatile Organic Compounds,
## Chemical Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Well ID | Analyte | Result[a] (µg/L) | MDL[b] (µg/L) | PQL[c] (µg/L) | MCL[d] (µg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CWL-MW2BL** 12-Apr-10 | Chloroform | 0.640 | 0.250 | 1.00 | NE | J | 1.0U | 088581-001 | SW846 8260 |
| **CWL-MW5L** 13-Apr-10 | Chloroform | 0.480 | 0.250 | 1.00 | NE | J | 1.0U | 088578-001 | SW846 8260 |
| | Trichloroethene | 0.570 | 0.250 | 1.00 | 5.00 | J | | 088578-001 | SW846 8260 |
| **CWL-MW5U** 09-Apr-10 | Chloromethane | 0.310 | 0.300 | 1.00 | NE | J | 1.0U | 088571-001 | SW846 8260 |
| | Trichloroethene | 2.74 | 0.250 | 1.00 | 5.00 | | | 088571-001 | SW846 8260 |
| **CWL-MW5U** (Duplicate) 09-Apr-10 | Trichloroethene | 2.75 | 0.250 | 1.00 | 5.00 | | | 088572-001 | SW846 8260 |
| **CWL-MW6L** 12-Apr-10 | Trichloroethene | 0.450 | 0.250 | 1.00 | 5.00 | J | | 088575-001 | SW846 8260 |
| **CWL-MW6U** 07-Apr-10 | Chloromethane | 0.400 | 0.300 | 1.00 | NE | J | | 088565-001 | SW846 8260 |
| | Toluene | 0.330 | 0.250 | 1.00 | 1,000 | J | | 088565-001 | SW846 8260 |
| **CWL-MW6U** (Duplicate) 07-Apr-10 | Chloromethane | 0.480 | 0.300 | 1.00 | NE | J | | 088566-001 | SW846 8260 |
| **CWL-MW10** 06-Dec-10 | Trichloroethene | 1.11 | 0.250 | 1.00 | 5.00 | | | 089885-001 | SW846 8260 |

Refer to footnotes on page 3A-21.

## Table 3A-2
## Method Detection Limits for Appendix IX Volatile Organic Compounds, Chemical Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Analyte | MDL[b] (µg/L) | Analytical Method[g] | Analyte | MDL[b] (µg/L) | Analytical Method[g] |
|---|---|---|---|---|---|
| 1,1,1,2-Tetrachloroethane | 0.300 | SW846 8260 | Chloroform | 0.250 | SW846 8260 |
| 1,1,1-Trichloroethane | 0.325 | SW846 8260 | Chloromethane | 0.300 | SW846 8260 |
| 1,1,2,2-Tetrachloroethane | 0.250 | SW846 8260 | Chloroprene | 0.300 | SW846 8260 |
| 1,1,2-Trichloroethane | 0.250 | SW846 8260 | Dibromochloromethane | 0.300 | SW846 8260 |
| 1,1-Dichloroethane | 0.300 | SW846 8260 | Dibromomethane | 0.300 | SW846 8260 |
| 1,1-Dichloroethene | 0.300 | SW846 8260 | Dichlorodifluoromethane | 0.300 | SW846 8260 |
| 1,2,3-Trichloropropane | 0.300 | SW846 8260 | Ethyl benzene | 0.250 | SW846 8260 |
| 1,2,4-Trichlorobenzene | 0.300 | SW846 8260 | Ethyl cyanide | 1.50 | SW846 8260 |
| 1,2-Dibromo-3-chloropropane | 0.300 | SW846 8260 | Ethyl methacrylate | 1.00 | SW846 8260 |
| 1,2-Dibromoethane | 0.250 | SW846 8260 | Iodomethane | 1.25 | SW846 8260 |
| 1,2-Dichloroethane | 0.250 | SW846 8260 | Isobutanol | 12.5 | SW846 8260 |
| 1,2-Dichloropropane | 0.250 | SW846 8260 | Methacrylonitrile | 1.00 | SW846 8260 |
| 2-Butanone | 1.25 | SW846 8260 | Methyl methacrylate | 1.00 | SW846 8260 |
| 2-Hexanone | 1.25 | SW846 8260 | Methylene chloride | 3.00 | SW846 8260 |
| 4-methyl-, 2-Pentanone | 1.25 | SW846 8260 | Pentachloroethane | 1.00 | SW846 8260 |
| Acetone | 3.50 | SW846 8260 | Styrene | 0.250 | SW846 8260 |
| Acetonitrile | 6.25 | SW846 8260 | Tetrachloroethene | 0.300 | SW846 8260 |
| Acrolein | 1.25 | SW846 8260 | Toluene | 0.250 | SW846 8260 |
| Acrylonitrile | 1.00 | SW846 8260 | Trichloroethene | 0.250 | SW846 8260 |
| Allyl chloride | 1.50 | SW846 8260 | Trichlorofluoromethane | 0.300 | SW846 8260 |
| Benzene | 0.300 | SW846 8260 | Vinyl acetate | 1.50 | SW846 8260 |
| Bromodichloromethane | 0.250 | SW846 8260 | Vinyl chloride | 0.500 | SW846 8260 |
| Bromoform | 0.250 | SW846 8260 | Xylene | 0.300 | SW846 8260 |
| Bromomethane | 0.300 | SW846 8260 | bis-Chloroisopropyl ether | 1.50 | SW846 8260 |
| Carbon disulfide | 1.25 | SW846 8260 | cis-1,3-Dichloropropene | 0.250 | SW846 8260 |
| Carbon tetrachloride | 0.300 | SW846 8260 | trans-1,2-Dichloroethene | 0.300 | SW846 8260 |
| Chlorobenzene | 0.250 | SW846 8260 | trans-1,3-Dichloropropene | 0.250 | SW846 8260 |
| Chloroethane | 0.300 | SW846 8260 | trans-1,4-Dichloro-2-butene | 1.00 | SW846 8260 |

Refer to footnotes on page 3A-21.

## Table 3A-3
## Summary of Total Metal Results,
## Chemical Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CWL-MW2BL** | Aluminum | ND | 0.050 | 0.150 | NE | U | R | 088581-009 | SW846 6020 |
| 14-Apr-10 | Aluminum | ND | 0.010 | 0.030 | NE | U | | 088581-R09 | SW846 6020 |
| | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 088581-009 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 088581-009 | SW846 6020 |
| | Barium | 0.0579 | 0.0005 | 0.002 | 2.00 | | | 088581-009 | SW846 6020 |
| | Beryllium | ND | 0.0005 | 0.0025 | 0.004 | U | | 088581-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 088581-009 | SW846 6020 |
| | Calcium | 117 | 0.100 | 1.00 | NE | | | 088581-009 | SW846 6020 |
| | Chromium | ND | 0.0125 | 0.050 | 0.100 | U | | 088581-009 | SW846 6020 |
| | Cobalt | ND | 0.0005 | 0.005 | NE | U | | 088581-009 | SW846 6020 |
| | Copper | ND | 0.0015 | 0.005 | NE | U | | 088581-009 | SW846 6020 |
| | Iron | 0.160 | 0.050 | 0.500 | NE | J | | 088581-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 088581-009 | SW846 6020 |
| | Magnesium | 36.5 | 0.025 | 0.075 | NE | | | 088581-009 | SW846 6020 |
| | Manganese | ND | 0.005 | 0.025 | NE | U | | 088581-009 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 088581-009 | SW846 6020 |
| | Nickel | 0.00273 | 0.0025 | 0.010 | NE | J | | 088581-009 | SW846 6020 |
| | Potassium | 5.95 | 0.400 | 1.50 | NE | | | 088581-009 | SW846 6020 |
| | Selenium | 0.00155 | 0.001 | 0.005 | 0.050 | J | | 088581-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 088581-009 | SW846 6020 |
| | Sodium | 83.0 | 0.400 | 1.25 | NE | | | 088581-009 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 088581-009 | SW846 6020 |
| | Tin | ND | 0.001 | 0.005 | NE | U | | 088581-009 | SW846 6020 |
| | Vanadium | ND | 0.015 | 0.050 | NE | U | R | 088581-009 | SW846 6020 |
| | Vanadium | ND | 0.015 | 0.050 | NE | U | UJ | 088581-R09 | SW846 6020 |
| | Zinc | ND | 0.0026 | 0.010 | NE | U | | 088581-009 | SW846 6020 |

Refer to footnotes on page 3A-21.

## Table 3A-3 *(Continued)*
## Summary of Total Metal Results,
## Chemical Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CWL-MW4** | Aluminum | ND | 0.010 | 0.030 | NE | U | | 088560-009 | SW846 6020 |
| 05-Apr-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 088560-009 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 088560-009 | SW846 6020 |
| | Barium | 0.0597 | 0.0025 | 0.010 | 2.00 | | | 088560-009 | SW846 6020 |
| | Beryllium | ND | 0.0005 | 0.0025 | 0.004 | U | | 088560-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 088560-009 | SW846 6020 |
| | Calcium | 95.1 | 0.100 | 1.00 | NE | | | 088560-009 | SW846 6020 |
| | Chromium | 0.0263 | 0.0125 | 0.050 | 0.100 | J | | 088560-009 | SW846 6020 |
| | Cobalt | 0.00331 | 0.0005 | 0.005 | NE | J | | 088560-009 | SW846 6020 |
| | Copper | 0.00261 | 0.0015 | 0.005 | NE | B, J | J+ | 088560-009 | SW846 6020 |
| | Iron | 0.771 | 0.050 | 0.500 | NE | | | 088560-009 | SW846 6020 |
| | Lead | ND | 0.0025 | 0.010 | NE | U | | 088560-009 | SW846 6020 |
| | Magnesium | 25.3 | 0.005 | 0.015 | NE | | | 088560-009 | SW846 6020 |
| | Manganese | 0.0368 | 0.005 | 0.025 | NE | | | 088560-009 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 088560-009 | SW846 6020 |
| | Nickel | 0.252 | 0.0025 | 0.010 | NE | | | 088560-009 | SW846 6020 |
| | Potassium | 8.74 | 0.080 | 0.300 | NE | | | 088560-009 | SW846 6020 |
| | Selenium | 0.00164 | 0.001 | 0.005 | 0.050 | J | | 088560-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 088560-009 | SW846 6020 |
| | Sodium | 74.0 | 0.400 | 1.25 | NE | | | 088560-009 | SW846 6020 |
| | Thallium | ND | 0.0015 | 0.005 | 0.002 | U | | 088560-009 | SW846 6020 |
| | Tin | ND | 0.001 | 0.005 | NE | U | | 088560-009 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | | 088560-009 | SW846 6020 |
| | Zinc | 0.00413 | 0.0026 | 0.010 | NE | J | | 088560-009 | SW846 6020 |

Refer to footnotes on page 3A-21.

**Table 3A-3** *(Continued)*
**Summary of Total Metal Results,**
**Chemical Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CWL-MW5L** | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 088578-009 | SW846 6020 |
| 13-Apr-10 | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 088578-009 | SW846 6020 |
| | Barium | 0.057 | 0.0005 | 0.002 | 2.00 | | | 088578-009 | SW846 6020 |
| | Beryllium | ND | 0.0005 | 0.0025 | 0.004 | U | | 088578-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 088578-009 | SW846 6020 |
| | Chromium | ND | 0.0125 | 0.050 | 0.100 | U | | 088578-009 | SW846 6020 |
| | Cobalt | ND | 0.0005 | 0.005 | NE | U | | 088578-009 | SW846 6020 |
| | Copper | ND | 0.0015 | 0.005 | NE | U | | 088578-009 | SW846 6020 |
| | Iron | 0.173 | 0.050 | 0.500 | NE | J | | 088578-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 088578-009 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 088578-009 | SW846 7470 |
| | Nickel | ND | 0.0025 | 0.010 | NE | U | | 088578-009 | SW846 6020 |
| | Selenium | 0.00132 | 0.001 | 0.005 | 0.050 | J | | 088578-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 088578-009 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 088578-009 | SW846 6020 |
| | Tin | ND | 0.001 | 0.005 | NE | U | | 088578-009 | SW846 6020 |
| | Vanadium | ND | 0.015 | 0.050 | NE | U | R | 088578-009 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | | 088578-R09 | SW846 6020 |
| | Zinc | ND | 0.0026 | 0.010 | NE | U | | 088578-009 | SW846 6020 |

Refer to footnotes on page 3A-21.

## Table 3A-3 *(Continued)*
## Summary of Total Metal Results,
## Chemical Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CWL-MW5U** | Aluminum | ND | 0.050 | 0.150 | NE | U | R | 088571-009 | SW846 6020 |
| 09-Apr-10 | Aluminum | ND | 0.010 | 0.030 | NE | U | | 088571-R09 | SW846 6020 |
| | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 088571-009 | SW846 6020 |
| | Arsenic | 0.00253 | 0.0015 | 0.005 | 0.010 | J | | 088571-009 | SW846 6020 |
| | Barium | 0.0666 | 0.0005 | 0.002 | 2.00 | | | 088571-009 | SW846 6020 |
| | Beryllium | ND | 0.0005 | 0.0025 | 0.004 | U | | 088571-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 088571-009 | SW846 6020 |
| | Calcium | 91.8 | 0.100 | 1.00 | NE | | | 088571-009 | SW846 6020 |
| | Chromium | ND | 0.0125 | 0.050 | 0.100 | U | | 088571-009 | SW846 6020 |
| | Cobalt | ND | 0.0005 | 0.005 | NE | U | | 088571-009 | SW846 6020 |
| | Copper | ND | 0.0015 | 0.005 | NE | U | | 088571-009 | SW846 6020 |
| | Iron | 0.133 | 0.050 | 0.500 | NE | J | | 088571-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 088571-009 | SW846 6020 |
| | Magnesium | 26.0 | 0.025 | 0.075 | NE | | | 088571-009 | SW846 6020 |
| | Manganese | ND | 0.005 | 0.025 | NE | U | | 088571-009 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 088571-009 | SW846 6020 |
| | Nickel | ND | 0.0025 | 0.010 | NE | U | | 088571-009 | SW846 6020 |
| | Potassium | 9.08 | 0.400 | 1.50 | NE | | | 088571-009 | SW846 6020 |
| | Selenium | 0.0017 | 0.001 | 0.005 | 0.050 | J | | 088571-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 088571-009 | SW846 6020 |
| | Sodium | 75.3 | 0.400 | 1.25 | NE | | | 088571-009 | SW846 6020 |
| | Thallium | 0.000686 | 0.0003 | 0.001 | 0.002 | J | 0.0043U | 088571-009 | SW846 6020 |
| | Tin | ND | 0.001 | 0.005 | NE | U | | 088571-009 | SW846 6020 |
| | Vanadium | ND | 0.015 | 0.050 | NE | U | R | 088571-009 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | UJ | 088571-R09 | SW846 6020 |
| | Zinc | 0.0309 | 0.0026 | 0.010 | NE | | | 088571-009 | SW846 6020 |

Refer to footnotes on page 3A-21.

## Table 3A-3 *(Continued)*
## Summary of Total Metal Results,
## Chemical Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CWL-MW5U** (Duplicate) 09-Apr-10 | Aluminum | ND | 0.050 | 0.150 | NE | U | R | 088572-009 | SW846 6020 |
| | Aluminum | ND | 0.010 | 0.030 | NE | U | | 088572-R09 | SW846 6020 |
| | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 088572-009 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 088572-009 | SW846 6020 |
| | Barium | 0.0671 | 0.0005 | 0.002 | 2.00 | | | 088572-009 | SW846 6020 |
| | Beryllium | ND | 0.0005 | 0.0025 | 0.004 | U | | 088572-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 088572-009 | SW846 6020 |
| | Calcium | 94.9 | 0.100 | 1.00 | NE | | | 088572-009 | SW846 6020 |
| | Chromium | ND | 0.0125 | 0.050 | 0.100 | U | | 088572-009 | SW846 6020 |
| | Cobalt | ND | 0.0005 | 0.005 | NE | U | | 088572-009 | SW846 6020 |
| | Copper | ND | 0.0015 | 0.005 | NE | U | | 088572-009 | SW846 6020 |
| | Iron | 0.162 | 0.050 | 0.500 | NE | J | | 088572-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 088572-009 | SW846 6020 |
| | Magnesium | 27.5 | 0.025 | 0.075 | NE | | | 088572-009 | SW846 6020 |
| | Manganese | ND | 0.005 | 0.025 | NE | U | | 088572-009 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 088572-009 | SW846 6020 |
| | Nickel | 0.00259 | 0.0025 | 0.010 | NE | J | | 088572-009 | SW846 6020 |
| | Potassium | 9.08 | 0.400 | 1.50 | NE | | | 088572-009 | SW846 6020 |
| | Selenium | 0.00136 | 0.001 | 0.005 | 0.050 | J | | 088572-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 088572-009 | SW846 6020 |
| | Sodium | 77.7 | 0.400 | 1.25 | NE | | | 088572-009 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 088572-009 | SW846 6020 |
| | Tin | ND | 0.001 | 0.005 | NE | U | | 088572-009 | SW846 6020 |
| | Vanadium | ND | 0.015 | 0.050 | NE | U | R | 088572-009 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | UJ | 088572-R09 | SW846 6020 |
| | Zinc | 0.0311 | 0.0026 | 0.010 | NE | | | 088572-009 | SW846 6020 |

Refer to footnotes on page 3A-21.

## Table 3A-3 *(Continued)*
## Summary of Total Metal Results,
## Chemical Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CWL-MW6L** | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 088575-009 | SW846 6020 |
| 12-Apr-10 | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 088575-009 | SW846 6020 |
| | Barium | 0.0559 | 0.0005 | 0.002 | 2.00 | | | 088575-009 | SW846 6020 |
| | Beryllium | ND | 0.0005 | 0.0025 | 0.004 | U | | 088575-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 088575-009 | SW846 6020 |
| | Chromium | ND | 0.0125 | 0.050 | 0.100 | U | | 088575-009 | SW846 6020 |
| | Cobalt | ND | 0.0005 | 0.005 | NE | U | | 088575-009 | SW846 6020 |
| | Copper | ND | 0.0015 | 0.005 | NE | U | | 088575-009 | SW846 6020 |
| | Iron | 0.185 | 0.050 | 0.500 | NE | J | | 088575-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 088575-009 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 088575-009 | SW846 7470 |
| | Nickel | 0.00253 | 0.0025 | 0.010 | NE | J | | 088575-009 | SW846 6020 |
| | Selenium | 0.00137 | 0.001 | 0.005 | 0.050 | J | | 088575-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 088575-009 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 088575-009 | SW846 6020 |
| | Tin | ND | 0.001 | 0.005 | NE | U | | 088575-009 | SW846 6020 |
| | Vanadium | ND | 0.015 | 0.050 | NE | U | R | 088575-009 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | | 088575-R09 | SW846 6020 |
| | Zinc | ND | 0.0026 | 0.010 | NE | U | | 088575-009 | SW846 6020 |

Refer to footnotes on page 3A-21.

**Table 3A-3** *(Continued)*
**Summary of Total Metal Results,**
**Chemical Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CWL-MW6U** | Antimony | ND | 0.0025 | 0.015 | 0.006 | U | | 088565-009 | SW846 6020 |
| 07-Apr-10 | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 088565-009 | SW846 6020 |
| | Barium | 0.073 | 0.0025 | 0.010 | 2.00 | | | 088565-009 | SW846 6020 |
| | Beryllium | ND | 0.0005 | 0.0025 | 0.004 | U | | 088565-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 088565-009 | SW846 6020 |
| | Chromium | ND | 0.0125 | 0.050 | 0.100 | U | | 088565-009 | SW846 6020 |
| | Cobalt | ND | 0.0005 | 0.005 | NE | U | | 088565-009 | SW846 6020 |
| | Copper | ND | 0.0015 | 0.005 | NE | U | UJ | 088565-009 | SW846 6020 |
| | Iron | 0.321 | 0.050 | 0.500 | NE | J | | 088565-009 | SW846 6020 |
| | Lead | ND | 0.0025 | 0.010 | NE | U | | 088565-009 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 088565-009 | SW846 7470 |
| | Nickel | 0.00271 | 0.0025 | 0.010 | NE | J | | 088565-009 | SW846 6020 |
| | Selenium | 0.00152 | 0.001 | 0.005 | 0.050 | J | | 088565-009 | SW846 6020 |
| | Silver | ND | 0.001 | 0.005 | NE | U | | 088565-009 | SW846 6020 |
| | Thallium | ND | 0.0015 | 0.005 | 0.002 | U | | 088565-009 | SW846 6020 |
| | Tin | ND | 0.005 | 0.025 | NE | U | | 088565-009 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | | 088565-009 | SW846 6020 |
| | Zinc | 0.00623 | 0.0026 | 0.010 | NE | J | | 088565-009 | SW846 6020 |

Refer to footnotes on page 3A-21.

**Table 3A-3** *(Continued)*
**Summary of Total Metal Results,**
**Chemical Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CWL-MW6U** (Duplicate) 07-Apr-10 | Antimony | ND | 0.0025 | 0.015 | 0.006 | U | | 088566-009 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 088566-009 | SW846 6020 |
| | Barium | 0.0697 | 0.0025 | 0.010 | 2.00 | | | 088566-009 | SW846 6020 |
| | Beryllium | ND | 0.0005 | 0.0025 | 0.004 | U | | 088566-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 088566-009 | SW846 6020 |
| | Chromium | ND | 0.0125 | 0.050 | 0.100 | U | | 088566-009 | SW846 6020 |
| | Cobalt | ND | 0.0005 | 0.005 | NE | U | | 088566-009 | SW846 6020 |
| | Copper | ND | 0.0015 | 0.005 | NE | U | UJ | 088566-009 | SW846 6020 |
| | Iron | 0.301 | 0.050 | 0.500 | NE | J | | 088566-009 | SW846 6020 |
| | Lead | ND | 0.0025 | 0.010 | NE | U | | 088566-009 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 088566-009 | SW846 7470 |
| | Nickel | 0.00255 | 0.0025 | 0.010 | NE | J | | 088566-009 | SW846 6020 |
| | Selenium | 0.00129 | 0.001 | 0.005 | 0.050 | J | | 088566-009 | SW846 6020 |
| | Silver | ND | 0.001 | 0.005 | NE | U | | 088566-009 | SW846 6020 |
| | Thallium | ND | 0.0015 | 0.005 | 0.002 | U | | 088566-009 | SW846 6020 |
| | Tin | ND | 0.005 | 0.025 | NE | U | | 088566-009 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | | 088566-009 | SW846 6020 |
| | Zinc | 0.00677 | 0.0026 | 0.010 | NE | J | | 088566-009 | SW846 6020 |

Refer to footnotes on page 3A-21.

## Table 3A-3 *(Continued)*
## Summary of Total Metal Results, Chemical Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CWL-BW5** | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 089878-009 | SW846 6020 |
| 29-Nov-10 | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 089878-009 | SW846 6020 |
| | Barium | 0.063 | 0.0005 | 0.002 | 2.00 | | | 089878-009 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089878-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 089878-009 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 089878-009 | SW846 6020 |
| | Cobalt | 0.00027 | 0.0001 | 0.001 | NE | J | J+ | 089878-009 | SW846 6020 |
| | Copper | 0.00091 | 0.0003 | 0.001 | NE | J | J+ | 089878-009 | SW846 6020 |
| | Iron | 0.470 | 0.010 | 0.100 | NE | B | | 089878-009 | SW846 6020 |
| | Lead | 0.00052 | 0.0005 | 0.002 | NE | J | | 089878-009 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 089878-009 | SW846 7470 |
| | Nickel | 0.003 | 0.0005 | 0.002 | NE | | J+ | 089878-009 | SW846 6020 |
| | Selenium | 0.00127 | 0.001 | 0.005 | 0.050 | J | J- | 089878-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089878-009 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 089878-009 | SW846 6020 |
| | Tin | ND | 0.001 | 0.005 | NE | U | | 089878-009 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | | 089878-009 | SW846 6020 |
| | Zinc | ND | 0.0026 | 0.010 | NE | U | | 089878-009 | SW846 6020 |

Refer to footnotes on page 3A-21.

**Table 3A-3** *(Continued)*
**Summary of Total Metal Results,**
**Chemical Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CWL-MW9** | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 089882-009 | SW846 6020 |
| 01-Dec-10 | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 089882-009 | SW846 6020 |
| | Barium | 0.148 | 0.0025 | 0.010 | 2.00 | | | 089882-009 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089882-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 089882-009 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 089882-009 | SW846 6020 |
| | Cobalt | 0.00118 | 0.0001 | 0.001 | NE | | J+ | 089882-009 | SW846 6020 |
| | Copper | 0.000893 | 0.0003 | 0.001 | NE | J | 0.0034U | 089882-009 | SW846 6020 |
| | Iron | 1.06 | 0.010 | 0.100 | NE | B | | 089882-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089882-009 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 089882-009 | SW846 7470 |
| | Nickel | 0.00329 | 0.0005 | 0.002 | NE | | J+ | 089882-009 | SW846 6020 |
| | Selenium | ND | 0.001 | 0.005 | 0.050 | U | UJ | 089882-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089882-009 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 089882-009 | SW846 6020 |
| | Tin | ND | 0.001 | 0.005 | NE | U | | 089882-009 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | | 089882-009 | SW846 6020 |
| | Zinc | 0.023 | 0.0026 | 0.010 | NE | | J+ | 089882-009 | SW846 6020 |

Refer to footnotes on page 3A-21.

**Table 3A-3** *(Continued)*
**Summary of Total Metal Results,**
**Chemical Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CWL-MW9** (Duplicate) 01-Dec-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 089883-009 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 089883-009 | SW846 6020 |
| | Barium | 0.141 | 0.0025 | 0.010 | 2.00 | | | 089883-009 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089883-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 089883-009 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 089883-009 | SW846 6020 |
| | Cobalt | 0.00119 | 0.0001 | 0.001 | NE | | J+ | 089883-009 | SW846 6020 |
| | Copper | 0.000968 | 0.0003 | 0.001 | NE | J | 0.0034U | 089883-009 | SW846 6020 |
| | Iron | 1.11 | 0.010 | 0.100 | NE | B | | 089883-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089883-009 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 089883-009 | SW846 7470 |
| | Nickel | 0.00348 | 0.0005 | 0.002 | NE | | J+ | 089883-009 | SW846 6020 |
| | Selenium | ND | 0.001 | 0.005 | 0.050 | U | UJ | 089883-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089883-009 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 089883-009 | SW846 6020 |
| | Tin | ND | 0.001 | 0.005 | NE | U | | 089883-009 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | | 089883-009 | SW846 6020 |
| | Zinc | 0.0228 | 0.0026 | 0.010 | NE | | J+ | 089883-009 | SW846 6020 |

Refer to footnotes on page 3A-21.

## Table 3A-3 *(Continued)*
## Summary of Total Metal Results,
## Chemical Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CWL-MW10** | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 089885-009 | SW846 6020 |
| 06-Dec-10 | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 089885-009 | SW846 6020 |
| | Barium | 0.311 | 0.0025 | 0.010 | 2.00 | B | | 089885-009 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089885-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 089885-009 | SW846 6020 |
| | Chromium | 0.00325 | 0.0025 | 0.010 | 0.100 | B, J | 0.014U | 089885-009 | SW846 6020 |
| | Cobalt | 0.00185 | 0.0001 | 0.001 | NE | | J+ | 089885-009 | SW846 6020 |
| | Copper | 0.00201 | 0.0003 | 0.001 | NE | | J+ | 089885-009 | SW846 6020 |
| | Iron | 1.07 | 0.010 | 0.100 | NE | B | | 089885-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089885-009 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | UJ | 089885-009 | SW846 7470 |
| | Nickel | 0.00707 | 0.0005 | 0.002 | NE | B | J+ | 089885-009 | SW846 6020 |
| | Selenium | ND | 0.001 | 0.005 | 0.050 | U | | 089885-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089885-009 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 089885-009 | SW846 6020 |
| | Tin | ND | 0.001 | 0.005 | NE | U | | 089885-009 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | | 089885-009 | SW846 6020 |
| | Zinc | 0.0682 | 0.0026 | 0.010 | NE | | J+ | 089885-009 | SW846 6020 |

Refer to footnotes on page 3A-21.

**Table 3A-3** *(Concluded)*
**Summary of Total Metal Results,**
**Chemical Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CWL-MW11** | Antimony | 0.000659 | 0.0005 | 0.003 | 0.006 | B, J | 0.0075U | 089888-009 | SW846 6020 |
| 14-Dec-10 | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 089888-009 | SW846 6020 |
| | Barium | 0.0818 | 0.0005 | 0.002 | 2.00 | | | 089888-009 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089888-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 089888-009 | SW846 6020 |
| | Chromium | 0.00253 | 0.0025 | 0.010 | 0.100 | J | J+ | 089888-009 | SW846 6020 |
| | Cobalt | 0.000489 | 0.0001 | 0.001 | NE | J | J+ | 089888-009 | SW846 6020 |
| | Copper | 0.00129 | 0.0003 | 0.001 | NE | | | 089888-009 | SW846 6020 |
| | Iron | 0.531 | 0.010 | 0.100 | NE | B | | 089888-009 | SW846 6020 |
| | Lead | 0.000578 | 0.0005 | 0.002 | NE | J | | 089888-009 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 089888-009 | SW846 7470 |
| | Nickel | 0.00449 | 0.0005 | 0.002 | NE | | J+ | 089888-009 | SW846 6020 |
| | Selenium | 0.00257 | 0.001 | 0.005 | 0.050 | J | | 089888-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089888-009 | SW846 6020 |
| | Thallium | 0.000424 | 0.0003 | 0.001 | 0.002 | J | 0.0019U | 089888-009 | SW846 6020 |
| | Tin | ND | 0.001 | 0.005 | NE | U | | 089888-009 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | | 089888-009 | SW846 6020 |
| | Zinc | 0.0222 | 0.0026 | 0.010 | NE | | J+ | 089888-009 | SW846 6020 |

Refer to footnotes on page 3A-21.

## Table 3A-4
## Summary of Field Water Quality Measurements[h],
## Chemical Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Well ID | Sample Date | Temperature ($^{0}$C) | Specific Conductivity (μmho/cm) | Oxidation Reduction Potential (mV) | pH | Turbidity (NTU) | Dissolved Oxygen (% Sat) | Dissolved Oxygen (mg/L) |
|---|---|---|---|---|---|---|---|---|
| **CWL-MW2BL** | 14-Apr-10 | 22.10 | 1107 | 204.5 | 6.70 | 0.12 | 80.1 | 7.09 |
| **CWL-MW4** | 05-Apr-10 | 18.14 | 960 | 59.9 | 6.86 | 4.45 | 63.9 | 6.03 |
| **CWL-MW5L** | 13-Apr-10 | 18.22 | 1083 | 177.8 | 6.74 | 0.20 | 83.8 | 7.99 |
| **CWL-MW5U** | 09-Apr-10 | 17.48 | 919 | 179.0 | 6.93 | 0.23 | 63.7 | 6.08 |
| **CWL-MW6L** | 12-Apr-10 | 20.59 | 1042 | 173.4 | 6.79 | 2.77 | 78.8 | 7.21 |
| **CWL-MW6U** | 07-Apr-10 | 16.33 | 914 | 189.6 | 6.93 | 0.43 | 59.7 | 5.82 |
| | | | | | | | | |
| **CWL-BW5** | 29-Nov-10 | 18.79 | 1050 | 202.0 | 6.97 | 1.59 | 70.9 | 6.60 |
| **CWL-MW9** | 01-Dec-10 | 19.62 | 924 | -6.7 | 7.11 | 0.94 | 22.4 | 2.05 |
| **CWL-MW10** | 06-Dec-10 | 18.25 | 880 | 375.2 | 7.24 | 8.45 | 20.3 | 1.90 |
| **CWL-MW11** | 14-Dec-10 | 19.05 | 982 | 395.2 | 7.05 | 4.09 | 57.2 | 5.29 |

Refer to footnotes on page 3A-21.

## *Footnotes for Chemical Waste Landfill Groundwater Monitoring Tables*

**[a]Result**

- Values in bold exceed the established MCL.
- ND = not detected (at method detection limit).
- µg/L = micrograms per liter.
- mg/L = milligrams per liter.

**[b]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.

**[c]PQL**

Practical quantitation limit. The lowest concentration of analytes in a sample that can be reliably determined within specified limits of precision and accuracy by that indicated method under routine laboratory operating conditions.

**[d]MCL**

- Maximum contaminant level. Established by the U.S. Environmental Protection Agency Primary Water Regulations (40 CFR 141.11[b]), National Primary Drinking Water Standards, EPA, May 2009.
- NE = not established.

**[e]Laboratory Qualifier**

B = Analyte is detected in associated laboratory method blank.
J = Amount detected is below the practical quantitation limit (PQL).
U = Analyte is absent or below the method detection limit.

**[f]Validation Qualifier**

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.
J+ = The associated numerical value is an estimated quantity with suspected positive bias.
J- = The associated numerical value is an estimated quantity with a suspected negative bias.
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.
R = The data are unusable. Re-sampling and re-analysis are necessary for verification.

**[g]Analytical Method**

- EPA, 1979, "Methods for Chemical Analysis of Water and Wastes," EPA-600/4-79-020, U.S. Environmental Protection Agency, Cincinnati, Ohio.
- EPA, 1986, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3rd ed., Rev. 1, U.S. Environmental Protection Agency, Washington, D.C.
- U.S. Environmental Protection Agency, Washington, D.C.

**[h]Field Water Quality Measurements**

- Field measurements collected prior to sampling.

°C = degrees Celsius.
% Sat = present saturation.
µmho/cm = micromhos per centimeter.
mg/L = milligrams per liter.
mV = millivolts.
NTU = nephelometric turbidity units.
pH = potential of hydrogen (negative logarithm of the hydrogen ion concentration).

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# Attachment 3B
# Chemical Waste Landfill
# Hydrographs

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# Attachment 3B Hydrographs

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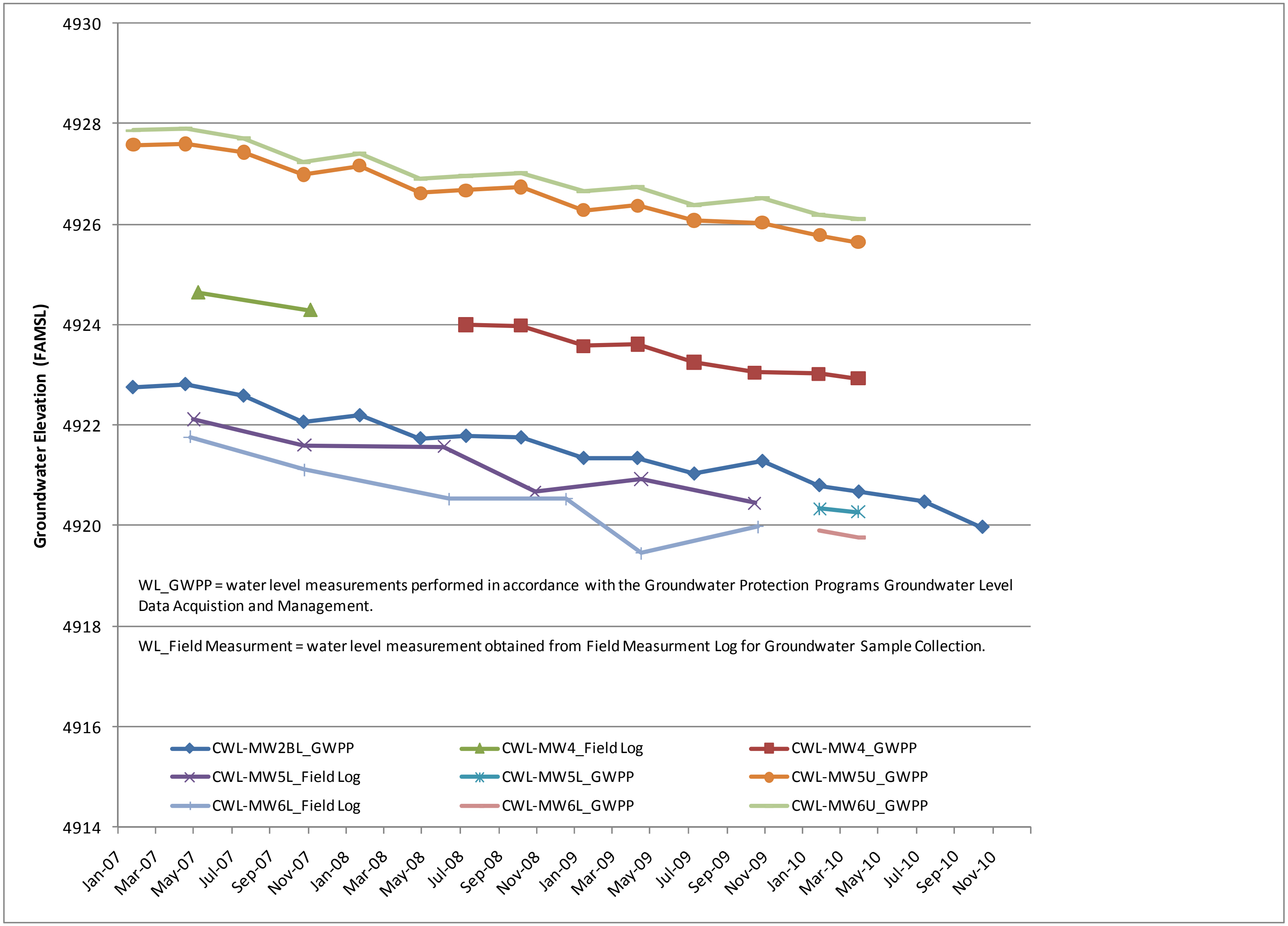


**Figure 3B-1. CWL Water Table Hydrographs for the April 2010 Monitoring Wells**

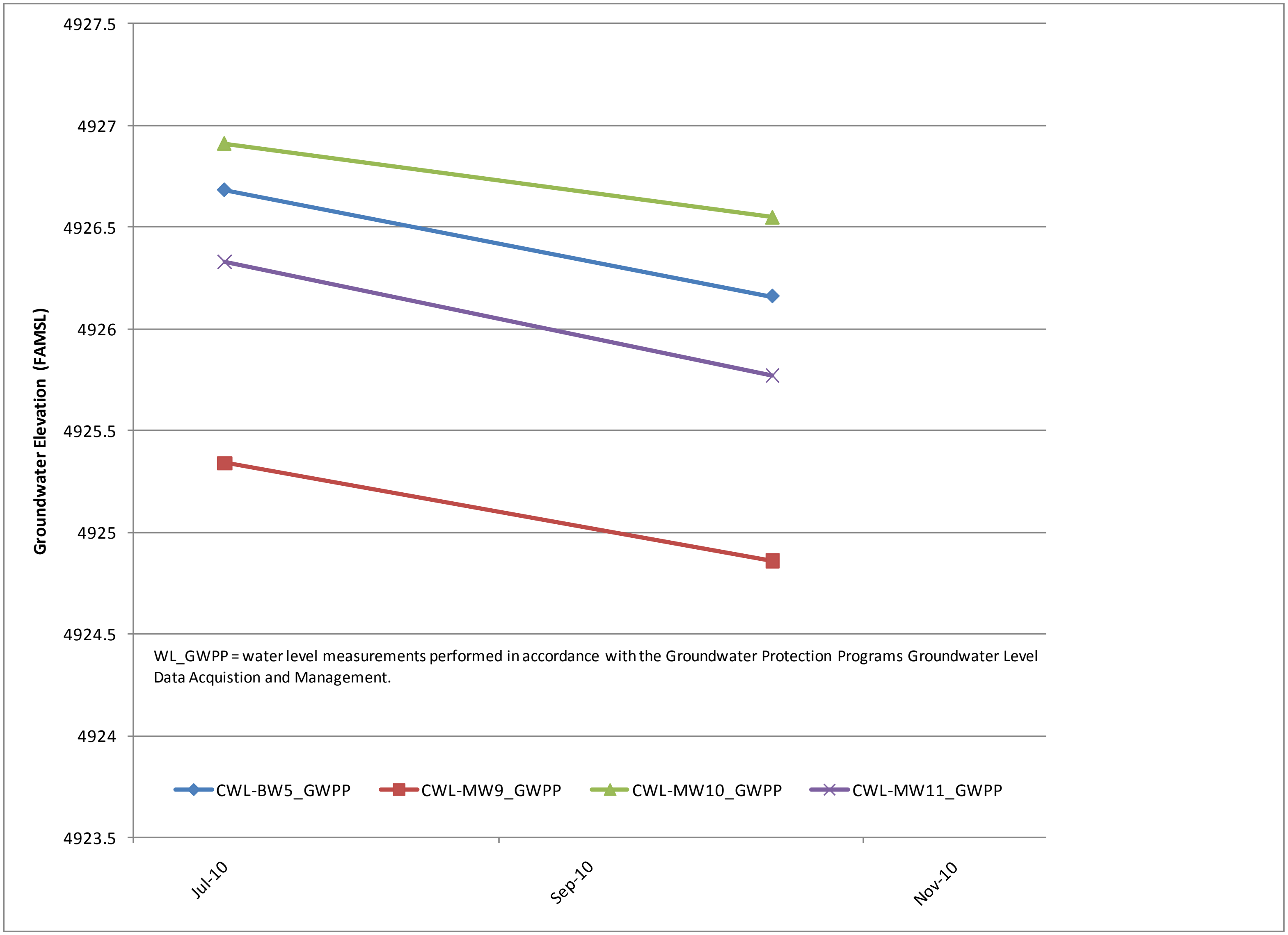


**Figure 3B-2. CWL Water Table Hydrographs for the November-December 2010 Monitoring Wells**

# 4.0 Mixed Waste Landfill

## 4.1 Introduction

The Mixed Waste Landfill (MWL) is a 2.6-acre site in the north-central portion of Technical Area III at Sandia National Laboratories, New Mexico (SNL/NM) (Figure 4-1). The MWL consists of two distinct disposal areas: the classified area (occupying 0.6 acres) and the unclassified area (occupying 2.0 acres). Approximately 100,000 cubic feet of low-level radioactive and mixed waste containing approximately 6,300 curies (at the time of disposal) of activity were disposed of in the MWL from March 1959 through December 1988. Classified wastes were buried in cylindrical pits in the classified area and unclassified wastes were buried in shallow trenches in the unclassified area.

The Phase 1 Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) was conducted in 1989 and 1990 to determine whether a release of RCRA contaminants had occurred at the MWL (SNL September 1990). The Phase 1 RFI indicated that tritium had been released to the environment. A Phase 2 RFI was conducted from 1992 to 1995 to determine the contaminant source, define the nature and extent of contamination, identify potential contaminant transport pathways, evaluate potential risks, and provide remedial action alternatives for the MWL (Peace et al. 2002).

The Phase 2 RFI confirmed tritium as the constituent of concern (COC) in soil at the MWL. Tritium occurs in surface and near-surface soil in and around the classified area. Tritium levels range from 1,100 picocuries per gram (pCi/g) in surface soil to 206 pCi/g in subsurface soil. The highest tritium levels have been found within 30 feet (ft) below ground surface (bgs) in soil adjacent to and directly below classified area disposal pits. At depths greater than 30 ft bgs, tritium levels decrease rapidly. At approximately 100 ft bgs, the highest tritium level detected has been 0.074 pCi/g, and at 120 to 140 ft bgs, maximum tritium levels have been 0.029 pCi/g.

On October 11, 2001, the New Mexico Environment Department (NMED) directed the U.S. Department of Energy (DOE) and Sandia Corporation (Sandia) to conduct a Corrective Measures Study (CMS) for the MWL (SNL December 2001a). The MWL CMS Report (SNL/NM May 2003) was submitted to the NMED on May 21, 2003, for technical review and comment and recommended that an alternative vegetative soil cover (i.e., evapotranspirative [ET] cover) be deployed as the preferred corrective measure for the MWL. The NMED held a public comment period on the MWL CMS from August 11 to December 9, 2004, and a public hearing was held from December 2 to December 3 and December 8 to December 9, 2004. On May 26, 2005, the Secretary of the NMED selected a vegetative ET cover with a biointrusion barrier as the final remedy for the MWL. The selection was documented in the NMED *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* (NMED May 2005), which also required a Corrective Measures Implementation Plan (CMIP). The MWL CMIP (SNL/NM November 2005) was submitted to the NMED in November 2005. The NMED conditionally approved the CMIP in December 2008 after resolution of two Notices of Disapproval (NODs) (Bearzi December 2008). The MWL ET cover construction was completed from May through September 2009.

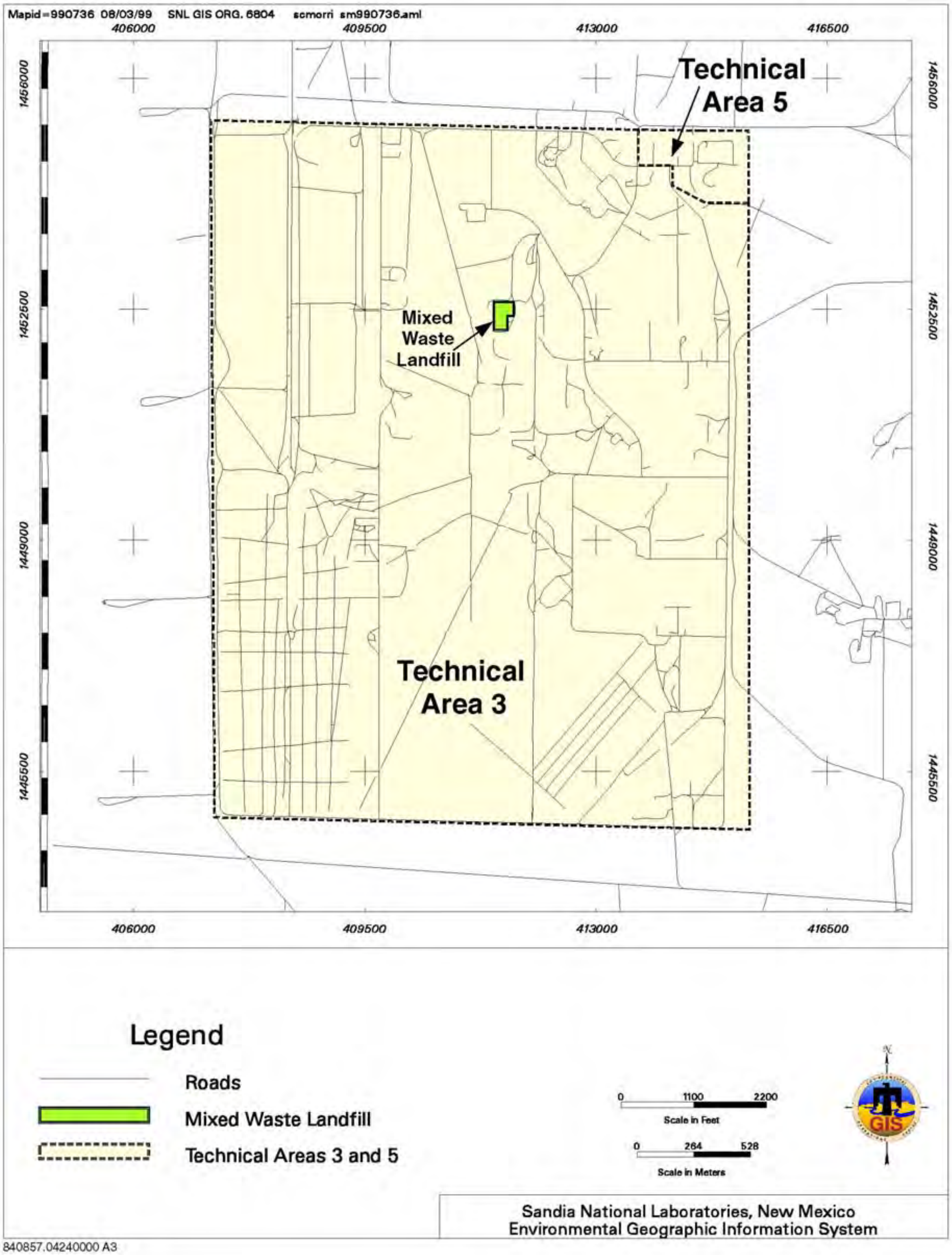


**Figure 4-1. Location of the Mixed Waste Landfill within Technical Area III**

### 4.1.1 Monitoring History

The original groundwater monitoring well network at the MWL (MWL-BW1, MWL-MW1, MWL-MW2, and MWL-MW3) was installed in 1989. In 1993 MWL-MW4 was completed at an angle of 6 degrees from vertical and was screened at two discrete intervals 20 ft apart to evaluate vertical potentiometric gradients and changes in aquifer parameters with depth. An inflatable packer separates the screened intervals, and pressure is maintained in the packer to prevent combining water from the two screened sections of the aquifer. Monitoring wells MWL-MW5 and MWL-MW6 were installed in 2000 at a distance of approximately 200 and 500 ft west of the landfill, respectively, with their screened intervals placed below the top of the regional water table in the coarse-grained Ancestral Rio Grande (ARG) deposits.

The MWL groundwater monitoring network was modified in 2008 (SNL May 2009a). Due to the declining water table and stainless screen corrosion, four monitoring wells were plugged and abandoned (MWL-BW1, MWL-MW1, MWL-MW2, and MWL-MW3) and four new monitoring wells were installed (MWL-BW2, MWL-MW7, MWL-MW8, and MWL-MW9) (SNL April 2008 and September 2008). The four wells installed in 2008 comprise the MWL groundwater monitoring network for the uppermost part of the regional aquifer and were approved by the NMED (Bearzi October 2008 and January 2009).

Wells MWL-MW7, MWL-MW8, MWL-MW9, and MWL-BW2 were considered new wells and, as required by the Compliance Order on Consent (the Order) (NMED 2004), were sampled a minimum of eight consecutive quarters for a defined suite of parameters in addition to sampling for perchlorate for at least four consecutive quarters. The four consecutive quarters of perchlorate sampling were completed in Calendar Year (CY) 2009 with no detections at or above the screening level of 4 micrograms per liter (µg/L); therefore, these wells have been removed from the perchlorate monitoring network. The required eight quarterly sampling events were completed in CY 2010. Wells MWL-MW4, MWL-MW5, and MWL-MW6 are preexisting wells and are sampled on an annual basis. All MWL wells are now being sampled annually as required by the Order.

Figure 4-2 shows the current groundwater monitoring network consisting of seven wells completed within the interfingering, fine-grained, alluvial fan deposits (MWL-BW2, MWL-MW4 uppermost screened interval, MWL-MW7, MWL-MW8, and MWL-MW9) and coarse-grained ARG alluvial deposits (MWL-MW4 lower screened interval, MWL-MW5, and MWL-MW6). All seven MWL wells are constructed of 5-inch, Schedule 80 polyvinyl chloride (PVC) casing and have screens composed of slotted Schedule 80 PVC.

During construction of the ET cover on May 27, 2009, the packer at MWL-MW4 was removed to allow the well casing to be extended. The packer was serviced and reinstalled on March 4, 2010. References in this report to groundwater samples and water levels from MWL-MW4 refer to groundwater withdrawn or measured from the upper screened interval, and references made to the bottom of this well refer to the depth to the top of the packer.

In April 2010 the DOE and Sandia received a letter from the NMED entitled *Toluene Detections in Groundwater*, which required further investigation to determine the source of very low toluene concentrations in some groundwater samples collected from the MWL in 2008 through early 2010, including conducting a purging/sampling study of the groundwater along with any other studies necessary to determine the source (Bearzi April 2010). DOE/Sandia submitted the *MWL Toluene Investigation Report* in August 2010 and received an NOD with two comments from the NMED in September 2010 (Bearzi September 2010). The DOE/Sandia NOD response (Wagner October 2010) that included a revised version of the report (SNL/NM October 2010) was submitted to the NMED in October 2010 and was approved in January 2011 (Bearzi January 2011).

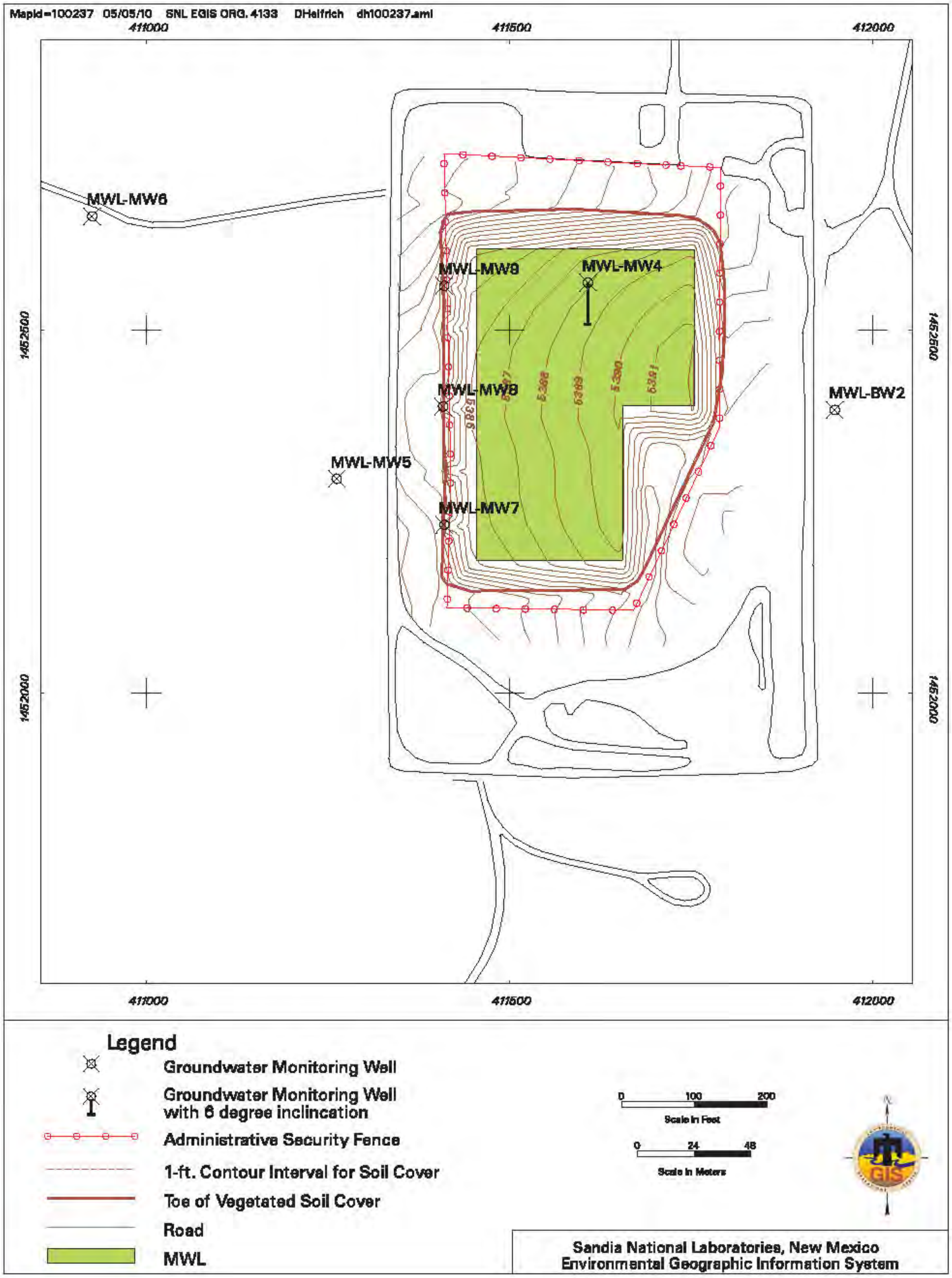


**Figure 4-2. Location of Groundwater Monitoring Wells at the Mixed Waste Landfill**

Groundwater at the MWL has been extensively characterized since 1990 for major ion chemistry, volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), nitrate, metals, radionuclides, and perchlorate. Twenty years of data indicate that groundwater has not been contaminated by releases from the MWL (Goering et al. 2002; SNL December 2001b, January 2002, July 2002, October 2002, June 2003, September 2003, July 2004; Lyon and Goering January 2006; SNL November 2006, January 2008, May 2009a, June 2010, and October 2010).

### 4.1.2 Monitoring Network

The current groundwater monitoring network at the MWL consists of seven wells, as shown in Figure 4-2 and listed in Table 4-1. The upper interval of monitoring well MWL-MW4 was sampled in 2010, as this interval represents the uppermost portion of the regional aquifer beneath the MWL. Table 4-1 shows the quarterly and annual monitoring events conducted during CY 2010 for each of the MWL wells.

**Table 4-1. Calendar Year 2010 Groundwater Sampling Events, Mixed Waste Landfill**

| Well ID | Installation Year | WQ | WL | January 2010 | April 2010 | July 2010 |
|---|---|---|---|---|---|---|
| **MWL-BW2** | 2008 | ✓ | ✓ | 8th quarter sampling | 9th quarter sampling | 10th quarter sampling |
| **MWL-MW4** | 1993 | ✓ | ✓ | – | Annual sampling | – |
| **MWL-MW5** | 2000 | ✓ | ✓ | – | Annual sampling | – |
| **MWL-MW6** | 2000 | ✓ | ✓ | – | Annual sampling | – |
| **MWL-MW7** | 2008 | ✓ | ✓ | 7th quarter sampling | 8th quarter sampling | 9th quarter sampling |
| **MWL-MW8** | 2008 | ✓ | ✓ | 7th quarter sampling | 8th quarter sampling | 9th quarter sampling |
| **MWL-MW9** | 2008 | ✓ | ✓ | 7th quarter sampling | 8th quarter sampling | 9th quarter sampling |

**NOTES:** [1] Refer to page xviii of this report for well descriptions. Check marks in the WQ and WL columns indicate WQ sampling and WL measurements during the period from January to December 2010.

MWL = Mixed Waste Landfill.
ID = Identification.
WL = Water level.
WQ = Water quality.

### 4.1.3 Summary of Activities

Quarterly and annual groundwater sampling were conducted during CY 2010 at the MWL in January, April, and July as summarized in Table 4-1. Groundwater samples were collected from seven monitoring wells and analyzed for VOCs, Target Analyte List (TAL) metals plus uranium, anions (as bromide, chloride, fluoride, and sulfate), total alkalinity, nitrate plus nitrite (NPN), gamma spectroscopy, gross alpha, gross beta, and tritium. Additional samples were collected and analyzed for SVOCs (January and April), low-level tritium (April), and isotopic uranium and radon-222 (July). Attachment 4A provides summary tables for the CY 2010 analytical results. The July sampling event was the last quarterly event for the wells installed in 2008 (MWL-BW2, MWL-MW7, MWL-MW8, and MWL-MW9). This report and the Environmental Restoration MWL Annual Groundwater Monitoring Report for CY 2010 (SNL July 2011, in preparation) provide a complete summary of the CY 2010 sampling events.

### 4.1.4 Summary of Future Activities

The MWL Corrective Measures Implementation (CMI) Report (SNL January 2010a) documents the construction of the MWL ET cover and was submitted to the NMED on January 26, 2010. The topography of the ET cover and side slopes is shown in Figure 4-2. After NMED approval of the CMI Report, DOE and Sandia will revise the 2007 MWL Long-Term Monitoring and Maintenance Plan and submit the revised plan to the NMED for review and approval. The plan will define the long-term monitoring, maintenance, inspection, and repair requirements for the MWL.

### 4.1.5 Conceptual Site Model

Tritium and VOCs are identified as the COCs at the MWL based upon the Phase 2 RFI, CMIP, and more than 20 years of groundwater monitoring. A detailed conceptual site model is provided in the

MWL Phase 2 RFI Report (Peace et al. 2002) and the *MWL Groundwater Report, 1990 through 2001* (Goering et. al. 2002).

SNL/NM is located within Kirtland Air Force Base (KAFB) in the eastern portion of the Albuquerque Basin. Groundwater at the MWL is present at approximately 500 ft bgs in unconsolidated Santa Fe Group deposits (i.e., fine-grained alluvial deposits). Groundwater recharge occurs by infiltration of precipitation from the mountains to the east. Recharge from infiltration of precipitation at the MWL is negligible due to high evapotranspiration, low precipitation, and dry Santa Fe Group deposits. At KAFB, regional groundwater flows generally westward toward the Rio Grande, but local perturbations in the water table occur due to pumping wells and geologic (i.e., lithologic and structural) controls. Pumping by the City of Albuquerque and KAFB have profoundly modified the natural groundwater flow regime (Reeder et al. 1967 and Kues 1987) creating a trough in the water table in the western and northeastern portions of KAFB. MWL groundwater monitoring records indicate that groundwater is declining an average of approximately 0.8 ft/year (Goering et. al. 2002). Hydrographs for the MWL groundwater monitoring wells are provided in Attachment 4B.

A generalized conceptual model integrating new information from the installation and monitoring of the four wells installed in 2008 is presented in the MWL Annual Groundwater Monitoring Report for CY 2009 (SNL June 2010). In summary, the geology of the upper portion of the regional groundwater system, which is in general a stratified system, varies with depth from a low hydraulic conductivity layer (in which MWL-MW2 and MWL-MW3 are screened) to a medium conductivity layer (in which the lower parts of the screens of MWL-MW7, MWL-MW8, and MWL-MW9 reside) to a high conductivity layer corresponding to the ARG sediments (in which at least part of the screen intervals of MWL-MW4 [lower screen], MWL-MW5, and MWL-MW6 are located). The uppermost surface of the regional aquifer continues to decline as a result of historic and ongoing large-scale removal of water by the City of Albuquerque and KAFB. The overall effect at the MWL is that groundwater flow is predominantly vertically downward in the lower and medium conductivity layers in response to this regional drawdown from pumping (i.e., a draining system). Figure 4-3 shows the October 2010 potentiometric surface of the regional aquifer beneath the MWL and the groundwater flow direction to the west-northwest. The trough in the regional aquifer described above is located to the west of the MWL.

## 4.2 Regulatory Criteria

Historically, the NMED Hazardous Waste Bureau (HWB) has provided regulatory oversight of the MWL as Solid Waste Management Unit (SWMU) 76 under the Hazardous and Solid Waste Amendments module of the facility RCRA permit. The NMED confirmed that the MWL is properly designated as a SWMU (Dinwiddie June 1998) and, as such, must comply with the corrective action program defined in Title 20, New Mexico Administrative Code, Section 4.1.50, incorporating Title 40, Code of Federal Regulations (CFR), Section 264.101. The requirements for corrective action at the MWL, including those for groundwater monitoring, are established through the corrective measures process.

The NMED issued the Order in April 2004, which transferred the regulatory authority for groundwater sampling at the MWL to the Order (NMED 2004). This report has been formatted to address the content criteria set forth in the Order for Periodic Monitoring Reports.

Although radionuclides are being monitored and screened at the MWL, the information related to radionuclides is provided voluntarily by the DOE and Sandia. The voluntary inclusion of such radionuclide information shall not be enforceable and shall not constitute the basis for any enforcement because such information falls wholly outside the requirements imposed by the NMED, as specified in Section III.A of the Order (NMED 2004).

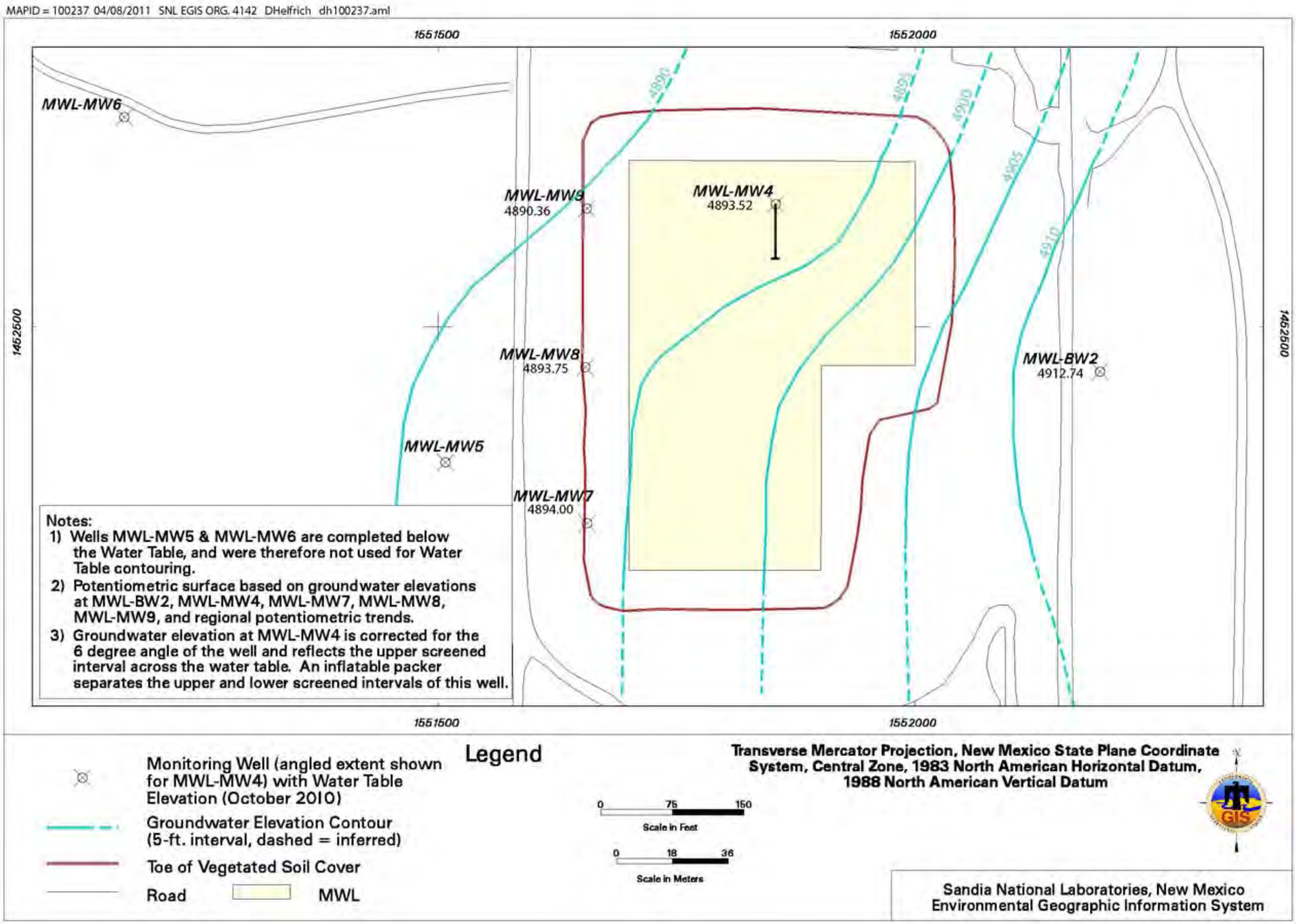


**Figure 4-3. Localized Potentiometric Surface of the Basin Fill Aquifer at the Mixed Waste Landfill**

## 4.3 Scope of Activities

Quarterly and annual groundwater sampling are summarized in Section 4.1.3 for CY 2010. As part of the toluene investigation discussed in Section 4.1.1, additional VOC samples were collected during the purging process at each well in April. The April VOC purging/sampling study results are presented in the *MWL Toluene Investigation Report* (SNL October 2010).

The NMED DOE Oversight Bureau (OB) participated in all sampling events and received split samples that were submitted to a different laboratory for analysis. During April, the NMED DOE OB requested additional samples for low-level tritium analysis at each location except MWL-BW2. To ensure a consistent level of quality assurance for these analyses, SNL/NM personnel also collected samples for low-level tritium at these MWL monitoring wells. The NMED DOE OB split sampling results are presented in a separate report and not included in this report. Table 4-2 lists the analytical parameters and MWL wells sampled.

The MWL groundwater samples were submitted for analysis to GEL Laboratories, Inc. (GEL) in Charleston, South Carolina, except for the low-level tritium samples that were sent to GEL in Richland, Washington. All groundwater sampling results are compared with U.S. Environmental Protection Agency (EPA) maximum contaminant levels (MCLs) for drinking water supplies (EPA 2001 and 2009). The analytical results are summarized in Attachment 4A, Tables 4A-1 through 4A-7.

Field and laboratory quality control (QC) samples were prepared to determine the accuracy of the methods used and to detect inadvertent sample contamination that may have occurred during the sampling and analysis process. Field QC samples included environmental duplicate, equipment blank (EB), field blank (FB), and trip blank (TB) samples. Laboratory QC analyses performed included method blank, laboratory control sample, matrix spike, matrix spike duplicate, and surrogate spike analyses.

Water quality parameters for groundwater temperature, specific conductance (SC), and pH were measured using a YSI™ Model 620 Water Quality Meter during the purging process. Turbidity was measured with a Hach™ Model 2100P portable turbidity meter.

## 4.4 Field Methods and Measurements

Groundwater elevation and water quality field measurements were obtained during groundwater sampling activities. Field water quality parameters are presented in Table 4A-8 (Attachment 4A). Depth-to-groundwater measurements were obtained using a Solinst™ depth-to-water well sounder prior to purging activities. Depth-to-groundwater measurements were performed in accordance with the Field Operating Procedure (FOP), *Long-Term Environmental Stewardship Groundwater Monitoring Well Sampling and Field Analytical Measurements,* FOP 05-01 (SNL August 2007). Groundwater elevation measurements at the MWL monitoring wells from CY 2007 through CY 2010 are presented in Attachment 4B, Figure 4B-1. The October 2010 potentiometric surface for the regional aquifer beneath the MWL is shown in Figure 4-3.

**Table 4-2. Analytical Parameters at MWL Monitoring Wells for Each Sampling Period**

<table>
<tr><th>Analytical Parameter</th><th>January</th><th>April</th><th>July</th></tr>
<tr><td>Total Metals<br>TAL and Uranium</td><td rowspan="7">MWL–BW2, MWL–MW7, MWL–MW7 (dup), MWL–MW8, and MWL–MW9</td><td rowspan="2">MWL–BW2, MWL–BW2 (dup), MWL–MW4, MWL–MW5, MWL–MW5 (dup), MWL–MW6, MWL–MW7, MWL–MW8, and MWL–MW9</td><td rowspan="2">MWL–BW2, MWL–MW7, MWL–MW7 (dup), MWL–MW8, and MWL–MW9</td></tr>
<tr><td>Volatile Organic Compounds</td></tr>
<tr><td>Semivolatile Organic Compounds</td><td>MWL–MW7, MWL–MW8, and MWL–MW9</td><td>NA</td></tr>
<tr><td>Nitrate plus Nitrite (as nitrogen)</td><td rowspan="4">MWL–BW2, MWL–BW2 (dup), MWL–MW4, MWL–MW5, MWL–MW5 (dup), MWL–MW6, MWL–MW7, MWL–MW8, and MWL–MW9</td><td rowspan="6">MWL–BW2, MWL–MW7, MWL–MW7 (dup), MWL–MW8, and MWL–MW9</td></tr>
<tr><td>Major Anions<br>Bromide, Fluoride, Chloride, and Sulfate</td></tr>
<tr><td>Total Alkalinity as Calcium Carbonate</td></tr>
<tr><td>Radionuclides<br>Gamma-Emitting Radionuclides<br>Gross Alpha Activity<br>Gross Beta Activity<br>Tritium</td></tr>
<tr><td>Isotopic Uranium</td><td>NA</td><td>NA</td></tr>
<tr><td>Radon-222</td><td>NA</td><td>NA</td></tr>
<tr><td>Low-Level Tritium</td><td>NA</td><td>All wells except MWL–BW2</td><td>NA</td></tr>
</table>

**NOTES:**
dup = Duplicate.
MWL = Mixed Waste Landfill.
NA = Not analyzed.
TAL = Target Analyte List.

A Bennett™ sampling system was used to collect the groundwater samples from all MWL monitoring wells. The pump intake was set near or at the bottom of the screened interval. The minimum flow rate, given limitations of equipment and well characteristics, was used for all purging and sampling activities. Minimum purge requirements for wells that do not produce one saturated casing volume of water before going dry are different; these monitoring wells were purged to dryness, allowed to recover, and then sampled to collect the most representative groundwater sample possible given the low yield of the wells. During CY 2010, monitoring wells MWL-MW4, MWL-MW8 and MWL-MW9 were purged to dryness prior to removing one saturated casing volume and obtaining one set of four stable water quality measurements. The wells were allowed to recover and then sampled in accordance with the Mini-Sampling and Analysis Plans (SAPs) (SNL January 2010b, April 2010, and July 2010).

In accordance with procedures described in SNL/NM FOP 05-01 (SNL August 2007), all other wells were purged a minimum of one saturated casing volume (the volume of one length of the saturated screen plus the borehole annulus around the saturated screen interval). Purging continued until four stable water quality measurements for turbidity, pH, temperature, and SC were obtained from the well prior to the collection of groundwater samples. Groundwater stability is considered acceptable when measurements are equal to or within 10 percent of 5 nephelometric turbidity units, pH is within 0.1 units, temperature is within 1.0 degree Celsius, and SC is within 5 percent.

Groundwater samples collected after the purging process were submitted to off-site laboratories (GEL) following analysis request/chain of custody protocol.

## 4.5 Analytical Methods

The analytical laboratory analyzed samples using EPA-approved analytical methods (EPA 1979 and 1986) and specified performance criteria in accordance with the *SNL/NM Statement of Work for Analytical Laboratories* (SNL May 2009b). Prior to each sampling event, the analytical laboratory provided appropriate sample containers prepared with the required sample preservative. Table 4-3 summarizes analytical parameters, EPA Methods (EPA 1986), container types, and holding times applicable to groundwater sampling at the MWL during CY 2010.

**Table 4-3. MWL Analyses, Methods, Sample Containers, Preservatives, and Holding Times**

| Analysis | Method[a] | Container Type/ Volume/Preservative | Holding Time |
|---|---|---|---|
| Total Metals (TAL and Uranium) | SW846-6020/7470A | Polyethylene; 500 mL; $HNO_3$; 4°C | 28 days/180 days[b] |
| Volatile Organic Compounds | SW846-8260B | Glass; 3 x 40 mL; HCl; 4°C | 14 days |
| Semivolatile Organic Compounds | SW846-8270 | Amber Glass, 3 x 1 L; None; 4°C | 7 days |
| Nitrate plus Nitrite (as nitrogen) | EPA 353.2 | Polyethylene; 250 mL; $H_2SO_4$; 4°C | 28 days |
| Major Anions<br>Total Alkalinity | EPA 353.2<br>SM2320B | Polyethylene; 500 mL; None; 4°C | 28 days Anions<br>14 days Alkalinity |
| Gamma-Emitting Radionuclides | EPA 901.1 | Polyethylene; 1 L; $HNO_3$ | 180 days |
| Gross Alpha/Beta | EPA 900.0 | Polyethylene; 1 L; $HNO_3$ | 180 days |
| Tritium | EPA 906.0 | Amber Glass; 250 mL; None | 180 days |
| Isotopic Uranium | HASL-300 | Polyethylene; 1 L; None | 180 days |
| Radon-222 | SM 7500-RnB | Glass; 2 x 40 mL; None | 4 days |
| Low-Level Tritium | Liquid Scintillation Method | Glass; 2 x 1 L; None | 365 days |

**NOTES:**

[a]U.S. Environmental Protection Agency, 1979, *Methods for Chemical Analysis of Water and Wastes*, EPA-600/4-79-020, U.S. Environmental Protection Agency, Cincinnati, Ohio.

U.S. Environmental Protection Agency, 1980, *Prescribed Procedures for Measurement of Radioactivity in Drinking Water*, EPA-600/4-80-032, U.S. Environmental Protection Agency, Cincinnati, Ohio

U.S. Environmental Protection Agency, November 1986, *Test Methods for Evaluating Solid, Physical/Chemical Methods,* 3rd ed., (and updates), SW-846, Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, D.C.; or Clesceri, Greenburg, and Eaton, 1998, *Standard Methods for the Examination of Water and Wastewater*, 20th ed., Method 2320B.

U.S. Department of Energy, Environmental Measurements Laboratory, 1990, *EML Procedures Manual*, 27th ed., Vol. 1, Rev. 1992, HASL-300.

Beckman, 1998, *Standard Methods for the Examination of Water and Wastewater*, *7500-Rn B Method*, 20th ed., Beckman LS5000TD Liquid Scintillation System Operation Manual, May 1988.

[b]Holding time for mercury is 28 days; all other metals are 180 days.

°C = Degree(s) Celsius.
EPA = U.S. Environmental Protection Agency.
$H_2SO_4$ = Sulfuric acid.
HCl = Hydrochloric acid.
$HNO_3$ = Nitric acid.
L = Liter(s).
mL = Milliliter(s).
MWL = Mixed Waste Landfill.
SM = Standard Method.
TAL = Target Analyte List.

## 4.6 Summary of Analytical Results

The results for chemical, general chemistry, and radiological constituent analyses are presented in Attachment 4A, Tables 4A-1 through 4A-7. Field water quality measurements are presented in Attachment 4A, Table 4A-8. All results are compared with established EPA MCLs where applicable; no constituents were detected above established MCLs during CY 2010. Data qualifiers from the data validation process are presented with the associated results in the Attachment 4A tables. Data validation and QC sample results associated with each sampling event are discussed in Section 4.7.

### 4.6.1 Volatile and Semivolatile Organic Compounds

Detected VOCs and SVOCs are presented in Attachment 4A, Table 4A-1. No VOCs or SVOCs were detected in any sample except for the VOCs toluene, chloromethane, and acetone. Toluene was detected in five January samples (one of which was a duplicate sample) including the sample from the background well MWL-BW2. Toluene concentrations ranged from 0.285 to 1.45 μg/L. All detections were very low concentrations and, of the five sample results, three were below the practical quantitation limit (PQL) of 1.00 μg/L. No toluene detections were reported for the April and July samples, including the April purging/sampling study samples (34 samples and 14 field QC samples; SNL October 2010). Chloromethane was detected in two samples below the PQL of 1.00 μg/L, and acetone was detected below the PQL of 10.0 μg/L. Neither constituent has an established MCL.

During the April groundwater sampling event, two detections of methylene chloride (MWL-MW5 primary and duplicate samples) and one detection of toluene were qualified as not detected during data validation due to associated laboratory method blank contamination (Section 4.7). Laboratory method detection limits (MDLs) for all VOCs and SVOCs are presented in Attachment 4A, Table 4A-2.

### 4.6.2 General Chemistry Parameters

The general chemistry analytical results are presented in Attachment 4A, Tables 4A-3 and 4A-4. No general chemistry parameters exceed established MCLs in the groundwater samples. The only two parameters that have established MCLs are NPN (as nitrogen) and fluoride (10 and 4 milligrams per liter [mg/L], respectively). Concentrations of NPN (as nitrogen) ranged from 0.900 mg/L in the July MWL-MW8 sample to 3.59 mg/L in the April MWL-MW7 sample. Fluoride was detected at concentrations ranging from 0.642 mg/L in the January MWL-BW2 sample to 1.05 mg/L in the April MWL-MW9 sample.

### 4.6.3 Metals

Metal analysis includes two sets of analyses and results, filtered and unfiltered. Groundwater samples obtained for total metal analyses are collected without filtering. Dissolved metal samples are collected by filtering the sample prior to analysis (SNL August 2007). The difference in concentrations between the total and dissolved fraction may be attributed to the original metallic ion content of the particles and any sorption of ions to the suspended particles.

Table 4A-5 (Attachment 4A) summarizes the metal results, including total uranium, from all unfiltered groundwater samples collected during the CY 2010 groundwater monitoring events at the MWL. Samples were analyzed for TAL metals according to EPA Method 6020 (EPA 1986). No metals were detected in the unfiltered samples at concentrations that exceeded the established MCLs, and the results are consistent with those for previous sampling events at the MWL.

Table 4A-6 (Attachment 4A) summarizes the metal results, including total uranium, for the filtered samples collected during the CY 2010 groundwater monitoring events. No detections of any metals in the filtered samples exceeded the respective MCLs, and the results are consistent with those for previous sampling events at the MWL.

### 4.6.4 Radiological Parameters

Groundwater samples from the MWL monitoring wells were screened for gamma-emitting radionuclides, gross alpha/beta activity, and tritium. The results for tritium, gross alpha/beta, gamma spectroscopy, and low-level tritium (April only) analyses are presented in Table 4A-7 (Attachment 4A) and are compared with the established EPA MCLs (no MCL has been established for tritium).

Gamma spectroscopy activity levels for short-list radionuclides are less than the associated minimum detectable activity (MDA). Potassium-40 in the January MWL-MW7 environmental sample was qualified as unusable during data validation as the laboratory rejected the result due to the peak not meeting identification criteria. The potassium-40 activity in the MWL-MW7 duplicate sample was less than the associated MDA.

Radioisotopic analyses included gross alpha/beta activity and tritium analyses (all sampling events) and isotopic uranium and radon-222 (July). The gross alpha measurements were corrected for naturally occurring uranium activity according to 40 CFR Parts 9, 141, and 142, Table I-4. No gross alpha results exceeded the MCL of 15 picocuries per liter (pCi/L), and gross beta activity screening results did not exceed established limits. Isotopic uranium activities were below NMED HWB background concentrations. Radon-222 was reported below the NMED HWB background of 300 pCi/L in all groundwater samples, except the July sample from MWL-BW2 that had an activity of 494 ± 132 pCi/L. Tritium activity levels were below laboratory MDAs in all groundwater samples (i.e., tritium was not detected). However, as it is a COC at the MWL, the results are presented in Table 4A-7.

All April low-level tritium results were reported as nondetections except for the MWL-MW6 sample result (1.22 pCi/L). This result was slightly higher than the PQL of 1.18 pCi/L, but was qualified as estimated during data validation.

#### 4.6.5 Water Quality Parameters

The field water quality parameters represent readings measured immediately before sampling. The CY 2010 results for MWL wells are presented in Attachment 4A, Table 4A-8.

## 4.7 Quality Control Results

Field and laboratory QC samples were used to determine the accuracy of the methods used and to monitor for inadvertent sample contamination that can occur during the sampling and analysis process. All data were reviewed in accordance with AOP [Administrative Operating Procedure] 00-03, *Data Validation Procedure for Chemical and Radiochemical Data* (SNL July 2007). The results for each QC analysis and the impact on data quality are discussed in the following sections.

### 4.7.1 Field Quality Control Samples

The QC samples collected in the field included EB, TB, FB, and field duplicate samples. TB samples are submitted whenever samples are collected for VOC analysis to assess whether contamination of the samples occurred during shipment and storage. FB samples provide a check for potential ambient sources of sample contamination during the sampling process and/or sampling error. EB samples are collected to verify the effectiveness of the sampling equipment decontamination process, and duplicate samples are collected immediately after the environmental sample to provide information about sampling variability. The field QC samples were submitted for analysis along with the groundwater samples in accordance with the MWL Mini-SAPs (SNL January 2010b, April 2010, and July 2010). The following sections discuss the analytical results for each QC sample type.

#### 4.7.1.1 Duplicate Environmental Samples

Duplicate groundwater samples were collected at MWL-MW7 (January and July) and MWL-BW2 and MWL-MW5 (April). Relative percent difference (RPD) calculations were performed for all detected chemical analytes for duplicate samples to measure sample variability.

The MWL Mini-SAPs (SNL January 2010b, April 2010, and July 2010) do not specify QC acceptance criteria for duplicate sample data; however, duplicate sampling results show good correlation (low RPD values less than or equal to 20) for all calculated parameters, except aluminum, nickel, vanadium, and zinc. The RPD values for aluminum and vanadium were calculated at 58 and 90, respectively, for the unfiltered MWL-BW2 sample in April; the RPD for zinc was calculated at 44 in the filtered MWL-MW5 sample in April; and the RPD values for nickel and vanadium were calculated at 97 and 23, respectively, for the filtered MWL-MW7 sample in July. The RPD values for these metal parameters are considered estimated values, as reported concentrations are below associated PQLs.

#### 4.7.1.2 Equipment Blank Samples

A total of seven EB samples were collected during the CY 2010 sampling events at the MWL to verify the equipment decontamination process. The EB sampling results are summarized in this section by sampling event.

In January four EB samples were collected prior to sampling each monitoring well. The EB collected prior to sampling MWL-MW7 was submitted for all analytical parameters. EB samples associated with MWL-BW2, MWL-MW8, and MWL-MW9 were submitted for a limited set of parameters including VOCs, SVOCs, and metals. Various organic and inorganic parameters were detected in EB samples. No corrective action was required except for metals. Detected metals included aluminum, arsenic, barium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, nickel, potassium, sodium, and zinc. Metals in associated environmental samples detected at concentrations less than five times the EB result were qualified as not detected during data validation. The number of metals detected in the EB samples may be attributed to new stainless steel water lines installed inside the sampling truck prior to this sampling event as part of the toluene investigation (Section 4.1.1), deionized water quality, sampling equipment, and/or the analytical laboratory.

In April two EB samples were collected prior to sampling monitoring wells MWL-BW2 and MWL-MW5 and submitted for all analyses. Various VOCs, chloride, alkalinity, calcium, chromium, cobalt, copper, iron, magnesium, manganese, sodium, and vanadium were detected in the EB samples. No corrective action was required for detected organic compounds as these compounds were not detected in associated environmental samples. No corrective action was required for chloride, alkalinity, calcium, chromium, iron, magnesium, manganese, or sodium because these parameters either were not detected in the associated environmental samples or were detected in the environmental sample at concentrations greater than five times the blank result. Filtered fractions of cobalt, copper, and vanadium, and unfiltered fractions of copper in associated environmental samples were detected at concentrations less than five times the EB result and were qualified as not detected during data validation.

In July one EB sample was collected prior to sampling monitoring well MWL-MW7 and submitted for all analyses. Bromodichloromethane, chloroform, cadmium, calcium, cobalt, copper, iron, magnesium, zinc, and gross alpha were detected in the EB sample. No corrective action was required for bromodichloromethane, chloroform, cadmium, or zinc as these analytes were not detected in the associated environmental sample. No corrective action was required for calcium, cobalt, or magnesium because these parameters were detected in the environmental sample at concentrations greater than five times the blank result. The environmental sample results for copper, iron, and gross alpha were qualified as not detected during data validation as the results were less than five times the EB result.

#### 4.7.1.3 Field Blank Samples

FB samples were collected at the various sampling locations, stored with the associated environmental samples throughout the sampling process, and returned to the laboratory for VOC analyses with the associated environmental samples to assess whether contamination of the samples resulted from ambient field conditions. The FB samples are prepared by pouring deionized water into sample containers at the sampling point (i.e., in the sampling truck at the well location) to simulate the transfer of environmental samples from the sampling system to the sample container. Based on a recommendation presented in the *MWL Toluene Investigation Report* (SNL October 2010), an FB sample was collected for each MWL sampling location starting with the July sampling event.

In January and April an FB sample was collected at MWL-MW9, and in July four FB samples were collected (MWL-BW2, MWL-MW7, MWL-MW8 and MWL-MW9). Bromodichloromethane, chloroform, and dibromochloromethane were detected in the FB samples. No corrective action was required as these compounds were not detected in the associated environmental samples.

#### 4.7.1.4 Trip Blank Samples

TB samples consist of laboratory reagent grade water with hydrochloric acid preservative contained in 40-milliliter volatile organic analysis vials prepared by the analytical laboratory. These samples accompany the empty sample containers supplied by the laboratory and are brought to the field and accompany each VOC sample shipment. TB sample results are summarized in this section by sampling event.

A total of seven TB samples were submitted with the January samples. No VOCs were detected above associated laboratory MDLs, except chloromethane. Chloromethane was detected in TB samples associated with three EB samples and the MWL-BW2 environmental sample. No corrective action was required as chloromethane was not detected in associated EB samples or the MWL-BW2 environmental sample.

A total of 10 TB samples were submitted with the April samples. No VOCs were detected above associated laboratory MDLs. During data validation, methylene chloride and toluene results were qualified as not detected in TB samples associated with MWL-MW5, MWL-MW8, and both EB samples due to associated laboratory method blank contamination.

A total of five TB samples were submitted with the July 2010 samples. No VOCs were detected above associated laboratory MDLs.

### 4.7.2 Laboratory Quality Control Samples

Internal laboratory QC samples, including method blanks and duplicate laboratory control samples, were analyzed concurrently with the groundwater samples. Additionally, batch matrix spike, matrix spike duplicate, and surrogate spike samples were analyzed. All environmental sample, field QC sample, and laboratory QC sample results were reviewed and qualified in accordance with AOP 00-03, *Data Validation Procedure for Chemical and Radiochemical Data* (SNL July 2007).

Although some analytical results were qualified as not detected or as estimated values during the data validation process, no significant data quality problems were noted for any CY 2010 MWL groundwater monitoring samples. The most significant issue involved the potassium-40 isotope result for the January MWL-MW7 environmental sample, which was qualified as unusable during data validation because the peak did not meet identification criteria. Corrective action was not initiated as potassium-40 is not a primary COC at the MWL, and the result for the corresponding duplicate sample was nondetect. Data validation reports and findings associated with MWL groundwater monitoring are filed in the SNL/NM Customer Funded Records Center.

### 4.8 Variances and Nonconformances

All analytical and field methods were performed according to the requirements specified in the MWL groundwater monitoring Mini-SAPs for Fiscal Year 2010 (SNL January 2010b, April 2010, and July 2010), and there were no variances from the plans.

As addressed in Section 4.7, various parameters have been detected in field QC samples since SNL/NM changed suppliers for deionized water. In particular, various metals and the VOCs bromodichloromethane, chloroform, and dibromochloromethane continue to be detected in the FB samples. DOE and Sandia continue to test and investigate the quality of deionized water currently in use and will make adjustments as necessary.

### 4.9 Summary and Conclusions

Groundwater sampling and analysis were conducted at the MWL during three quarters in 2010 according to the Mini-SAPs generated for each sampling event (SNL January 2010b, April 2010, and July 2010). No organic, inorganic, general chemistry, or radiological constituents were detected at concentrations/activities that exceed the respective established MCLs (where applicable) in the groundwater samples. The groundwater monitoring results for the CY 2010 sampling events are consistent with data from previous sampling events, within the range of historical MWL groundwater data, and indicate the MWL has not impacted groundwater beneath the site. The field and laboratory QC sample and data validation results indicate that the CY 2010 groundwater monitoring data are defensible and representative.

Toluene was detected at very low concentrations in all the groundwater samples in January, but was not detected in any of the samples collected in April and July. The only toluene concentrations detected in the April groundwater and field QC samples, including some of the samples associated with the toluene investigation purging/sampling study, were related to contamination introduced into the samples during the analytical process at the off-site laboratory.

### 4.10 References

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# Attachment 4A
# Mixed Waste Landfill
# Analytical Results Tables

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# Attachment 4A Tables

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## Table 4A-1
## Summary of Detected Volatile and Semivolatile Organic Compounds, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Result[a] (µg/L) | MDL[b] (µg/L) | PQL[c] (µg/L) | MCL[d] (µg/L) | Laboratory Qualifier[f] | Validation Qualifier[g] | Sample No. | Analytical Method[h] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-BW2** 04-Jan-10 | Toluene | 0.438 | 0.250 | 1.00 | 1000 | J | | 087998-001 | SW846-8260B |
| **MWL-MW7** 05-Jan-10 | Toluene | 0.320 | 0.250 | 1.00 | 1000 | J | | 088002-001 | SW846-8260B |
| **MWL-MW7** (Duplicate) 05-Jan-10 | Toluene | 0.285 | 0.250 | 1.00 | 1000 | J | | 088003-001 | SW846-8260B |
| **MWL-MW8** | Chloromethane | 0.338 | 0.300 | 1.00 | NE | J | | 088007-001 | SW846-8260B |
| 06-Jan-10 | Toluene | 1.45 | 0.250 | 1.00 | 1000 | | | 088007-001 | SW846-8260B |
| **MWL-MW9** 07-Jan-10 | Toluene | 1.10 | 0.250 | 1.00 | 1000 | | | 088011-001 | SW846-8260B |
| | | | | | | | | | |
| **MWL-MW5** 20-Apr-10 | Methylene Chloride | 3.95 | 3.00 | 10.0 | 5.00 | B, J | 10.0U | 088918-001 | SW846-8260B |
| **MWL-MW5** (Duplicate) 20-Apr-10 | Methylene Chloride | 3.95 | 3.00 | 10.0 | 5.00 | B, J | 10.0U | 088919-001 | SW846-8260B |
| **MWL-MW6** 19-Apr-10 | Acetone | 7.91 | 3.50 | 10.0 | NE | J | | 088909-001 | SW846-8260B |
| **MWL-MW8** 26-Apr-10 | Toluene | 0.260 | 0.250 | 1.00 | 1000 | B, J | 1.0U | 088934-001 | SW846-8260B |
| | | | | | | | | | |
| **MWL-MW8** 12-Jul-10 | Chloromethane | 0.370 | 0.300 | 1.00 | NE | J | | 089411-001 | SW846-8260B |

Refer to footnotes on page 4A-57.

# Table 4A-2
## Method Detection Limits for Volatile and Semivolatile Organic Compounds, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Analyte | MDL[b] (μg/L) | Analytical Method[g] | Analyte | MDL[b] (μg/L) | Analytical Method[g] | Analyte | MDL[b] (μg/L) | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|
| 1,1,1-Trichloroethane | 0.325 | 8260 | 1,2,4-Trichlorobenzene | 2.00 - 2.38 | 8270 | Di-n-butyl phthalate | 2.00 - 2.38 | 8270 |
| 1,1,2,2-Tetrachloroethane | 0.250 | 8260 | 1,2-Dichlorobenzene | 2.00 - 2.38 | 8270 | Di-n-octyl phthalate | 3.00 - 3.57 | 8270 |
| 1,1,2-Trichloroethane | 0.250 | 8260 | 1,3-Dichlorobenzene | 2.00 - 2.38 | 8270 | Dibenz[a,h]anthracene | 0.200 - 0.238 | 8270 |
| 1,1-Dichloroethane | 0.300 | 8260 | 1,4-Dichlorobenzene | 2.00 - 2.38 | 8270 | Dibenzofuran | 2.00 - 2.38 | 8270 |
| 1,1-Dichloroethene | 0.300 | 8260 | 2,4,5-Trichlorophenol | 2.00 - 2.38 | 8270 | Diethylphthalate | 2.00 - 2.38 | 8270 |
| 1,2-Dichloroethane | 0.250 | 8260 | 2,4,6-Trichlorophenol | 2.00 - 2.38 | 8270 | Dimethylphthalate | 2.00 - 2.38 | 8270 |
| 1,2-Dichloropropane | 0.250 | 8260 | 2,4-Dichlorophenol | 2.00 - 2.38 | 8270 | Dinitro-o-cresol | 3.00 - 3.57 | 8270 |
| 2-Butanone | 1.25 | 8260 | 2,4-Dimethylphenol | 2.00 - 2.38 | 8270 | Diphenyl amine | 3.00 - 3.57 | 8270 |
| 2-Hexanone | 1.25 | 8260 | 2,4-Dinitrophenol | 5.00 - 5.95 | 8270 | Fluoranthene | 0.200 - 0.238 | 8270 |
| 4-methyl-, 2-Pentanone | 1.25 | 8260 | 2,4-Dinitrotoluene | 2.00 - 2.38 | 8270 | Fluorene | 0.200 - 0.238 | 8270 |
| Acetone | 3.50 | 8260 | 2,6-Dinitrotoluene | 2.00 - 2.38 | 8270 | Hexachlorobenzene | 2.00 - 2.38 | 8270 |
| Benzene | 0.300 | 8260 | 2-Chloronaphthalene | 0.300 - 0.357 | 8270 | Hexachlorobutadiene | 2.00 - 2.38 | 8270 |
| Bromodichloromethane | 0.250 | 8260 | 2-Chlorophenol | 2.00 - 2.38 | 8270 | Hexachlorocyclopentadiene | 3.00 - 3.57 | 8270 |
| Bromoform | 0.250 | 8260 | 2-Methylnaphthalene | 0.300 - 0.357 | 8270 | Hexachloroethane | 2.00 - 2.38 | 8270 |
| Bromomethane | 0.300 | 8260 | 2-Nitroaniline | 2.00 - 2.38 | 8270 | Indeno(1,2,3-c,d)pyrene | 0.200 - 0.238 | 8270 |
| Carbon disulfide | 1.25 | 8260 | 2-Nitrophenol | 2.00 - 2.38 | 8270 | Isophorone | 3.00 - 3.57 | 8270 |
| Carbon tetrachloride | 0.300 | 8260 | 3,3'-Dichlorobenzidine | 2.00 - 2.38 | 8270 | Naphthalene | 0.300 - 0.357 | 8270 |
| Chlorobenzene | 0.250 | 8260 | 3-Nitroaniline | 2.00 - 2.38 | 8270 | Nitro-benzene | 3.00 - 3.57 | 8270 |
| Chloroethane | 0.300 | 8260 | 4-Bromophenyl phenyl ether | 2.00 - 2.38 | 8270 | Pentachlorophenol | 2.00 - 2.38 | 8270 |
| Chloroform | 0.250 | 8260 | 4-Chloro-3-methylphenol | 2.00 - 2.38 | 8270 | Phenanthrene | 0.200 - 0.238 | 8270 |
| Chloromethane | 0.300 | 8260 | 4-Chlorobenzenamine | 2.00 - 2.38 | 8270 | Phenol | 1.00 - 1.19 | 8270 |
| Dibromochloromethane | 0.300 | 8260 | 4-Chlorophenyl phenyl ether | 2.00 - 2.38 | 8270 | Pyrene | 0.300 - 0.357 | 8270 |
| Ethyl benzene | 0.250 | 8260 | 4-Nitroaniline | 3.00 - 3.57 | 8270 | bis(2-Chloroethoxy)methane | 3.00 - 3.57 | 8270 |
| Methylene chloride | 3.00 | 8260 | 4-Nitrophenol | 2.00 - 2.38 | 8270 | bis(2-Chloroethyl)ether | 2.00 - 2.38 | 8270 |
| Styrene | 0.250 | 8260 | Acenaphthene | 0.310 - 0.369 | 8270 | bis(2-Ethylhexyl)phthalate | 2.00 - 2.38 | 8270 |
| Tetrachloroethene | 0.300 | 8260 | Acenaphthylene | 0.200 - 0.238 | 8270 | bis-Chloroisopropyl ether | 2.00 - 2.38 | 8270 |
| Toluene | 0.250 | 8260 | Anthracene | 0.200 - 0.238 | 8270 | m,p-Cresol | 3.00 - 3.57 | 8270 |
| Trichloroethene | 0.250 | 8260 | Benzo(a)anthracene | 0.200 - 0.238 | 8270 | n-Nitrosodipropylamine | 2.00 - 2.38 | 8270 |
| Vinyl acetate | 1.50 | 8260 | Benzo(a)pyrene | 0.200 - 0.238 | 8270 | o-Cresol | 2.00 - 2.38 | 8270 |
| Vinyl chloride | 0.500 | 8260 | Benzo(b)fluoranthene | 0.200 - 0.238 | 8270 | | | |
| Xylene | 0.300 | 8260 | Benzo(ghi)perylene | 0.200 - 0.238 | 8270 | | | |
| cis-1,2-Dichloroethene | 0.300 | 8260 | Benzo(k)fluoranthene | 0.200 - 0.238 | 8270 | | | |
| cis-1,3-Dichloropropene | 0.250 | 8260 | Butylbenzyl phthalate | 2.00 - 2.38 | 8270 | | | |
| trans-1,2-Dichloroethene | 0.300 | 8260 | Carbazole | 0.200 - 0.238 | 8270 | | | |
| trans-1,3-Dichloropropene | 0.250 | 8260 | Chrysene | 0.200 - 0.238 | 8270 | | | |

Refer to footnotes on page 4A-57.

## Table 4A-3
## Summary of Nitrate plus Nitrite Results,
## Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[f] | Validation Qualifier[g] | Sample No. | Analytical Method[h] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-BW2** 04-Jan-10 | Nitrate plus nitrite as N | 2.20 | 0.100 | 0.500 | 10.0 | | | 087998-018 | EPA 353.2 |
| **MWL-MW7** 05-Jan-10 | Nitrate plus nitrite as N | 3.41 | 0.100 | 0.500 | 10.0 | | | 088002-018 | EPA 353.2 |
| **MWL-MW7** (Duplicate) 05-Jan-10 | Nitrate plus nitrite as N | 3.29 | 0.100 | 0.500 | 10.0 | | | 088003-018 | EPA 353.2 |
| **MWL-MW8** 06-Jan-10 | Nitrate plus nitrite as N | 1.07 | 0.050 | 0.250 | 10.0 | | | 088007-018 | EPA 353.2 |
| **MWL-MW9** 07-Jan-10 | Nitrate plus nitrite as N | 2.12 | 0.100 | 0.500 | 10.0 | | | 088011-018 | EPA 353.2 |
| | | | | | | | | | |
| **MWL-BW2** 27-Apr-10 | Nitrate plus nitrite as N | 2.38 | 0.100 | 0.500 | 10.0 | B | | 088942-018 | EPA 353.2 |
| **MWL-BW2** (Duplicate) 27-Apr-10 | Nitrate plus nitrite as N | 2.30 | 0.050 | 0.250 | 10.0 | B | | 088943-018 | EPA 353.2 |
| **MWL-MW4** 29-Apr-10 | Nitrate plus nitrite as N | 2.43 | 0.100 | 0.500 | 10.0 | B | | 088949-018 | EPA 353.2 |
| **MWL-MW5** 20-Apr-10 | Nitrate plus nitrite as N | 1.45 | 0.050 | 0.250 | 10.0 | B | | 088918-018 | EPA 353.2 |
| **MWL-MW5** (Duplicate) 20-Apr-10 | Nitrate plus nitrite as N | 1.55 | 0.050 | 0.250 | 10.0 | B | | 088919-018 | EPA 353.2 |
| **MWL-MW6** 19-Apr-10 | Nitrate plus nitrite as N | 1.89 | 0.100 | 0.500 | 10.0 | B | | 088909-018 | EPA 353.2 |
| **MWL-MW7** 22-Apr-10 | Nitrate plus nitrite as N | 3.59 | 0.100 | 0.500 | 10.0 | B | | 088929-018 | EPA 353.2 |
| **MWL-MW8** 26-Apr-10 | Nitrate plus nitrite as N | 1.32 | 0.050 | 0.250 | 10.0 | B | | 088934-018 | EPA 353.2 |
| **MWL-MW9** 21-Apr-10 | Nitrate plus nitrite as N | 2.33 | 0.100 | 0.500 | 10.0 | B | | 088924-018 | EPA 353.2 |
| | | | | | | | | | |
| **MWL-BW2** 06-Jul-10 | Nitrate plus nitrite as N | 2.03 | 0.100 | 0.500 | 10.0 | | | 089402-018 | EPA 353.2 |
| **MWL-MW7** 07-Jul-10 | Nitrate plus nitrite as N | 3.11 | 0.100 | 0.500 | 10.0 | | | 089407-018 | EPA 353.2 |
| **MWL-MW7** (Duplicate) 07-Jul-10 | Nitrate plus nitrite as N | 3.11 | 0.050 | 0.250 | 10.0 | | | 089408-018 | EPA 353.2 |

Refer to footnotes on page 4A-57.

**Table 4A-3** *(Concluded)*
**Summary of Nitrate plus Nitrite Results,**
**Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[f] | Validation Qualifier[g] | Sample No. | Analytical Method[h] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-MW8** 12-Jul-10 | Nitrate plus nitrite as N | 0.900 | 0.050 | 0.250 | 10.0 | B | | 089411-018 | EPA 353.2 |
| **MWL-MW9** 13-Jul-10 | Nitrate plus nitrite as N | 2.41 | 0.100 | 0.500 | 10.0 | B | | 089414-018 | EPA 353.2 |

Refer to footnotes on page 4A-57.

# Table 4A-4
## Summary of Alkalinity and Anion Results,
## Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[f] | Validation Qualifier[g] | Sample No. | Analytical Method[h] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-BW2** | Alkalinity, total as CaCO3 | 236 | 0.725 | 1.00 | NE | | | 087998-016 | SM 2320B |
| 04-Jan-10 | Bromide | 0.361 | 0.066 | 0.200 | NE | | | 087998-016 | SW846 9056 |
| | Chloride | 67.3 | 0.660 | 2.00 | NE | | | 087998-016 | SW846 9056 |
| | Fluoride | 0.642 | 0.033 | 0.100 | 4.0 | | | 087998-016 | SW846 9056 |
| | Sulfate | 46.5 | 1.00 | 4.00 | NE | | | 087998-016 | SW846 9056 |
| **MWL-MW7** | Alkalinity, total as CaCO3 | 207 | 0.725 | 1.00 | NE | | | 088002-016 | SM 2320B |
| 05-Jan-10 | Bromide | 0.294 | 0.066 | 0.200 | NE | | | 088002-016 | SW846 9056 |
| | Chloride | 40.2 | 0.660 | 2.00 | NE | | | 088002-016 | SW846 9056 |
| | Fluoride | 0.903 | 0.033 | 0.100 | 4.0 | | | 088002-016 | SW846 9056 |
| | Sulfate | 36.8 | 0.100 | 0.400 | NE | | | 088002-016 | SW846 9056 |
| **MWL-MW7** (Duplicate) | Alkalinity, total as CaCO3 | 206 | 0.725 | 1.00 | NE | | | 088003-016 | SM 2320B |
| 05-Jan-10 | Bromide | 0.278 | 0.066 | 0.200 | NE | | | 088003-016 | SW846 9056 |
| | Chloride | 40.4 | 0.660 | 2.00 | NE | | | 088003-016 | SW846 9056 |
| | Fluoride | 0.971 | 0.033 | 0.100 | 4.0 | | | 088003-016 | SW846 9056 |
| | Sulfate | 36.8 | 0.100 | 0.400 | NE | | | 088003-016 | SW846 9056 |
| **MWL-MW8** | Alkalinity, total as CaCO3 | 217 | 0.725 | 1.00 | NE | | | 088007-016 | SM 2320B |
| 06-Jan-10 | Bromide | 0.325 | 0.066 | 0.200 | NE | | | 088007-016 | SW846 9056 |
| | Chloride | 48.7 | 0.660 | 2.00 | NE | | | 088007-016 | SW846 9056 |
| | Fluoride | 0.970 | 0.033 | 0.100 | 4.0 | | | 088007-016 | SW846 9056 |
| | Sulfate | 36.0 | 0.100 | 0.400 | NE | | | 088007-016 | SW846 9056 |
| **MWL-MW9** | Alkalinity, total as CaCO3 | 209 | 0.725 | 1.00 | NE | B | | 088011-016 | SM 2320B |
| 07-Jan-10 | Bromide | 0.279 | 0.066 | 0.200 | NE | | | 088011-016 | SW846 9056 |
| | Chloride | 38.9 | 0.660 | 2.00 | NE | | | 088011-016 | SW846 9056 |
| | Fluoride | 1.02 | 0.033 | 0.100 | 4.0 | | | 088011-016 | SW846 9056 |
| | Sulfate | 38.0 | 0.100 | 0.400 | NE | | | 088011-016 | SW846 9056 |
| | | | | | | | | | |
| **MWL-BW2** | Alkalinity, total as CaCO3 | 238 | 0.725 | 1.00 | NE | B | | 088942-016 | SM 2320B |
| 27-Apr-10 | Bromide | 0.399 | 0.066 | 0.200 | NE | | | 088942-016 | SW846 9056 |
| | Chloride | 58.4 | 0.660 | 2.00 | NE | | | 088942-016 | SW846 9056 |
| | Fluoride | 0.667 | 0.033 | 0.100 | 4.0 | | | 088942-016 | SW846 9056 |
| | Sulfate | 43.7 | 1.00 | 4.00 | NE | | | 088942-016 | SW846 9056 |
| **MWL-BW2** (Duplicate) | Alkalinity, total as CaCO3 | 235 | 0.725 | 1.00 | NE | B | | 088943-016 | SM 2320B |
| 27-Apr-10 | Bromide | 0.399 | 0.066 | 0.200 | NE | | | 088943-016 | SW846 9056 |
| | Chloride | 59.3 | 0.660 | 2.00 | NE | | | 088943-016 | SW846 9056 |
| | Fluoride | 0.675 | 0.033 | 0.100 | 4.0 | | | 088943-016 | SW846 9056 |
| | Sulfate | 44.6 | 1.00 | 4.00 | NE | | | 088943-016 | SW846 9056 |

Refer to footnotes on page 4A-57.

## Table 4A-4 *(Continued)*
## Summary of Alkalinity and Anion Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[f] | Validation Qualifier[g] | Sample No. | Analytical Method[h] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-MW4** | Alkalinity, total as CaCO3 | 208 | 0.725 | 1.00 | NE | B | | 088949-016 | SM 2320B |
| 29-Apr-10 | Bromide | 0.375 | 0.066 | 0.200 | NE | | | 088949-016 | SW846 9056 |
| | Chloride | 47.6 | 0.660 | 2.00 | NE | | | 088949-016 | SW846 9056 |
| | Fluoride | 0.982 | 0.033 | 0.100 | 4.0 | | | 088949-016 | SW846 9056 |
| | Sulfate | 38.0 | 0.100 | 0.400 | NE | | | 088949-016 | SW846 9056 |
| **MWL-MW5** | Alkalinity, total as CaCO3 | 307 | 0.725 | 1.00 | NE | B | | 088918-016 | SM 2320B |
| 20-Apr-10 | Bromide | 0.464 | 0.066 | 0.200 | NE | | | 088918-016 | SW846 9056 |
| | Chloride | 84.5 | 0.660 | 2.00 | NE | | | 088918-016 | SW846 9056 |
| | Fluoride | 0.861 | 0.033 | 0.100 | 4.0 | | | 088918-016 | SW846 9056 |
| | Sulfate | 53.6 | 1.00 | 4.00 | NE | | | 088918-016 | SW846 9056 |
| **MWL-MW5** (Duplicate) | Alkalinity, total as CaCO3 | 310 | 0.725 | 1.00 | NE | B | | 088919-016 | SM 2320B |
| 20-Apr-10 | Bromide | 0.467 | 0.066 | 0.200 | NE | | | 088919-016 | SW846 9056 |
| | Chloride | 84.7 | 0.660 | 2.00 | NE | | | 088919-016 | SW846 9056 |
| | Fluoride | 0.885 | 0.033 | 0.100 | 4.0 | | | 088919-016 | SW846 9056 |
| | Sulfate | 53.9 | 1.00 | 4.00 | NE | | | 088919-016 | SW846 9056 |
| **MWL-MW6** | Alkalinity, total as CaCO3 | 289 | 0.725 | 1.00 | NE | B | | 088909-016 | SM 2320B |
| 19-Apr-10 | Bromide | 0.530 | 0.066 | 0.200 | NE | | | 088909-016 | SW846 9056 |
| | Chloride | 74.4 | 0.660 | 2.00 | NE | | | 088909-016 | SW846 9056 |
| | Fluoride | 0.734 | 0.033 | 0.100 | 4.0 | | | 088909-016 | SW846 9056 |
| | Sulfate | 50.2 | 1.00 | 4.00 | NE | | | 088909-016 | SW846 9056 |
| **MWL-MW7** | Alkalinity, total as CaCO3 | 209 | 0.725 | 1.00 | NE | B | | 088929-016 | SM 2320B |
| 22-Apr-10 | Bromide | 0.298 | 0.066 | 0.200 | NE | | | 088929-016 | SW846 9056 |
| | Chloride | 40.4 | 0.660 | 2.00 | NE | | | 088929-016 | SW846 9056 |
| | Fluoride | 1.02 | 0.033 | 0.100 | 4.0 | | | 088929-016 | SW846 9056 |
| | Sulfate | 37.1 | 0.100 | 0.400 | NE | | | 088929-016 | SW846 9056 |
| **MWL-MW8** | Alkalinity, total as CaCO3 | 220 | 0.725 | 1.00 | NE | B | | 088934-016 | SM 2320B |
| 26-Apr-10 | Bromide | 0.349 | 0.066 | 0.200 | NE | | | 088934-016 | SW846 9056 |
| | Chloride | 44.8 | 0.660 | 2.00 | NE | | | 088934-016 | SW846 9056 |
| | Fluoride | 0.947 | 0.033 | 0.100 | 4.0 | | | 088934-016 | SW846 9056 |
| | Sulfate | 37.1 | 0.100 | 0.400 | NE | | | 088934-016 | SW846 9056 |
| **MWL-MW9** | Alkalinity, total as CaCO3 | 316 | 0.725 | 1.00 | NE | B | | 088924-016 | SM 2320B |
| 21-Apr-10 | Bromide | 0.298 | 0.066 | 0.200 | NE | | | 088924-016 | SW846 9056 |
| | Chloride | 39.9 | 0.660 | 2.00 | NE | | | 088924-016 | SW846 9056 |
| | Fluoride | 1.05 | 0.033 | 0.100 | 4.0 | | | 088924-016 | SW846 9056 |
| | Sulfate | 38.5 | 0.100 | 0.400 | NE | | | 088924-016 | SW846 9056 |

Refer to footnotes on page 4A-57.

## Table 4A-4 *(Concluded)*
## Summary of Alkalinity and Anion Results,
## Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[f] | Validation Qualifier[g] | Sample No. | Analytical Method[h] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-BW2** | Alkalinity, total as CaCO3 | 250 | 0.725 | 1.00 | NE | B | | 089402-016 | SM 2320B |
| 06-Jul-10 | Bromide | 0.388 | 0.066 | 0.200 | NE | | | 089402-016 | SW846 9056 |
| | Chloride | 60.1 | 0.660 | 2.00 | NE | B | | 089402-016 | SW846 9056 |
| | Fluoride | 0.690 | 0.033 | 0.100 | 4.0 | | | 089402-016 | SW846 9056 |
| | Sulfate | 45.0 | 1.00 | 4.00 | NE | | | 089402-016 | SW846 9056 |
| **MWL-MW7** | Alkalinity, total as CaCO3 | 217 | 0.725 | 1.00 | NE | B | | 089407-016 | SM 2320B |
| 07-Jul-10 | Bromide | 0.328 | 0.066 | 0.200 | NE | | | 089407-016 | SW846 9056 |
| | Chloride | 37.9 | 0.660 | 2.00 | NE | B | | 089407-016 | SW846 9056 |
| | Fluoride | 0.919 | 0.033 | 0.100 | 4.0 | | | 089407-016 | SW846 9056 |
| | Sulfate | 37.6 | 0.100 | 0.400 | NE | | | 089407-016 | SW846 9056 |
| **MWL-MW7** (Duplicate) | Alkalinity, total as CaCO3 | 219 | 0.725 | 1.00 | NE | B | | 089408-016 | SM 2320B |
| 07-Jul-10 | Bromide | 0.317 | 0.066 | 0.200 | NE | | | 089408-016 | SW846 9056 |
| | Chloride | 39.0 | 0.660 | 2.00 | NE | B | | 089408-016 | SW846 9056 |
| | Fluoride | 0.948 | 0.033 | 0.100 | 4.0 | | | 089408-016 | SW846 9056 |
| | Sulfate | 37.5 | 0.100 | 0.400 | NE | | | 089408-016 | SW846 9056 |
| **MWL-MW8** | Alkalinity, total as CaCO3 | 231 | 0.725 | 1.00 | NE | B | | 089411-016 | SM 2320B |
| 12-Jul-10 | Bromide | 0.361 | 0.066 | 0.200 | NE | | | 089411-016 | SW846 9056 |
| | Chloride | 50.5 | 0.660 | 2.00 | NE | | | 089411-016 | SW846 9056 |
| | Fluoride | 1.01 | 0.033 | 0.100 | 4.0 | | | 089411-016 | SW846 9056 |
| | Sulfate | 35.5 | 0.100 | 0.400 | NE | | | 089411-016 | SW846 9056 |
| **MWL-MW9** | Alkalinity, total as CaCO3 | 227 | 0.725 | 1.00 | NE | B | | 089414-016 | SM 2320B |
| 13-Jul-10 | Bromide | 0.333 | 0.066 | 0.200 | NE | | | 089414-016 | SW846 9056 |
| | Chloride | 39.3 | 0.660 | 2.00 | NE | | | 089414-016 | SW846 9056 |
| | Fluoride | 1.04 | 0.033 | 0.100 | 4.0 | | | 089414-016 | SW846 9056 |
| | Sulfate | 38.2 | 0.100 | 0.400 | NE | | | 089414-016 | SW846 9056 |

Refer to footnotes on page 4A-57.

# Table 4A-5
## Summary of Total Metal Results (Unfiltered), Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[f] | Validation Qualifier[g] | Sample No. | Analytical Method[h] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-BW2** | Aluminum | ND | 0.010 | 0.030 | NE | U | | 087998-009 | SW846 6020 |
| 04-Jan-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 087998-009 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 087998-009 | SW846 6020 |
| | Barium | 0.0909 | 0.0005 | 0.002 | 2.00 | | | 087998-009 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 087998-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 087998-009 | SW846 6020 |
| | Calcium | 72.3 | 0.100 | 1.00 | NE | | | 087998-009 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 087998-009 | SW846 6020 |
| | Cobalt | 0.000132 | 0.0001 | 0.001 | NE | J | | 087998-009 | SW846 6020 |
| | Copper | 0.000569 | 0.0003 | 0.001 | NE | J | 0.0039U | 087998-009 | SW846 6020 |
| | Iron | 0.192 | 0.010 | 0.100 | NE | | | 087998-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 087998-009 | SW846 6020 |
| | Magnesium | 23.0 | 0.005 | 0.015 | NE | | | 087998-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 087998-009 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 087998-009 | SW846 7470 |
| | Nickel | 0.00277 | 0.0005 | 0.002 | NE | | | 087998-009 | SW846 6020 |
| | Potassium | 3.86 | 0.080 | 0.300 | NE | | | 087998-009 | SW846 6020 |
| | Selenium | 0.00172 | 0.001 | 0.005 | 0.050 | J | | 087998-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 087998-009 | SW846 6020 |
| | Sodium | 60.6 | 0.400 | 1.25 | NE | | | 087998-009 | SW846 6020 |
| | Thallium | 0.000375 | 0.0003 | 0.001 | 0.002 | J | 0.0017U | 087998-009 | SW846 6020 |
| | Uranium | **0.00686** | 0.00005 | 0.0002 | 0.030 | | | 087998-009 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | | 087998-009 | SW846 6020 |
| | Zinc | ND | 0.0026 | 0.010 | NE | U | | 087998-009 | SW846 6020 |

Refer to footnotes on page 4A-57.

# Table 4A-5 *(Continued)*
## Summary of Total Metal Results (Unfiltered), Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[f] | Validation Qualifier[g] | Sample No. | Analytical Method[h] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-MW7** | Aluminum | ND | 0.010 | 0.030 | NE | U | | 088002-009 | SW846 6020 |
| 05-Jan-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 088002-009 | SW846 6020 |
| | Arsenic | 0.00184 | 0.0015 | 0.005 | 0.010 | B, J | 0.012U | 088002-009 | SW846 6020 |
| | Barium | 0.0974 | 0.0005 | 0.002 | 2.00 | | | 088002-009 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 088002-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 088002-009 | SW846 6020 |
| | Calcium | 58.6 | 0.100 | 1.00 | NE | | | 088002-009 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 088002-009 | SW846 6020 |
| | Cobalt | 0.000105 | 0.0001 | 0.001 | NE | J | | 088002-009 | SW846 6020 |
| | Copper | 0.000757 | 0.0003 | 0.001 | NE | J | 0.0045U | 088002-009 | SW846 6020 |
| | Iron | 0.168 | 0.010 | 0.100 | NE | | | 088002-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 088002-009 | SW846 6020 |
| | Magnesium | 20.3 | 0.005 | 0.015 | NE | | | 088002-009 | SW846 6020 |
| | Manganese | 0.00139 | 0.001 | 0.005 | NE | J | | 088002-009 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 088002-009 | SW846 7470 |
| | Nickel | 0.00226 | 0.0005 | 0.002 | NE | | | 088002-009 | SW846 6020 |
| | Potassium | 5.10 | 0.080 | 0.300 | NE | | | 088002-009 | SW846 6020 |
| | Selenium | ND | 0.001 | 0.005 | 0.050 | U | | 088002-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 088002-009 | SW846 6020 |
| | Sodium | 50.8 | 0.400 | 1.25 | NE | | | 088002-009 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 088002-009 | SW846 6020 |
| | Uranium | **0.00781** | 0.00005 | 0.0002 | 0.030 | | | 088002-009 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | | 088002-009 | SW846 6020 |
| | Zinc | ND | 0.0026 | 0.010 | NE | U | | 088002-009 | SW846 6020 |

Refer to footnotes on page 4A-57.

## Table 4A-5 *(Continued)*
## Summary of Total Metal Results (Unfiltered), Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[f] | Validation Qualifier[g] | Sample No. | Analytical Method[h] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-MW7** (Duplicate) 05-Jan-10 | Aluminum | ND | 0.010 | 0.030 | NE | U | | 088003-009 | SW846 6020 |
| | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 088003-009 | SW846 6020 |
| | Arsenic | 0.0019 | 0.0015 | 0.005 | 0.010 | B, J | 0.012U | 088003-009 | SW846 6020 |
| | Barium | 0.104 | 0.0005 | 0.002 | 2.00 | | | 088003-009 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 088003-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 088003-009 | SW846 6020 |
| | Calcium | 61.0 | 0.100 | 1.00 | NE | | | 088003-009 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 088003-009 | SW846 6020 |
| | Cobalt | 0.000113 | 0.0001 | 0.001 | NE | J | | 088003-009 | SW846 6020 |
| | Copper | 0.000695 | 0.0003 | 0.001 | NE | J | 0.0045U | 088003-009 | SW846 6020 |
| | Iron | 0.187 | 0.010 | 0.100 | NE | | | 088003-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 088003-009 | SW846 6020 |
| | Magnesium | 22.1 | 0.005 | 0.015 | NE | | | 088003-009 | SW846 6020 |
| | Manganese | 0.00137 | 0.001 | 0.005 | NE | J | | 088003-009 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 088003-009 | SW846 7470 |
| | Nickel | 0.00244 | 0.0005 | 0.002 | NE | | | 088003-009 | SW846 6020 |
| | Potassium | 5.37 | 0.080 | 0.300 | NE | | | 088003-009 | SW846 6020 |
| | Selenium | ND | 0.001 | 0.005 | 0.050 | U | | 088003-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 088003-009 | SW846 6020 |
| | Sodium | 53.2 | 0.400 | 1.25 | NE | | | 088003-009 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 088003-009 | SW846 6020 |
| | Uranium | **0.00833** | 0.00005 | 0.0002 | 0.030 | | | 088003-009 | SW846 6020 |
| | Vanadium | 0.0041 | 0.003 | 0.010 | NE | J | 0.024U | 088003-009 | SW846 6020 |
| | Zinc | ND | 0.0026 | 0.010 | NE | U | | 088003-009 | SW846 6020 |

Refer to footnotes on page 4A-57.

**Table 4A-5** *(Continued)*
**Summary of Total Metal Results (Unfiltered),**
**Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[f] | Validation Qualifier[g] | Sample No. | Analytical Method[h] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-MW8** | Aluminum | 0.077 | 0.010 | 0.030 | NE | | 0.18U | 088007-009 | SW846 6020 |
| 06-Jan-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 088007-009 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 088007-009 | SW846 6020 |
| | Barium | **0.143** | 0.0005 | 0.002 | 2.00 | | | 088007-009 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 088007-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 088007-009 | SW846 6020 |
| | Calcium | 60.9 | 0.100 | 1.00 | NE | | | 088007-009 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 088007-009 | SW846 6020 |
| | Cobalt | 0.000161 | 0.0001 | 0.001 | NE | J | | 088007-009 | SW846 6020 |
| | Copper | 0.000838 | 0.0003 | 0.001 | NE | J | 0.0043U | 088007-009 | SW846 6020 |
| | Iron | 0.275 | 0.010 | 0.100 | NE | | | 088007-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 088007-009 | SW846 6020 |
| | Magnesium | 22.1 | 0.005 | 0.015 | NE | | | 088007-009 | SW846 6020 |
| | Manganese | 0.227 | 0.001 | 0.005 | NE | | | 088007-009 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 088007-009 | SW846 7470 |
| | Nickel | 0.00279 | 0.0005 | 0.002 | NE | | | 088007-009 | SW846 6020 |
| | Potassium | 5.61 | 0.080 | 0.300 | NE | | | 088007-009 | SW846 6020 |
| | Selenium | ND | 0.001 | 0.005 | 0.050 | U | | 088007-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 088007-009 | SW846 6020 |
| | Sodium | 51.0 | 0.400 | 1.25 | NE | | | 088007-009 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 088007-009 | SW846 6020 |
| | Uranium | **0.00789** | 0.00005 | 0.0002 | 0.030 | | | 088007-009 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | | 088007-009 | SW846 6020 |
| | Zinc | 0.00496 | 0.0026 | 0.010 | NE | J | | 088007-009 | SW846 6020 |

Refer to footnotes on page 4A-57.

**Table 4A-5** *(Continued)*
**Summary of Total Metal Results (Unfiltered),**
**Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[f] | Validation Qualifier[g] | Sample No. | Analytical Method[h] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-MW9** | Aluminum | 0.0371 | 0.010 | 0.030 | NE | | | 088011-009 | SW846 6020 |
| 07-Jan-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 088011-009 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 088011-009 | SW846 6020 |
| | Barium | 0.095 | 0.0005 | 0.002 | 2.00 | | | 088011-009 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 088011-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 088011-009 | SW846 6020 |
| | Calcium | 57.4 | 0.100 | 1.00 | NE | B | | 088011-009 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 088011-009 | SW846 6020 |
| | Cobalt | 0.000256 | 0.0001 | 0.001 | NE | J | | 088011-009 | SW846 6020 |
| | Copper | 0.00104 | 0.0003 | 0.001 | NE | | 0.0048U | 088011-009 | SW846 6020 |
| | Iron | 0.233 | 0.010 | 0.100 | NE | | | 088011-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 088011-009 | SW846 6020 |
| | Magnesium | 19.9 | 0.005 | 0.015 | NE | | | 088011-009 | SW846 6020 |
| | Manganese | 0.0195 | 0.001 | 0.005 | NE | | | 088011-009 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 088011-009 | SW846 7470 |
| | Nickel | 0.00186 | 0.0005 | 0.002 | NE | J | | 088011-009 | SW846 6020 |
| | Potassium | 4.96 | 0.080 | 0.300 | NE | | | 088011-009 | SW846 6020 |
| | Selenium | ND | 0.001 | 0.005 | 0.050 | U | | 088011-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 088011-009 | SW846 6020 |
| | Sodium | 45.2 | 0.080 | 0.250 | NE | | | 088011-009 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 088011-009 | SW846 6020 |
| | Uranium | **0.00942** | 0.00005 | 0.0002 | 0.030 | | | 088011-009 | SW846 6020 |
| | Vanadium | 0.00317 | 0.003 | 0.010 | NE | J | | 088011-009 | SW846 6020 |
| | Zinc | 0.00317 | 0.0026 | 0.010 | NE | J | | 088011-009 | SW846 6020 |

Refer to footnotes on page 4A-57.

## Table 4A-5 *(Continued)*
## Summary of Total Metal Results (Unfiltered), Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[f] | Validation Qualifier[g] | Sample No. | Analytical Method[h] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-BW2** | Aluminum | 0.0109 | 0.010 | 0.030 | NE | J | | 088942-009 | SW846 6020 |
| 27-Apr-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 088942-009 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 088942-009 | SW846 6020 |
| | Barium | 0.0938 | 0.0005 | 0.002 | 2.00 | | | 088942-009 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 088942-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 088942-009 | SW846 6020 |
| | Calcium | 67.2 | 0.200 | 2.00 | NE | B | | 088942-009 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 088942-009 | SW846 6020 |
| | Cobalt | ND | 0.0001 | 0.001 | NE | U | | 088942-009 | SW846 6020 |
| | Copper | 0.000382 | 0.0003 | 0.001 | NE | J | 0.019UJ | 088942-009 | SW846 6020 |
| | Iron | 0.0703 | 0.010 | 0.100 | NE | J | | 088942-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 088942-009 | SW846 6020 |
| | Magnesium | 20.9 | 0.005 | 0.015 | NE | | | 088942-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 088942-009 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 088942-009 | SW846 7470 |
| | Nickel | 0.00103 | 0.0005 | 0.002 | NE | J | | 088942-009 | SW846 6020 |
| | Potassium | 4.14 | 0.080 | 0.300 | NE | | | 088942-009 | SW846 6020 |
| | Selenium | 0.00241 | 0.001 | 0.005 | 0.050 | J | | 088942-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 088942-009 | SW846 6020 |
| | Sodium | 50.2 | 0.800 | 2.50 | NE | | | 088942-009 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 088942-009 | SW846 6020 |
| | Uranium | **0.00652** | 0.00005 | 0.0002 | 0.030 | | | 088942-009 | SW846 6020 |
| | Vanadium | 0.010 | 0.003 | 0.010 | NE | | | 088942-009 | SW846 6020 |
| | Zinc | ND | 0.0026 | 0.010 | NE | U | | 088942-009 | SW846 6020 |

Refer to footnotes on page 4A-57.

**Table 4A-5** *(Continued)*
**Summary of Total Metal Results (Unfiltered),**
**Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[f] | Validation Qualifier[g] | Sample No. | Analytical Method[h] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-BW2** (Duplicate) 27-Apr-10 | Aluminum | 0.0197 | 0.010 | 0.030 | NE | J | | 088943-009 | SW846 6020 |
| | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 088943-009 | SW846 6020 |
| | Arsenic | 0.00517 | 0.0015 | 0.005 | 0.010 | B | 0.014U | 088943-009 | SW846 6020 |
| | Barium | 0.0943 | 0.0005 | 0.002 | 2.00 | | | 088943-009 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 088943-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 088943-009 | SW846 6020 |
| | Calcium | 67.8 | 0.200 | 2.00 | NE | B | | 088943-009 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 088943-009 | SW846 6020 |
| | Cobalt | ND | 0.0001 | 0.001 | NE | U | | 088943-009 | SW846 6020 |
| | Copper | 0.000393 | 0.0003 | 0.001 | NE | J | 0.019UJ | 088943-009 | SW846 6020 |
| | Iron | 0.070 | 0.010 | 0.100 | NE | J | | 088943-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 088943-009 | SW846 6020 |
| | Magnesium | 20.5 | 0.005 | 0.015 | NE | | | 088943-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 088943-009 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 088943-009 | SW846 7470 |
| | Nickel | 0.00104 | 0.0005 | 0.002 | NE | J | | 088943-009 | SW846 6020 |
| | Potassium | 4.02 | 0.080 | 0.300 | NE | | | 088943-009 | SW846 6020 |
| | Selenium | 0.00214 | 0.001 | 0.005 | 0.050 | J | | 088943-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 088943-009 | SW846 6020 |
| | Sodium | 49.8 | 0.800 | 2.50 | NE | | | 088943-009 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 088943-009 | SW846 6020 |
| | Uranium | **0.00636** | 0.00005 | 0.0002 | 0.030 | | | 088943-009 | SW846 6020 |
| | Vanadium | 0.00378 | 0.003 | 0.010 | NE | J | | 088943-009 | SW846 6020 |
| | Zinc | ND | 0.0026 | 0.010 | NE | U | | 088943-009 | SW846 6020 |

Refer to footnotes on page 4A-57.

## Table 4A-5 *(Continued)*
## Summary of Total Metal Results (Unfiltered),
## Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[f] | Validation Qualifier[g] | Sample No. | Analytical Method[h] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-MW4** | Aluminum | 0.0106 | 0.010 | 0.030 | NE | J | | 088949-009 | SW846 6020 |
| 29-Apr-10 | Antimony | 0.00372 | 0.0005 | 0.003 | 0.006 | | | 088949-009 | SW846 6020 |
| | Arsenic | 0.00913 | 0.0015 | 0.005 | 0.010 | B | 0.014U | 088949-009 | SW846 6020 |
| | Barium | 0.0974 | 0.0005 | 0.002 | 2.00 | | | 088949-009 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 088949-009 | SW846 6020 |
| | Cadmium | 0.000233 | 0.00011 | 0.001 | 0.005 | J | | 088949-009 | SW846 6020 |
| | Calcium | 61.0 | 0.200 | 2.00 | NE | B | | 088949-009 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 088949-009 | SW846 6020 |
| | Cobalt | 0.000166 | 0.0001 | 0.001 | NE | J | | 088949-009 | SW846 6020 |
| | Copper | 0.00305 | 0.0003 | 0.001 | NE | | | 088949-009 | SW846 6020 |
| | Iron | 0.0607 | 0.010 | 0.100 | NE | J | | 088949-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 088949-009 | SW846 6020 |
| | Magnesium | 18.5 | 0.005 | 0.015 | NE | | | 088949-009 | SW846 6020 |
| | Manganese | 0.00925 | 0.001 | 0.005 | NE | | | 088949-009 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 088949-009 | SW846 7470 |
| | Nickel | 0.0106 | 0.0005 | 0.002 | NE | | | 088949-009 | SW846 6020 |
| | Potassium | 5.29 | 0.080 | 0.300 | NE | | | 088949-009 | SW846 6020 |
| | Selenium | ND | 0.001 | 0.005 | 0.050 | U | | 088949-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 088949-009 | SW846 6020 |
| | Sodium | 44.5 | 0.800 | 2.50 | NE | | | 088949-009 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 088949-009 | SW846 6020 |
| | Uranium | **0.00573** | 0.00005 | 0.0002 | 0.030 | | | 088949-009 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | | 088949-009 | SW846 6020 |
| | Zinc | 0.117 | 0.0026 | 0.010 | NE | | | 088949-009 | SW846 6020 |

Refer to footnotes on page 4A-57.

**Table 4A-5** *(Continued)*
**Summary of Total Metal Results (Unfiltered),**
**Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[f] | Validation Qualifier[g] | Sample No. | Analytical Method[h] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-MW5** | Aluminum | ND | 0.010 | 0.030 | NE | U | | 088918-009 | SW846 6020 |
| 20-Apr-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 088918-009 | SW846 6020 |
| | Arsenic | 0.00326 | 0.0015 | 0.005 | 0.010 | B, J | 0.012U | 088918-009 | SW846 6020 |
| | Barium | **0.126** | 0.0005 | 0.002 | 2.00 | | | 088918-009 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 088918-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 088918-009 | SW846 6020 |
| | Calcium | 94.5 | 0.100 | 1.00 | NE | B | | 088918-009 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 088918-009 | SW846 6020 |
| | Cobalt | 0.000141 | 0.0001 | 0.001 | NE | J | | 088918-009 | SW846 6020 |
| | Copper | 0.000877 | 0.0003 | 0.001 | NE | J | 0.0092U | 088918-009 | SW846 6020 |
| | Iron | 0.197 | 0.010 | 0.100 | NE | B | | 088918-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 088918-009 | SW846 6020 |
| | Magnesium | 31.1 | 0.005 | 0.015 | NE | | | 088918-009 | SW846 6020 |
| | Manganese | 0.00759 | 0.001 | 0.005 | NE | | | 088918-009 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | UJ | 088918-009 | SW846 7470 |
| | Nickel | 0.00177 | 0.0005 | 0.002 | NE | J | | 088918-009 | SW846 6020 |
| | Potassium | 6.39 | 0.400 | 1.50 | NE | | | 088918-009 | SW846 6020 |
| | Selenium | 0.00123 | 0.001 | 0.005 | 0.050 | J | NJ- | 088918-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 088918-009 | SW846 6020 |
| | Sodium | 68.6 | 0.400 | 1.25 | NE | | | 088918-009 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 088918-009 | SW846 6020 |
| | Uranium | **0.00994** | 0.00005 | 0.0002 | 0.030 | | | 088918-009 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | UJ | 088918-009 | SW846 6020 |
| | Zinc | 0.00307 | 0.0026 | 0.010 | NE | | | 088918-009 | SW846 6020 |

Refer to footnotes on page 4A-57.

# Table 4A-5 *(Continued)*
## Summary of Total Metal Results (Unfiltered), Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[f] | Validation Qualifier[g] | Sample No. | Analytical Method[h] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-MW5** (Duplicate) 20-Apr-10 | Aluminum | ND | 0.010 | 0.030 | NE | U | | 088919-009 | SW846 6020 |
| | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 088919-009 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 088919-009 | SW846 6020 |
| | Barium | **0.127** | 0.0005 | 0.002 | 2.00 | | | 088919-009 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 088919-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 088919-009 | SW846 6020 |
| | Calcium | 90.7 | 0.100 | 1.00 | NE | B | | 088919-009 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 088919-009 | SW846 6020 |
| | Cobalt | 0.000122 | 0.0001 | 0.001 | NE | J | | 088919-009 | SW846 6020 |
| | Copper | 0.000822 | 0.0003 | 0.001 | NE | J | 0.0092U | 088919-009 | SW846 6020 |
| | Iron | 0.236 | 0.010 | 0.100 | NE | B | | 088919-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 088919-009 | SW846 6020 |
| | Magnesium | 30.9 | 0.005 | 0.015 | NE | | | 088919-009 | SW846 6020 |
| | Manganese | 0.0081 | 0.001 | 0.005 | NE | | | 088919-009 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | UJ | 088919-009 | SW846 7470 |
| | Nickel | 0.00178 | 0.0005 | 0.002 | NE | J | | 088919-009 | SW846 6020 |
| | Potassium | 6.43 | 0.400 | 1.50 | NE | | | 088919-009 | SW846 6020 |
| | Selenium | ND | 0.001 | 0.005 | 0.050 | U | UJ | 088919-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 088919-009 | SW846 6020 |
| | Sodium | 60.9 | 0.400 | 1.25 | NE | | | 088919-009 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 088919-009 | SW846 6020 |
| | Uranium | **0.0099** | 0.00005 | 0.0002 | 0.030 | | | 088919-009 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | UJ | 088919-009 | SW846 6020 |
| | Zinc | 0.00293 | 0.0026 | 0.010 | NE | J | | 088919-009 | SW846 6020 |

Refer to footnotes on page 4A-57.

## **Table 4A-5** *(Continued)*
## Summary of Total Metal Results (Unfiltered),
## Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[f] | Validation Qualifier[g] | Sample No. | Analytical Method[h] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-MW6** | Aluminum | ND | 0.010 | 0.030 | NE | U | | 088909-009 | SW846 6020 |
| 19-Apr-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 088909-009 | SW846 6020 |
| | Arsenic | 0.00288 | 0.0015 | 0.005 | 0.010 | B, J | 0.012U | 088909-009 | SW846 6020 |
| | Barium | 0.110 | 0.0005 | 0.002 | 2.00 | | | 088909-009 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 088909-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 088909-009 | SW846 6020 |
| | Calcium | 90.0 | 0.100 | 1.00 | NE | B | | 088909-009 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 088909-009 | SW846 6020 |
| | Cobalt | ND | 0.0001 | 0.001 | NE | U | | 088909-009 | SW846 6020 |
| | Copper | 0.000556 | 0.0003 | 0.001 | NE | J | | 088909-009 | SW846 6020 |
| | Iron | 0.0705 | 0.010 | 0.100 | NE | B, J | | 088909-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 088909-009 | SW846 6020 |
| | Magnesium | 28.7 | 0.005 | 0.015 | NE | | | 088909-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 088909-009 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | UJ | 088909-009 | SW846 7470 |
| | Nickel | 0.0012 | 0.0005 | 0.002 | NE | J | | 088909-009 | SW846 6020 |
| | Potassium | 6.08 | 0.400 | 1.50 | NE | | | 088909-009 | SW846 6020 |
| | Selenium | 0.0016 | 0.001 | 0.005 | 0.050 | J | NJ- | 088909-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 088909-009 | SW846 6020 |
| | Sodium | 63.7 | 0.400 | 1.25 | NE | | | 088909-009 | SW846 6020 |
| | Thallium | 0.000771 | 0.0003 | 0.001 | 0.002 | J | | 088909-009 | SW846 6020 |
| | Uranium | **0.00947** | 0.00005 | 0.0002 | 0.030 | | J+ | 088909-009 | SW846 6020 |
| | Vanadium | 0.00674 | 0.003 | 0.010 | NE | B, J | 0.022U | 088909-009 | SW846 6020 |
| | Zinc | ND | 0.0026 | 0.010 | NE | U | | 088909-009 | SW846 6020 |

Refer to footnotes on page 4A-57.

**Table 4A-5** *(Continued)*
**Summary of Total Metal Results (Unfiltered),**
**Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[f] | Validation Qualifier[g] | Sample No. | Analytical Method[h] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-MW7** | Aluminum | ND | 0.010 | 0.030 | NE | U | | 088929-009 | SW846 6020 |
| 22-Apr-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 088929-009 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 088929-009 | SW846 6020 |
| | Barium | 0.0995 | 0.0005 | 0.002 | 2.00 | | | 088929-009 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 088929-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 088929-009 | SW846 6020 |
| | Calcium | 54.5 | 0.100 | 1.00 | NE | B | | 088929-009 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 088929-009 | SW846 6020 |
| | Cobalt | ND | 0.0001 | 0.001 | NE | U | | 088929-009 | SW846 6020 |
| | Copper | 0.000703 | 0.0003 | 0.001 | NE | J | | 088929-009 | SW846 6020 |
| | Iron | 0.128 | 0.010 | 0.100 | NE | B | | 088929-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 088929-009 | SW846 6020 |
| | Magnesium | 19.1 | 0.005 | 0.015 | NE | | | 088929-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 088929-009 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | UJ | 088929-009 | SW846 7470 |
| | Nickel | 0.00123 | 0.0005 | 0.002 | NE | J | | 088929-009 | SW846 6020 |
| | Potassium | 4.84 | 0.400 | 1.50 | NE | | | 088929-009 | SW846 6020 |
| | Selenium | ND | 0.001 | 0.005 | 0.050 | U | UJ | 088929-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 088929-009 | SW846 6020 |
| | Sodium | 43.9 | 0.400 | 1.25 | NE | | | 088929-009 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 088929-009 | SW846 6020 |
| | Uranium | **0.00819** | 0.00005 | 0.0002 | 0.030 | | | 088929-009 | SW846 6020 |
| | Vanadium | 0.00648 | 0.003 | 0.010 | NE | B, J | 0.022UJ | 088929-009 | SW846 6020 |
| | Zinc | 0.00342 | 0.0026 | 0.010 | NE | J | | 088929-009 | SW846 6020 |

Refer to footnotes on page 4A-57.

## Table 4A-5 *(Continued)*
## Summary of Total Metal Results (Unfiltered), Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[f] | Validation Qualifier[g] | Sample No. | Analytical Method[h] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-MW8** | Aluminum | 0.0355 | 0.010 | 0.030 | NE | | | 088934-009 | SW846 6020 |
| 26-Apr-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 088934-009 | SW846 6020 |
| | Arsenic | 0.00304 | 0.0015 | 0.005 | 0.010 | B, J | 0.014U | 088934-009 | SW846 6020 |
| | Barium | **0.141** | 0.0005 | 0.002 | 2.00 | | | 088934-009 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 088934-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 088934-009 | SW846 6020 |
| | Calcium | 57.2 | 0.200 | 2.00 | NE | B | | 088934-009 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 088934-009 | SW846 6020 |
| | Cobalt | ND | 0.0001 | 0.001 | NE | U | | 088934-009 | SW846 6020 |
| | Copper | 0.000671 | 0.0003 | 0.001 | NE | J | | 088934-009 | SW846 6020 |
| | Iron | 0.149 | 0.010 | 0.100 | NE | | | 088934-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 088934-009 | SW846 6020 |
| | Magnesium | 20.3 | 0.005 | 0.015 | NE | | | 088934-009 | SW846 6020 |
| | Manganese | 0.00703 | 0.001 | 0.005 | NE | | | 088934-009 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 088934-009 | SW846 7470 |
| | Nickel | 0.00109 | 0.0005 | 0.002 | NE | J | | 088934-009 | SW846 6020 |
| | Potassium | 5.29 | 0.080 | 0.300 | NE | | | 088934-009 | SW846 6020 |
| | Selenium | ND | 0.001 | 0.005 | 0.050 | U | | 088934-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 088934-009 | SW846 6020 |
| | Sodium | 42.5 | 0.080 | 0.250 | NE | | | 088934-009 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 088934-009 | SW846 6020 |
| | Uranium | **0.00694** | 0.00005 | 0.0002 | 0.030 | | | 088934-009 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | | 088934-009 | SW846 6020 |
| | Zinc | 0.00359 | 0.0026 | 0.010 | NE | J | | 088934-009 | SW846 6020 |

Refer to footnotes on page 4A-57.

**Table 4A-5** *(Continued)*
**Summary of Total Metal Results (Unfiltered),**
**Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[f] | Validation Qualifier[g] | Sample No. | Analytical Method[h] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-MW9** | Aluminum | 0.0386 | 0.010 | 0.030 | NE | | | 088924-009 | SW846 6020 |
| 21-Apr-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 088924-009 | SW846 6020 |
| | Arsenic | 0.00344 | 0.0015 | 0.005 | 0.010 | B, J | 0.012U | 088924-009 | SW846 6020 |
| | Barium | 0.102 | 0.0005 | 0.002 | 2.00 | | | 088924-009 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 088924-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 088924-009 | SW846 6020 |
| | Calcium | 58.3 | 0.100 | 1.00 | NE | B | | 088924-009 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 088924-009 | SW846 6020 |
| | Cobalt | 0.000139 | 0.0001 | 0.001 | NE | J | | 088924-009 | SW846 6020 |
| | Copper | 0.000816 | 0.0003 | 0.001 | NE | J | | 088924-009 | SW846 6020 |
| | Iron | 0.144 | 0.010 | 0.100 | NE | B | | 088924-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 088924-009 | SW846 6020 |
| | Magnesium | 19.7 | 0.005 | 0.015 | NE | | | 088924-009 | SW846 6020 |
| | Manganese | 0.00676 | 0.001 | 0.005 | NE | | | 088924-009 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | UJ | 088924-009 | SW846 7470 |
| | Nickel | 0.00122 | 0.0005 | 0.002 | NE | J | | 088924-009 | SW846 6020 |
| | Potassium | 4.90 | 0.400 | 1.50 | NE | | | 088924-009 | SW846 6020 |
| | Selenium | ND | 0.001 | 0.005 | 0.050 | U | UJ | 088924-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 088924-009 | SW846 6020 |
| | Sodium | 44.8 | 0.400 | 1.25 | NE | | | 088924-009 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 088924-009 | SW846 6020 |
| | Uranium | **0.00982** | 0.00005 | 0.0002 | 0.030 | | | 088924-009 | SW846 6020 |
| | Vanadium | 0.0149 | 0.003 | 0.010 | NE | B | 0.022UJ | 088924-009 | SW846 6020 |
| | Zinc | 0.00441 | 0.0026 | 0.010 | NE | J | | 088924-009 | SW846 6020 |

Refer to footnotes on page 4A-57.

## Table 4A-5 *(Continued)*
## Summary of Total Metal Results (Unfiltered), Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[f] | Validation Qualifier[g] | Sample No. | Analytical Method[h] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-BW2** | Aluminum | ND | 0.010 | 0.030 | NE | U | | 089402-009 | SW846 6020 |
| 06-Jul-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 089402-009 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 089402-009 | SW846 6020 |
| | Barium | 0.0961 | 0.0005 | 0.002 | 2.00 | | | 089402-009 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089402-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 089402-009 | SW846 6020 |
| | Calcium | 69.2 | 0.100 | 1.00 | NE | B | | 089402-009 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 089402-009 | SW846 6020 |
| | Cobalt | 0.0001 | 0.0001 | 0.001 | NE | J | | 089402-009 | SW846 6020 |
| | Copper | 0.000576 | 0.0003 | 0.001 | NE | J | | 089402-009 | SW846 6020 |
| | Iron | 0.224 | 0.010 | 0.100 | NE | | | 089402-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089402-009 | SW846 6020 |
| | Magnesium | 25.2 | 0.005 | 0.015 | NE | | | 089402-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 089402-009 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 089402-009 | SW846 7470 |
| | Nickel | 0.00173 | 0.0005 | 0.002 | NE | J | | 089402-009 | SW846 6020 |
| | Potassium | 3.93 | 0.080 | 0.300 | NE | | | 089402-009 | SW846 6020 |
| | Selenium | 0.00226 | 0.001 | 0.005 | 0.050 | J | | 089402-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089402-009 | SW846 6020 |
| | Sodium | 51.8 | 0.400 | 1.25 | NE | | | 089402-009 | SW846 6020 |
| | Thallium | 0.000504 | 0.0003 | 0.001 | 0.002 | J | 0.0029U | 089402-009 | SW846 6020 |
| | Uranium | **0.00729** | 0.00005 | 0.0002 | 0.030 | | | 089402-009 | SW846 6020 |
| | Vanadium | 0.0057 | 0.003 | 0.010 | NE | J | | 089402-009 | SW846 6020 |
| | Zinc | ND | 0.0026 | 0.010 | NE | U | | 089402-009 | SW846 6020 |

Refer to footnotes on page 4A-57.

**Table 4A-5** *(Continued)*
**Summary of Total Metal Results (Unfiltered),**
**Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[f] | Validation Qualifier[g] | Sample No. | Analytical Method[h] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-MW7** 07-Jul-10 | Aluminum | ND | 0.010 | 0.030 | NE | U | | 089407-009 | SW846 6020 |
| | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 089407-009 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 089407-009 | SW846 6020 |
| | Barium | 0.0977 | 0.0005 | 0.002 | 2.00 | | | 089407-009 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089407-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 089407-009 | SW846 6020 |
| | Calcium | 55.8 | 0.100 | 1.00 | NE | B | | 089407-009 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 089407-009 | SW846 6020 |
| | Cobalt | ND | 0.0001 | 0.001 | NE | U | | 089407-009 | SW846 6020 |
| | Copper | 0.000736 | 0.0003 | 0.001 | NE | J | 0.013UJ | 089407-009 | SW846 6020 |
| | Iron | 0.183 | 0.010 | 0.100 | NE | | | 089407-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089407-009 | SW846 6020 |
| | Magnesium | 18.0 | 0.005 | 0.015 | NE | | | 089407-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 089407-009 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 089407-009 | SW846 7470 |
| | Nickel | 0.00157 | 0.0005 | 0.002 | NE | J | | 089407-009 | SW846 6020 |
| | Potassium | 4.86 | 0.080 | 0.300 | NE | | | 089407-009 | SW846 6020 |
| | Selenium | ND | 0.001 | 0.005 | 0.050 | U | | 089407-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089407-009 | SW846 6020 |
| | Sodium | 44.8 | 0.080 | 0.250 | NE | | | 089407-009 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 089407-009 | SW846 6020 |
| | Uranium | **0.00798** | 0.00005 | 0.0002 | 0.030 | | | 089407-009 | SW846 6020 |
| | Vanadium | 0.00783 | 0.003 | 0.010 | NE | J | | 089407-009 | SW846 6020 |
| | Zinc | ND | 0.0026 | 0.010 | NE | U | | 089407-009 | SW846 6020 |

Refer to footnotes on page 4A-57.

## Table 4A-5 *(Continued)*
## Summary of Total Metal Results (Unfiltered), Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[f] | Validation Qualifier[g] | Sample No. | Analytical Method[h] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-MW7** (Duplicate) 07-Jul-10 | Aluminum | ND | 0.010 | 0.030 | NE | U | | 089408-009 | SW846 6020 |
| | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 089408-009 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 089408-009 | SW846 6020 |
| | Barium | 0.0947 | 0.0005 | 0.002 | 2.00 | | | 089408-009 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089408-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 089408-009 | SW846 6020 |
| | Calcium | 54.9 | 0.100 | 1.00 | NE | B | | 089408-009 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 089408-009 | SW846 6020 |
| | Cobalt | ND | 0.0001 | 0.001 | NE | U | | 089408-009 | SW846 6020 |
| | Copper | 0.000721 | 0.0003 | 0.001 | NE | J | 0.013UJ | 089408-009 | SW846 6020 |
| | Iron | 0.181 | 0.010 | 0.100 | NE | | | 089408-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089408-009 | SW846 6020 |
| | Magnesium | 17.2 | 0.005 | 0.015 | NE | | | 089408-009 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 089408-009 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 089408-009 | SW846 7470 |
| | Nickel | 0.00139 | 0.0005 | 0.002 | NE | J | | 089408-009 | SW846 6020 |
| | Potassium | 4.52 | 0.080 | 0.300 | NE | | | 089408-009 | SW846 6020 |
| | Selenium | ND | 0.001 | 0.005 | 0.050 | U | | 089408-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089408-009 | SW846 6020 |
| | Sodium | 45.9 | 0.080 | 0.250 | NE | | | 089408-009 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 089408-009 | SW846 6020 |
| | Uranium | **0.00796** | 0.00005 | 0.0002 | 0.030 | | | 089408-009 | SW846 6020 |
| | Vanadium | 0.00828 | 0.003 | 0.010 | NE | J | | 089408-009 | SW846 6020 |
| | Zinc | ND | 0.0026 | 0.010 | NE | U | | 089408-009 | SW846 6020 |

Refer to footnotes on page 4A-57.

## Table 4A-5 *(Continued)*
## Summary of Total Metal Results (Unfiltered), Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[f] | Validation Qualifier[g] | Sample No. | Analytical Method[h] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-MW8** | Aluminum | 0.079 | 0.010 | 0.030 | NE | | | 089411-009 | SW846 6020 |
| 12-Jul-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 089411-009 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 089411-009 | SW846 6020 |
| | Barium | **0.145** | 0.0005 | 0.002 | 2.00 | | | 089411-009 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089411-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 089411-009 | SW846 6020 |
| | Calcium | 61.2 | 0.100 | 1.00 | NE | | | 089411-009 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 089411-009 | SW846 6020 |
| | Cobalt | 0.000101 | 0.0001 | 0.001 | NE | J | | 089411-009 | SW846 6020 |
| | Copper | 0.000687 | 0.0003 | 0.001 | NE | J | | 089411-009 | SW846 6020 |
| | Iron | 0.237 | 0.010 | 0.100 | NE | | | 089411-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089411-009 | SW846 6020 |
| | Magnesium | 21.4 | 0.005 | 0.015 | NE | | | 089411-009 | SW846 6020 |
| | Manganese | 0.0111 | 0.001 | 0.005 | NE | | | 089411-009 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 089411-009 | SW846 7470 |
| | Nickel | 0.0013 | 0.0005 | 0.002 | NE | J | | 089411-009 | SW846 6020 |
| | Potassium | 5.34 | 0.080 | 0.300 | NE | | | 089411-009 | SW846 6020 |
| | Selenium | ND | 0.001 | 0.005 | 0.050 | U | | 089411-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089411-009 | SW846 6020 |
| | Sodium | 46.5 | 0.080 | 0.250 | NE | | | 089411-009 | SW846 6020 |
| | Thallium | 0.000508 | 0.0003 | 0.001 | 0.002 | J | | 089411-009 | SW846 6020 |
| | Uranium | **0.00745** | 0.00005 | 0.0002 | 0.030 | B | | 089411-009 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | | 089411-009 | SW846 6020 |
| | Zinc | 0.0034 | 0.0026 | 0.010 | NE | J | | 089411-009 | SW846 6020 |

Refer to footnotes on page 4A-57.

**Table 4A-5** *(Concluded)*
**Summary of Total Metal Results (Unfiltered),**
**Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[f] | Validation Qualifier[g] | Sample No. | Analytical Method[h] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-MW9** | Aluminum | 0.0124 | 0.010 | 0.030 | NE | J | | 089414-009 | SW846 6020 |
| 13-Jul-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 089414-009 | SW846 6020 |
| | Arsenic | 0.00316 | 0.0015 | 0.005 | 0.010 | J | | 089414-009 | SW846 6020 |
| | Barium | 0.0959 | 0.0005 | 0.002 | 2.00 | | | 089414-009 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089414-009 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 089414-009 | SW846 6020 |
| | Calcium | 58.4 | 0.100 | 1.00 | NE | | | 089414-009 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 089414-009 | SW846 6020 |
| | Cobalt | ND | 0.0001 | 0.001 | NE | U | | 089414-009 | SW846 6020 |
| | Copper | 0.00102 | 0.0003 | 0.001 | NE | | | 089414-009 | SW846 6020 |
| | Iron | 0.165 | 0.010 | 0.100 | NE | | | 089414-009 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089414-009 | SW846 6020 |
| | Magnesium | 21.5 | 0.005 | 0.015 | NE | | | 089414-009 | SW846 6020 |
| | Manganese | 0.00364 | 0.001 | 0.005 | NE | J | | 089414-009 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 089414-009 | SW846 7470 |
| | Nickel | 0.00134 | 0.0005 | 0.002 | NE | J | | 089414-009 | SW846 6020 |
| | Potassium | 4.81 | 0.080 | 0.300 | NE | | | 089414-009 | SW846 6020 |
| | Selenium | ND | 0.001 | 0.005 | 0.050 | U | | 089414-009 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089414-009 | SW846 6020 |
| | Sodium | 42.4 | 0.080 | 0.250 | NE | | | 089414-009 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 089414-009 | SW846 6020 |
| | Uranium | **0.00881** | 0.00005 | 0.0002 | 0.030 | B | | 089414-009 | SW846 6020 |
| | Vanadium | 0.00697 | 0.003 | 0.010 | NE | J | | 089414-009 | SW846 6020 |
| | Zinc | ND | 0.0026 | 0.010 | NE | U | | 089414-009 | SW846 6020 |

Refer to footnotes on page 4A-57.

# Table 4A-6
## Summary of Total Metal Results (Filtered), Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[f] | Validation Qualifier[g] | Sample No. | Analytical Method[h] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-BW2** | Aluminum | ND | 0.010 | 0.030 | NE | U | | 087998-010 | SW846 6020 |
| 04-Jan-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 087998-010 | SW846 6020 |
| | Arsenic | 0.0024 | 0.0015 | 0.005 | 0.010 | B, J | 0.012U | 087998-010 | SW846 6020 |
| | Barium | 0.0949 | 0.0005 | 0.002 | 2.00 | | | 087998-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 087998-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 087998-010 | SW846 6020 |
| | Calcium | 75.6 | 0.100 | 1.00 | NE | | | 087998-010 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 087998-010 | SW846 6020 |
| | Cobalt | 0.000154 | 0.0001 | 0.001 | NE | J | 0.00087U | 087998-010 | SW846 6020 |
| | Copper | 0.000552 | 0.0003 | 0.001 | NE | J | 0.011U | 087998-010 | SW846 6020 |
| | Iron | 0.203 | 0.010 | 0.100 | NE | | | 087998-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 087998-010 | SW846 6020 |
| | Magnesium | 25.2 | 0.005 | 0.015 | NE | | | 087998-010 | SW846 6020 |
| | Manganese | 0.00101 | 0.001 | 0.005 | NE | J | 0.063U | 087998-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 087998-010 | SW846 7470 |
| | Nickel | 0.00279 | 0.0005 | 0.002 | NE | | 0.038U | 087998-010 | SW846 6020 |
| | Potassium | 4.27 | 0.080 | 0.300 | NE | | | 087998-010 | SW846 6020 |
| | Selenium | 0.00165 | 0.001 | 0.005 | 0.050 | J | | 087998-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 087998-010 | SW846 6020 |
| | Sodium | 66.3 | 0.400 | 1.25 | NE | | | 087998-010 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 087998-010 | SW846 6020 |
| | Uranium | **0.00706** | 0.00005 | 0.0002 | 0.030 | | | 087998-010 | SW846 6020 |
| | Vanadium | 0.00455 | 0.003 | 0.010 | NE | J | 0.024U | 087998-010 | SW846 6020 |
| | Zinc | ND | 0.0026 | 0.010 | NE | U | | 087998-010 | SW846 6020 |

Refer to footnotes on page 4A-57.

## Table 4A-6 *(Continued)*
## Summary of Total Metal Results (Filtered), Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[f] | Validation Qualifier[g] | Sample No. | Analytical Method[h] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-MW7** | Aluminum | ND | 0.010 | 0.030 | NE | U | | 088002-010 | SW846 6020 |
| 05-Jan-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 088002-010 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 088002-010 | SW846 6020 |
| | Barium | 0.0938 | 0.0005 | 0.002 | 2.00 | | | 088002-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 088002-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 088002-010 | SW846 6020 |
| | Calcium | 59.5 | 0.100 | 1.00 | NE | | | 088002-010 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 088002-010 | SW846 6020 |
| | Cobalt | ND | 0.0001 | 0.001 | NE | U | | 088002-010 | SW846 6020 |
| | Copper | 0.000825 | 0.0003 | 0.001 | NE | J | 0.012U | 088002-010 | SW846 6020 |
| | Iron | 0.155 | 0.010 | 0.100 | NE | | | 088002-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 088002-010 | SW846 6020 |
| | Magnesium | 21.3 | 0.005 | 0.015 | NE | | | 088002-010 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 088002-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 088002-010 | SW846 7470 |
| | Nickel | 0.00218 | 0.0005 | 0.002 | NE | | | 088002-010 | SW846 6020 |
| | Potassium | 5.15 | 0.080 | 0.300 | NE | | | 088002-010 | SW846 6020 |
| | Selenium | ND | 0.001 | 0.005 | 0.050 | U | | 088002-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 088002-010 | SW846 6020 |
| | Sodium | 49.3 | 0.400 | 1.25 | NE | | | 088002-010 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 088002-010 | SW846 6020 |
| | Uranium | **0.00774** | 0.00005 | 0.0002 | 0.030 | | | 088002-010 | SW846 6020 |
| | Vanadium | 0.00528 | 0.003 | 0.010 | NE | J | 0.024U | 088002-010 | SW846 6020 |
| | Zinc | ND | 0.0026 | 0.010 | NE | U | | 088002-010 | SW846 6020 |

Refer to footnotes on page 4A-57.

# Table 4A-6 *(Continued)*
## Summary of Total Metal Results (Filtered), Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[f] | Validation Qualifier[g] | Sample No. | Analytical Method[h] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-MW7** (Duplicate) 05-Jan-10 | Aluminum | ND | 0.010 | 0.030 | NE | U | | 088003-010 | SW846 6020 |
| | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 088003-010 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 088003-010 | SW846 6020 |
| | Barium | 0.0961 | 0.0005 | 0.002 | 2.00 | | | 088003-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 088003-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 088003-010 | SW846 6020 |
| | Calcium | 60.7 | 0.100 | 1.00 | NE | | | 088003-010 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 088003-010 | SW846 6020 |
| | Cobalt | 0.000105 | 0.0001 | 0.001 | NE | J | | 088003-010 | SW846 6020 |
| | Copper | 0.000672 | 0.0003 | 0.001 | NE | J | 0.012U | 088003-010 | SW846 6020 |
| | Iron | 0.161 | 0.010 | 0.100 | NE | | | 088003-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 088003-010 | SW846 6020 |
| | Magnesium | 22.7 | 0.005 | 0.015 | NE | | | 088003-010 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 088003-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 088003-010 | SW846 7470 |
| | Nickel | 0.0023 | 0.0005 | 0.002 | NE | | | 088003-010 | SW846 6020 |
| | Potassium | 5.71 | 0.080 | 0.300 | NE | | | 088003-010 | SW846 6020 |
| | Selenium | ND | 0.001 | 0.005 | 0.050 | U | | 088003-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 088003-010 | SW846 6020 |
| | Sodium | 53.1 | 0.400 | 1.25 | NE | | | 088003-010 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 088003-010 | SW846 6020 |
| | Uranium | **0.00792** | 0.00005 | 0.0002 | 0.030 | | | 088003-010 | SW846 6020 |
| | Vanadium | 0.00403 | 0.003 | 0.010 | NE | J | 0.024U | 088003-010 | SW846 6020 |
| | Zinc | ND | 0.0026 | 0.010 | NE | U | | 088003-010 | SW846 6020 |

Refer to footnotes on page 4A-57.

## Table 4A-6 *(Continued)*
## Summary of Total Metal Results (Filtered), Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[f] | Validation Qualifier[g] | Sample No. | Analytical Method[h] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-MW8** | Aluminum | ND | 0.010 | 0.030 | NE | U | | 088007-010 | SW846 6020 |
| 06-Jan-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 088007-010 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 088007-010 | SW846 6020 |
| | Barium | **0.142** | 0.0005 | 0.002 | 2.00 | | | 088007-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 088007-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 088007-010 | SW846 6020 |
| | Calcium | 62.3 | 0.100 | 1.00 | NE | | | 088007-010 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 088007-010 | SW846 6020 |
| | Cobalt | 0.000119 | 0.0001 | 0.001 | NE | J | | 088007-010 | SW846 6020 |
| | Copper | 0.000651 | 0.0003 | 0.001 | NE | J | 0.0021U | 088007-010 | SW846 6020 |
| | Iron | 0.179 | 0.010 | 0.100 | NE | | | 088007-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 088007-010 | SW846 6020 |
| | Magnesium | 22.2 | 0.005 | 0.015 | NE | | | 088007-010 | SW846 6020 |
| | Manganese | 0.224 | 0.001 | 0.005 | NE | | | 088007-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 088007-010 | SW846 7470 |
| | Nickel | 0.00269 | 0.0005 | 0.002 | NE | | | 088007-010 | SW846 6020 |
| | Potassium | 5.84 | 0.080 | 0.300 | NE | | | 088007-010 | SW846 6020 |
| | Selenium | ND | 0.001 | 0.005 | 0.050 | U | | 088007-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 088007-010 | SW846 6020 |
| | Sodium | 53.7 | 0.400 | 1.25 | NE | | | 088007-010 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 088007-010 | SW846 6020 |
| | Uranium | **0.00779** | 0.00005 | 0.0002 | 0.030 | | | 088007-010 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | | 088007-010 | SW846 6020 |
| | Zinc | 0.00492 | 0.0026 | 0.010 | NE | J | | 088007-010 | SW846 6020 |

Refer to footnotes on page 4A-57.

# Table 4A-6 *(Continued)*
## Summary of Total Metal Results (Filtered), Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[f] | Validation Qualifier[g] | Sample No. | Analytical Method[h] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-MW9** | Aluminum | ND | 0.010 | 0.030 | NE | U | | 088011-010 | SW846 6020 |
| 07-Jan-10 | Antimony | 0.000782 | 0.0005 | 0.003 | 0.006 | J | | 088011-010 | SW846 6020 |
| | Arsenic | 0.00175 | 0.0015 | 0.005 | 0.010 | J | | 088011-010 | SW846 6020 |
| | Barium | 0.0945 | 0.0005 | 0.002 | 2.00 | | | 088011-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 088011-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 088011-010 | SW846 6020 |
| | Calcium | 60.3 | 0.100 | 1.00 | NE | B | | 088011-010 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 088011-010 | SW846 6020 |
| | Cobalt | 0.000181 | 0.0001 | 0.001 | NE | J | | 088011-010 | SW846 6020 |
| | Copper | 0.00081 | 0.0003 | 0.001 | NE | J | 0.0025U | 088011-010 | SW846 6020 |
| | Iron | 0.180 | 0.010 | 0.100 | NE | | | 088011-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 088011-010 | SW846 6020 |
| | Magnesium | 20.3 | 0.005 | 0.015 | NE | | | 088011-010 | SW846 6020 |
| | Manganese | 0.00407 | 0.001 | 0.005 | NE | J | | 088011-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 088011-010 | SW846 7470 |
| | Nickel | 0.00164 | 0.0005 | 0.002 | NE | J | | 088011-010 | SW846 6020 |
| | Potassium | 4.95 | 0.080 | 0.300 | NE | | | 088011-010 | SW846 6020 |
| | Selenium | ND | 0.001 | 0.005 | 0.050 | U | | 088011-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 088011-010 | SW846 6020 |
| | Sodium | 47.8 | 0.080 | 0.250 | NE | | | 088011-010 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 088011-010 | SW846 6020 |
| | Uranium | **0.00971** | 0.00005 | 0.0002 | 0.030 | | | 088011-010 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | | 088011-010 | SW846 6020 |
| | Zinc | ND | 0.0026 | 0.010 | NE | U | | 088011-010 | SW846 6020 |

Refer to footnotes on page 4A-57.

## Table 4A-6 *(Continued)*
## Summary of Total Metal Results (Filtered), Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[f] | Validation Qualifier[g] | Sample No. | Analytical Method[h] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-BW2** | Aluminum | 0.0118 | 0.010 | 0.030 | NE | J | | 088942-010 | SW846 6020 |
| 27-Apr-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 088942-010 | SW846 6020 |
| | Arsenic | 0.00331 | 0.0015 | 0.005 | 0.010 | B, J | 0.014U | 088942-010 | SW846 6020 |
| | Barium | 0.0935 | 0.0005 | 0.002 | 2.00 | | | 088942-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 088942-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 088942-010 | SW846 6020 |
| | Calcium | 64.1 | 0.200 | 2.00 | NE | B | | 088942-010 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 088942-010 | SW846 6020 |
| | Cobalt | 0.000305 | 0.0001 | 0.001 | NE | J | 0.0034U | 088942-010 | SW846 6020 |
| | Copper | 0.00044 | 0.0003 | 0.001 | NE | J | 0.0036U | 088942-010 | SW846 6020 |
| | Iron | 0.0625 | 0.010 | 0.100 | NE | J | | 088942-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 088942-010 | SW846 6020 |
| | Magnesium | 20.1 | 0.005 | 0.015 | NE | | | 088942-010 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 088942-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 088942-010 | SW846 7470 |
| | Nickel | 0.00108 | 0.0005 | 0.002 | NE | J | | 088942-010 | SW846 6020 |
| | Potassium | 3.95 | 0.080 | 0.300 | NE | | | 088942-010 | SW846 6020 |
| | Selenium | 0.002 | 0.001 | 0.005 | 0.050 | J | | 088942-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 088942-010 | SW846 6020 |
| | Sodium | 48.0 | 0.800 | 2.50 | NE | | | 088942-010 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 088942-010 | SW846 6020 |
| | Uranium | **0.00638** | 0.00005 | 0.0002 | 0.030 | | | 088942-010 | SW846 6020 |
| | Vanadium | 0.00856 | 0.003 | 0.010 | NE | J | 0.074UJ | 088942-010 | SW846 6020 |
| | Zinc | ND | 0.0026 | 0.010 | NE | U | | 088942-010 | SW846 6020 |

Refer to footnotes on page 4A-57.

**Table 4A-6** *(Continued)*
**Summary of Total Metal Results (Filtered),**
**Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[f] | Validation Qualifier[g] | Sample No. | Analytical Method[h] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-BW2** (Duplicate) 27-Apr-10 | Aluminum | ND | 0.010 | 0.030 | NE | U | | 088943-010 | SW846 6020 |
| | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 088943-010 | SW846 6020 |
| | Arsenic | 0.00518 | 0.0015 | 0.005 | 0.010 | B | 0.014U | 088943-010 | SW846 6020 |
| | Barium | 0.095 | 0.0005 | 0.002 | 2.00 | | | 088943-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 088943-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 088943-010 | SW846 6020 |
| | Calcium | 71.7 | 0.200 | 2.00 | NE | B | | 088943-010 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 088943-010 | SW846 6020 |
| | Cobalt | 0.000139 | 0.0001 | 0.001 | NE | J | 0.0034U | 088943-010 | SW846 6020 |
| | Copper | 0.00043 | 0.0003 | 0.001 | NE | J | 0.0036U | 088943-010 | SW846 6020 |
| | Iron | 0.0648 | 0.010 | 0.100 | NE | J | | 088943-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 088943-010 | SW846 6020 |
| | Magnesium | 21.9 | 0.005 | 0.015 | NE | | | 088943-010 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 088943-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 088943-010 | SW846 7470 |
| | Nickel | 0.00113 | 0.0005 | 0.002 | NE | J | | 088943-010 | SW846 6020 |
| | Potassium | 4.20 | 0.080 | 0.300 | NE | | | 088943-010 | SW846 6020 |
| | Selenium | 0.00206 | 0.001 | 0.005 | 0.050 | J | | 088943-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 088943-010 | SW846 6020 |
| | Sodium | 53.1 | 0.800 | 2.50 | NE | | | 088943-010 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 088943-010 | SW846 6020 |
| | Uranium | **0.00642** | 0.00005 | 0.0002 | 0.030 | | | 088943-010 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | 0.074UJ | 088943-010 | SW846 6020 |
| | Zinc | ND | 0.0026 | 0.010 | NE | U | | 088943-010 | SW846 6020 |

Refer to footnotes on page 4A-57.

# Table 4A-6 *(Continued)*
# Summary of Total Metal Results (Filtered), Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[f] | Validation Qualifier[g] | Sample No. | Analytical Method[h] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-MW4** | Aluminum | 0.0172 | 0.010 | 0.030 | NE | J | | 088949-010 | SW846 6020 |
| 29-Apr-10 | Antimony | 0.00288 | 0.0005 | 0.003 | 0.006 | J | | 088949-010 | SW846 6020 |
| | Arsenic | 0.007 | 0.0015 | 0.005 | 0.010 | B | 0.014U | 088949-010 | SW846 6020 |
| | Barium | 0.0969 | 0.0005 | 0.002 | 2.00 | | | 088949-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 088949-010 | SW846 6020 |
| | Cadmium | 0.000237 | 0.00011 | 0.001 | 0.005 | J | | 088949-010 | SW846 6020 |
| | Calcium | 59.5 | 0.200 | 2.00 | NE | B | | 088949-010 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 088949-010 | SW846 6020 |
| | Cobalt | 0.000137 | 0.0001 | 0.001 | NE | J | | 088949-010 | SW846 6020 |
| | Copper | 0.00163 | 0.0003 | 0.001 | NE | | | 088949-010 | SW846 6020 |
| | Iron | 0.045 | 0.010 | 0.100 | NE | J | NJ- | 088949-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 088949-010 | SW846 6020 |
| | Magnesium | 18.6 | 0.005 | 0.015 | NE | | | 088949-010 | SW846 6020 |
| | Manganese | 0.004 | 0.001 | 0.005 | NE | J | | 088949-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 088949-010 | SW846 7470 |
| | Nickel | 0.00976 | 0.0005 | 0.002 | NE | | | 088949-010 | SW846 6020 |
| | Potassium | 5.11 | 0.080 | 0.300 | NE | | | 088949-010 | SW846 6020 |
| | Selenium | ND | 0.001 | 0.005 | 0.050 | U | | 088949-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 088949-010 | SW846 6020 |
| | Sodium | 44.5 | 0.800 | 2.50 | NE | | | 088949-010 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 088949-010 | SW846 6020 |
| | Uranium | **0.0058** | 0.00005 | 0.0002 | 0.030 | | | 088949-010 | SW846 6020 |
| | Vanadium | 0.0111 | 0.003 | 0.010 | NE | | | 088949-010 | SW846 6020 |
| | Zinc | 0.106 | 0.0026 | 0.010 | NE | | | 088949-010 | SW846 6020 |

Refer to footnotes on page 4A-57.

**Table 4A-6** *(Continued)*
**Summary of Total Metal Results (Filtered),**
**Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[f] | Validation Qualifier[g] | Sample No. | Analytical Method[h] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-MW5** | Aluminum | ND | 0.010 | 0.030 | NE | U | | 088918-010 | SW846 6020 |
| 20-Apr-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 088918-010 | SW846 6020 |
| | Arsenic | 0.004 | 0.0015 | 0.005 | 0.010 | B, J | 0.012U | 088918-010 | SW846 6020 |
| | Barium | **0.129** | 0.0005 | 0.002 | 2.00 | | | 088918-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 088918-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 088918-010 | SW846 6020 |
| | Calcium | 88.8 | 0.100 | 1.00 | NE | B | | 088918-010 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 088918-010 | SW846 6020 |
| | Cobalt | 0.000134 | 0.0001 | 0.001 | NE | J | 0.00086U | 088918-010 | SW846 6020 |
| | Copper | 0.000791 | 0.0003 | 0.001 | NE | J | 0.0081U | 088918-010 | SW846 6020 |
| | Iron | 0.165 | 0.010 | 0.100 | NE | B | | 088918-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 088918-010 | SW846 6020 |
| | Magnesium | 28.7 | 0.005 | 0.015 | NE | | | 088918-010 | SW846 6020 |
| | Manganese | 0.00296 | 0.001 | 0.005 | NE | J | | 088918-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | UJ | 088918-010 | SW846 7470 |
| | Nickel | 0.00203 | 0.0005 | 0.002 | NE | | | 088918-010 | SW846 6020 |
| | Potassium | 5.62 | 0.400 | 1.50 | NE | | | 088918-010 | SW846 6020 |
| | Selenium | 0.00135 | 0.001 | 0.005 | 0.050 | J | NJ- | 088918-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 088918-010 | SW846 6020 |
| | Sodium | 60.6 | 0.400 | 1.25 | NE | | | 088918-010 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 088918-010 | SW846 6020 |
| | Uranium | **0.0102** | 0.00005 | 0.0002 | 0.030 | | | 088918-010 | SW846 6020 |
| | Vanadium | 0.00933 | 0.003 | 0.010 | NE | B, J | 0.022UJ | 088918-010 | SW846 6020 |
| | Zinc | 0.00443 | 0.0026 | 0.010 | NE | J | | 088918-010 | SW846 6020 |

Refer to footnotes on page 4A-57.

**Table 4A-6** *(Continued)*
**Summary of Total Metal Results (Filtered),**
**Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[f] | Validation Qualifier[g] | Sample No. | Analytical Method[h] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-MW5** (Duplicate) 20-Apr-10 | Aluminum | ND | 0.010 | 0.030 | NE | U | | 088919-010 | SW846 6020 |
| | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 088919-010 | SW846 6020 |
| | Arsenic | 0.00234 | 0.0015 | 0.005 | 0.010 | B, J | 0.012U | 088919-010 | SW846 6020 |
| | Barium | **0.138** | 0.0005 | 0.002 | 2.00 | | | 088919-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 088919-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 088919-010 | SW846 6020 |
| | Calcium | 95.5 | 0.100 | 1.00 | NE | B | | 088919-010 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 088919-010 | SW846 6020 |
| | Cobalt | 0.000126 | 0.0001 | 0.001 | NE | J | 0.00086U | 088919-010 | SW846 6020 |
| | Copper | 0.000843 | 0.0003 | 0.001 | NE | J | 0.0081U | 088919-010 | SW846 6020 |
| | Iron | 0.198 | 0.010 | 0.100 | NE | B | | 088919-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 088919-010 | SW846 6020 |
| | Magnesium | 31.2 | 0.005 | 0.015 | NE | | | 088919-010 | SW846 6020 |
| | Manganese | 0.00323 | 0.001 | 0.005 | NE | J | | 088919-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | UJ | 088919-010 | SW846 7470 |
| | Nickel | 0.00169 | 0.0005 | 0.002 | NE | J | | 088919-010 | SW846 6020 |
| | Potassium | 5.92 | 0.400 | 1.50 | NE | | | 088919-010 | SW846 6020 |
| | Selenium | 0.00155 | 0.001 | 0.005 | 0.050 | J | NJ- | 088919-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 088919-010 | SW846 6020 |
| | Sodium | 65.5 | 0.400 | 1.25 | NE | | | 088919-010 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 088919-010 | SW846 6020 |
| | Uranium | **0.0102** | 0.00005 | 0.0002 | 0.030 | | | 088919-010 | SW846 6020 |
| | Vanadium | 0.00358 | 0.003 | 0.010 | NE | B, J | 0.022UJ | 088919-010 | SW846 6020 |
| | Zinc | 0.00282 | 0.0026 | 0.010 | NE | J | | 088919-010 | SW846 6020 |

Refer to footnotes on page 4A-57.

**Table 4A-6** *(Continued)*
**Summary of Total Metal Results (Filtered),**
**Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[f] | Validation Qualifier[g] | Sample No. | Analytical Method[h] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-MW6** | Aluminum | ND | 0.010 | 0.030 | NE | U | | 088909-010 | SW846 6020 |
| 19-Apr-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 088909-010 | SW846 6020 |
| | Arsenic | 0.00474 | 0.0015 | 0.005 | 0.010 | B, J | 0.012U | 088909-010 | SW846 6020 |
| | Barium | 0.109 | 0.0005 | 0.002 | 2.00 | | | 088909-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 088909-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 088909-010 | SW846 6020 |
| | Calcium | 86.6 | 0.100 | 1.00 | NE | B | | 088909-010 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 088909-010 | SW846 6020 |
| | Cobalt | 0.000196 | 0.0001 | 0.001 | NE | J | | 088909-010 | SW846 6020 |
| | Copper | 0.00102 | 0.0003 | 0.001 | NE | | | 088909-010 | SW846 6020 |
| | Iron | 0.184 | 0.010 | 0.100 | NE | B | | 088909-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 088909-010 | SW846 6020 |
| | Magnesium | 28.1 | 0.005 | 0.015 | NE | | | 088909-010 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 088909-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | UJ | 088909-010 | SW846 7470 |
| | Nickel | 0.00156 | 0.0005 | 0.002 | NE | J | | 088909-010 | SW846 6020 |
| | Potassium | 5.94 | 0.400 | 1.50 | NE | | | 088909-010 | SW846 6020 |
| | Selenium | 0.00158 | 0.001 | 0.005 | 0.050 | J | NJ- | 088909-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 088909-010 | SW846 6020 |
| | Sodium | 62.8 | 0.400 | 1.25 | NE | | | 088909-010 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 088909-010 | SW846 6020 |
| | Uranium | **0.00989** | 0.00005 | 0.0002 | 0.030 | | | 088909-010 | SW846 6020 |
| | Vanadium | 0.00826 | 0.003 | 0.010 | NE | B, J | 0.022UJ | 088909-010 | SW846 6020 |
| | Zinc | ND | 0.0026 | 0.010 | NE | U | | 088909-010 | SW846 6020 |

Refer to footnotes on page 4A-57.

## Table 4A-6 *(Continued)*
## Summary of Total Metal Results (Filtered), Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[f] | Validation Qualifier[g] | Sample No. | Analytical Method[h] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-MW7** | Aluminum | ND | 0.010 | 0.030 | NE | U | | 088929-010 | SW846 6020 |
| 22-Apr-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 088929-010 | SW846 6020 |
| | Arsenic | 0.00242 | 0.0015 | 0.005 | 0.010 | B, J | 0.012U | 088929-010 | SW846 6020 |
| | Barium | 0.108 | 0.0005 | 0.002 | 2.00 | | | 088929-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 088929-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 088929-010 | SW846 6020 |
| | Calcium | 58.5 | 0.100 | 1.00 | NE | B | | 088929-010 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 088929-010 | SW846 6020 |
| | Cobalt | 0.000128 | 0.0001 | 0.001 | NE | J | | 088929-010 | SW846 6020 |
| | Copper | 0.000799 | 0.0003 | 0.001 | NE | J | | 088929-010 | SW846 6020 |
| | Iron | 0.159 | 0.010 | 0.100 | NE | B | | 088929-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 088929-010 | SW846 6020 |
| | Magnesium | 19.2 | 0.005 | 0.015 | NE | | | 088929-010 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 088929-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | UJ | 088929-010 | SW846 7470 |
| | Nickel | 0.00127 | 0.0005 | 0.002 | NE | J | | 088929-010 | SW846 6020 |
| | Potassium | 5.45 | 0.400 | 1.50 | NE | | | 088929-010 | SW846 6020 |
| | Selenium | ND | 0.001 | 0.005 | 0.050 | U | UJ | 088929-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 088929-010 | SW846 6020 |
| | Sodium | 49.8 | 0.400 | 1.25 | NE | | | 088929-010 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 088929-010 | SW846 6020 |
| | Uranium | **0.00842** | 0.00005 | 0.0002 | 0.030 | | | 088929-010 | SW846 6020 |
| | Vanadium | 0.00828 | 0.003 | 0.010 | NE | B, J | 0.022UJ | 088929-010 | SW846 6020 |
| | Zinc | ND | 0.0026 | 0.010 | NE | U | | 088929-010 | SW846 6020 |

Refer to footnotes on page 4A-57.

**Table 4A-6** *(Continued)*
**Summary of Total Metal Results (Filtered),**
**Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[f] | Validation Qualifier[g] | Sample No. | Analytical Method[h] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-MW8** | Aluminum | ND | 0.010 | 0.030 | NE | U | | 088934-010 | SW846 6020 |
| 26-Apr-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 088934-010 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 088934-010 | SW846 6020 |
| | Barium | **0.142** | 0.0005 | 0.002 | 2.00 | | | 088934-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 088934-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 088934-010 | SW846 6020 |
| | Calcium | 56.6 | 0.200 | 2.00 | NE | B | | 088934-010 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 088934-010 | SW846 6020 |
| | Cobalt | 0.000266 | 0.0001 | 0.001 | NE | J | | 088934-010 | SW846 6020 |
| | Copper | 0.000555 | 0.0003 | 0.001 | NE | J | | 088934-010 | SW846 6020 |
| | Iron | 0.087 | 0.010 | 0.100 | NE | J | | 088934-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 088934-010 | SW846 6020 |
| | Magnesium | 19.2 | 0.005 | 0.015 | NE | | | 088934-010 | SW846 6020 |
| | Manganese | 0.00265 | 0.001 | 0.005 | NE | J | | 088934-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 088934-010 | SW846 7470 |
| | Nickel | 0.00104 | 0.0005 | 0.002 | NE | J | | 088934-010 | SW846 6020 |
| | Potassium | 5.25 | 0.080 | 0.300 | NE | | | 088934-010 | SW846 6020 |
| | Selenium | ND | 0.001 | 0.005 | 0.050 | U | | 088934-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 088934-010 | SW846 6020 |
| | Sodium | 43.0 | 0.080 | 0.250 | NE | | | 088934-010 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 088934-010 | SW846 6020 |
| | Uranium | **0.00679** | 0.00005 | 0.0002 | 0.030 | | | 088934-010 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | | 088934-010 | SW846 6020 |
| | Zinc | 0.0032 | 0.0026 | 0.010 | NE | J | | 088934-010 | SW846 6020 |

Refer to footnotes on page 4A-57.

### Table 4A-6 *(Continued)*
### Summary of Total Metal Results (Filtered),
### Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[f] | Validation Qualifier[g] | Sample No. | Analytical Method[h] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-MW9** | Aluminum | ND | 0.010 | 0.030 | NE | U | | 088924-010 | SW846 6020 |
| 21-Apr-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 088924-010 | SW846 6020 |
| | Arsenic | 0.0044 | 0.0015 | 0.005 | 0.010 | B, J | 0.012U | 088924-010 | SW846 6020 |
| | Barium | 0.098 | 0.0005 | 0.002 | 2.00 | | | 088924-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 088924-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 088924-010 | SW846 6020 |
| | Calcium | 58.6 | 0.100 | 1.00 | NE | B | | 088924-010 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 088924-010 | SW846 6020 |
| | Cobalt | 0.000158 | 0.0001 | 0.001 | NE | J | | 088924-010 | SW846 6020 |
| | Copper | 0.000725 | 0.0003 | 0.001 | NE | J | | 088924-010 | SW846 6020 |
| | Iron | 0.127 | 0.010 | 0.100 | NE | B | | 088924-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 088924-010 | SW846 6020 |
| | Magnesium | 18.5 | 0.005 | 0.015 | NE | | | 088924-010 | SW846 6020 |
| | Manganese | 0.00168 | 0.001 | 0.005 | NE | J | | 088924-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | UJ | 088924-010 | SW846 7470 |
| | Nickel | 0.00129 | 0.0005 | 0.002 | NE | J | | 088924-010 | SW846 6020 |
| | Potassium | 5.44 | 0.400 | 1.50 | NE | | | 088924-010 | SW846 6020 |
| | Selenium | ND | 0.001 | 0.005 | 0.050 | U | UJ | 088924-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 088924-010 | SW846 6020 |
| | Sodium | 49.3 | 0.400 | 1.25 | NE | | | 088924-010 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 088924-010 | SW846 6020 |
| | Uranium | **0.00959** | 0.00005 | 0.0002 | 0.030 | | | 088924-010 | SW846 6020 |
| | Vanadium | 0.012 | 0.003 | 0.010 | NE | B | 0.022UJ | 088924-010 | SW846 6020 |
| | Zinc | ND | 0.0026 | 0.010 | NE | U | | 088924-010 | SW846 6020 |

Refer to footnotes on page 4A-57.

# Table 4A-6 *(Continued)*
## Summary of Total Metal Results (Filtered), Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[f] | Validation Qualifier[g] | Sample No. | Analytical Method[h] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-BW2** | Aluminum | ND | 0.010 | 0.030 | NE | U | | 089402-010 | SW846 6020 |
| 06-Jul-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 089402-010 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 089402-010 | SW846 6020 |
| | Barium | 0.0948 | 0.0005 | 0.002 | 2.00 | | | 089402-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089402-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 089402-010 | SW846 6020 |
| | Calcium | 70.4 | 0.100 | 1.00 | NE | B | | 089402-010 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 089402-010 | SW846 6020 |
| | Cobalt | ND | 0.0001 | 0.001 | NE | U | | 089402-010 | SW846 6020 |
| | Copper | 0.000786 | 0.0003 | 0.001 | NE | J | | 089402-010 | SW846 6020 |
| | Iron | 0.226 | 0.010 | 0.100 | NE | | | 089402-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089402-010 | SW846 6020 |
| | Magnesium | 25.1 | 0.005 | 0.015 | NE | | | 089402-010 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 089402-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 089402-010 | SW846 7470 |
| | Nickel | 0.00172 | 0.0005 | 0.002 | NE | J | | 089402-010 | SW846 6020 |
| | Potassium | 4.00 | 0.080 | 0.300 | NE | | | 089402-010 | SW846 6020 |
| | Selenium | 0.00228 | 0.001 | 0.005 | 0.050 | J | | 089402-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089402-010 | SW846 6020 |
| | Sodium | 54.4 | 0.400 | 1.25 | NE | | | 089402-010 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 089402-010 | SW846 6020 |
| | Uranium | **0.0074** | 0.00005 | 0.0002 | 0.030 | | | 089402-010 | SW846 6020 |
| | Vanadium | 0.00687 | 0.003 | 0.010 | NE | J | | 089402-010 | SW846 6020 |
| | Zinc | ND | 0.0026 | 0.010 | NE | U | | 089402-010 | SW846 6020 |

Refer to footnotes on page 4A-57.

**Table 4A-6** *(Continued)*
**Summary of Total Metal Results (Filtered),**
**Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[f] | Validation Qualifier[g] | Sample No. | Analytical Method[h] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-MW7** | Aluminum | ND | 0.010 | 0.030 | NE | U | | 089407-010 | SW846 6020 |
| 07-Jul-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 089407-010 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 089407-010 | SW846 6020 |
| | Barium | 0.0982 | 0.0005 | 0.002 | 2.00 | | | 089407-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089407-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 089407-010 | SW846 6020 |
| | Calcium | 55.6 | 0.100 | 1.00 | NE | B | | 089407-010 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 089407-010 | SW846 6020 |
| | Cobalt | ND | 0.0001 | 0.001 | NE | U | | 089407-010 | SW846 6020 |
| | Copper | 0.00246 | 0.0003 | 0.001 | NE | | 0.0032U | 089407-010 | SW846 6020 |
| | Iron | 0.184 | 0.010 | 0.100 | NE | | 0.29U | 089407-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089407-010 | SW846 6020 |
| | Magnesium | 17.4 | 0.005 | 0.015 | NE | | | 089407-010 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 089407-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 089407-010 | SW846 7470 |
| | Nickel | 0.00445 | 0.0005 | 0.002 | NE | | | 089407-010 | SW846 6020 |
| | Potassium | 4.91 | 0.080 | 0.300 | NE | | | 089407-010 | SW846 6020 |
| | Selenium | ND | 0.001 | 0.005 | 0.050 | U | | 089407-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089407-010 | SW846 6020 |
| | Sodium | 45.3 | 0.080 | 0.250 | NE | | | 089407-010 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 089407-010 | SW846 6020 |
| | Uranium | **0.00816** | 0.00005 | 0.0002 | 0.030 | | | 089407-010 | SW846 6020 |
| | Vanadium | 0.0081 | 0.003 | 0.010 | NE | J | | 089407-010 | SW846 6020 |
| | Zinc | ND | 0.0026 | 0.010 | NE | U | | 089407-010 | SW846 6020 |

Refer to footnotes on page 4A-57.

## Table 4A-6 *(Continued)*
## Summary of Total Metal Results (Filtered), Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[f] | Validation Qualifier[g] | Sample No. | Analytical Method[h] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-MW7** (Duplicate) 07-Jul-10 | Aluminum | ND | 0.010 | 0.030 | NE | U | | 089408-010 | SW846 6020 |
| | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 089408-010 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 089408-010 | SW846 6020 |
| | Barium | 0.0971 | 0.0005 | 0.002 | 2.00 | | | 089408-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089408-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 089408-010 | SW846 6020 |
| | Calcium | 54.8 | 0.100 | 1.00 | NE | B | | 089408-010 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 089408-010 | SW846 6020 |
| | Cobalt | 0.000171 | 0.0001 | 0.001 | NE | J | 0.00088U | 089408-010 | SW846 6020 |
| | Copper | 0.000873 | 0.0003 | 0.001 | NE | J | 0.0032U | 089408-010 | SW846 6020 |
| | Iron | 0.198 | 0.010 | 0.100 | NE | | 0.29U | 089408-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089408-010 | SW846 6020 |
| | Magnesium | 17.4 | 0.005 | 0.015 | NE | | | 089408-010 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 089408-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 089408-010 | SW846 7470 |
| | Nickel | 0.00155 | 0.0005 | 0.002 | NE | J | | 089408-010 | SW846 6020 |
| | Potassium | 4.58 | 0.080 | 0.300 | NE | | | 089408-010 | SW846 6020 |
| | Selenium | ND | 0.001 | 0.005 | 0.050 | U | | 089408-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089408-010 | SW846 6020 |
| | Sodium | 46.0 | 0.080 | 0.250 | NE | | | 089408-010 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 089408-010 | SW846 6020 |
| | Uranium | **0.008** | 0.00005 | 0.0002 | 0.030 | | | 089408-010 | SW846 6020 |
| | Vanadium | 0.00646 | 0.003 | 0.010 | NE | J | | 089408-010 | SW846 6020 |
| | Zinc | ND | 0.0026 | 0.010 | NE | U | | 089408-010 | SW846 6020 |

Refer to footnotes on page 4A-57.

**Table 4A-6** *(Continued)*
**Summary of Total Metal Results (Filtered),**
**Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[f] | Validation Qualifier[g] | Sample No. | Analytical Method[h] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-MW8** | Aluminum | ND | 0.010 | 0.030 | NE | U | | 089411-010 | SW846 6020 |
| 12-Jul-10 | Antimony | 0.000927 | 0.0005 | 0.003 | 0.006 | J | | 089411-010 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 089411-010 | SW846 6020 |
| | Barium | **0.144** | 0.0005 | 0.002 | 2.00 | | | 089411-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089411-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 089411-010 | SW846 6020 |
| | Calcium | 61.7 | 0.100 | 1.00 | NE | | | 089411-010 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 089411-010 | SW846 6020 |
| | Cobalt | 0.000251 | 0.0001 | 0.001 | NE | J | | 089411-010 | SW846 6020 |
| | Copper | 0.00058 | 0.0003 | 0.001 | NE | J | | 089411-010 | SW846 6020 |
| | Iron | 0.140 | 0.010 | 0.100 | NE | | | 089411-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089411-010 | SW846 6020 |
| | Magnesium | 21.4 | 0.005 | 0.015 | NE | | | 089411-010 | SW846 6020 |
| | Manganese | 0.00325 | 0.001 | 0.005 | NE | J | | 089411-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 089411-010 | SW846 7470 |
| | Nickel | 0.00133 | 0.0005 | 0.002 | NE | J | | 089411-010 | SW846 6020 |
| | Potassium | 5.06 | 0.080 | 0.300 | NE | | | 089411-010 | SW846 6020 |
| | Selenium | ND | 0.001 | 0.005 | 0.050 | U | | 089411-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089411-010 | SW846 6020 |
| | Sodium | 44.4 | 0.080 | 0.250 | NE | | | 089411-010 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 089411-010 | SW846 6020 |
| | Uranium | **0.00739** | 0.00005 | 0.0002 | 0.030 | B | | 089411-010 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | | 089411-010 | SW846 6020 |
| | Zinc | 0.00364 | 0.0026 | 0.010 | NE | J | | 089411-010 | SW846 6020 |

Refer to footnotes on page 4A-57.

**Table 4A-6** *(Concluded)*
**Summary of Total Metal Results (Filtered),**
**Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[f] | Validation Qualifier[g] | Sample No. | Analytical Method[h] |
|---|---|---|---|---|---|---|---|---|---|
| **MWL-MW9** | Aluminum | ND | 0.010 | 0.030 | NE | U | | 089414-010 | SW846 6020 |
| 13-Jul-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 089414-010 | SW846 6020 |
| | Arsenic | 0.00316 | 0.0015 | 0.005 | 0.010 | J | | 089414-010 | SW846 6020 |
| | Barium | 0.0971 | 0.0005 | 0.002 | 2.00 | | | 089414-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089414-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 089414-010 | SW846 6020 |
| | Calcium | 57.3 | 0.100 | 1.00 | NE | | | 089414-010 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 089414-010 | SW846 6020 |
| | Cobalt | 0.00017 | 0.0001 | 0.001 | NE | J | | 089414-010 | SW846 6020 |
| | Copper | 0.000471 | 0.0003 | 0.001 | NE | J | | 089414-010 | SW846 6020 |
| | Iron | 0.138 | 0.010 | 0.100 | NE | | | 089414-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089414-010 | SW846 6020 |
| | Magnesium | 20.3 | 0.005 | 0.015 | NE | | | 089414-010 | SW846 6020 |
| | Manganese | 0.00153 | 0.001 | 0.005 | NE | J | | 089414-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 089414-010 | SW846 7470 |
| | Nickel | 0.0013 | 0.0005 | 0.002 | NE | J | | 089414-010 | SW846 6020 |
| | Potassium | 5.03 | 0.080 | 0.300 | NE | | | 089414-010 | SW846 6020 |
| | Selenium | ND | 0.001 | 0.005 | 0.050 | U | | 089414-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089414-010 | SW846 6020 |
| | Sodium | 46.4 | 0.080 | 0.250 | NE | | | 089414-010 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 089414-010 | SW846 6020 |
| | Uranium | **0.00883** | 0.00005 | 0.0002 | 0.030 | B | | 089414-010 | SW846 6020 |
| | Vanadium | 0.00767 | 0.003 | 0.010 | NE | J | | 089414-010 | SW846 6020 |
| | Zinc | ND | 0.0026 | 0.010 | NE | U | | 089414-010 | SW846 6020 |

Refer to footnotes on page 4A-57.

## Table 4A-7
## Summary of Tritium, Gross Alpha, Gross Beta, Gamma Spectroscopy, Isotopic Uranium, and Radon-222 Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Well ID | Analyte | Activity[a] (pCi/L) | MDA[b] (pCi/L) | Critical Level[c] (pCi/L) | MCL[d] (pCi/L) | NMED HWB[e] (pCi/L) | Laboratory Qualifier[f] | Validation Qualifier[g] | Sample No. | Analytical Method[h] |
|---|---|---|---|---|---|---|---|---|---|---|
| **MWL-BW2** | Americium-241 | -4.38 ± 18.4 | 21.9 | 11.0 | NE | NE | U | BD | 087998-033 | EPA 901.1 |
| 04-Jan-10 | Cesium-137 | -3.32 ± 2.28 | 3.60 | 1.80 | NE | 9.3 | U | BD | 087998-033 | EPA 901.1 |
| | Cobalt-60 | 0.698 ± 2.22 | 3.85 | 1.93 | NE | NE | U | BD | 087998-033 | EPA 901.1 |
| | Potassium-40 | 11.7 ± 50.3 | 39.1 | 19.6 | NE | NE | U | BD | 087998-033 | EPA 901.1 |
| | Gross Alpha | 1.97 | NA | NA | 15 | NE | NA | None | 087998-034 | EPA 900.0 |
| | Gross Beta | 4.74 ± 1.23 | 1.33 | 0.637 | 4mrem/yr | NE | | | 087998-034 | EPA 900.0 |
| | Tritium | 11.4 ± 87.7 | 151 | 73.2 | NE | NE | U | BD | 087998-036 | EPA 906.0 M |
| **MWL-MW7** | Americium-241 | 1.95 ± 12.1 | 21.0 | 10.5 | NE | NE | U | BD | 088002-033 | EPA 901.1 |
| 05-Jan-10 | Cesium-137 | -3.4 ± 3.87 | 3.97 | 1.99 | NE | 9.3 | U | BD | 088002-033 | EPA 901.1 |
| | Cobalt-60 | -5.06 ± 4.14 | 3.42 | 1.71 | NE | NE | U | BD | 088002-033 | EPA 901.1 |
| | Potassium-40 | 73.4 ± 28.7 | 33.5 | 16.8 | NE | NE | X | R | 088002-033 | EPA 901.1 |
| | Gross Alpha | 7.07 | NA | NA | 15 | NE | NA | None | 088002-034 | EPA 900.0 |
| | Gross Beta | 3.98 ± 1.04 | 1.07 | 0.513 | 4mrem/yr | NE | | | 088002-034 | EPA 900.0 |
| | Tritium | 43.6 ± 90.1 | 153 | 74.0 | NE | NE | U | BD | 088002-036 | EPA 906.0 M |
| **MWL-MW7** (Duplicate) | Americium-241 | -18.2 ± 12.6 | 20.7 | 10.4 | NE | NE | U | BD | 088003-033 | EPA 901.1 |
| 05-Jan-10 | Cesium-137 | 0.400 ± 2.27 | 3.78 | 1.89 | NE | 9.3 | U | BD | 088003-033 | EPA 901.1 |
| | Cobalt-60 | 0.487 ± 2.25 | 3.79 | 1.90 | NE | NE | U | BD | 088003-033 | EPA 901.1 |
| | Potassium-40 | -14.6 ± 42.5 | 46.6 | 23.3 | NE | NE | U | BD | 088003-033 | EPA 901.1 |
| | Gross Alpha | 5.02 | NA | NA | 15 | NE | NA | None | 088003-034 | EPA 900.0 |
| | Gross Beta | 4.94 ± 1.19 | 1.17 | 0.564 | 4mrem/yr | NE | | | 088003-034 | EPA 900.0 |
| | Tritium | -34.2 ± 87.1 | 153 | 74.1 | NE | NE | U | BD | 088003-036 | EPA 906.0 M |
| **MWL-MW8** | Americium-241 | -4.21 ± 5.90 | 9.77 | 4.89 | NE | NE | U | BD | 088007-033 | EPA 901.1 |
| 06-Jan-10 | Cesium-137 | -2.37 ± 2.65 | 3.08 | 1.54 | NE | 9.3 | U | BD | 088007-033 | EPA 901.1 |
| | Cobalt-60 | 2.37 ± 1.95 | 3.55 | 1.77 | NE | NE | U | BD | 088007-033 | EPA 901.1 |
| | Potassium-40 | 25.2 ± 46.4 | 30.7 | 15.4 | NE | NE | U | BD | 088007-033 | EPA 901.1 |
| | Gross Alpha | 4.91 | NA | NA | 15 | NE | NA | None | 088007-034 | EPA 900.0 |
| | Gross Beta | 6.81 ± 1.53 | 1.41 | 0.687 | 4mrem/yr | NE | | | 088007-034 | EPA 900.0 |
| | Tritium | -38 ± 87.2 | 153 | 74.3 | NE | NE | U | BD | 088007-036 | EPA 906.0 M |
| **MWL-MW9** | Americium-241 | -1.52 ± 8.81 | 13.6 | 6.82 | NE | NE | U | BD | 088011-033 | EPA 901.1 |
| 07-Jan-10 | Cesium-137 | 1.92 ± 1.84 | 3.26 | 1.63 | NE | 9.3 | U | BD | 088011-033 | EPA 901.1 |
| | Cobalt-60 | 0.306 ± 1.84 | 3.11 | 1.56 | NE | NE | U | BD | 088011-033 | EPA 901.1 |
| | Potassium-40 | 16.8 ± 41.2 | 31.1 | 15.6 | NE | NE | U | BD | 088011-033 | EPA 901.1 |
| | Gross Alpha | 9.89 | NA | NA | 15 | NE | NA | None | 088011-034 | EPA 900.0 |
| | Gross Beta | 10.4 ± 2.11 | 1.67 | 0.813 | 4mrem/yr | NE | | | 088011-034 | EPA 900.0 |
| | Tritium | 27.9 ± 91.3 | 157 | 75.6 | NE | NE | U | BD | 088011-036 | EPA 906.0 M |

Refer to footnotes on page 4A-57.

## Table 4A-7 *(Continued)*
## Summary of Tritium, Gross Alpha, Gross Beta, Gamma Spectroscopy, Isotopic Uranium, and Radon-222 Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Activity[a] (pCi/L) | MDA[b] (pCi/L) | Critical Level[c] (pCi/L) | MCL[d] (pCi/L) | NMED HWB[e] (pCi/L) | Laboratory Qualifier[f] | Validation Qualifier[g] | Sample No. | Analytical Method[h] |
|---|---|---|---|---|---|---|---|---|---|---|
| **MWL-BW2** | Americium-241 | -0.0373 ± 5.88 | 9.55 | 4.78 | NE | NE | U | BD | 088942-033 | EPA 901.1 |
| 27-Apr-10 | Cesium-137 | 0.751 ± 1.60 | 2.72 | 1.36 | NE | 9.3 | U | BD | 088942-033 | EPA 901.1 |
| | Cobalt-60 | -1.43 ± 2.86 | 2.87 | 1.44 | NE | NE | U | BD | 088942-033 | EPA 901.1 |
| | Potassium-40 | 17.2 ± 31.1 | 40.6 | 20.3 | NE | NE | U | BD | 088942-033 | EPA 901.1 |
| | Gross Alpha | 7.73 | NA | NA | 15 | NE | NA | None | 088942-034 | EPA 900.0 |
| | Gross Beta | 3.63 ± 1.09 | 1.20 | 0.572 | 4mrem/yr | NE | | BD | 088942-034 | EPA 900.0 |
| | Tritium | 34.7 ± 101 | 183 | 80.9 | NE | NE | U | BD | 088942-036 | EPA 906.0 M |
| **MWL-BW2** (Duplicate) | Americium-241 | -1.16 ± 7.62 | 12.8 | 6.42 | NE | NE | U | BD | 088943-033 | EPA 901.1 |
| 27-Apr-10 | Cesium-137 | -0.495 ± 2.82 | 3.30 | 1.65 | NE | 9.3 | U | BD | 088943-033 | EPA 901.1 |
| | Cobalt-60 | 0.546 ± 1.86 | 3.18 | 1.59 | NE | NE | U | BD | 088943-033 | EPA 901.1 |
| | Potassium-40 | -1.01 ± 35.8 | 42.4 | 21.2 | NE | NE | U | BD | 088943-033 | EPA 901.1 |
| | Gross Alpha | 6.24 | NA | NA | 15 | NE | NA | None | 088943-034 | EPA 900.0 |
| | Gross Beta | 3.19 ± 1.06 | 1.23 | 0.586 | 4mrem/yr | NE | | J | 088943-034 | EPA 900.0 |
| | Tritium | 34.5 ± 101 | 182 | 80.4 | NE | NE | U | BD | 088943-036 | EPA 906.0 M |
| **MWL-MW4** | Americium-241 | -0.689 ± 7.49 | 11.9 | 5.94 | NE | NE | U | BD | 088949-033 | EPA 901.1 |
| 29-Apr-10 | Cesium-137 | 1.87 ± 1.65 | 2.87 | 1.44 | NE | 9.3 | U | BD | 088949-033 | EPA 901.1 |
| | Cobalt-60 | -0.705 ± 1.69 | 2.69 | 1.35 | NE | NE | U | BD | 088949-033 | EPA 901.1 |
| | Potassium-40 | -9.08 ± 34.3 | 43.3 | 21.7 | NE | NE | U | BD | 088949-033 | EPA 901.1 |
| | Gross Alpha | 6.56 | NA | NA | 15 | NE | NA | None | 088949-034 | EPA 900.0 |
| | Gross Beta | 4.68 ± 1.21 | 1.20 | 0.569 | 4mrem/yr | NE | | | 088949-034 | EPA 900.0 |
| | Tritium | -36.9 ± 89.2 | 180 | 79.4 | NE | NE | U | BD | 088949-036 | EPA 906.0 M |
| **MWL-MW5** | Americium-241 | -36.5 ± 11.6 | 17.5 | 8.77 | NE | NE | U | BD | 088918-033 | EPA 901.1 |
| 20-Apr-10 | Cesium-137 | 0.0424 ± 1.92 | 3.28 | 1.64 | NE | 9.3 | U | BD | 088918-033 | EPA 901.1 |
| | Cobalt-60 | -1.93 ± 2.83 | 3.20 | 1.60 | NE | NE | U | BD | 088918-033 | EPA 901.1 |
| | Potassium-40 | 5.62 ± 42.1 | 45.2 | 22.6 | NE | NE | U | BD | 088918-033 | EPA 901.1 |
| | Gross Alpha | 6.74 | NA | NA | 15 | NE | NA | None | 088918-034 | EPA 900.0 |
| | Gross Beta | 4.55 ± 1.46 | 1.86 | 0.894 | 4mrem/yr | NE | | J | 088918-034 | EPA 900.0 |
| | Tritium | -21 ± 90.0 | 157 | 76.1 | NE | NE | U | BD | 088918-036 | EPA 906.0 M |
| **MWL-MW5** (Duplicate) | Americium-241 | -26.5 ± 11.6 | 18.7 | 9.33 | NE | NE | U | BD | 088919-033 | EPA 901.1 |
| 20-Apr-10 | Cesium-137 | -0.343 ± 1.91 | 3.21 | 1.61 | NE | 9.3 | U | BD | 088919-033 | EPA 901.1 |
| | Cobalt-60 | 1.07 ± 1.93 | 3.35 | 1.68 | NE | NE | U | BD | 088919-033 | EPA 901.1 |
| | Potassium-40 | 4.85 ± 53.3 | 52.6 | 26.3 | NE | NE | U | BD | 088919-033 | EPA 901.1 |
| | Gross Alpha | 8.57 | NA | NA | 15 | NE | NA | None | 088919-034 | EPA 900.0 |
| | Gross Beta | 5.50 ± 1.39 | 1.33 | 0.633 | 4mrem/yr | NE | | | 088919-034 | EPA 900.0 |
| | Tritium | -24.8 ± 89.7 | 157 | 76.0 | NE | NE | U | BD | 088919-036 | EPA 906.0 M |

Refer to footnotes on page 4A-57.

## Table 4A-7 *(Continued)*
## Summary of Tritium, Gross Alpha, Gross Beta, Gamma Spectroscopy, Isotopic Uranium, and Radon-222 Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Activity[a] (pCi/L) | MDA[b] (pCi/L) | Critical Level[c] (pCi/L) | MCL[d] (pCi/L) | NMED HWB[e] (pCi/L) | Laboratory Qualifier[f] | Validation Qualifier[g] | Sample No. | Analytical Method[h] |
|---|---|---|---|---|---|---|---|---|---|---|
| **MWL-MW6** | Americium-241 | -18 ± 12.1 | 19.1 | 9.57 | NE | NE | U | BD | 088909-033 | EPA 901.1 |
| 19-Apr-10 | Cesium-137 | -0.304 ± 1.79 | 2.97 | 1.49 | NE | 9.3 | U | BD | 088909-033 | EPA 901.1 |
| | Cobalt-60 | 0.169 ± 1.88 | 3.17 | 1.58 | NE | NE | U | BD | 088909-033 | EPA 901.1 |
| | Potassium-40 | -19.9 ± 37.2 | 45.3 | 22.6 | NE | NE | U | BD | 088909-033 | EPA 901.1 |
| | Gross Alpha | 5.26 | NA | NA | 15 | NE | NA | None | 088909-034 | EPA 900.0 |
| | Gross Beta | 3.20 ± 1.08 | 1.32 | 0.627 | 4mrem/yr | NE | | J | 088909-034 | EPA 900.0 |
| | Tritium | 41.7 ± 91.6 | 156 | 75.4 | NE | NE | U | BD | 088909-036 | EPA 906.0 M |
| | Low Level Tritium | 1.22 ± 0.744 | 1.18 | 0.554 | NE | NE | | J | 088909-037 | HASL 300 |
| **MWL-MW7** | Americium-241 | 1.28 ± 5.88 | 9.61 | 4.81 | NE | NE | U | BD | 088929-033 | EPA 901.1 |
| 22-Apr-10 | Cesium-137 | 0.658 ± 1.66 | 2.81 | 1.41 | NE | 9.3 | U | BD | 088929-033 | EPA 901.1 |
| | Cobalt-60 | 1.77 ± 1.71 | 3.04 | 1.52 | NE | NE | U | BD | 088929-033 | EPA 901.1 |
| | Potassium-40 | -5.69 ± 36.1 | 36.5 | 18.2 | NE | NE | U | BD | 088929-033 | EPA 901.1 |
| | Gross Alpha | 3.52 | NA | NA | 15 | NE | NA | None | 088929-034 | EPA 900.0 |
| | Gross Beta | 5.63 ± 1.24 | 0.969 | 0.459 | 4mrem/yr | NE | | | 088929-034 | EPA 900.0 |
| | Tritium | -21 ± 89.8 | 157 | 76.0 | NE | NE | U | BD | 088929-036 | EPA 906.0 M |
| **MWL-MW8** | Americium-241 | -8.24 ± 5.47 | 8.80 | 4.40 | NE | NE | U | BD | 088934-033 | EPA 901.1 |
| 26-Apr-10 | Cesium-137 | 1.65 ± 1.77 | 3.12 | 1.56 | NE | 9.3 | U | BD | 088934-033 | EPA 901.1 |
| | Cobalt-60 | -2.01 ± 2.70 | 3.21 | 1.61 | NE | NE | U | BD | 088934-033 | EPA 901.1 |
| | Potassium-40 | 49.5 ± 43.8 | 29.3 | 14.7 | NE | NE | X | BD | 088934-033 | EPA 901.1 |
| | Gross Alpha | 3.52 | NA | NA | 15 | NE | NA | None | 088934-034 | EPA 900.0 |
| | Gross Beta | 4.29 ± 1.12 | 1.12 | 0.529 | 4mrem/yr | NE | | | 088934-034 | EPA 900.0 |
| | Tritium | 108 ± 112 | 181 | 79.8 | NE | NE | U | BD | 088934-036 | EPA 906.0 M |
| **MWL-MW9** | Americium-241 | -2.93 ± 13.3 | 22.5 | 11.3 | NE | NE | U | BD | 088924-033 | EPA 901.1 |
| 21-Apr-10 | Cesium-137 | 0.313 ± 1.86 | 3.19 | 1.60 | NE | 9.3 | U | BD | 088924-033 | EPA 901.1 |
| | Cobalt-60 | 0.497 ± 1.94 | 3.35 | 1.67 | NE | NE | U | BD | 088924-033 | EPA 901.1 |
| | Potassium-40 | -36.3 ± 44.5 | 49.3 | 24.7 | NE | NE | U | BD | 088924-033 | EPA 901.1 |
| | Gross Alpha | 1.63 | NA | NA | 15 | NE | NA | None | 088924-034 | EPA 900.0 |
| | Gross Beta | 5.65 ± 1.37 | 1.31 | 0.632 | 4mrem/yr | NE | | | 088924-034 | EPA 900.0 |
| | Tritium | -115 ± 86.7 | 157 | 76.1 | NE | NE | U | BD | 088924-036 | EPA 906.0 M |

Refer to footnotes on page 4A-57.

## Table 4A-7 *(Continued)*
## Summary of Tritium, Gross Alpha, Gross Beta, Gamma Spectroscopy, Isotopic Uranium, and Radon-222 Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Well ID | Analyte | Activity[a] (pCi/L) | MDA[b] (pCi/L) | Critical Level[c] (pCi/L) | MCL[d] (pCi/L) | NMED HWB[e] (pCi/L) | Laboratory Qualifier[f] | Validation Qualifier[g] | Sample No. | Analytical Method[h] |
|---|---|---|---|---|---|---|---|---|---|---|
| **MWL-BW2** | Americium-241 | 2.09 ± 7.82 | 11.7 | 5.84 | NE | NE | U | BD | 089402-033 | EPA 901.1 |
| 06-Jul-10 | Cesium-137 | 0.0535 ± 1.91 | 3.17 | 1.59 | NE | 9.3 | U | BD | 089402-033 | EPA 901.1 |
| | Cobalt-60 | 1.65 ± 2.02 | 3.57 | 1.79 | NE | NE | U | BD | 089402-033 | EPA 901.1 |
| | Potassium-40 | -44.9 ± 38.0 | 42.0 | 21.0 | NE | NE | U | BD | 089402-033 | EPA 901.1 |
| | Gross Alpha | 1.31 | NA | NA | 15 | NE | NA | None | 089402-034 | EPA 900.0 |
| | Gross Beta | 5.56 ± 1.61 | 1.94 | 0.935 | 4mrem/yr | NE | | J | 089402-034 | EPA 900.0 |
| | Uranium-233/234 | 6.13 ± 0.909 | 0.122 | 0.0544 | NE | 7.0 | | | 089402-035 | HASL-300 |
| | Uranium-235/236 | 0.199 ± 0.0724 | 0.0735 | 0.0288 | NE | 0.41 | | J | 089402-035 | HASL-300 |
| | Uranium-238 | 2.12 ± 0.353 | 0.0845 | 0.0358 | NE | 3.0 | | | 089402-035 | HASL-300 |
| | Tritium | 37.6 ± 91.4 | 156 | 75.3 | NE | NE | U | BD | 089402-036 | EPA 906.0 M |
| | Radon-222 | **494 ± 132** | 92.4 | 43.9 | NE | 300 | | | 089402-038 | SM 7500 Rn B |
| **MWL-MW7** | Americium-241 | 0.165 ± 3.95 | 5.01 | 2.51 | NE | NE | U | BD | 089407-033 | EPA 901.1 |
| 07-Jul-10 | Cesium-137 | 0.155 ± 3.51 | 3.96 | 1.98 | NE | 9.3 | U | BD | 089407-033 | EPA 901.1 |
| | Cobalt-60 | -2.63 ± 3.37 | 4.03 | 2.02 | NE | NE | U | BD | 089407-033 | EPA 901.1 |
| | Potassium-40 | 58.5 ± 25.5 | 58.5 | 24.7 | NE | NE | U | BD | 089407-033 | EPA 901.1 |
| | Gross Alpha | -2.23 | NA | NA | 15 | NE | NA | None | 089407-034 | EPA 900.0 |
| | Gross Beta | 5.39 ± 1.57 | 1.95 | 0.948 | 4mrem/yr | NE | | J | 089407-034 | EPA 900.0 |
| | Uranium-233/234 | 5.38 ± 0.818 | 0.132 | 0.059 | NE | 7.0 | | | 089407-035 | HASL-300 |
| | Uranium-235/236 | 0.286 ± 0.0926 | 0.0797 | 0.0312 | NE | 0.41 | | | 089407-035 | HASL-300 |
| | Uranium-238 | 2.38 ± 0.396 | 0.0916 | 0.0388 | NE | 3.0 | | | 089407-035 | HASL-300 |
| | Tritium | 61.8 ± 93.4 | 157 | 75.9 | NE | NE | U | BD | 089407-036 | EPA 906.0 M |
| | Radon-222 | 289 ± 85.8 | 77.9 | 37.0 | NE | 300 | | | 089407-038 | SM 7500 Rn B |
| **MWL-MW7** (Duplicate) | Americium-241 | -40.3 ± 11.7 | 17.4 | 8.68 | NE | NE | U | BD | 089408-033 | EPA 901.1 |
| 07-Jul-10 | Cesium-137 | -0.51 ± 1.86 | 3.14 | 1.57 | NE | 9.3 | U | BD | 089408-033 | EPA 901.1 |
| | Cobalt-60 | 2.81 ± 2.08 | 3.77 | 1.89 | NE | NE | U | BD | 089408-033 | EPA 901.1 |
| | Potassium-40 | 6.90 ± 35.9 | 46.5 | 23.3 | NE | NE | U | BD | 089408-033 | EPA 901.1 |
| | Gross Alpha | -2.41 | NA | NA | 15 | NE | NA | None | 089408-034 | EPA 900.0 |
| | Gross Beta | 4.28 ± 1.13 | 1.23 | 0.592 | 4mrem/yr | NE | | | 089408-034 | EPA 900.0 |
| | Uranium-233/234 | 5.27 ± 0.794 | 0.125 | 0.0559 | NE | 7.0 | | | 089408-035 | HASL-300 |
| | Uranium-235/236 | 0.187 ± 0.0707 | 0.0756 | 0.0296 | NE | 0.41 | | J | 089408-035 | HASL-300 |
| | Uranium-238 | 2.71 ± 0.438 | 0.0868 | 0.0368 | NE | 3.0 | | | 089408-035 | HASL-300 |
| | Tritium | 41.5 ± 91.5 | 156 | 75.3 | NE | NE | U | BD | 089408-036 | EPA 906.0 M |
| | Radon-222 | 231 ± 75.3 | 78.1 | 37.1 | NE | 300 | | J | 089408-038 | SM 7500 Rn B |

Refer to footnotes on page 4A-57.

## Table 4A-7 *(Concluded)*
## Summary of Tritium, Gross Alpha, Gross Beta, Gamma Spectroscopy, Isotopic Uranium, and Radon-222 Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Activity[a] (pCi/L) | MDA[b] (pCi/L) | Critical Level[c] (pCi/L) | MCL[d] (pCi/L) | NMED HWB[e] (pCi/L) | Laboratory Qualifier[f] | Validation Qualifier[g] | Sample No. | Analytical Method[h] |
|---|---|---|---|---|---|---|---|---|---|---|
| **MWL-MW8** | Americium-241 | 1.48 ± 4.05 | 6.68 | 3.34 | NE | NE | U | BD | 089411-033 | EPA 901.1 |
| 12-Jul-10 | Cesium-137 | -9.95 ± 5.84 | 8.40 | 4.20 | NE | 9.3 | U | BD | 089411-033 | EPA 901.1 |
| | Cobalt-60 | -0.248 ± 3.33 | 5.58 | 2.79 | NE | NE | U | BD | 089411-033 | EPA 901.1 |
| | Potassium-40 | -0.685 ± 59.6 | 76.8 | 38.4 | NE | NE | U | BD | 089411-033 | EPA 901.1 |
| | Gross Alpha | -4.99 | NA | NA | 15 | NE | NA | None | 089411-034 | EPA 900.0 |
| | Gross Beta | 9.90 ± 2.90 | 3.51 | 1.69 | 4mrem/yr | NE | | J | 089411-034 | EPA 900.0 |
| | Uranium-233/234 | 5.24 ± 0.813 | 0.149 | 0.0667 | NE | 7.0 | | | 089411-035 | HASL-300 |
| | Uranium-235/236 | 0.223 ± 0.0844 | 0.0901 | 0.0353 | NE | 0.41 | | J | 089411-035 | HASL-300 |
| | Uranium-238 | 2.33 ± 0.400 | 0.103 | 0.0439 | NE | 3.0 | | | 089411-035 | HASL-300 |
| | Tritium | 59.4 ± 92.5 | 156 | 75.3 | NE | NE | U | BD | 089411-036 | EPA 906.0 M |
| | Radon-222 | 183 ± 61.4 | 67.0 | 31.9 | NE | 300 | | J | 089411-038 | SM 7500 Rn B |
| **MWL-MW9** | Americium-241 | 5.51 ± 8.50 | 13.2 | 6.59 | NE | NE | U | BD | 089414-033 | EPA 901.1 |
| 13-Jul-10 | Cesium-137 | 2.66 ± 1.79 | 3.21 | 1.61 | NE | 9.3 | U | BD | 089414-033 | EPA 901.1 |
| | Cobalt-60 | 0.205 ± 1.83 | 3.08 | 1.54 | NE | NE | U | BD | 089414-033 | EPA 901.1 |
| | Potassium-40 | -10.1 ± 39.7 | 42.5 | 21.2 | NE | NE | U | BD | 089414-033 | EPA 901.1 |
| | Gross Alpha | -0.42 | NA | NA | 15 | NE | NA | None | 089414-034 | EPA 900.0 |
| | Gross Beta | 6.44 ± 2.04 | 2.44 | 1.16 | 4mrem/yr | NE | | J | 089414-034 | EPA 900.0 |
| | Uranium-233/234 | 5.43 ± 0.832 | 0.140 | 0.0624 | NE | 7.0 | | | 089414-035 | HASL-300 |
| | Uranium-235/236 | 0.148 ± 0.0652 | 0.0843 | 0.0331 | NE | 0.41 | | J | 089414-035 | HASL-300 |
| | Uranium-238 | 2.78 ± 0.458 | 0.0969 | 0.0411 | NE | 3.0 | | | 089414-035 | HASL-300 |
| | Tritium | -21.9 ± 89.5 | 157 | 75.8 | NE | NE | U | BD | 089414-036 | EPA 906.0 M |
| | Radon-222 | 294 ± 83.4 | 70.5 | 33.6 | NE | 300 | | | 089414-038 | SM 7500 Rn B |

Refer to footnotes on page 4A-57.

# Table 4A-8
## Summary of Field Water Quality Measurements[i], Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Well ID | Sample Date | Temperature ($^{0}C$) | Specific Conductivity (μmho/cm) | Oxidation Reduction Potential (mV) | pH | Turbidity (NTU) | Dissolved Oxygen (% Sat) | Dissolved Oxygen (mg/L) |
|---|---|---|---|---|---|---|---|---|
| **MWL-BW2** | 04-Jan-10 | 18.14 | 704 | 100.3 | 7.07 | 0.18 | 6.7 | 0.63 |
| **MWL-MW7** | 05-Jan-10 | 16.74 | 579 | 196.9 | 7.24 | 0.62 | 41.7 | 4.04 |
| **MWL-MW8** | 06-Jan-10 | 17.54 | 594 | 194.9 | 7.23 | 0.65 | 22.0 | 2.08 |
| **MWL-MW9** | 07-Jan-10 | 12.97 | 569 | 219.2 | 7.29 | 1.87 | 59.1 | 6.12 |
| | | | | | | | | |
| **MWL-BW2** | 27-Apr-10 | 20.02 | 688 | 152.4 | 7.12 | 0.25 | 8.0 | 0.72 |
| **MWL-MW4** | 29-Apr-10 | 19.80 | 592 | 257.4 | 7.33 | 0.26 | 27.6 | 2.51 |
| **MWL-MW5** | 20-Apr-10 | 21.00 | 863 | 166.5 | 7.03 | 0.24 | 28.9 | 2.56 |
| **MWL-MW6** | 19-Apr-10 | 20.72 | 822 | 175.0 | 7.16 | 0.11 | 33.3 | 2.98 |
| **MWL-MW7** | 22-Apr-10 | 16.67 | 565 | 242.3 | 7.30 | 0.42 | 44.2 | 4.29 |
| **MWL-MW8** | 26-Apr-10 | 22.14 | 586 | 153.3 | 7.21 | 0.53 | 30.1 | 2.62 |
| **MWL-MW9** | 21-Apr-10 | 21.44 | 571 | 134.5 | 7.20 | 1.50 | 30.8 | 2.71 |
| | | | | | | | | |
| **MWL-BW2** | 06-Jul-10 | 21.70 | 683 | 143.6 | 7.32 | 0.58 | 12.8 | 1.11 |
| **MWL-MW7** | 07-Jul-10 | 23.69 | 568 | 243.1 | 7.55 | 0.28 | 52.6 | 4.44 |
| **MWL-MW8** | 12-Jul-10 | 25.54 | 595 | 167.5 | 7.45 | 0.83 | 27.9 | 2.28 |
| **MWL-MW9** | 13-Jul-10 | 25.66 | 577 | 223.5 | 7.47 | 1.65 | 47.9 | 3.90 |

Refer to footnotes on page 4A-57.

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## *Footnotes for Mixed Waste Landfill Groundwater Monitoring Tables*

**[a]Result**

- Values in bold exceed the established MCL and/or NMED HWB-approved background level.
- ND = not detected (at method detection limit).
- Activities of zero or less are considered to be not detected.
- Gross alpha activity measurements were corrected by subtracting out the total uranium activity (40 CFR Parts 9, 141, and 142, Table 1-4)
- μg/L = micrograms per liter
- mg/L = milligrams per liter
- pCi/L = picocuries per liter

**[b]MDL or MDA**

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.

The minimum 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.

NA = not applicable for gross alpha activities. The MDA could not be calculated as the gross alpha activity was corrected by subtracting out the total uranium activity.

**[c]PQL or Critical Level**

Practical quantitation limit. The lowest concentration of analytes in a sample that can be reliably determined within specified limits of precision and accuracy by that indicated method under routine laboratory operating conditions.

The minimum activity that can be measured and reported with 99% confidence that the analyte is greater than zero; analyte is matrix specific.

NA = not applicable for gross alpha activities. The critical level could not be calculated as the gross alpha activity was corrected by subtracting out the total uranium activity.

**[d]MCL**

- Maximum contaminant level. Established by the U.S. Environmental Protection Agency Primary Water Regulations (40 CFR 141.11[b]), National Primary Drinking Water Standards, EPA, May 2009.
- NE = not established.
- The following are the MCLs for gross alpha particles and beta particles in community water systems:
  15 pCi/L = Gross alpha particle activity, excluding total uranium (40 CFR Parts 9, 141, and 142, Table 1-4).
  4 mrem/yr = any combination of beta and/or gamma emitting radionuclides (as dose rate).

**[e]NMED HWB**

- The New Mexico Environment Department Hazardous Waste Bureau-approved maximum background concentrations, NMED Letter to M. Zamorski and J.B. Woodard, dated November 25, 1998.
- NE = not established.

**[f]Laboratory Qualifier**

B = Analyte is detected in associated laboratory method blank.
J = Estimated value, the analyte concentration is below the practical quantitation limit (PQL).
NA = Not applicable for gross alpha activities.
U = Analyte is absent or below the method detection limit.
X = Data rejected due to peak not meeting identification criteria.

## ***Footnotes for Mixed Waste Landfill Groundwater Monitoring Tables*** *(Concluded)*

[g]**Validation Qualifier** (Continued)

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

| | | |
|---|---|---|
| BD | = | Below detection limit as used in radiochemistry to identify results that are not statistically different from zero. |
| J | = | The associated value is an estimated quantity. |
| J+ | = | The associated numerical value is an estimated quantity with a suspected positive bias. |
| NJ- | = | Presumptive evidence of the presence of the material at an estimated quantity with a suspected negative bias. |
| 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. |
| R | = | The data are unusable. Re-sampling and re-analysis are necessary for verification. |

[h]**Analytical Method**

- EPA, 1979, "Methods for Chemical Analysis of Water and Wastes," EPA-600/4-79-020, U.S. Environmental Protection Agency, Cincinnati, Ohio..
- EPA, 1980, "Prescribed Procedures for Measurement of Radioactivity in Drinking Water," EPA-600/4-80-032, U.S. Environmental Protection Agency, Cincinnati, Ohio
- EPA, 1986, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3rd ed., Rev. 1, U.S. Environmental Protection Agency, Washington, D.C.
- U.S. Environmental Protection Agency, Washington, D.C.; or Clesceri, Greenburg, and Eaton, 1998, *Standard Methods for the Examination of Water and Wastewater*, 20th ed., Method 2320B.
- U.S. Department of Energy, Environmental Measurements Laboratory, 1990, *EML Procedures Manual*, 27th ed., Vol. 1, Rev. 1992, HASL-300.
- Beckman, 1998, *Standard Methods for the Examination of Water and Wastewater, 7500-Rn B Method*, 20th ed., Beckman LS5000TD Liquid Scintillation System Operation Manual, May 1988.

[i]**Field Water Quality Measurements**

- Field measurements collected prior to sampling.

| | | |
|---|---|---|
| °C | = | degrees Celsius. |
| % Sat | = | present saturation. |
| μmho/cm | = | micromhos per centimeter. |
| mg/L | = | milligrams per liter. |
| mV | = | millivolts. |
| NTU | = | nephelometric turbidity units. |
| pH | = | potential of hydrogen (negative logarithm of the hydrogen ion concentration). |

# Attachment 4B
# Mixed Waste Landfill
# Hydrographs

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# Attachment 4B Hydrographs

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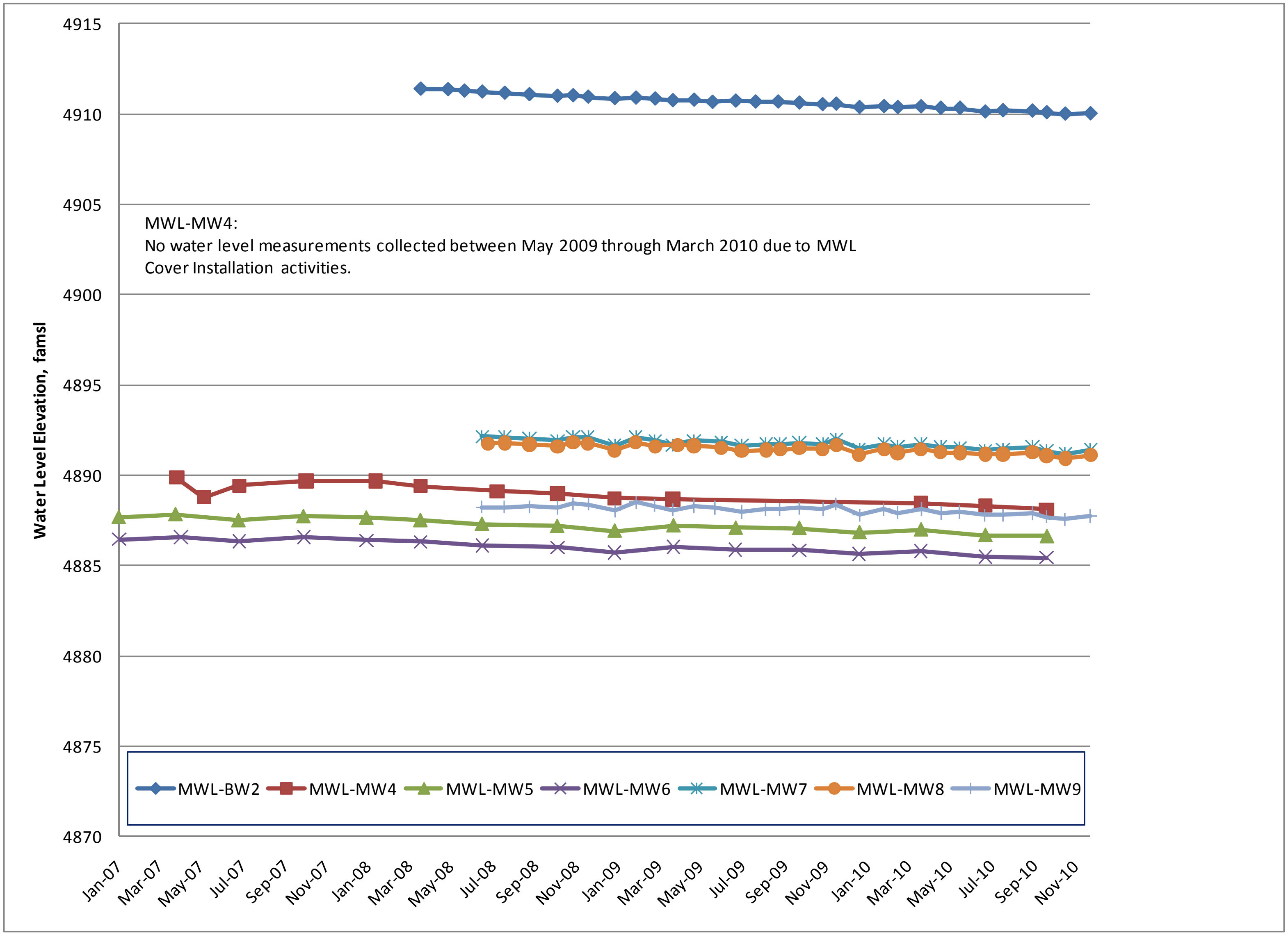


**Figure 4B-1. Mixed Waste Landfill Groundwater Wells**

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# 5.0 Technical Area V Groundwater

## 5.1 Introduction

Trichloroethene (TCE) and nitrate have been identified as constituents of concern (COCs) in groundwater at the Technical Area (TA)-V Groundwater Investigation Study Area (TA-V study area) based on detections above the U.S. Environmental Protection Agency (EPA) maximum contaminant levels (MCLs) in samples collected from monitoring wells. Since 1993, the maximum concentrations detected in the study area have been 26 micrograms per liter (µg/L) of TCE and 19 milligrams per liter (mg/L) of nitrate. The EPA and State of New Mexico drinking water standards (MCLs) for TCE and nitrate are 5 µg/L and 10 mg/L (as nitrogen), respectively. Unique features of the TA-V study area include low concentrations of TCE and nitrate in a deep alluvial aquifer.

### 5.1.1 Location

TA-V occupies approximately 35 acres in the northeastern corner of TA-III (Figure 5-1) at Sandia National Laboratories, New Mexico (SNL/NM). TA-V is located in the north-central portion of Kirtland Air Force Base (KAFB), south of the City of Albuquerque (COA) (Figure 5-1). The SNL/NM facility is a government-owned, contractor-operated, multi-program laboratory overseen by the U.S. Department of Energy (DOE), National Nuclear Security Administration through the Sandia Site Office in Albuquerque, New Mexico. Sandia Corporation (Sandia), a wholly owned subsidiary of Lockheed Martin Corporation, manages and operates SNL/NM under Contract DE-AC04-94AL85000.

TA-V is situated within the Albuquerque Basin, and the vadose zone at TA-V is approximately 500 feet (ft) in thickness and consists of heterogeneous, lenticular, coarse- to fine-grained deposits. The underlying aquifer at TA-V consists of unconsolidated fine-grained, clay-rich, alluvial-fan sediments. Groundwater in the vicinity of TA-V flows generally from east to west. To the west of TA-V, groundwater flow paths turn to the north in response to pumping from municipal well fields located north of KAFB and from water supply wells located in the northern portion of KAFB.

### 5.1.2 Site History

TA-V facilities are designed to test radiation effects on components and include two research reactors, the Gamma Irradiation Facility and Hot Cell Facility. Historically, wastewater containing contaminants derived from these facilities was disposed of to drain fields, seepage pits, and unlined ponds. SNL/NM Environmental Restoration (ER) Operations (formerly ER Project) personnel have conducted numerous groundwater investigations in the TA-V study area since 1992 (Table 5-1). Many of these investigations were site-specific and conducted in support of various Solid Waste Management Unit (SWMU) assessments. Other investigations in the TA-V study area were more regional studies conducted by the SNL/NM Site-Wide Hydrogeologic Characterization Project (SNL February 1998).

### 5.1.3 Monitoring History

Investigations of groundwater quality in the TA-V study area have been conducted by Sandia over the past 18 years (Table 5-1). Groundwater monitoring at TA-V began in October 1992. TCE was first detected in monitoring well LWDS-MW1 in October 1993 and was later detected in TAV-MW1 in September 1995. Since then, low concentrations of TCE have been consistently detected during quarterly sampling events. Potential sources for TCE in groundwater include the Liquid Waste Disposal System (LWDS) drain field and surface impoundments and the TA-V seepage pits (Section 5.1.7).

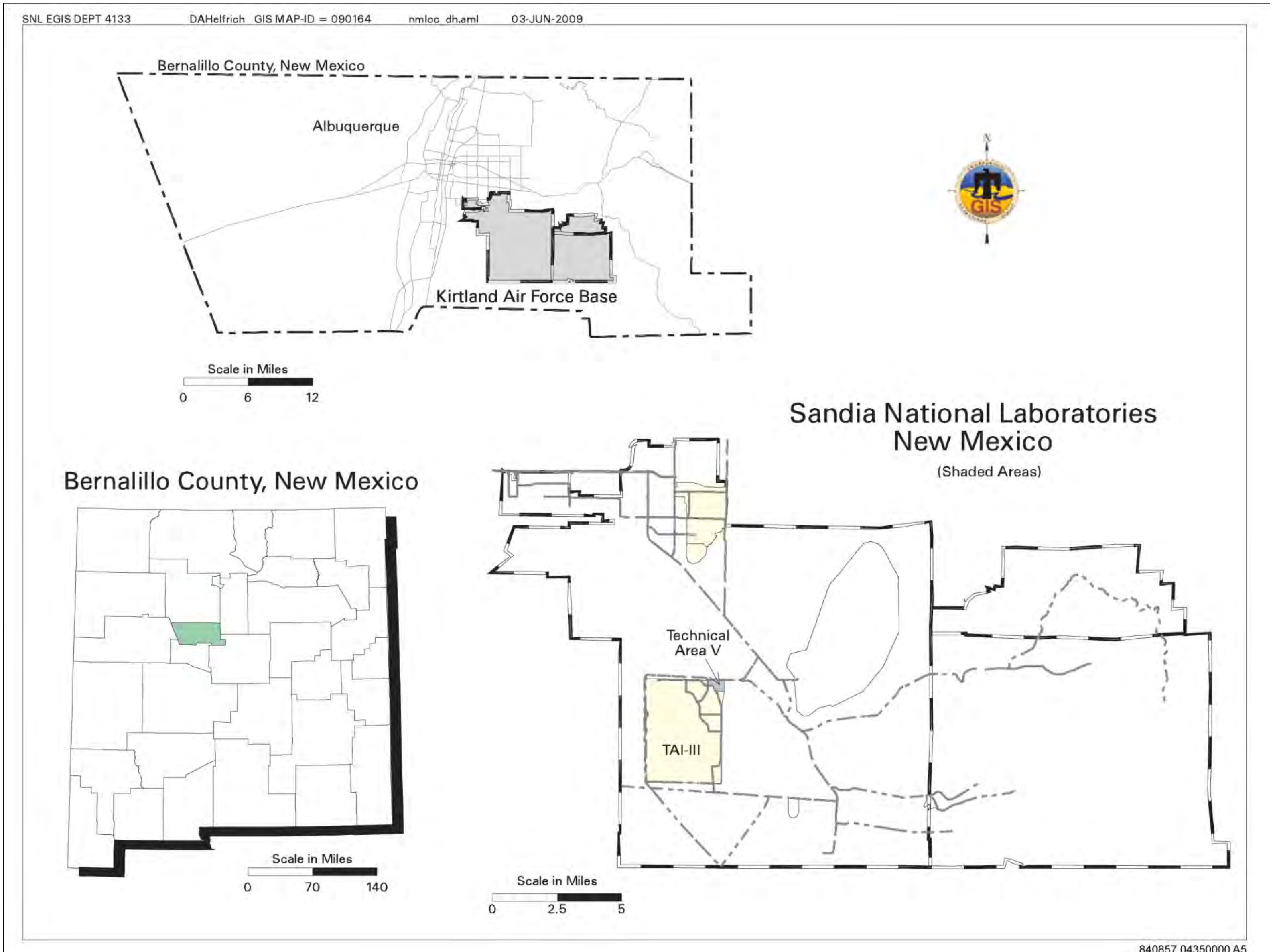


**Figure 5-1. Location of the TA-V Study Area**

**Table 5-1. Historical Timeline of the TA-V Study Area**

| Month | Year | Event | Reference |
|---|---|---|---|
| May | 1959 | KAFB water supply well KAFB-10 is installed west of TA-V and north of TA-III. Water from the well was used as auxiliary water for fire protection. | NMSEO May 1959 |
| April | 1992 | The LWDS RFI Work Plan is submitted. The investigation will examine SWMUs 4, 5, and 52. | SNL March 1993 |
| | 1992–1993 | Two groundwater monitoring wells are installed as part of the LWDS investigation. LWDS-MW2 installed October 1992, and LWDS-MW1 installed May 1993. | SNL September 1995 |
| November | 1993 | LWDS-MW1 and LWDS-MW2 are sampled. The first sampling event of LWDS-MW1 in November 1993 reveals TCE near the method detection limit, and the detection is confirmed during a later sampling event at values exceeding the MCL of 5 μg/L. | SNL March 1995 |
| June | 1994 | Notification letter from DOE to EPA regarding TCE detection in LWDS-MW1. | DOE June 1994 |
| March | 1995 | Groundwater sample analytical results for TA-V wells LWDS-MW1 and LWDS-MW2 reported in the Calendar Year 1994 SNL/NM Annual Groundwater Monitoring Report. | SNL March 1995 |
| June | 1995 | Report submitted discussing water quality issues reported in the Calendar Year 1994 SNL/NM Annual Groundwater Monitoring Report. TCE was consistently detected during 1994 in LWDS-MW1. | IT June 1995 |
| January–June | 1995 | Wells AVN-1 and AVN-2 installed. | SNL 1995 |
| April | 1995 | Wells TAV-MW1 and TAV-MW2 installed. | SNL March 1996 |
| | 1995 | The LWDS RFI is performed and completed. | SNL September 1995 |
| March | 1996 | Groundwater sampling analytical results for TA-V wells reported in the Calendar Year 1995 SNL/NM Annual Groundwater Monitoring Report | SNL March 1996 |
| March | 1996 | DOE submits a letter to the NMED with notification of a single elevated nitrate detection for groundwater monitoring well LWDS-MW1. The result is 10.1 mg/L, exceeding the MCL of 10 mg/L. | DOE March 1996 |
| April | 1996 | KAFB-10 is plugged and abandoned as there is a potential for the ungrouted borehole for this production well to act as a conduit for contaminant transport into the groundwater. | SNL April 1996 |
| March | 1997 | Groundwater sampling analytical results for TA-V wells reported in the Calendar Year 1996 SNL/NM Annual Groundwater Monitoring Report. | SNL March 1997 |
| April | 1997 | Wells TAV-MW3, TAV-MW4, and TAV-MW5 installed. | SNL March 1999a |
| September | 1997 | NMED issues an RSI stating that additional characterization at TA-V is needed. Numerous other issues are discussed pertaining to each of the LWDS sites (SWMUs 4, 5, and 52). | NMED September 1997 |
| January | 1998 | DOE/Sandia provides responses to the NMED September 1997 RSI. | SNL January 1998 |
| March | 1998 | Groundwater sampling analytical results for TA-V wells reported in the Calendar Year 1997 SNL/NM Annual Groundwater Monitoring Report | SNL March 1998 |

**Table 5-1. Historical Timeline of the TA-V Study Area** *(Continued)*

| Month | Year | Event | Reference |
|---|---|---|---|
| October | 1998 | DOE/Sandia provides cross sections to NMED for the LWDS as required in the September 1997 RSI from NMED. | DOE October 1998 |
| March | 1999 | Groundwater sampling analytical results for TA-V wells reported in the Fiscal Year 1998 SNL/NM Annual Groundwater Monitoring Report. | SNL March 1999b |
| March | 1999 | SNL/NM submits a summary report detailing groundwater conditions for the TA-III/V area that includes sites from OU 1306 (TA-III) and OU 1307 (LWDS). | SNL March 1999a |
| March | 2000 | Groundwater sampling analytical results for TA-V wells reported in the Fiscal Year 1999 SNL/NM Annual Groundwater Monitoring Report | SNL March 2000 |
| April | 2001 | Groundwater sampling analytical results for TA-V wells reported in the Fiscal Year 2000 SNL/NM Annual Groundwater Monitoring Report. | SNL April 2001 |
| March - May | 2001 | Wells TAV-MW6, TAV-MW7, TAV-MW8, and TAV-MW9 installed. | SNL October 2001 |
| November | 2001 | A summary of groundwater sampling results from TA-V wells for Fiscal Years 1999 and 2000 are compiled into a report. This is an update of the March 1999 summary report. | SNL November 2001 |
| March | 2002 | Groundwater sampling analytical results for TA-V wells reported in the Fiscal Year 2001 SNL/NM Annual Groundwater Monitoring Report. | SNL March 2002 |
| March | 2003 | Groundwater sampling analytical results for TA-V wells reported in the Fiscal Year 2002 SNL/NM Annual Groundwater Monitoring Report. | SNL March 2003a |
| June | 2003 | Subsurface geology at KAFB, including the TA-V area, is updated. | Van Hart June 2003 |
| March | 2004 | Groundwater sampling analytical results for TA-V wells reported in the Fiscal Year 2003 SNL/NM Annual Groundwater Monitoring Report. | SNL March 2004 |
| April | 2004 | The NMED issues the Compliance Order on Consent (the Consent Order) to the DOE/Sandia, which identified TA-V as an area with groundwater contamination requiring a CME. | NMED April 2004 |
| May | 2004 | DOE/Sandia submit the *Current Conceptual Model of Groundwater Flow and Contaminant Transport at Sandia National Laboratories/New Mexico Technical Area-V*. This document was required by the Consent Order. | SNL April 2004a |
| May | 2004 | DOE/Sandia submit the *Corrective Measures Evaluation Work Plan, Technical Area V Groundwater*. This document was required by the Consent Order. | SNL April 2004b |
| October | 2004 | The NMED issues an approval with modifications to the TA-V CME Work Plan and the Current Conceptual Model of Groundwater Flow and Contaminant Transport. | NMED October 2004 |

**Table 5-1. Historical Timeline of the TA-V Study Area** *(Continued)*

| Month | Year | Event | Reference |
|---|---|---|---|
| December | 2004 | DOE/Sandia submit responses to the NMED request of October 2004. The responses are included in the revised *Corrective Measures Evaluation Work Plan, Technical Area V Groundwater, Revision 0*. | SNL December 2004 |
| July | 2005 | DOE/Sandia submit the *Corrective Measures Evaluation Report for Technical Area V Groundwater*. The report details the selection of a preferred remedial alternative, cleanup goals, and the corrective measures implementation plan. | SNL July 2005 |
| October | 2005 | DOE/Sandia submit request to NMED for change in sampling frequency for TA-V wells. | DOE October 2005 |
| October | 2005 | Groundwater sampling analytical results for TA-V wells reported in the Fiscal Year 2004 SNL/NM Annual Groundwater Monitoring Report. | SNL October 2005 |
| March | 2006 | DOE/Sandia request the removal of well AVN-2 from the TA-V monitoring network due to insufficient water for sampling caused by declining water levels. The well would be returned to service if water levels in the well recover. | DOE March 2006 |
| November | 2006 | Groundwater sampling analytical results for TA-V wells reported in the Fiscal Year 2005 SNL/NM Annual Groundwater Monitoring Report. | SNL November 2006 |
| March | 2007 | Groundwater sampling analytical results for TA-V wells reported in the Fiscal Year 2006 SNL/NM Annual Groundwater Monitoring Report. | SNL March 2007 |
| January–March | 2008 | Well TAV-MW1 plugged and abandoned, and well TAV-MW10 installed as replacement for TAV-MW1. | SNL June 2008 |
| March | 2008 | Groundwater sampling analytical results for TA-V wells reported in the Fiscal Year 2007 SNL/NM Annual Groundwater Monitoring Report. | SNL March 2008 |
| July | 2008 | NMED issues an NOD on the July 2005 CME Report for TA-V Groundwater. | NMED July 2008 |
| September | 2008 | The 13 TA-V monitoring wells are resurveyed to establish new northing and easting coordinates and elevations for each well. | SNL October 2008 |
| December | 2008 | SNL/NM, DOE, and NMED personnel attend an MNA seminar presented by Savannah River National Laboratory personnel and also discuss technical issues and the need for additional characterization work at TA-V. | SRNL December 2008 |
| April | 2009 | NMED requires characterization of perchlorate in groundwater in one well in the TA-V study area. | NMED April 2009 |
| April | 2009 | DOE/Sandia submit a response to the NOD on the July 2005 CME Report for TA-V Groundwater. | SNL April 2009 |
| June | 2009 | Groundwater sampling analytical results for TA-V wells reported in the Calendar Year 2008 SNL/NM Annual Groundwater Monitoring Report. | SNL June 2009 |
| August | 2009 | NMED issues a second NOD on the July 2005 CME Report for TA-V Groundwater. | NMED August 2009 |

**Table 5-1. Historical Timeline of the TA-V Study Area** *(Concluded)*

| Month | Year | Event | Reference |
|---|---|---|---|
| November | 2009 | DOE/Sandia submit a response to the second NOD on the July 2005 CME Report for TA-V Groundwater. | SNL November 2009 |
| December | 2009 | NMED issues a third NOD on the July 2005 CME Report for TA-V Groundwater. | NMED December 2009 |
| February | 2010 | DOE/Sandia submit a response to the third NOD on the July 2005 CME Report for TA-V Groundwater. | SNL February 2010 |
| May | 2010 | NMED issues a notice of conditional approval for the TA-V Groundwater Investigation Work Plan associated with July 2005 TA-V Groundwater CME Report. | NMED May 2010 |
| October | 2010 | DOE/Sandia began installation of groundwater monitoring wells TAV-MW11, TAV-MW12, TAV-MW13, and TAV-MW14. | SNL February 2010 |
| November | 2010 | DOE/Sandia submit a report on the geophysical log and slug test results for the new TA-V wells. | SNL November 2010 |
| December | 2010 | NMED issues approval for the modification of soil-vapor monitoring well design. | NMED December 2010 |

**NOTES:**
CME = Corrective Measures Evaluation.
DOE = U.S. Department of Energy.
EPA = U.S. Environmental Protection Agency.
KAFB = Kirtland Air Force Base.
LWDS = Liquid Waste Disposal System.
MCL = Maximum Contaminant Level.
µg/L = Microgram(s) per liter.
mg/L = Milligram(s) per liter.
MNA = Monitored Natural Attenuation.
MW = Monitoring well.
NMED = New Mexico Environment Department.
NMSEO = New Mexico State Engineer Office.
NOD = Notice of Disapproval.
OU = Operable Unit.
RCRA = Resource Conservation and Recovery Act.
RFI = RCRA Facility Investigation.
RSI = Request for Supplemental Information.
Sandia = Sandia Corporation.
SNL = Sandia National Laboratories.
SNL/NM = Sandia National Laboratories/New Mexico.
SRNL = Savannah River National Laboratory.
SWMU = Solid Waste Management Unit.
TA = Technical Area.
TCE = Trichloroethene.

In April 2004, the Compliance Order on Consent (the Order) between the New Mexico Environment Department (NMED), DOE, and Sandia specified that TA-V was an area of groundwater contamination (NMED April 2004). Since the initial discoveries of TCE and nitrate at the TA-V study area, numerous characterization activities have been conducted (Table 5-1), which are summarized in the *Current Conceptual Model of Groundwater Flow and Contaminant Transport at Sandia National Laboratories/New Mexico Technical Area-V* (SNL April 2004a). In response to the Order, this document was submitted to the NMED along with the *Corrective Measures Evaluation (CME) Work Plan, TA-V Groundwater* (SNL April 2004b) by Sandia in April 2004. The Current Conceptual Model provides a comprehensive list of groundwater monitoring data sources used to support the summary of investigations. After fulfilling the requirements of the CME Work Plan, Sandia submitted the CME Report to the NMED in July 2005 (SNL July 2005).

### 5.1.4 Current Monitoring Network

In Calendar Year (CY) 2010, 12 wells in the TA-V study area were being monitored for water quality and water levels (Figure 5-2; Table 5-2). Table XI-1 of the Order (NMED April 2004) specifies that the sampling frequency for groundwater monitoring at TA-V is quarterly.

### 5.1.5 Summary of Calendar Year Activities

The following activities took place for the TA-V study area during CY 2010:

- Obtained monthly or quarterly water level measurements for all TA-V wells.
- Conducted quarterly groundwater sampling events at 12 wells (Table 5-2) in February 2010, June 2010, August/September 2010, and October 2010 (SNL January 2010, May 2010, August 2010, and September 2010).
- Performed quarterly perchlorate screening groundwater sampling and reporting for LWDS-MW1 in February 2010 (NMED April 2009).
- Submitted a response to the NMED’s third Notice of Disapproval (NMED December 2009) for the CME Report for TA-V Groundwater (SNL February 2010).
- NMED issued a *Notice of Conditional Approval for the TA-V Groundwater Investigation Work Plan* associated with the July 2005 TA-V CME Report (NMED May 2010).
- Installed groundwater monitoring wells TAV-MW11, TAV-MW12, TAV-MW13, and TAV-MW14 (SNL February 2010).
- Submitted a report on the geophysical log and slug test results for the new TA-V wells (SNL November 2010).
- Discussed changes in soil-vapor well installation and received approval from the NMED (NMED December 2010).
- Prepared tables of analytical results (Attachment 5A), concentration versus time plots (Attachment 5B), and hydrographs (Attachment 5C) in support of this report.

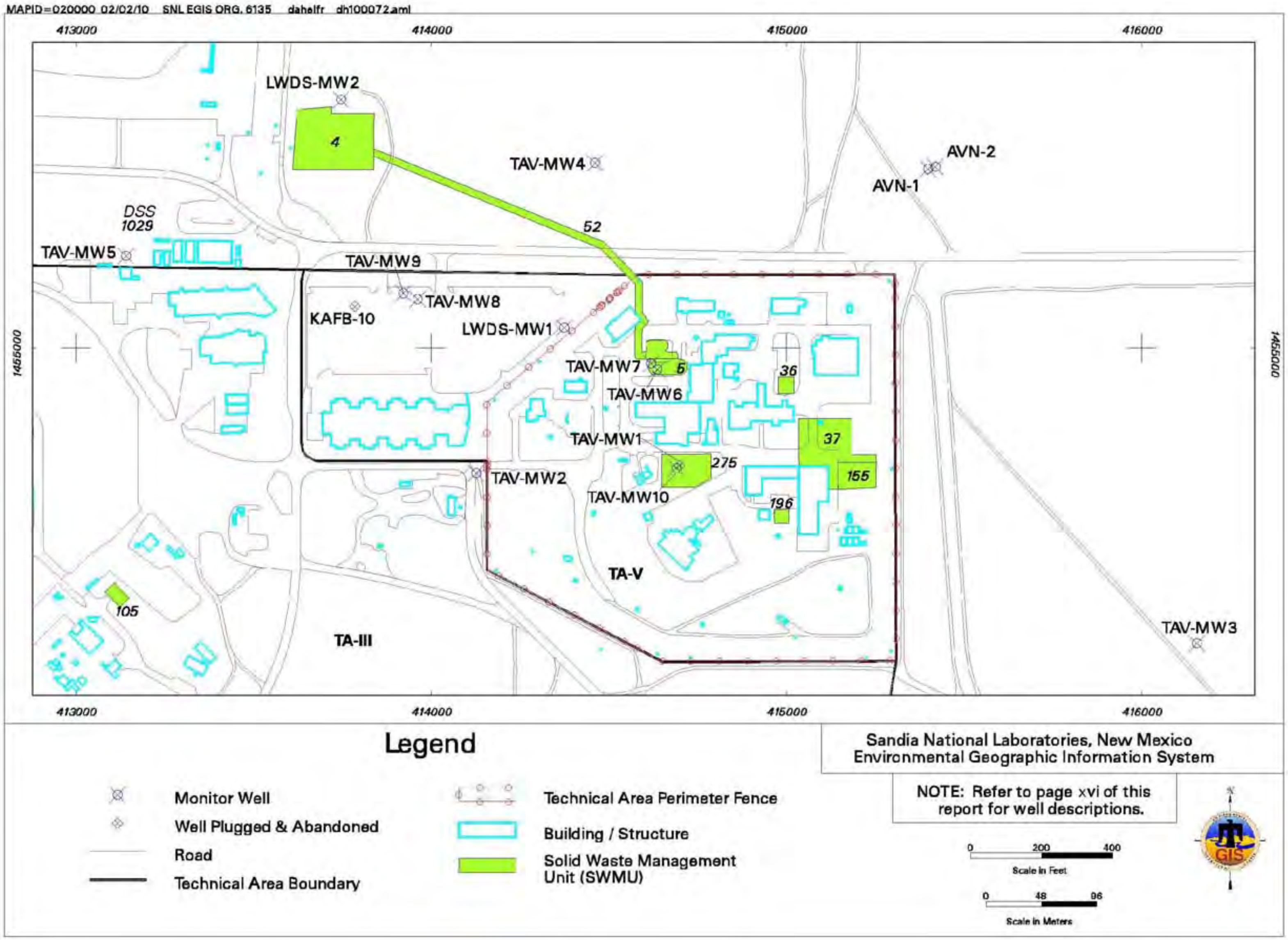


**Figure 5-2. TA-V Monitoring Well Locations (12 Active Wells)**

**Table 5-2. Groundwater Monitoring Wells at the TA-V Study Area**

| Well | Installation Year | WQ | WL | Comments |
|---|---|---|---|---|
| LWDS-MW1 | 1993 | √ | √ | Regional aquifer |
| LWDS-MW2 | 1992 | √ | √ | Regional aquifer |
| AVN-1 | 1995 | √ | √ | Regional aquifer |
| AVN-2 | 1995 | | | Regional aquifer; currently dry |
| TAV-MW1 | 1995 | | | Regional aquifer, plugged and abandoned February 2008 |
| TAV-MW2 | 1995 | √ | √ | Regional aquifer |
| TAV-MW3 | 1997 | √ | √ | Regional aquifer |
| TAV-MW4 | 1997 | √ | √ | Regional aquifer |
| TAV-MW5 | 1997 | √ | √ | Regional aquifer |
| TAV-MW6 | 2001 | √ | √ | Regional aquifer, water table completion |
| TAV-MW7 | 2001 | √ | √ | Regional aquifer, deep completion (597–617 feet) |
| TAV-MW8 | 2001 | √ | √ | Regional aquifer, water table completion |
| TAV-MW9 | 2001 | √ | √ | Regional aquifer, deep completion (582–602 feet) |
| TAV-MW10 | 2008 | √ | √ | Regional aquifer, replaced TAV-MW1 |
| TAV-MW11 | 2010 | | | Regional aquifer, water table completion |
| TAV-MW12 | 2010 | | | Regional aquifer, water table completion |
| TAV-MW13 | 2010 | | | Regional aquifer, deep completion (525–545 feet) |
| TAV-MW14 | 2010 | | | Regional aquifer, water table completion |

**NOTE:** Check marks in the WQ and WL columns indicate WQ sampling and WL measurements were obtained during this reporting period.
LWDS = Liquid Waste Disposal System.
TA-V = Technical Area V.
WL = Water level.
WQ = Water quality.

### 5.1.6 Summary of Future Activities

The following activities are anticipated for the TA-V study area during CY 2011:

- Obtain periodic water level measurements for all TA-V wells.
- Conduct quarterly or semi-annual groundwater sampling at 16 TA-V wells.
- Install three soil-vapor monitoring wells.
- Obtain location surveys for the new groundwater and soil-vapor monitoring wells.
- Conduct quarterly soil-vapor sampling at three TA-V wells.
- Submit a report on the TA-V field activities.

### 5.1.7 Current Conceptual Model

The conceptual site model of contaminant transport at TA-V includes release from the source term, migration through the vadose zone, and movement in groundwater.

TCE and other organic chemicals were present in water that was discharged to the LWDS drain field from 1962 to 1967 and to the TA-V seepage pits from the 1960s until the early 1980s when disposal practices were modified to protect the environment. Wastewater discharged to the seepage pits from the early 1980s until 1992 contained no TCE.

Water containing dissolved concentrations of TCE and other organic chemicals moved rapidly through the alluvial fan lithofacies into the aquifer. Upon cessation of disposal, vertical pathways to the aquifer drained rapidly. Continued flushing of the vadose zone beneath the seepage pits until 1992 likely removed significant sources of secondary contaminants.

Low concentrations of TCE present in the aquifer today are a result of these initial releases. The slow rate of groundwater flow (4 to 20 ft per year [ft/yr]) is responsible for the present distribution of TCE in the aquifer.

Nitrate concentrations in groundwater at TA-V are primarily derived from unknown upgradient sources. These concentrations have exceeded MCLs in the two upgradient AVN wells, LWDS-MW1, and TAV-MW10.

#### 5.1.7.1 Regional Hydrogeologic Conditions

SNL/NM TA-V is located within the Albuquerque Basin of the Rio Grande Rift in north-central New Mexico. The Rio Grande Rift is marked by a series of sediment-filled structural basins and adjoining uplifted mountain ranges. One of these basins, the Albuquerque Basin (also known as the Middle Rio Grande Basin), covers about 3,060 square miles in central New Mexico and extends from Cochiti Reservoir on the north to San Acacia, New Mexico, on the south. The Albuquerque Basin includes KAFB and TA-V.

The sedimentary deposits of the Santa Fe Group and overlying alluvium that fill the Albuquerque Basin contain the Santa Fe Group aquifer system. This aquifer system provides the primary source of municipal, domestic, and industrial water in the Albuquerque area. The structure of the aquifer system within the Middle Rio Grande Basin today is complex (Bartolino and Cole 2002). The major hydrostratigraphic units in the aquifer are tabular and wedge-shaped bodies that are truncated and displaced by numerous faults. Few of the major units are present continuously throughout all three subbasins, and most "pinch out" against the subsurface basement blocks that separate the subbasins. These major units are hundreds to thousands of feet thick, extend over tens of square miles, and primarily consist of unconsolidated and partially cemented deposits that interfinger in complex arrangements.

Prior to development of water resources in the Albuquerque area, groundwater flow direction in the Albuquerque Basin generally was from the north to the south, with a westward component of flow from recharge areas along mountain-front boundaries to the east (Bartolino and Cole 2002). As the Santa Fe Group aquifer has been developed as a source for municipal and industrial water supplies, groundwater flow directions have been altered toward pumping centers to the north of TA-V. Regional discharge occurs as groundwater moves out of the Albuquerque Basin into downgradient basins on the Rio Grande Rift as underflow or through discharge to the Rio Grande.

Contaminant transport at TA-V is constrained by geologic features. The stratigraphic units of hydrologic significance consist of the alluvial fan lithofacies and Ancestral Rio Grande (ARG) lithofacies. TA-V is largely underlain by a thick section of alluvial fan deposits. These deposits consist of the alluvial fan lithofacies of the Santa Fe Group overlain by post-Santa Fe Group alluvial fan deposits. The deepest monitoring well in the study area (AVN-1) penetrated 650 ft of these deposits. The total thickness of deposits at TA-V is not known.

The alluvial fan lithofacies is further subdivided into lower and upper sections. The lower section consists of a fine-grained, clay-rich unit. This unit has been identified as low-energy piedmont deposits derived from upland soil that developed during a preglacial humid climate. The upper section consists of relatively coarse-grained sediments deposited in a higher-energy environment. The water table of the Santa Fe Group aquifer at TA-V is located in the fine-grained lower unit of alluvial fan deposits.

The post-Santa Fe Group alluvial fan deposits blanket the area around TA-V and compose the upper few tens of feet of the vadose zone. These deposits were derived primarily from alluvial fans that developed from Coyote Canyon to the east.

The ARG deposits interfinger with alluvial fan deposits west of TA-V. These deposits consist predominantly of uniformly coarse sand and gravel that were deposited with the integration of the Rio Grande drainage system.

#### 5.1.7.2 Hydrologic Conditions at the TA-V Study Area

Areal precipitation may provide one possible source of local recharge. The average annual precipitation at TA-V is 8.7 inches (SNL April 2004a). Much of this precipitation is derived from summer thunderstorms that occur between July and October. Because the rate of evapotranspiration in the Albuquerque area greatly exceeds precipitation, this source of recharge is considered to be minimal as a mechanism for transporting contaminants through the thick vadose zone at TA-V. Estimates of evapotranspiration for the KAFB area range from 95 to 99 percent of the annual rainfall (SNL February 1998).

The Tijeras and Coyote arroyos to the north and Hells Canyon arroyo to the south of TA-V channel sporadic, short, ephemeral flows from mountainous drainages to the east. Part of the recharge derived from infiltration of these flows is returned to the atmosphere through processes of evapotranspiration. Some water that infiltrates arroyo channels may move past the root zone and provide some local recharge. The distance between these ephemeral stream channels and TA-V precludes a significant effect on local flow and contaminant transport.

The vadose zone at TA-V, consisting of approximately 500 ft of unconsolidated to semiconsolidated alluvial sediments, forms the potential pathway for contaminant transport from contaminant sources to the aquifer. Upper sections of the alluvial-fan sediments are relatively coarse-grained, becoming fine-grained and clay-rich with depth.

The unsaturated and saturated hydraulic properties of the vadose zone at TA-V have not been fully characterized. However, they are highly variable and anisotropic because of the heterogeneous textures, lenticularity, layering, and changes in cementation. Disposal of wastewater from the LWDS drain field, the LWDS surface impoundments, and the TA-V seepage pits resulted in the development of preferential pathways of saturated or nearly saturated flow through the thick vadose zone to the aquifer. Rapid vertical flow through the discontinuous, layered, lenticular sediments in the vadose zone may have been somewhat attenuated or diverted at horizons of contrasting hydraulic properties. Discharge of wastewater to the drain field was discontinued in 1967. Discharge to the seepage pits was discontinued in the early 1990s.

No evidence of perching has been observed at TA-V. Based on moisture content measurements in vadose-zone sediment samples, drainage of residual water from the vadose zone to the aquifer was rapid after discharge ceased; minimal moisture from wastewater discharge at TA-V probably remains in the vadose zone.

A wide range of hydraulic conductivity estimates were derived from aquifer tests at TA-V that is attributed to the textural heterogeneities associated with the alluvial fan lithofacies. The average horizontal hydraulic conductivity for these sediments is estimated to be about $1.24 \times 10^{-4}$ ft per minute (SNL March 1999a). Vertical hydraulic conductivity is estimated to be one-tenth to one-hundredth the horizontal hydraulic conductivity.

### 5.1.7.3 Local Direction of Flow

Water levels measured in nine wells were used to construct a map of the potentiometric surface at TA-V (Figure 5-3). Groundwater elevations presented in this potentiometric surface map reflect new survey coordinates. Until recently, ER Operations survey coordinates were based on the New Mexico State Plane Coordinate System, Central Zone, North American Datum of 1927 and Northern Geographic Vertical Datum of 1929 for elevations. In order to be consistent with current SNL/NM Facilities and KAFB survey practices, ER Operations survey data now are based on New Mexico State Plane Coordinate System, Central Zone, North American Datum of 1983 (NAD83) and North American Vertical Datum of 1988 (NAVD88). Location information for wells surveyed before August 2010 has been mathematically converted to the new NAD83/NAVD88 coordinates using National Geodetic Survey-approved software.

The potentiometric surface indicates that the regional groundwater flow beneath TA-V is generally to the northwest. Localized flow paths are to the west and southwest. The October 2010 horizontal gradient ranged from approximately 0.0007 to 0.002 feet per foot. Calculated groundwater flow velocities based on aquifer testing range from 4 to 10 ft/yr (SNL March 1999a). Water-table contours for October 2010 suggest that a subtle groundwater mound is present at TA-V. This apparent groundwater mound is considered to be an artifact of regional water level declines within a heterogeneous aquifer and does not represent residual mounding from wastewater disposal that was discontinued in the early 1990s (SNL March 1999a).

Water-level data indicate that groundwater flow to the west of TA-V turns sharply to the north, moving toward COA pumping centers located north of KAFB and KAFB water-supply wells. The sharp change in flow direction coincides with the location of coarse, uniformly sorted ARG sediments. These sediments are much more permeable than the fine-grained sediments of the alluvial fan facies at TA-V and permit more rapid flow.

Vertical flow gradients in the regional aquifer within the TA-V study area are strongly downward. Historically, water levels in the regional aquifer have been declining at a rate approaching 1.3 ft/yr (Attachment 5C, Figures 5C-1 and 5C-2).

### 5.1.7.4 Contaminant Sources

Contaminant migration in the subsurface at TA-V is controlled by local recharge to the Santa Fe Group aquifer and by the permeability of the sedimentary units in the vadose zone and aquifer. Possible sources of recharge include infiltration of wastewater disposed of at TA-V, areal precipitation, and ephemeral flows in nearby arroyos.

SWMUs 4, 5, and 275 are responsible for the majority of wastewater discharged at TA-V. Table 5-3 identifies the dates of disposal and estimated disposal volumes. After 1992, wastewater was disposed of to the COA sanitary sewer system.

Sampling and analysis have been conducted in the vadose zone in order to characterize the presence of COCs. Locations of investigations are based on possible source terms (Table 5-3). Overall, the presence of COCs in the vadose zone is minimal. Movement of water and contaminant transport through the vadose zone occurred rapidly, and vadose zone drainage occurred soon after cessation of wastewater disposal.

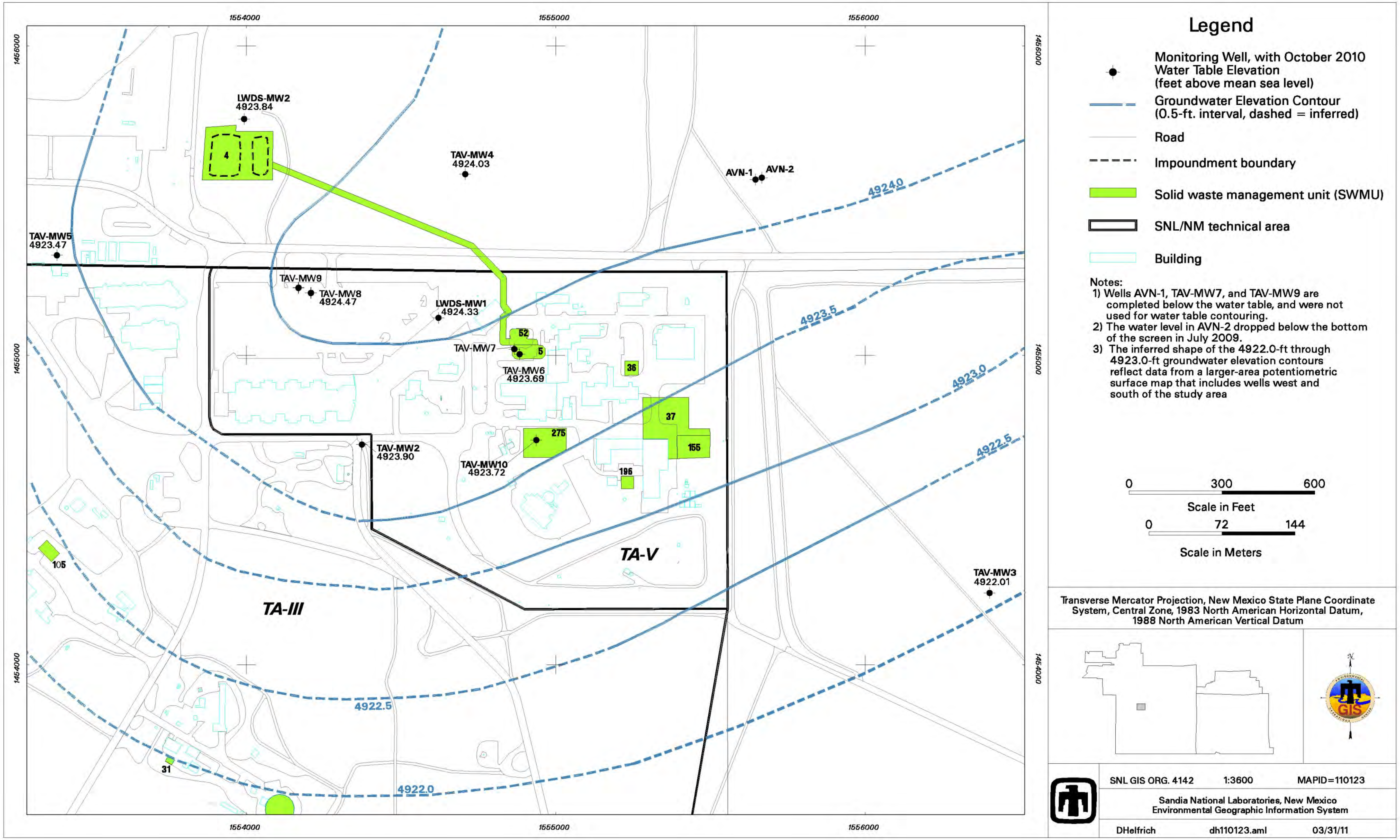


Figure 5-3. TA-V Study Area Potentiometric Surface Map (October 2010)

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**Table 5-3. Wastewater Disposal History at TA-V**

| Disposal Site | Dates | Estimated Volume of Wastewater (gal.) |
|---|---|---|
| SWMU 275 – TA-V Seepage Pits | 1960s–1992 | 30 to 50 million |
| SWMU 5 – LWDS Drain Field | 1962–1967 | 6.5 million |
| SWMU 4 – LWDS Surface Impoundments | 1967–1972 | 12 million |

**NOTES:**
gal. = Gallon(s).
LWDS = Liquid Waste Disposal System.
SWMU = Solid Waste Management Unit.
TA-V = Technical Area V.

Within the LWDS drain field, trace quantities of TCE, tetrachloroethene (PCE), and benzene were detected in shallow borehole soil-vapor samples collected during 1994 (SNL March 1999a). The possibility of vadose zone contamination was further investigated with the installation of wells TAV-MW6, TAV-MW7, TAV-MW8, and TAV-MW9 in March and April 2001. The results for soil and soil-vapor samples show no significant residual soil contamination in the vadose zone. Also, no results have shown evidence of excessive moisture in the vadose zone sediments; therefore, no significant residual contaminated water is present in the vadose zone beneath the LWDS drain field (SNL October 2001).

In the vicinity of the TA-V seepage pits, trace quantities of TCE, PCE, benzene, toluene, and total xylene were detected in shallow and deep vadose-zone borehole soil-vapor samples collected during passive, surficial characterization studies conducted during 1994 and 1995. Vapor-phase TCE was detected at 44 parts per billion (by volume) at a depth of 80 ft below ground surface in TAV-BH-01 (SNL March 1999a). Solvent disposals to the seepage pits were most likely reduced in the early 1980s (SNL March 1999a), but wastewater disposal continued. This likely flushed any residual contaminants that may have been present in the vapor and aqueous phase in the vadose zone into the aquifer.

Other surface contamination sites have been investigated at TA-V. Investigations have included surficial and subsurficial passive and active vapor-phase sampling for COCs. Sampling results have shown that these other sites probably have not contributed to groundwater contamination. For example, only trace quantities of TCE, methylene chloride, trichloroethane, benzene, and toluene were detected in shallow soil samples collected at SWMU 196 (Building 6597 cistern).

Because TCE is volatile and the vapors are denser than ambient air, the physical properties of TCE are conducive to vapor transport; therefore, vapor transport in the vadose zone is a possible mechanism for the presence of TCE in the aquifer. Some TCE will typically be retained in the vadose zone due to absorption onto fine-grained materials and capillary forces.

Three physical processes, occurring in the vadose zone, affect the migration of TCE into the aquifer as follows:

- Vaporization from the source
- Transport to the capillary fringe
- Adsorption into the water table

Nitrate is present primarily in the aqueous phase in both the vadose zone and aquifer. It is nonsorptive and, for the most part, does not exchange on sediment surfaces in the vadose zone or groundwater.

Therefore, any locally derived nitrate most likely was transported through the vadose zone with the initial discharges of wastewater.

#### 5.1.7.5 Contaminant Distribution and Transport in Groundwater

Distribution and transport of COCs and aquifer parameters are discussed in this section. TCE is present in low concentrations in the Santa Fe Group aquifer beneath TA-V. The highest TCE concentrations are not directly under the drain field source; rather, the highest concentrations have migrated in the localized direction of groundwater flow. The TCE distribution depicted in Figure 5-4 shows that the center of the TCE mass is located about 200 ft northwest of the SWMU 5 drain field and about 300 ft northwest of the SWMU 275 seepage pits.

Maximum historical TCE concentrations reported at TA-V were 23 to 26 μg/L for LWDS-MW1 on November 13, 2000. TCE has consistently exceeded the MCL at LWDS-MW1 since 1993, and concentrations at TAV-MW6 and TAV-MW10 have exceeded the MCL in recent sampling events (Section 5.6). TCE has been found only in water-table completion wells and has not been detected 100 ft below the water table based on data collected from deep wells TAV-MW7 and TAV-MW9.

Nitrate is present in groundwater in all wells at TA-V, generally at concentrations ranging from less than 5 to more than 10 mg/L. Nitrate concentrations have exceeded MCLs in samples from AVN-1, AVN-2, LWDS-MW1, TAV-MW5, and TAV-MW10, although concentrations do not appear to be increasing over time. The highest reported concentrations for TA-V wells include the following:

- 13 mg/L for AVN-1 on May 14, 2001
- 16 mg/L for AVN-2 on October 27, 1999
- 13 mg/L for TAV-MW5 on August 18, 1999
- 14 mg/L for TAV-MW10 on October 20, 2010
- 19 mg/L for LWDS-MW1 on November 13, 2000, and February 16, 2001

Upgradient wells AVN-1 and AVN-2 were completed at different depths and show relatively consistent nitrate concentrations with depth and over time.

The source of nitrate in water from TA-V wells is unknown. Some nitrate may have been disposed of to the subsurface in TA-V sanitary wastes; however, nitrate concentrations exceeding the MCL in the AVN wells suggests that the source of nitrate is regionally upgradient and to the northeast of TA-V. The background nitrate concentration is 4 mg/L.

## 5.2 Regulatory Criteria

The NMED Hazardous Waste Bureau provides regulatory oversight of SNL/NM ER Operations as well as implements and enforces federal regulations mandated by the Resource Conservation and Recovery Act (RCRA). All ER SWMUs and Areas of Concern (AOCs) are listed in Module IV of the SNL/NM RCRA Part B Operating Permit, *Special Conditions Pursuant to the 1984 Hazardous and Solid Waste Amendments (HSWA) to RCRA for Sandia National Laboratories* (NMED 1993).

All investigations and corrective action requirements pertaining to SWMUs and AOCs are contained in the Order (NMED April 2004). Groundwater characterization for TA-V was initiated to satisfy the requirements of the SNL/NM HSWA permit for characterization of SWMUs. The groundwater monitoring activities for the TA-V study area are not associated with a single SWMU but are more regional in nature and have historically been voluntarily conducted by SNL/NM ER Operations.

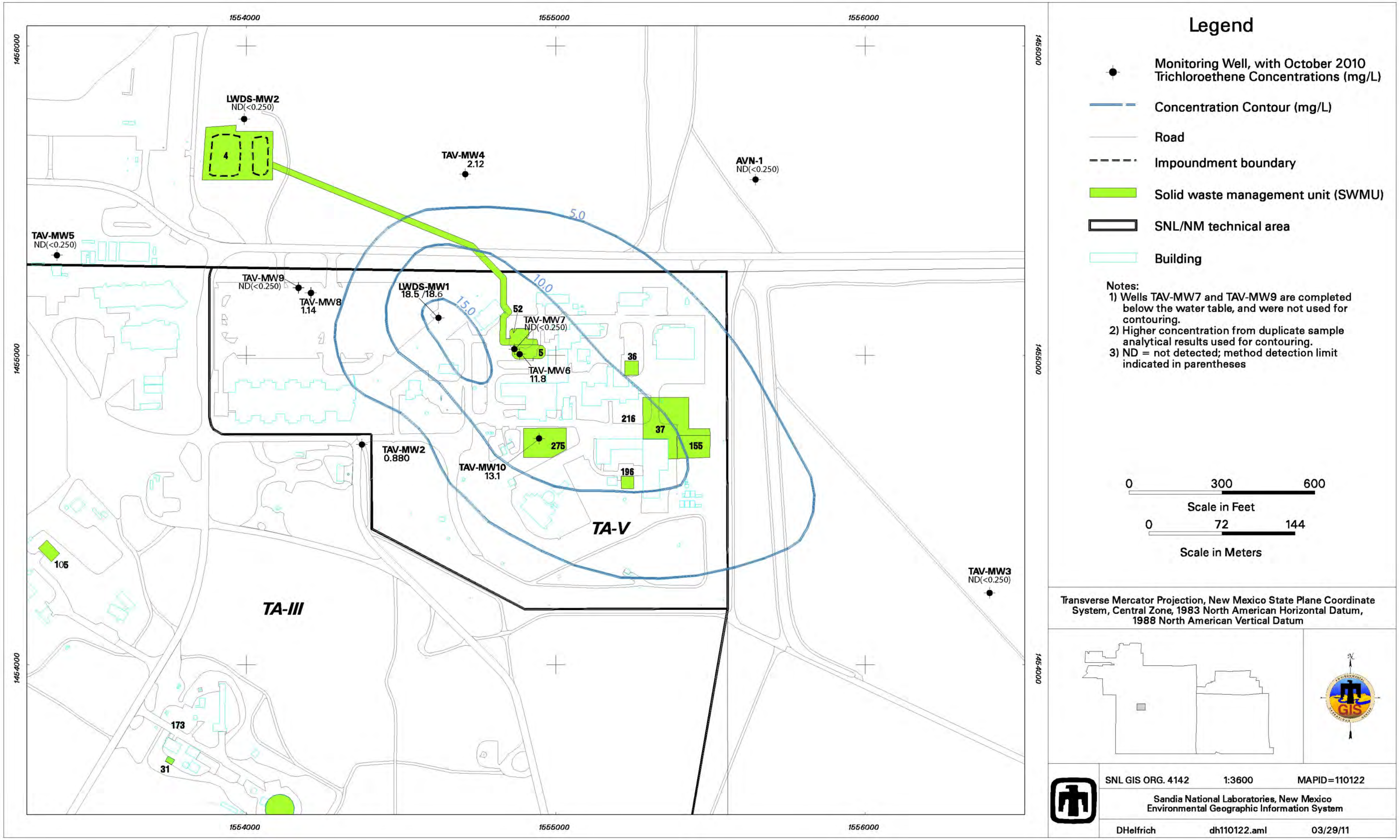


**Figure 5-4. Distribution of TCE in Groundwater at SNL/NM TA-V, October 2010**

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The Order, which became effective in April 2004, transferred regulatory authority for corrective action requirements from the HSWA module to the Order (NMED April 2004). The TA-V investigations must comply with requirements set forth in the Order for site characterization and development of a CME. The Order also contains schedules that define dates for the delivery of plans and reports related to TA-V.

Although the Order requires that the DOE and Sandia evaluate the nature and extent of contamination in the TA-V study area, no specific reporting requirements are prescribed in the Order. Sandia continues to present TA-V data with the data from other groundwater sites in the Groundwater Protection Program (GWPP) Annual Groundwater Monitoring Report. The outline of this report is based on the required elements of a "Periodic Monitoring Report" described in Section X.D. of the Order (NMED April 2004).

In this report, TA-V groundwater monitoring data are presented for both hazardous and radioactive constituents; however, the monitoring data for radionuclides (gamma spectroscopy, gross alpha/beta activity, and tritium) are provided voluntarily by the DOE/Sandia. The voluntary inclusion of such radionuclide information shall not be enforceable and shall not constitute the basis for any enforcement because such information falls wholly outside the requirements of the Order. Additional information on radionuclides and the scope of the Order is available in Section III.A of the Order (NMED April 2004).

## 5.3 Scope of Activities

The activities for the TA-V investigation for CY 2010, including plans and reports, are listed in Section 5.1.5. The field activities completed in the study area include monitoring well installation and groundwater monitoring. The CY 2010 sampling events (four quarterly events) are summarized in Table 5-4, and the analytical parameters for each well for each sampling event are listed in Table 5-5.

**Table 5-4. Groundwater Monitoring Well Network and Sampling Dates for the TA-V Study Area, Calendar Year 2010**

| Date of Sampling Event | Wells Sampled[1] | SAP |
|---|---|---|
| February 2010 | AVN-1, LWDS-MW1, LWDS-MW2, TAV-MW2, TAV-MW3, TAV-MW4, TAV-MW5, TAV-MW6, TAV-MW7, TAV-MW8, TAV-MW9, and TAV-MW10 | *TA-V Groundwater Monitoring Mini-SAP for Second Quarter, Fiscal Year 2010* (SNL January 2010) |
| June 2010 | AVN-1, LWDS-MW1, LWDS-MW2, TAV-MW2, TAV-MW3, TAV-MW4, TAV-MW5, TAV-MW6, TAV-MW7, TAV-MW8, TAV-MW9, and TAV-MW10 | *TA-V Groundwater Monitoring Mini-SAP for Third Quarter, Fiscal Year 2010* (SNL May 2010) |
| August/ September 2010 | AVN-1, LWDS-MW1, LWDS-MW2, TAV-MW2, TAV-MW3, TAV-MW4, TAV-MW5, TAV-MW6, TAV-MW7, TAV-MW8, TAV-MW9, and TAV-MW10 | *TA-V Groundwater Monitoring Mini-SAP for Fourth Quarter, Fiscal Year 2010* (SNL August 2010) |
| October 2010 | AVN-1, LWDS-MW1, LWDS-MW2, TAV-MW2, TAV-MW3, TAV-MW4, TAV-MW5, TAV-MW6, TAV-MW7, TAV-MW8, TAV-MW9, and TAV-MW10 | *TA-V Groundwater Monitoring Mini-SAP for First Quarter, Fiscal Year 2011* (SNL September 2010) |

**NOTE:** [1] Refer to page xviii of this report for well descriptions.
SAP = Sampling and Analysis Plan.
TA-V = Technical Area V.

**Table 5-5. Parameters Sampled at TA-V Wells[1] for Each Sampling Event, Calendar Year 2010**

| Parameter | February 2010 | Parameter | June 2010 |
|---|---|---|---|
| NPN<br>VOCs | AVN-1<br>LWDS-MW1<br>LWDS-MW2<br>TAV-MW2<br>TAV-MW3<br>TAV-MW3 (dup)<br>TAV-MW4<br>TAV-MW5<br>TAV-MW6<br>TAV-MW7<br>TAV-MW8<br>TAV-MW9<br>TAV-MW10<br>TAV-MW10 (dup) | NPN<br>VOCs | AVN-1<br>LWDS-MW1<br>LWDS-MW2<br>TAV-MW2<br>TAV-MW3<br>TAV-MW4<br>TAV-MW5<br>TAV-MW5 (dup)<br>TAV-MW6<br>TAV-MW7<br>TAV-MW8<br>TAV-MW8 (dup)<br>TAV-MW9<br>TAV-MW10<br>TAV-MW10 (dup) |
| Perchlorate | LWDS-MW1 | | |

| Parameter | August/September 2010 | Parameter | October 2010 |
|---|---|---|---|
| Anions<br>Gamma Spec*<br>Gross Alpha<br>Gross Beta<br>NPN<br>TAL Metals, plus Total Uranium<br>Tritium<br>VOCs | AVN-1<br>LWDS-MW1<br>LWDS-MW2<br>TAV-MW2<br>TAV-MW2 (dup)<br>TAV-MW3<br>TAV-MW4<br>TAV-MW5<br>TAV-MW6<br>TAV-MW7<br>TAV-MW8<br>TAV-MW9<br>TAV-MW9 (dup)<br>TAV-MW10 | NPN<br>VOCs | AVN-1<br>LWDS-MW1<br>LWDS-MW1 (dup)<br>LWDS-MW2<br>TAV-MW2<br>TAV-MW3<br>TAV-MW4<br>TAV-MW5<br>TAV-MW5 (dup)<br>TAV-MW6<br>TAV-MW7<br>TAV-MW8<br>TAV-MW9<br>TAV-MW10 |

**NOTE:** [1] Refer to page xviii of this report for well descriptions.
dup = Duplicate sample.
Gamma Spec* = Gamma spectroscopy short list (Americium-241, Cesium-137, Cobalt-60, and Potassium-40).
NPN = Nitrate plus nitrite (reported as nitrogen).
TAL = Target Analyte List.
TA-V = Technical Area V.
VOC = Volatile organic compound.

Quality control (QC) samples are collected in the field at the time of environmental sample collection. Field QC samples include duplicate samples, split samples, equipment blank (EB), and trip blank (TB) samples. Field QC samples are used to monitor the sampling process. Duplicate samples are used to measure the precision of the sampling process. Split samples are used to verify the performance of the analytical laboratory. EB samples are used to verify the effectiveness of sampling equipment decontamination procedures. TB samples are used to determine whether volatile organic compounds (VOCs) contaminated the sample during preparation, transportation, or handling prior to receipt by the analytical laboratory.

## 5.4 Field Methods and Measurements

The monitoring procedures, as conducted by ER Operations personnel, are consistent with procedures identified in the EPA technical enforcement guidance document (EPA 1986). The following sections provide an overview of the sampling and data collection procedures.

### 5.4.1 Groundwater Elevation

Throughout CY 2010, water level measurements were obtained to determine groundwater flow directions, hydraulic gradients, and changes in water table elevations. Water levels are periodically measured in TA-V groundwater monitoring wells according to the instructions and requirements of SNL/NM Field Operating Procedure (FOP) 03-02, *Groundwater Level Data Acquisition and Management,* Rev. 02 (SNL November 2007). The water level information was used to develop the potentiometric surface map presented in Figure 5-3 and the hydrographs presented in Figures 5C-1 and 5C-2 (Attachment 5C).

### 5.4.2 Well Purging and Water Quality Measurements

A Bennett™ groundwater sampling system (a nitrogen gas-powered portable piston pump) was used to collect the groundwater samples from TA-V wells. The wells are purged a minimum of one saturated screen volume. Field water quality measurements for turbidity, pH, temperature, specific conductance (SC), oxidation-reduction potential (ORP), and dissolved oxygen (DO) were recorded for each well prior to the collection of groundwater samples, according to SNL/NM FOP 05-01 (SNL August 2007a). Groundwater temperature, SC, ORP, DO, and pH were measured using a YSI™ Model 620 water quality meter. Turbidity was measured with a HACH™ Model 2100P portable turbidity meter.

The amount of water required to achieve stability of field parameters is fairly consistent. However, the ability of the aquifer to produce water varies greatly from well to well. In accordance with the Mini-Sampling and Analysis Plans (SAPs) (Table 5-4), purging continues until four stable measurements for temperature, SC, pH, and turbidity are obtained.

Groundwater stability is considered acceptable when measurements are equal to or within 10 percent of 5 nephelometric turbidity units, pH is within 0.1 units, temperature is within 1.0 degree Celsius, and SC is within 5 percent. Associated Field Measurement Logs documenting details of well purging and water quality measurements for each sampling event have been submitted to the SNL/NM Customer Funded Records Center.

### 5.4.3 Pump Decontamination

The Bennett™ sampling pump and tubing bundle were decontaminated prior to installation into monitoring wells according to procedures described in *Long-Term Environmental Stewardship (LTES) Groundwater Sampling Equipment Decontamination,* SNL/NM FOP 05-03 (SNL August 2007b). An EB or rinsate sample was collected to verify the effectiveness of the equipment decontamination process.

### 5.4.4 Sample Collection Sampling Procedures

Groundwater samples are collected using the Bennett™ pump in accordance with SNL/NM FOP 05-01 (SNL August 2007a). Sample bottles are filled directly from the pump discharge line, with the VOC samples collected at the lowest achievable discharge rate.

### 5.4.5 Sample Handling and Shipment

The SNL/NM Sample Management Office (SMO) processes environmental samples collected by ER Operations personnel. The SMO reviews the Mini-SAPs, orders sample containers, issues sample control and tracking numbers, tracks the chain-of-custody, and reviews analytical results returned from the laboratories for laboratory contract compliance (SNL March 2003b and April 2007). All groundwater samples are analyzed by off-site laboratories using EPA-specified protocols.

QC samples are also prepared at the laboratory to determine whether contaminant chemicals are introduced into laboratory processes and procedures. These include method blanks, laboratory control samples (LCS), matrix spike, matrix spike duplicate, and surrogate spike samples. Reported laboratory analytical and QC data are reviewed against quality assurance requirements specified in the *Procedure for Completing the Contract Verification Review, SMO-05-03, Issue 03*, (SNL April 2007) and Administrative Operating Procedure (AOP) 00-03, *Data Validation Procedure for Chemical and Radiochemical Data*, (SNL July 2007).

### 5.4.6 Waste Management

Purge and decontamination water generated from sampling activities were placed into 55-gallon containers and stored at the ER Operations Field Office waste accumulation area. All waste was managed in accordance with SNL/NM FOP 05-04 (SNL August 2007c) as nonregulated waste, based on historical sampling results and process knowledge of the monitoring well location. Associated environmental sampling results provide supplemental data for approval to discharge water to the sanitary sewer. All data were compared with COA discharge limits.

## 5.5 Analytical Methods

All groundwater samples were analyzed by off-site laboratories using EPA-specified protocols. Groundwater samples were submitted to GEL Laboratories, Inc. for analysis. Samples were analyzed in accordance with applicable EPA analytical methods (Tables 5-6 and 5-7), including:

- *The Determination of Inorganic Anions in Water by Ion Chromatography-Method 300.0* (EPA 1983)
- *Perchlorate in Drinking Water Using Ion Chromatography* (EPA, 1999)
- *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, Rev. 1* (EPA 1996)
- *Prescribed Procedures for Measurement of Radioactivity in Drinking Water* (EPA 1980)

**Table 5-6. TA-V Study Area Chemical Analytical Methods**

| Analyte | Analytical Method[a,b,c] |
|---|---|
| Anions | SW846-9056 |
| NPN | EPA 353.2 |
| Perchlorate | EPA 314.0 |
| TAL Metals, plus Uranium | SW846-6020/7470 |
| VOCs | SW846-8260 |

**NOTES:** [a]U.S. Environmental Protection Agency, 1996, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, 3rd ed., Rev. 1 (and all updates), U.S. Environmental Protection Agency, Washington, D.C.
[b]U.S. Environmental Protection Agency, 1983, *The Determination of Inorganic Anions in Water by Ion Chromatography-Method 300.0*, EPA-600/4-84-017.
[c]U.S. Environmental Protection Agency (EPA), 1999, *Perchlorate in Drinking Water Using Ion Chromatography*, EPA 815/R-00-014.
EPA = U.S. Environmental Protection Agency.
NPN = Nitrate plus nitrite (reported as nitrogen).
SW = Solid Waste.
TAL = Target analyte list.
TA-V = Technical Area V.
VOC = Volatile organic compound.

**Table 5-7. TA-V Study Area Radiochemical Analytical Methods**

| Analyte | Analytical Method[a] |
|---|---|
| Gamma Spectroscopy (short list) | EPA 901.0 |
| Gross Alpha/Beta Activity | EPA 900.0 |
| Tritium | EPA 906.0 |

**NOTES**: [a]U.S. Environmental Protection Agency, 1980, *Prescribed Procedures for Measurement of Radioactivity in Drinking Water*, EPA-600/4-80-032, U.S. Environmental Protection Agency, Cincinnati, Ohio.
EPA = U.S. Environmental Protection Agency.
TA-V = Technical Area V.

## 5.6 Summary of Analytical Results

This section discusses monitoring results, exceedances of standards, and pertinent trends in concentrations for COCs in the TA-V study area that exceed standards. The analytical results and field measurements for all TA-V sampling events are presented in Attachment 5A, Tables 5A-1 through 5A-8; concentration trend plots for COCs that exceed the MCLs are presented in Attachment 5B, Figures 5B-1 through 5B-5. A summary of detected VOC results are presented in Table 5A-1. The method detection limits (MDLs) for all analyzed VOCs are listed in Table 5A-2.

The VOCs detected at low concentrations in groundwater samples from TA-V study area monitoring wells include the following:

- Chloroform
- cis-1,2-Dichloroethene
- TCE

Three VOCs were detected during CY 2010. Two of these VOCs have promulgated MCLs. Only TCE exceeds its corresponding MCL, which is 5 µg/L (Table 5A-1). TCE was detected in samples from three wells: LWDS-MW1, TAV-MW6, and TAV-MW10. The maximum concentration of TCE detected during this reporting period was 18.6 µg/L in the sample from LWDS-MW1 collected in October 2010. Figures 5B-1, 5B-2, and 5B-3 (Attachment 5B) show that the TCE concentrations are decreasing over time in LWDS-MW1 and increasing over time in TAV-MW6 and TAV-MW10.

The analytical results for NPN (reported as nitrogen) are presented in Table 5A-3 (Attachment 5A). During this reporting period, NPN results exceed the MCL of 10 mg/L in samples from LWDS-MW1 and TAV-MW10. The maximum concentration of NPN detected during this reporting period is 13.7 mg/L in the sample collected from TAV-MW10 in October 2010. Figure 5B-4 (Attachment 5B) shows that the NPN concentrations in LWDS-MW1 have typically exceeded the MCL, with concentrations being stable to slightly decreasing over time. In contrast, Figure 5B-5 (Attachment 5B) shows that NPN concentrations in TAV-MW10 (and its predecessor, TAV-MW1) only occasionally exceed the MCL with the trend increasing over time.

The analytical results for anions (bromide, chloride, fluoride, and sulfate) are presented in Table 5A-4 (Attachment 5A). Secondary MCLs have been promulgated for three of the anions; none of the results exceed the corresponding secondary MCLs.

The analytical result for perchlorate are presented in Table 5A-5; perchlorate was not detected in the one groundwater sample analyzed in CY 2010.

Total metal results are presented in Table 5A-6; no metal results exceed established primary or secondary MCLs.

Tritium, gross alpha/beta activity, and gamma spectroscopy results are presented in Table 5A-7; all radionuclide results are below established MCLs.

Field water quality parameters were measured during purging of each well prior to sampling and included temperature, SC, ORP, pH, turbidity, and DO. The parameter measurements obtained immediately before sample collection are presented in Table 5A-8.

## 5.7 Quality Control Results

Field and laboratory QC samples were prepared to determine the accuracy of the methods used and to detect inadvertent sample contamination that may have occurred during the sampling and analysis process. All chemical data were reviewed and qualified in accordance with AOP 00-03, *Data Validation Procedure for Chemical and Radiochemical Data* (SNL July 2007). Although some analytical results were qualified during the data validation process, no significant data quality problems were noted for TA-V COCs during CY 2010 sampling events. Data validation qualifiers are presented with the analytical results in Tables 5A-1 through 5A-7 (Attachment 5A). The data validation report associated with each sampling event has been submitted to the SNL/NM Customer Funded Records Center. The results for each QC sample and the impact on data quality for the TA-V quarterly sampling events are discussed in the following sections.

### 5.7.1 Field Quality Control Samples

Field QC samples included environmental duplicate, EB, and TB samples. The field QC samples were submitted for analysis along with the groundwater samples in accordance with QC procedures specified in the Mini-SAPs (SNL January 2010, May 2010, August 2010, and September 2010).

#### 5.7.1.1 Duplicate Environmental Samples

Duplicate environmental samples were analyzed in order to estimate the overall reproducibility of the sampling and analytical process. A duplicate sample is collected immediately after the original environmental sample in order to reduce variability caused by time and/or sampling mechanics. The results for duplicate sample analyses (detected parameters only) are used to calculate relative percent difference (RPD) values. Duplicate sampling results for all wells and all sampling periods show good correlation (RPD values of less than 20) for all calculated parameters.

#### 5.7.1.2 Equipment Blank Samples

The Bennett™ pump and tubing bundle were decontaminated prior to installation into monitoring wells according to procedures described in SNL/NM FOP 05-03 (SNL August 2007b). An EB or rinsate sample was collected to verify the effectiveness of the equipment decontamination process. The results for the EB analyses are as follows:

- **February 2010 Sampling Event—**EB samples were collected prior to sampling at TAV-MW3 and TAV-MW10 and submitted for all analyses. Bromodichloromethane, bromoform, chloroform, and dibromochloromethane were detected above the laboratory MDLs. No corrective action was necessary as these compounds were not detected in associated environmental samples.

- **June 2010 Sampling Event—**EB samples were collected prior to sampling at TAV-MW5 and TAV-MW8 and submitted for all analyses. Bromodichloromethane, chloroform, and dibromochloromethane were detected above the laboratory MDLs. No corrective action was necessary as these compounds were not detected in associated environmental samples.

- **August/September 2010 Sampling Event—**EB samples were collected prior to sampling at TAV-MW2 and TAV-MW9 and submitted for VOC, total metal, anion, NPN, gamma spectroscopy, gross alpha, gross beta, and tritium analyses. The analytical parameters barium, bromodichloromethane, calcium, chloride, chloroform, chromium, copper, dibromochloromethane, iron, manganese, and zinc were detected in the EB samples. Chromium, copper, iron, manganese, and zinc were qualified as not detected during data validation when environmental samples reported these metals at concentrations less than five times the associated EB result. No corrective action was required for barium, bromodichloromethane, calcium, chloride, chloroform, and dibromochloromethane. These parameters either were not detected in environmental samples or were detected at concentrations greater than five times the blank result.

- **October 2010 2008 Sampling Event—**EB samples were collected prior to sampling at LWDS-MW1 and TAV-MW5 and submitted for VOC and NPN analyses. The organic compounds bromodichloromethane, bromoform, chloroform, dibromochloromethane, and TCE were detected in the EB samples. No corrective action was required as these compounds either were not detected in environmental samples or were detected at concentrations greater than five times the blank result.

#### 5.7.1.3 Trip Blank Samples

TB samples are submitted whenever samples are collected for VOC analysis to assess whether contamination of the samples has occurred during shipment and storage. TB samples consist of laboratory reagent grade water with hydrochloric acid preservative contained in 40-milliliter volatile organic analysis vials prepared by the analytical laboratory, which accompany the empty sample containers supplied by the laboratory. TBs were brought to the field and accompanied each sample shipment. TB qualifiers are provided with the analytical results in Table 5A-1 (Attachment 5A).

### 5.7.2 Laboratory Quality Control Samples

Internal laboratory QC samples, including method blanks and duplicate LCSs were analyzed concurrently with all groundwater samples. All chemical data were reviewed and qualified in accordance with AOP 00-03, *Data Validation Procedure for Chemical and Radiochemical Data* (SNL July 2007). Laboratory data qualifiers are provided with the analytical results in Tables 5A-1 through 5A-7 (Attachment 5A).

## 5.8 Variances and Nonconformances

No variances or nonconformances from requirements specified in the TA-V Mini-SAPs were identified during CY 2010 sampling activities. However, a project-specific issue associated with these sampling events was noted during all sampling events. Monitoring well LWDS-MW1 was purged dry prior to minimum volume and stability requirements. This well was allowed to recover and then sampled to collect a representative groundwater sample given the low yield of this well.

## 5.9 Summary and Conclusions

The conceptual site model of contaminant transport at TA-V includes release from the two primary sources, migration through the vadose zone, and movement into and along with groundwater. TCE and other organic chemicals were present in wastewater that was discharged to the underground LWDS drain field during the period from 1962 to 1967, and to the TA-V seepage pits from the 1960s until the early 1980s when disposal practices were modified to protect the environment. Wastewater discharged to the seepage pits from the early 1980s until 1992 contained no TCE.

Wastewater containing dissolved concentrations of TCE and other organic chemicals moved rapidly through the alluvial fan lithofacies into the aquifer. Upon cessation of disposal, vertical pathways to the aquifer drained rapidly. Continued flushing of the vadose zone beneath the seepage pits that occurred until 1992 removed a significant portion of residual COCs present in the vadose zone. Rapid drainage and continued flushing removed significant secondary contaminant sources. Low concentrations of TCE present in the aquifer today represent these initial wastewater releases. The combined effect of low groundwater velocities, dispersion, and dilution are responsible for the current distribution of TCE in the regional aquifer.

Nitrate concentrations in groundwater at TA-V are primarily derived from unknown upgradient sources. These concentrations have exceeded MCLs in samples from the two upgradient AVN wells (AVN-1 and AVN-2), LWDS-MW1, and TAV-MW5.

The analytical results for this reporting period are consistent with historical concentrations. The following conclusions are based on a comprehensive review of available information for current groundwater contamination conditions in the TA-V study area:

- The primary COCs for the TA-V study area are TCE and nitrate.
- Based on the historical use and disposal of chlorinated solvents, the extent of TCE in groundwater is associated with multiple TA-V wastewater releases containing VOCs and the subsequent vapor-phase transport of these VOCs through the vadose zone to the water table.
- The distribution of low concentrations of TCE in the regional aquifer is principally attributed to the combined effect of low groundwater velocities, dispersion, and dilution.
- The distribution of nitrate above the background level is laterally widespread in the study area, but the lateral extent of nitrate above the MCL is limited.
- The primary sources of TCE and possibly nitrate in the TA-V study area consist of two wastewater disposal systems (SWMUs 5 and 275). An upgradient source of nitrate may be present.
- The current conceptual site model described in Section 5.1.7 does not require modification based on the analytical results for this reporting period.

DOE/Sandia recommend the following approach as part of the ongoing environmental studies of the TA-V study area:

- Continue collecting groundwater samples at the 16 TA-V groundwater and 3 soil-vapor monitoring wells on a quarterly basis. At a minimum, the analytes for groundwater sampling will consist of VOCs and NPN.
- Continue obtaining periodic measurements of groundwater elevations in all TA-V monitoring wells.
- Continue reporting future TA-V investigation results in the SNL/NM GWPP Annual Groundwater Monitoring Report.

## 5.10 References


| | |
|---|---|
| **Bartolino and Cole 2002** | Bartolino, J.R., and J.C. Cole, 2002. *Groundwater Resources of the Middle Rio Grande Basin,* U.S. Geological Survey, Circular 1222, http://water.usgs.gov/pubs/circ/2002/circ1222/. |
| **DOE March 2006** | U.S. Department of Energy (DOE), March 2006. Letter to NMED requesting permission to remove well AVN-2 from the TA-V monitoring well network, U.S. Department of Energy, National Nuclear Security Administration, Sandia Site Office, Albuquerque, New Mexico, March 26, 2005. |
| **DOE October 2005** | U.S. Department of Energy (DOE), October 2005. Letter to NMED requesting change of sampling frequency from TA-V groundwater monitoring wells, U.S. Department of Energy, National Nuclear Security Administration, Sandia Site Office, Albuquerque, New Mexico, October 28, 2005. |
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# Attachment 5A
# Technical Area V
# Analytical Results Tables

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# Attachment 5A Tables

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# Table 5A-1
## Summary of Detected Volatile Organic Compounds,
## Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Well ID | Analyte | Result[a] (µg/L) | MDL[b] (µg/L) | PQL[c] (µg/L) | MCL[d] (µg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **LWDS-MW1** | Trichloroethene | **16.9** | 0.250 | 1.00 | 5.00 | | | 088141-001 | SW846-8260B |
| 17-Feb-10 | cis-1,2-Dichloroethene | 2.95 | 0.300 | 1.00 | 70.0 | | | 088141-001 | SW846-8260B |
| **TAV-MW2**<br>10-Feb-10 | Trichloroethene | 1.06 | 0.250 | 1.00 | 5.00 | | | 088129-001 | SW846-8260B |
| **TAV-MW4** | Chloroform | 0.490 | 0.250 | 1.00 | NE | J | | 088131-001 | SW846-8260B |
| 11-Feb-10 | Trichloroethene | 1.80 | 0.250 | 1.00 | 5.00 | | | 088131-001 | SW846-8260B |
| **TAV-MW6** | Trichloroethene | **12.6** | 0.250 | 1.00 | 5.00 | | | 088133-001 | SW846-8260B |
| 12-Feb-10 | cis-1,2-Dichloroethene | 2.03 | 0.300 | 1.00 | 70.0 | | | 088133-001 | SW846-8260B |
| **TAV-MW8**<br>09-Feb-10 | Trichloroethene | 1.41 | 0.250 | 1.00 | 5.00 | | | 088127-001 | SW846-8260B |
| **TAV-MW10** | Trichloroethene | **14.8** | 0.250 | 1.00 | 5.00 | | | 088138-001 | SW846-8260B |
| 15-Feb-10 | cis-1,2-Dichloroethene | 2.33 | 0.300 | 1.00 | 70.0 | | | 088138-001 | SW846-8260B |
| **TAV-MW10** (Duplicate) | Trichloroethene | **14.7** | 0.250 | 1.00 | 5.00 | | | 088139-001 | SW846-8260B |
| 15-Feb-10 | cis-1,2-Dichloroethene | 2.28 | 0.300 | 1.00 | 70.0 | | | 088139-001 | SW846-8260B |
| | | | | | | | | | |
| **LWDS-MW1** | Trichloroethene | **14.4** | 0.250 | 1.00 | 5.00 | | | 089212-001 | SW846-8260B |
| 25-Jun-10 | cis-1,2-Dichloroethene | 2.55 | 0.300 | 1.00 | 70.0 | | | 089212-001 | SW846-8260B |
| **TAV-MW2**<br>21-Jun-10 | Trichloroethene | 1.02 | 0.250 | 1.00 | 5.00 | | 1.0U | 089205-001 | SW846-8260B |
| **TAV-MW4** | Chloroform | 0.650 | 0.250 | 1.00 | NE | J | | 089207-001 | SW846-8260B |
| 22-Jun-10 | Trichloroethene | 2.15 | 0.250 | 1.00 | 5.00 | | | 089207-001 | SW846-8260B |
| **TAV-MW6** | Trichloroethene | **11.9** | 0.250 | 1.00 | 5.00 | | | 089209-001 | SW846-8260B |
| 23-Jun-10 | cis-1,2-Dichloroethene | 2.12 | 0.300 | 1.00 | 70.0 | | | 089209-001 | SW846-8260B |
| **TAV-MW8**<br>16-Jun-10 | Trichloroethene | 1.27 | 0.250 | 1.00 | 5.00 | | | 089202-001 | SW846-8260B |
| **TAV-MW8** (Duplicate)<br>16-Jun-10 | Trichloroethene | 1.17 | 0.250 | 1.00 | 5.00 | | | 089203-001 | SW846-8260B |
| **TAV-MW10** | Trichloroethene | **14.7** | 0.250 | 1.00 | 5.00 | | | 089181-001 | SW846-8260B |
| 07-Jun-10 | cis-1,2-Dichloroethene | 2.32 | 0.300 | 1.00 | 70.0 | | | 089181-001 | SW846-8260B |
| **TAV-MW10** (Duplicate) | Trichloroethene | **14.7** | 0.250 | 1.00 | 5.00 | | | 089182-001 | SW846-8260B |
| 07-Jun-10 | cis-1,2-Dichloroethene | 2.36 | 0.300 | 1.00 | 70.0 | | | 089182-001 | SW846-8260B |
| | | | | | | | | | |
| **LWDS-MW1** | Trichloroethene | **12.6** | 0.250 | 1.00 | 5.00 | | | 089563-001 | SW846-8260B |
| 13-Sep-10 | cis-1,2-Dichloroethene | 2.98 | 0.300 | 1.00 | 70.0 | | | 089563-001 | SW846-8260B |
| **TAV-MW2**<br>31-Aug-10 | Trichloroethene | 1.04 | 0.250 | 1.00 | 5.00 | | | 089551-001 | SW846-8260B |

Refer to footnotes on page 5A-35.

## **Table 5A-1** *(Concluded)*
## Summary of Detected Volatile Organic Compounds, Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Result[a] (µg/L) | MDL[b] (µg/L) | PQL[c] (µg/L) | MCL[d] (µg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW2** (Duplicate) 31-Aug-10 | Trichloroethene | 1.01 | 0.250 | 1.00 | 5.00 | | | 089552-001 | SW846-8260B |
| **TAV-MW4** | Chloroform | 0.630 | 0.250 | 1.00 | NE | J | | 089561-001 | SW846-8260B |
| 09-Sep-10 | Trichloroethene | 2.39 | 0.250 | 1.00 | 5.00 | | | 089561-001 | SW846-8260B |
| **TAV-MW6** | Trichloroethene | **12.0** | 0.250 | 1.00 | 5.00 | | | 089554-001 | SW846-8260B |
| 01-Sep-10 | cis-1,2-Dichloroethene | 1.91 | 0.300 | 1.00 | 70.0 | | | 089554-001 | SW846-8260B |
| **TAV-MW8** 30-Aug-10 | Trichloroethene | 1.35 | 0.250 | 1.00 | 5.00 | | | 089546-001 | SW846-8260B |
| **TAV-MW10** | Trichloroethene | **14.9** | 0.250 | 1.00 | 5.00 | | | 089556-001 | SW846-8260B |
| 02-Sep-10 | cis-1,2-Dichloroethene | 2.19 | 0.300 | 1.00 | 70.0 | | | 089556-001 | SW846-8260B |
| | | | | | | | | | |
| **LWDS-MW1** | Trichloroethene | **18.5** | 0.250 | 1.00 | 5.00 | | | 089728-001 | SW846-8260B |
| 25-Oct-10 | cis-1,2-Dichloroethene | 3.52 | 0.300 | 1.00 | 70.0 | | | 089728-001 | SW846-8260B |
| **LWDS-MW1** (Duplicate) | Trichloroethene | **18.6** | 0.250 | 1.00 | 5.00 | | | 089729-001 | SW846-8260B |
| 25-Oct-10 | cis-1,2-Dichloroethene | 3.63 | 0.300 | 1.00 | 70.0 | | | 089729-001 | SW846-8260B |
| **TAV-MW2** 14-Oct-10 | Trichloroethene | 0.880 | 0.250 | 1.00 | 5.00 | J | | 089717-001 | SW846-8260B |
| **TAV-MW4** | Chloroform | 0.530 | 0.250 | 1.00 | NE | J | | 089719-001 | SW846-8260B |
| 18-Oct-10 | Trichloroethene | 2.12 | 0.250 | 1.00 | 5.00 | | | 089719-001 | SW846-8260B |
| **TAV-MW6** | Trichloroethene | **11.8** | 0.250 | 1.00 | 5.00 | | | 089721-001 | SW846-8260B |
| 19-Oct-10 | cis-1,2-Dichloroethene | 2.27 | 0.300 | 1.00 | 70.0 | | | 089721-001 | SW846-8260B |
| **TAV-MW8** 13-Oct-10 | Trichloroethene | 1.14 | 0.250 | 1.00 | 5.00 | | | 089715-001 | SW846-8260B |
| **TAV-MW10** | Trichloroethene | **13.1** | 0.250 | 1.00 | 5.00 | | | 089723-001 | SW846-8260B |
| 20-Oct-10 | cis-1,2-Dichloroethene | 2.39 | 0.300 | 1.00 | 70.0 | | | 089723-001 | SW846-8260B |

Refer to footnotes on page 5A-35.

## Table 5A-2
## Method Detection Limits for Volatile Organic Compounds (Method[g] SW846-8260), Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Analyte | MDL[b] (µg/L) |
|---|---|
| 1,1,1-Trichloroethane | 0.325 |
| 1,1,2,2-Tetrachloroethane | 0.250 |
| 1,1,2-Trichloroethane | 0.250 |
| 1,1-Dichloroethane | 0.300 |
| 1,1-Dichloroethene | 0.300 |
| 1,2-Dichloroethane | 0.250 |
| 1,2-Dichloropropane | 0.250 |
| 2-Butanone | 1.25 |
| 2-Hexanone | 1.25 |
| 4-methyl-, 2-Pentanone | 1.25 |
| Acetone | 3.50 |
| Benzene | 0.300 |
| Bromodichloromethane | 0.250 |
| Bromoform | 0.250 |
| Bromomethane | 0.300 |
| Carbon disulfide | 1.25 |
| Carbon tetrachloride | 0.300 |
| Chlorobenzene | 0.250 |
| Chloroethane | 0.300 |
| Chloroform | 0.250 |
| Chloromethane | 0.300 |
| Dibromochloromethane | 0.300 |
| Ethyl benzene | 0.250 |
| Methylene chloride | 3.00 |
| Styrene | 0.250 |
| Tetrachloroethene | 0.300 |
| Toluene | 0.250 |
| Trichloroethene | 0.250 |
| Vinyl acetate | 1.50 |
| Vinyl chloride | 0.500 |
| Xylene | 0.300 |
| cis-1,2-Dichloroethene | 0.300 |
| cis-1,3-Dichloropropene | 0.250 |
| trans-1,2-Dichloroethene | 0.300 |
| trans-1,3-Dichloropropene | 0.250 |

Refer to footnotes on page 5A-35.

## Table 5A-3
## Summary of Nitrate plus Nitrite Results,
## Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **AVN-1** 08-Feb-10 | Nitrate plus nitrite as N | 8.80 | 0.250 | 1.25 | 10.0 | | | 088125-018 | EPA 353.2 |
| **LWDS-MW1** 17-Feb-10 | Nitrate plus nitrite as N | **10.9** | 0.250 | 1.25 | 10.0 | | | 088141-018 | EPA 353.2 |
| **LWDS-MW2** 05-Feb-10 | Nitrate plus nitrite as N | 7.55 | 0.250 | 1.25 | 10.0 | | | 088123-018 | EPA 353.2 |
| **TAV-MW2** 10-Feb-10 | Nitrate plus nitrite as N | 3.12 | 0.100 | 0.500 | 10.0 | | | 088129-018 | EPA 353.2 |
| **TAV-MW3** 02-Feb-10 | Nitrate plus nitrite as N | 4.38 | 0.250 | 1.25 | 10.0 | | | 088115-018 | EPA 353.2 |
| **TAV-MW3** (Duplicate) 02-Feb-10 | Nitrate plus nitrite as N | 4.55 | 0.250 | 1.25 | 10.0 | | | 088116-018 | EPA 353.2 |
| **TAV-MW4** 11-Feb-10 | Nitrate plus nitrite as N | 5.88 | 0.250 | 1.25 | 10.0 | | | 088131-018 | EPA 353.2 |
| **TAV-MW5** 04-Feb-10 | Nitrate plus nitrite as N | 6.58 | 0.250 | 1.25 | 10.0 | | | 088121-018 | EPA 353.2 |
| **TAV-MW6** 12-Feb-10 | Nitrate plus nitrite as N | 8.70 | 0.250 | 1.25 | 10.0 | | | 088133-018 | EPA 353.2 |
| **TAV-MW7** 03-Feb-10 | Nitrate plus nitrite as N | 3.53 | 0.100 | 0.500 | 10.0 | | | 088118-018 | EPA 353.2 |
| **TAV-MW8** 09-Feb-10 | Nitrate plus nitrite as N | 5.54 | 0.100 | 0.500 | 10.0 | | | 088127-018 | EPA 353.2 |
| **TAV-MW9** 01-Feb-10 | Nitrate plus nitrite as N | 3.20 | 0.250 | 1.25 | 10.0 | | | 088111-018 | EPA 353.2 |
| **TAV-MW10** 15-Feb-10 | Nitrate plus nitrite as N | **10.1** | 0.250 | 1.25 | 10.0 | | | 088138-018 | EPA 353.2 |
| **TAV-MW10** (Duplicate) 15-Feb-10 | Nitrate plus nitrite as N | 9.95 | 0.250 | 1.25 | 10.0 | | | 088139-018 | EPA 353.2 |
| | | | | | | | | | |
| **AVN-1** 15-Jun-10 | Nitrate plus nitrite as N | 8.58 | 0.250 | 1.25 | 10.0 | | | 089198-018 | EPA 353.2 |
| **LWDS-MW1** 25-Jun-10 | Nitrate plus nitrite as N | **11.0** | 0.250 | 1.25 | 10.0 | | | 089212-018 | EPA 353.2 |
| **LWDS-MW2** 11-Jun-10 | Nitrate plus nitrite as N | 7.40 | 0.500 | 2.50 | 10.0 | | | 089191-018 | EPA 353.2 |
| **TAV-MW2** 21-Jun-10 | Nitrate plus nitrite as N | 3.18 | 0.250 | 1.25 | 10.0 | | | 089205-018 | EPA 353.2 |

Refer to footnotes on page 5A-35.

## Table 5A-3 *(Continued)*
## Summary of Nitrate plus Nitrite Results,
## Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW3**<br>09-Jun-10 | Nitrate plus nitrite as N | 4.95 | 0.250 | 1.25 | 10.0 | | | 089186-018 | EPA 353.2 |
| **TAV-MW4**<br>22-Jun-10 | Nitrate plus nitrite as N | 5.83 | 0.100 | 0.500 | 10.0 | | | 089207-018 | EPA 353.2 |
| **TAV-MW5**<br>14-Jun-10 | Nitrate plus nitrite as N | 7.05 | 0.500 | 2.50 | 10.0 | | | 089195-018 | EPA 353.2 |
| **TAV-MW5** (Duplicate)<br>14-Jun-10 | Nitrate plus nitrite as N | 7.05 | 0.500 | 2.50 | 10.0 | | | 089196-018 | EPA 353.2 |
| **TAV-MW6**<br>23-Jun-10 | Nitrate plus nitrite as N | 8.43 | 0.250 | 1.25 | 10.0 | | | 089209-018 | EPA 353.2 |
| **TAV-MW7**<br>10-Jun-10 | Nitrate plus nitrite as N | 3.93 | 0.250 | 1.25 | 10.0 | | | 089188-018 | EPA 353.2 |
| **TAV-MW8**<br>16-Jun-10 | Nitrate plus nitrite as N | 5.55 | 0.500 | 2.50 | 10.0 | | | 089202-018 | EPA 353.2 |
| **TAV-MW8** (Duplicate)<br>16-Jun-10 | Nitrate plus nitrite as N | 5.55 | 0.500 | 2.50 | 10.0 | | | 089203-018 | EPA 353.2 |
| **TAV-MW9**<br>08-Jun-10 | Nitrate plus nitrite as N | 3.55 | 0.250 | 1.25 | 10.0 | | | 089184-018 | EPA 353.2 |
| **TAV-MW10**<br>07-Jun-10 | Nitrate plus nitrite as N | **10.5** | 0.500 | 2.50 | 10.0 | | | 089181-018 | EPA 353.2 |
| **TAV-MW10** (Duplicate)<br>07-Jun-10 | Nitrate plus nitrite as N | **10.8** | 0.500 | 2.50 | 10.0 | | | 089182-018 | EPA 353.2 |
| | | | | | | | | | |
| **AVN-1**<br>26-Aug-10 | Nitrate plus nitrite as N | 9.05 | 0.500 | 2.50 | 10.0 | B | | 089542-018 | EPA 353.2 |
| **LWDS-MW1**<br>13-Sep-10 | Nitrate plus nitrite as N | **11.0** | 0.250 | 1.25 | 10.0 | | | 089563-018 | EPA 353.2 |
| **LWDS-MW2**<br>07-Sep-10 | Nitrate plus nitrite as N | 7.50 | 0.250 | 1.25 | 10.0 | B | | 089559-018 | EPA 353.2 |
| **TAV-MW2**<br>31-Aug-10 | Nitrate plus nitrite as N | 3.00 | 0.100 | 0.500 | 10.0 | B | | 089551-018 | EPA 353.2 |
| **TAV-MW2** (Duplicate)<br>31-Aug-10 | Nitrate plus nitrite as N | 3.00 | 0.100 | 0.500 | 10.0 | B | | 089552-018 | EPA 353.2 |
| **TAV-MW3**<br>23-Aug-10 | Nitrate plus nitrite as N | 5.50 | 0.250 | 1.25 | 10.0 | B | | 089533-018 | EPA 353.2 |
| **TAV-MW4**<br>09-Sep-10 | Nitrate plus nitrite as N | 5.80 | 0.250 | 1.25 | 10.0 | | | 089561-018 | EPA 353.2 |

Refer to footnotes on page 5A-35.

## Table 5A-3 *(Continued)*
## Summary of Nitrate plus Nitrite Results, Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW5** 27-Aug-10 | Nitrate plus nitrite as N | 6.83 | 0.250 | 1.25 | 10.0 | B | | 089544-018 | EPA 353.2 |
| **TAV-MW6** 01-Sep-10 | Nitrate plus nitrite as N | 8.63 | 0.250 | 1.25 | 10.0 | B | | 089554-018 | EPA 353.2 |
| **TAV-MW7** 25-Aug-10 | Nitrate plus nitrite as N | 4.00 | 0.100 | 0.500 | 10.0 | B | | 089540-018 | EPA 353.2 |
| **TAV-MW8** 30-Aug-10 | Nitrate plus nitrite as N | 5.58 | 0.250 | 1.25 | 10.0 | B | | 089546-018 | EPA 353.2 |
| **TAV-MW9** 24-Aug-10 | Nitrate plus nitrite as N | 3.80 | 0.250 | 1.25 | 10.0 | B | | 089537-018 | EPA 353.2 |
| **TAV-MW9** (Duplicate) 24-Aug-10 | Nitrate plus nitrite as N | 3.85 | 0.250 | 1.25 | 10.0 | B | | 089538-018 | EPA 353.2 |
| **TAV-MW10** 02-Sep-10 | Nitrate plus nitrite as N | **10.4** | 0.250 | 1.25 | 10.0 | B | | 089556-018 | EPA 353.2 |
| | | | | | | | | | |
| **AVN-1** 12-Oct-10 | Nitrate plus nitrite as N | 9.18 | 0.250 | 1.25 | 10.0 | B | | 089713-018 | EPA 353.2 |
| **LWDS-MW1** 25-Oct-10 | Nitrate plus nitrite as N | **12.0** | 0.250 | 1.25 | 10.0 | B | | 089728-018 | EPA 353.2 |
| **LWDS-MW1** (Duplicate) 25-Oct-10 | Nitrate plus nitrite as N | **12.1** | 0.500 | 2.50 | 10.0 | B | | 089729-018 | EPA 353.2 |
| **LWDS-MW2** 11-Oct-10 | Nitrate plus nitrite as N | 7.63 | 0.250 | 1.25 | 10.0 | B | | 089710-018 | EPA 353.2 |
| **TAV-MW2** 14-Oct-10 | Nitrate plus nitrite as N | 3.18 | 0.100 | 0.500 | 10.0 | B | | 089717-018 | EPA 353.2 |
| **TAV-MW3** 04-Oct-10 | Nitrate plus nitrite as N | 4.53 | 0.250 | 1.25 | 10.0 | | | 089701-018 | EPA 353.2 |
| **TAV-MW4** 18-Oct-10 | Nitrate plus nitrite as N | 5.95 | 0.250 | 1.25 | 10.0 | B | | 089719-018 | EPA 353.2 |
| **TAV-MW5** 07-Oct-10 | Nitrate plus nitrite as N | 6.33 | 0.250 | 1.25 | 10.0 | | | 089707-018 | EPA 353.2 |
| **TAV-MW5** (Duplicate) 07-Oct-10 | Nitrate plus nitrite as N | 6.73 | 0.250 | 1.25 | 10.0 | | | 089708-018 | EPA 353.2 |
| **TAV-MW6** 19-Oct-10 | Nitrate plus nitrite as N | 8.95 | 0.250 | 1.25 | 10.0 | B | | 089721-018 | EPA 353.2 |

Refer to footnotes on page 5A-35.

## Table 5A-3 *(Concluded)*
## Summary of Nitrate plus Nitrite Results, Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW7** 06-Oct-10 | Nitrate plus nitrite as N | 3.40 | 0.250 | 1.25 | 10.0 | | | 089703-018 | EPA 353.2 |
| **TAV-MW8** 13-Oct-10 | Nitrate plus nitrite as N | 5.88 | 0.250 | 1.25 | 10.0 | B | | 089715-018 | EPA 353.2 |
| **TAV-MW9** 05-Oct-10 | Nitrate plus nitrite as N | 3.15 | 0.250 | 1.25 | 10.0 | | | 089699-018 | EPA 353.2 |
| **TAV-MW10** 20-Oct-10 | Nitrate plus nitrite as N | **13.7** | 0.250 | 1.25 | 10.0 | B | | 089723-018 | EPA 353.2 |

Refer to footnotes on page 5A-35.

## Table 5A-4
## Summary of Anion Results,
## Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **AVN-1** | Bromide | 0.138 | 0.066 | 0.200 | NE | J | | 089542-016 | SW846 9056 |
| 26-Aug-10 | Chloride | 9.51 | 0.066 | 0.200 | NE | | | 089542-016 | SW846 9056 |
| | Fluoride | 1.25 | 0.033 | 0.100 | 4.0 | | | 089542-016 | SW846 9056 |
| | Sulfate | 32.2 | 0.100 | 0.400 | NE | | | 089542-016 | SW846 9056 |
| **LWDS-MW1** | Bromide | 0.824 | 0.066 | 0.200 | NE | | | 089563-016 | SW846 9056 |
| 13-Sep-10 | Chloride | 72.6 | 0.660 | 2.00 | NE | | | 089563-016 | SW846 9056 |
| | Fluoride | 0.690 | 0.033 | 0.100 | 4.0 | | | 089563-016 | SW846 9056 |
| | Sulfate | 38.7 | 1.00 | 4.00 | NE | | | 089563-016 | SW846 9056 |
| **LWDS-MW2** | Bromide | 0.190 | 0.066 | 0.200 | NE | J | | 089559-016 | SW846 9056 |
| 07-Sep-10 | Chloride | 13.4 | 0.066 | 0.200 | NE | | | 089559-016 | SW846 9056 |
| | Fluoride | 1.26 | 0.033 | 0.100 | 4.0 | | | 089559-016 | SW846 9056 |
| | Sulfate | 37.4 | 0.200 | 0.800 | NE | | | 089559-016 | SW846 9056 |
| **TAV-MW2** | Bromide | 0.378 | 0.066 | 0.200 | NE | | | 089551-016 | SW846 9056 |
| 31-Aug-10 | Chloride | 55.0 | 0.660 | 2.00 | NE | | | 089551-016 | SW846 9056 |
| | Fluoride | 0.985 | 0.033 | 0.100 | 4.0 | | | 089551-016 | SW846 9056 |
| | Sulfate | 53.3 | 1.00 | 4.00 | NE | | | 089551-016 | SW846 9056 |
| **TAV-MW2** (Duplicate) | Bromide | 0.389 | 0.066 | 0.200 | NE | | | 089552-016 | SW846 9056 |
| 31-Aug-10 | Chloride | 55.2 | 0.660 | 2.00 | NE | | | 089552-016 | SW846 9056 |
| | Fluoride | 0.945 | 0.033 | 0.100 | 4.0 | | | 089552-016 | SW846 9056 |
| | Sulfate | 53.5 | 1.00 | 4.00 | NE | | | 089552-016 | SW846 9056 |
| **TAV-MW3** | Bromide | 0.222 | 0.066 | 0.200 | NE | | | 089533-016 | SW846 9056 |
| 23-Aug-10 | Chloride | 20.5 | 0.660 | 2.00 | NE | | | 089533-016 | SW846 9056 |
| | Fluoride | 1.57 | 0.033 | 0.100 | 4.0 | | | 089533-016 | SW846 9056 |
| | Sulfate | 61.8 | 1.00 | 4.00 | NE | | | 089533-016 | SW846 9056 |
| **TAV-MW4** | Bromide | 0.396 | 0.066 | 0.200 | NE | | | 089561-016 | SW846 9056 |
| 09-Sep-10 | Chloride | 31.9 | 0.660 | 2.00 | NE | | | 089561-016 | SW846 9056 |
| | Fluoride | 1.19 | 0.033 | 0.100 | 4.0 | | | 089561-016 | SW846 9056 |
| | Sulfate | 37.0 | 0.100 | 0.400 | NE | | | 089561-016 | SW846 9056 |
| **TAV-MW5** | Bromide | 0.189 | 0.066 | 0.200 | NE | J | | 089544-016 | SW846 9056 |
| 27-Aug-10 | Chloride | 17.2 | 0.066 | 0.200 | NE | | | 089544-016 | SW846 9056 |
| | Fluoride | 1.28 | 0.033 | 0.100 | 4.0 | | | 089544-016 | SW846 9056 |
| | Sulfate | 39.5 | 0.200 | 0.800 | NE | | | 089544-016 | SW846 9056 |

Refer to footnotes on page 5A-35.

**Table 5A-4** *(Concluded)*
**Summary of Anion Results,**
**Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW6** | Bromide | 0.778 | 0.066 | 0.200 | NE | | | 089554-016 | SW846 9056 |
| 01-Sep-10 | Chloride | 64.4 | 0.330 | 1.00 | NE | | | 089554-016 | SW846 9056 |
| | Fluoride | 1.11 | 0.033 | 0.100 | 4.0 | | | 089554-016 | SW846 9056 |
| | Sulfate | 42.5 | 0.500 | 2.00 | NE | | | 089554-016 | SW846 9056 |
| **TAV-MW7** | Bromide | 0.249 | 0.066 | 0.200 | NE | | | 089540-016 | SW846 9056 |
| 25-Aug-10 | Chloride | 26.7 | 0.660 | 2.00 | NE | | | 089540-016 | SW846 9056 |
| | Fluoride | 1.14 | 0.033 | 0.100 | 4.0 | | | 089540-016 | SW846 9056 |
| | Sulfate | 64.0 | 1.00 | 4.00 | NE | | | 089540-016 | SW846 9056 |
| **TAV-MW8** | Bromide | 0.325 | 0.066 | 0.200 | NE | | | 089546-016 | SW846 9056 |
| 30-Aug-10 | Chloride | 34.9 | 0.330 | 1.00 | NE | | | 089546-016 | SW846 9056 |
| | Fluoride | 1.43 | 0.033 | 0.100 | 4.0 | | | 089546-016 | SW846 9056 |
| | Sulfate | 51.1 | 0.500 | 2.00 | NE | | | 089546-016 | SW846 9056 |
| **TAV-MW9** | Bromide | 0.265 | 0.066 | 0.200 | NE | | | 089537-016 | SW846 9056 |
| 24-Aug-10 | Chloride | 31.8 | 0.660 | 2.00 | NE | | | 089537-016 | SW846 9056 |
| | Fluoride | 0.932 | 0.033 | 0.100 | 4.0 | | | 089537-016 | SW846 9056 |
| | Sulfate | 57.3 | 1.00 | 4.00 | NE | | | 089537-016 | SW846 9056 |
| **TAV-MW9** (Duplicate) | Bromide | 0.249 | 0.066 | 0.200 | NE | | | 089538-016 | SW846 9056 |
| 24-Aug-10 | Chloride | 31.3 | 0.660 | 2.00 | NE | | | 089538-016 | SW846 9056 |
| | Fluoride | 0.931 | 0.033 | 0.100 | 4.0 | | | 089538-016 | SW846 9056 |
| | Sulfate | 56.9 | 1.00 | 4.00 | NE | | | 089538-016 | SW846 9056 |
| **TAV-MW10** | Bromide | 0.387 | 0.066 | 0.200 | NE | | | 089556-016 | SW846 9056 |
| 02-Sep-10 | Chloride | 47.4 | 0.330 | 1.00 | NE | | | 089556-016 | SW846 9056 |
| | Fluoride | 1.35 | 0.033 | 0.100 | 4.0 | | | 089556-016 | SW846 9056 |
| | Sulfate | 42.9 | 0.500 | 2.00 | NE | | | 089556-016 | SW846 9056 |

Refer to footnotes on page 5A-35.

## Table 5A-5
## Summary of Perchlorate Results,
## Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (µg/L) | PQL[c] (µg/L) | MCL[d] (µg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **LWDS-MW1**<br>17-Feb-10 | Perchlorate | ND | 4.0 | 12 | NE | U | | 088141-020 | EPA 314.0 |

Refer to footnotes on page 5A-35.

# Table 5A-6
## Summary of Total Metal Results,
## Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **AVN-1** | Aluminum | 0.0649 | 0.010 | 0.030 | NE | | | 089542-010 | SW846 6020 |
| 26-Aug-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 089542-010 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 089542-010 | SW846 6020 |
| | Barium | 0.0729 | 0.0005 | 0.002 | 2.00 | | | 089542-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089542-010 | SW846 6020 |
| | Cadmium | 0.000319 | 0.00011 | 0.001 | 0.005 | J | | 089542-010 | SW846 6020 |
| | Calcium | 37.3 | 0.020 | 0.200 | NE | B | | 089542-010 | SW846 6020 |
| | Chromium | 0.00527 | 0.0025 | 0.010 | 0.100 | J | | 089542-010 | SW846 6020 |
| | Cobalt | 0.000135 | 0.0001 | 0.001 | NE | J | | 089542-010 | SW846 6020 |
| | Copper | 0.00172 | 0.0003 | 0.001 | NE | | | 089542-010 | SW846 6020 |
| | Iron | 0.195 | 0.010 | 0.100 | NE | B | | 089542-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089542-010 | SW846 6020 |
| | Magnesium | 8.44 | 0.005 | 0.015 | NE | | | 089542-010 | SW846 6020 |
| | Manganese | 0.00215 | 0.001 | 0.005 | NE | J | | 089542-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 089542-010 | SW846 7470 |
| | Nickel | 0.00101 | 0.0005 | 0.002 | NE | J | | 089542-010 | SW846 6020 |
| | Potassium | 3.19 | 0.080 | 0.300 | NE | | | 089542-010 | SW846 6020 |
| | Selenium | 0.00145 | 0.001 | 0.005 | 0.050 | J | | 089542-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089542-010 | SW846 6020 |
| | Sodium | 34.3 | 0.080 | 0.250 | NE | | | 089542-010 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 089542-010 | SW846 6020 |
| | Uranium | 0.00225 | 0.00005 | 0.0002 | 0.030 | B | | 089542-010 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | | 089542-010 | SW846 6020 |
| | Zinc | 0.00791 | 0.0026 | 0.010 | NE | J | | 089542-010 | SW846 6020 |

Refer to footnotes on page 5A-35.

## Table 5A-6 *(Continued)*
## Summary of Total Metal Results,
## Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **LWDS-MW1** | Aluminum | ND | 0.010 | 0.030 | NE | U | | 089563-010 | SW846 6020 |
| 13-Sep-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 089563-010 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 089563-010 | SW846 6020 |
| | Barium | 0.0793 | 0.0005 | 0.002 | 2.00 | | | 089563-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089563-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 089563-010 | SW846 6020 |
| | Calcium | 63.2 | 0.200 | 2.00 | NE | B | | 089563-010 | SW846 6020 |
| | Chromium | 0.00394 | 0.0025 | 0.010 | 0.100 | J | | 089563-010 | SW846 6020 |
| | Cobalt | 0.000231 | 0.0001 | 0.001 | NE | J | | 089563-010 | SW846 6020 |
| | Copper | 0.000877 | 0.0003 | 0.001 | NE | J | | 089563-010 | SW846 6020 |
| | Iron | 0.280 | 0.010 | 0.100 | NE | | | 089563-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089563-010 | SW846 6020 |
| | Magnesium | 20.2 | 0.005 | 0.015 | NE | | | 089563-010 | SW846 6020 |
| | Manganese | 0.0012 | 0.001 | 0.005 | NE | J | | 089563-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 089563-010 | SW846 7470 |
| | Nickel | 0.00173 | 0.0005 | 0.002 | NE | J | | 089563-010 | SW846 6020 |
| | Potassium | 3.11 | 0.080 | 0.300 | NE | | | 089563-010 | SW846 6020 |
| | Selenium | 0.00521 | 0.001 | 0.005 | 0.050 | | | 089563-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089563-010 | SW846 6020 |
| | Sodium | 58.3 | 0.800 | 2.50 | NE | | | 089563-010 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 089563-010 | SW846 6020 |
| | Uranium | 0.0043 | 0.00005 | 0.0002 | 0.030 | B | | 089563-010 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | | 089563-010 | SW846 6020 |
| | Zinc | 0.00432 | 0.0026 | 0.010 | NE | J | | 089563-010 | SW846 6020 |

Refer to footnotes on page 5A-35.

**Table 5A-6** *(Continued)*
**Summary of Total Metal Results,**
**Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **LWDS-MW2** | Aluminum | ND | 0.010 | 0.030 | NE | U | | 089559-010 | SW846 6020 |
| 07-Sep-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 089559-010 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 089559-010 | SW846 6020 |
| | Barium | 0.068 | 0.0005 | 0.002 | 2.00 | | | 089559-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089559-010 | SW846 6020 |
| | Cadmium | 0.000417 | 0.00011 | 0.001 | 0.005 | J | | 089559-010 | SW846 6020 |
| | Calcium | 46.3 | 0.020 | 0.200 | NE | B | | 089559-010 | SW846 6020 |
| | Chromium | 0.00531 | 0.0025 | 0.010 | 0.100 | J | | 089559-010 | SW846 6020 |
| | Cobalt | 0.00016 | 0.0001 | 0.001 | NE | J | | 089559-010 | SW846 6020 |
| | Copper | 0.00116 | 0.0003 | 0.001 | NE | | | 089559-010 | SW846 6020 |
| | Iron | 0.194 | 0.010 | 0.100 | NE | | | 089559-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089559-010 | SW846 6020 |
| | Magnesium | 13.0 | 0.005 | 0.015 | NE | | | 089559-010 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 089559-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 089559-010 | SW846 7470 |
| | Nickel | 0.00116 | 0.0005 | 0.002 | NE | J | | 089559-010 | SW846 6020 |
| | Potassium | 2.79 | 0.080 | 0.300 | NE | | | 089559-010 | SW846 6020 |
| | Selenium | 0.00248 | 0.001 | 0.005 | 0.050 | J | | 089559-010 | SW846 6020 |
| | Silver | 0.00193 | 0.0002 | 0.001 | NE | | | 089559-010 | SW846 6020 |
| | Sodium | 45.6 | 0.080 | 0.250 | NE | | | 089559-010 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 089559-010 | SW846 6020 |
| | Uranium | 0.00345 | 0.00005 | 0.0002 | 0.030 | | | 089559-010 | SW846 6020 |
| | Vanadium | 0.00449 | 0.003 | 0.010 | NE | J | | 089559-010 | SW846 6020 |
| | Zinc | 0.00372 | 0.0026 | 0.010 | NE | J | | 089559-010 | SW846 6020 |

Refer to footnotes on page 5A-35.

## Table 5A-6 *(Continued)*
## Summary of Total Metal Results,
## Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW2** | Aluminum | 0.0115 | 0.010 | 0.030 | NE | J | | 089551-010 | SW846 6020 |
| 31-Aug-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 089551-010 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 089551-010 | SW846 6020 |
| | Barium | 0.0591 | 0.0005 | 0.002 | 2.00 | | | 089551-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089551-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 089551-010 | SW846 6020 |
| | Calcium | 67.1 | 0.100 | 1.00 | NE | | | 089551-010 | SW846 6020 |
| | Chromium | 0.0042 | 0.0025 | 0.010 | 0.100 | J | | 089551-010 | SW846 6020 |
| | Cobalt | ND | 0.0001 | 0.001 | NE | U | | 089551-010 | SW846 6020 |
| | Copper | ND | 0.0003 | 0.001 | NE | U | 0.0052UJ | 089551-010 | SW846 6020 |
| | Iron | 0.108 | 0.010 | 0.100 | NE | | | 089551-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089551-010 | SW846 6020 |
| | Magnesium | 21.9 | 0.005 | 0.015 | NE | | | 089551-010 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 089551-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 089551-010 | SW846 7470 |
| | Nickel | 0.0014 | 0.0005 | 0.002 | NE | J | | 089551-010 | SW846 6020 |
| | Potassium | 3.52 | 0.080 | 0.300 | NE | | | 089551-010 | SW846 6020 |
| | Selenium | 0.00249 | 0.001 | 0.005 | 0.050 | J | | 089551-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089551-010 | SW846 6020 |
| | Sodium | 64.1 | 0.400 | 1.25 | NE | B | | 089551-010 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 089551-010 | SW846 6020 |
| | Uranium | 0.00695 | 0.00005 | 0.0002 | 0.030 | B | | 089551-010 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | | 089551-010 | SW846 6020 |
| | Zinc | 0.0028 | 0.0026 | 0.010 | NE | J | 0.014U | 089551-010 | SW846 6020 |

Refer to footnotes on page 5A-35.

# Table 5A-6 *(Continued)*
## Summary of Total Metal Results, Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW2** (Duplicate) | Aluminum | ND | 0.010 | 0.030 | NE | U | | 089552-010 | SW846 6020 |
| 31-Aug-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 089552-010 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 089552-010 | SW846 6020 |
| | Barium | 0.0604 | 0.0005 | 0.002 | 2.00 | | | 089552-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089552-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 089552-010 | SW846 6020 |
| | Calcium | 67.2 | 0.100 | 1.00 | NE | | | 089552-010 | SW846 6020 |
| | Chromium | 0.00363 | 0.0025 | 0.010 | 0.100 | J | | 089552-010 | SW846 6020 |
| | Cobalt | ND | 0.0001 | 0.001 | NE | U | | 089552-010 | SW846 6020 |
| | Copper | ND | 0.0003 | 0.001 | NE | U | 0.0052UJ | 089552-010 | SW846 6020 |
| | Iron | 0.123 | 0.010 | 0.100 | NE | | | 089552-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089552-010 | SW846 6020 |
| | Magnesium | 23.0 | 0.005 | 0.015 | NE | | | 089552-010 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 089552-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 089552-010 | SW846 7470 |
| | Nickel | 0.00133 | 0.0005 | 0.002 | NE | J | | 089552-010 | SW846 6020 |
| | Potassium | 3.49 | 0.080 | 0.300 | NE | | | 089552-010 | SW846 6020 |
| | Selenium | 0.00265 | 0.001 | 0.005 | 0.050 | J | | 089552-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089552-010 | SW846 6020 |
| | Sodium | 69.4 | 0.400 | 1.25 | NE | B | | 089552-010 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 089552-010 | SW846 6020 |
| | Uranium | 0.0071 | 0.00005 | 0.0002 | 0.030 | B | | 089552-010 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | | 089552-010 | SW846 6020 |
| | Zinc | 0.00297 | 0.0026 | 0.010 | NE | J | 0.014U | 089552-010 | SW846 6020 |

Refer to footnotes on page 5A-35.

**Table 5A-6** *(Continued)*
**Summary of Total Metal Results,**
**Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW3** | Aluminum | ND | 0.010 | 0.030 | NE | U | | 089533-010 | SW846 6020 |
| 23-Aug-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 089533-010 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 089533-010 | SW846 6020 |
| | Barium | 0.0411 | 0.0005 | 0.002 | 2.00 | | | 089533-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089533-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 089533-010 | SW846 6020 |
| | Calcium | 46.8 | 0.020 | 0.200 | NE | B | | 089533-010 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 089533-010 | SW846 6020 |
| | Cobalt | 0.000118 | 0.0001 | 0.001 | NE | J | | 089533-010 | SW846 6020 |
| | Copper | 0.000516 | 0.0003 | 0.001 | NE | J | | 089533-010 | SW846 6020 |
| | Iron | 0.163 | 0.010 | 0.100 | NE | B | | 089533-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089533-010 | SW846 6020 |
| | Magnesium | 12.4 | 0.005 | 0.015 | NE | | | 089533-010 | SW846 6020 |
| | Manganese | 0.00152 | 0.001 | 0.005 | NE | J | | 089533-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 089533-010 | SW846 7470 |
| | Nickel | 0.000889 | 0.0005 | 0.002 | NE | J | | 089533-010 | SW846 6020 |
| | Potassium | 4.28 | 0.080 | 0.300 | NE | | | 089533-010 | SW846 6020 |
| | Selenium | 0.00177 | 0.001 | 0.005 | 0.050 | J | | 089533-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089533-010 | SW846 6020 |
| | Sodium | 45.9 | 0.080 | 0.250 | NE | | | 089533-010 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 089533-010 | SW846 6020 |
| | Uranium | 0.00358 | 0.00005 | 0.0002 | 0.030 | B | | 089533-010 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | | 089533-010 | SW846 6020 |
| | Zinc | ND | 0.0026 | 0.010 | NE | U | | 089533-010 | SW846 6020 |

Refer to footnotes on page 5A-35.

**Table 5A-6** *(Continued)*
**Summary of Total Metal Results,**
**Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW4** | Aluminum | ND | 0.010 | 0.030 | NE | U | | 089561-010 | SW846 6020 |
| 09-Sep-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 089561-010 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 089561-010 | SW846 6020 |
| | Barium | 0.0814 | 0.0005 | 0.002 | 2.00 | | | 089561-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089561-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 089561-010 | SW846 6020 |
| | Calcium | 46.3 | 0.020 | 0.200 | NE | B | | 089561-010 | SW846 6020 |
| | Chromium | 0.0234 | 0.0025 | 0.010 | 0.100 | | | 089561-010 | SW846 6020 |
| | Cobalt | 0.000152 | 0.0001 | 0.001 | NE | J | | 089561-010 | SW846 6020 |
| | Copper | 0.00062 | 0.0003 | 0.001 | NE | J | | 089561-010 | SW846 6020 |
| | Iron | 0.201 | 0.010 | 0.100 | NE | | | 089561-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089561-010 | SW846 6020 |
| | Magnesium | 14.2 | 0.005 | 0.015 | NE | | | 089561-010 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 089561-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 089561-010 | SW846 7470 |
| | Nickel | 0.0011 | 0.0005 | 0.002 | NE | J | | 089561-010 | SW846 6020 |
| | Potassium | 2.92 | 0.080 | 0.300 | NE | | | 089561-010 | SW846 6020 |
| | Selenium | 0.00364 | 0.001 | 0.005 | 0.050 | J | | 089561-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089561-010 | SW846 6020 |
| | Sodium | 43.3 | 0.080 | 0.250 | NE | | | 089561-010 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 089561-010 | SW846 6020 |
| | Uranium | 0.0039 | 0.00005 | 0.0002 | 0.030 | | | 089561-010 | SW846 6020 |
| | Vanadium | 0.00427 | 0.003 | 0.010 | NE | J | | 089561-010 | SW846 6020 |
| | Zinc | ND | 0.0026 | 0.010 | NE | U | | 089561-010 | SW846 6020 |

Refer to footnotes on page 5A-35.

## Table 5A-6 *(Continued)*
## Summary of Total Metal Results,
## Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW5** | Aluminum | ND | 0.010 | 0.030 | NE | U | | 089544-010 | SW846 6020 |
| 27-Aug-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 089544-010 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 089544-010 | SW846 6020 |
| | Barium | 0.0592 | 0.0005 | 0.002 | 2.00 | | | 089544-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089544-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 089544-010 | SW846 6020 |
| | Calcium | 43.6 | 0.020 | 0.200 | NE | | | 089544-010 | SW846 6020 |
| | Chromium | 0.00415 | 0.0025 | 0.010 | 0.100 | J | | 089544-010 | SW846 6020 |
| | Cobalt | ND | 0.0001 | 0.001 | NE | U | | 089544-010 | SW846 6020 |
| | Copper | ND | 0.0003 | 0.001 | NE | U | | 089544-010 | SW846 6020 |
| | Iron | 0.0799 | 0.010 | 0.100 | NE | J | | 089544-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089544-010 | SW846 6020 |
| | Magnesium | 13.9 | 0.005 | 0.015 | NE | | | 089544-010 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 089544-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 089544-010 | SW846 7470 |
| | Nickel | 0.000734 | 0.0005 | 0.002 | NE | J | | 089544-010 | SW846 6020 |
| | Potassium | 2.90 | 0.080 | 0.300 | NE | | | 089544-010 | SW846 6020 |
| | Selenium | 0.00221 | 0.001 | 0.005 | 0.050 | J | | 089544-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089544-010 | SW846 6020 |
| | Sodium | 46.9 | 0.080 | 0.250 | NE | B | | 089544-010 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 089544-010 | SW846 6020 |
| | Uranium | 0.00367 | 0.00005 | 0.0002 | 0.030 | B | | 089544-010 | SW846 6020 |
| | Vanadium | 0.00392 | 0.003 | 0.010 | NE | J | | 089544-010 | SW846 6020 |
| | Zinc | ND | 0.0026 | 0.010 | NE | U | | 089544-010 | SW846 6020 |

Refer to footnotes on page 5A-35.

**Table 5A-6** *(Continued)*
**Summary of Total Metal Results,**
**Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW6** | Aluminum | 0.0118 | 0.010 | 0.030 | NE | J | | 089554-010 | SW846 6020 |
| 01-Sep-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 089554-010 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 089554-010 | SW846 6020 |
| | Barium | 0.0623 | 0.0005 | 0.002 | 2.00 | | | 089554-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089554-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 089554-010 | SW846 6020 |
| | Calcium | 60.6 | 0.100 | 1.00 | NE | | | 089554-010 | SW846 6020 |
| | Chromium | 0.00489 | 0.0025 | 0.010 | 0.100 | J | | 089554-010 | SW846 6020 |
| | Cobalt | ND | 0.0001 | 0.001 | NE | U | | 089554-010 | SW846 6020 |
| | Copper | ND | 0.0003 | 0.001 | NE | U | | 089554-010 | SW846 6020 |
| | Iron | 0.106 | 0.010 | 0.100 | NE | | | 089554-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089554-010 | SW846 6020 |
| | Magnesium | 19.2 | 0.005 | 0.015 | NE | | | 089554-010 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 089554-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 089554-010 | SW846 7470 |
| | Nickel | 0.00125 | 0.0005 | 0.002 | NE | J | | 089554-010 | SW846 6020 |
| | Potassium | 3.76 | 0.080 | 0.300 | NE | | | 089554-010 | SW846 6020 |
| | Selenium | 0.00342 | 0.001 | 0.005 | 0.050 | J | | 089554-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089554-010 | SW846 6020 |
| | Sodium | 65.9 | 0.400 | 1.25 | NE | B | | 089554-010 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 089554-010 | SW846 6020 |
| | Uranium | 0.00462 | 0.00005 | 0.0002 | 0.030 | B | | 089554-010 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | | 089554-010 | SW846 6020 |
| | Zinc | ND | 0.0026 | 0.010 | NE | U | | 089554-010 | SW846 6020 |

Refer to footnotes on page 5A-35.

## Table 5A-6 *(Continued)*
## Summary of Total Metal Results, Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW7** | Aluminum | ND | 0.010 | 0.030 | NE | U | | 089540-010 | SW846 6020 |
| 25-Aug-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 089540-010 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 089540-010 | SW846 6020 |
| | Barium | 0.0488 | 0.0005 | 0.002 | 2.00 | | | 089540-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089540-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 089540-010 | SW846 6020 |
| | Calcium | 58.7 | 0.200 | 2.00 | NE | B | | 089540-010 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 089540-010 | SW846 6020 |
| | Cobalt | 0.000138 | 0.0001 | 0.001 | NE | J | | 089540-010 | SW846 6020 |
| | Copper | 0.000653 | 0.0003 | 0.001 | NE | J | | 089540-010 | SW846 6020 |
| | Iron | 0.171 | 0.010 | 0.100 | NE | B | | 089540-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089540-010 | SW846 6020 |
| | Magnesium | 16.0 | 0.005 | 0.015 | NE | | | 089540-010 | SW846 6020 |
| | Manganese | 0.00259 | 0.001 | 0.005 | NE | J | | 089540-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 089540-010 | SW846 7470 |
| | Nickel | 0.000918 | 0.0005 | 0.002 | NE | J | | 089540-010 | SW846 6020 |
| | Potassium | 3.85 | 0.080 | 0.300 | NE | | | 089540-010 | SW846 6020 |
| | Selenium | 0.0016 | 0.001 | 0.005 | 0.050 | J | | 089540-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089540-010 | SW846 6020 |
| | Sodium | 49.0 | 0.080 | 0.250 | NE | | | 089540-010 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 089540-010 | SW846 6020 |
| | Uranium | 0.00509 | 0.00005 | 0.0002 | 0.030 | B | | 089540-010 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | | 089540-010 | SW846 6020 |
| | Zinc | 0.0029 | 0.0026 | 0.010 | NE | J | | 089540-010 | SW846 6020 |

Refer to footnotes on page 5A-35.

# Table 5A-6 *(Continued)*
## Summary of Total Metal Results,
## Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW8** | Aluminum | 0.0243 | 0.010 | 0.030 | NE | J | | 089546-010 | SW846 6020 |
| 30-Aug-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 089546-010 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 089546-010 | SW846 6020 |
| | Barium | 0.0502 | 0.0005 | 0.002 | 2.00 | | | 089546-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089546-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 089546-010 | SW846 6020 |
| | Calcium | 53.5 | 0.100 | 1.00 | NE | | | 089546-010 | SW846 6020 |
| | Chromium | 0.00461 | 0.0025 | 0.010 | 0.100 | J | | 089546-010 | SW846 6020 |
| | Cobalt | ND | 0.0001 | 0.001 | NE | U | | 089546-010 | SW846 6020 |
| | Copper | ND | 0.0003 | 0.001 | NE | U | | 089546-010 | SW846 6020 |
| | Iron | 0.0985 | 0.010 | 0.100 | NE | J | | 089546-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089546-010 | SW846 6020 |
| | Magnesium | 16.1 | 0.005 | 0.015 | NE | | | 089546-010 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 089546-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 089546-010 | SW846 7470 |
| | Nickel | 0.00103 | 0.0005 | 0.002 | NE | J | | 089546-010 | SW846 6020 |
| | Potassium | 3.81 | 0.080 | 0.300 | NE | | | 089546-010 | SW846 6020 |
| | Selenium | 0.0026 | 0.001 | 0.005 | 0.050 | J | | 089546-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089546-010 | SW846 6020 |
| | Sodium | 56.7 | 0.400 | 1.25 | NE | B | | 089546-010 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 089546-010 | SW846 6020 |
| | Uranium | 0.00385 | 0.00005 | 0.0002 | 0.030 | B | | 089546-010 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | | 089546-010 | SW846 6020 |
| | Zinc | 0.00283 | 0.0026 | 0.010 | NE | J | | 089546-010 | SW846 6020 |

Refer to footnotes on page 5A-35.

**Table 5A-6** *(Continued)*
**Summary of Total Metal Results,**
**Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW9** | Aluminum | 0.0158 | 0.010 | 0.030 | NE | J | | 089537-010 | SW846 6020 |
| 24-Aug-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 089537-010 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 089537-010 | SW846 6020 |
| | Barium | 0.0565 | 0.0005 | 0.002 | 2.00 | | | 089537-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089537-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 089537-010 | SW846 6020 |
| | Calcium | 59.4 | 0.200 | 2.00 | NE | B | | 089537-010 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 089537-010 | SW846 6020 |
| | Cobalt | 0.000168 | 0.0001 | 0.001 | NE | J | | 089537-010 | SW846 6020 |
| | Copper | 0.000999 | 0.0003 | 0.001 | NE | J | 0.0044U | 089537-010 | SW846 6020 |
| | Iron | 0.196 | 0.010 | 0.100 | NE | B | 0.67UJ | 089537-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089537-010 | SW846 6020 |
| | Magnesium | 17.8 | 0.005 | 0.015 | NE | | | 089537-010 | SW846 6020 |
| | Manganese | 0.00495 | 0.001 | 0.005 | NE | J | 0.0052U | 089537-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 089537-010 | SW846 7470 |
| | Nickel | 0.00124 | 0.0005 | 0.002 | NE | J | | 089537-010 | SW846 6020 |
| | Potassium | 3.83 | 0.080 | 0.300 | NE | | | 089537-010 | SW846 6020 |
| | Selenium | 0.00145 | 0.001 | 0.005 | 0.050 | J | | 089537-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089537-010 | SW846 6020 |
| | Sodium | 48.6 | 0.080 | 0.250 | NE | | | 089537-010 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 089537-010 | SW846 6020 |
| | Uranium | 0.00561 | 0.00005 | 0.0002 | 0.030 | B | | 089537-010 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | | 089537-010 | SW846 6020 |
| | Zinc | 0.00842 | 0.0026 | 0.010 | NE | J | 0.014U | 089537-010 | SW846 6020 |

Refer to footnotes on page 5A-35.

## Table 5A-6 *(Continued)*
## Summary of Total Metal Results, Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW9** (Duplicate) | Aluminum | 0.016 | 0.010 | 0.030 | NE | J | | 089538-010 | SW846 6020 |
| 24-Aug-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 089538-010 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 089538-010 | SW846 6020 |
| | Barium | 0.0563 | 0.0005 | 0.002 | 2.00 | | | 089538-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089538-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 089538-010 | SW846 6020 |
| | Calcium | 60.1 | 0.200 | 2.00 | NE | B | | 089538-010 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 089538-010 | SW846 6020 |
| | Cobalt | 0.000169 | 0.0001 | 0.001 | NE | J | | 089538-010 | SW846 6020 |
| | Copper | 0.00184 | 0.0003 | 0.001 | NE | | 0.0044U | 089538-010 | SW846 6020 |
| | Iron | 0.235 | 0.010 | 0.100 | NE | B | 0.67UJ | 089538-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089538-010 | SW846 6020 |
| | Magnesium | 16.9 | 0.005 | 0.015 | NE | | | 089538-010 | SW846 6020 |
| | Manganese | 0.00528 | 0.001 | 0.005 | NE | | | 089538-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 089538-010 | SW846 7470 |
| | Nickel | 0.00125 | 0.0005 | 0.002 | NE | J | | 089538-010 | SW846 6020 |
| | Potassium | 3.69 | 0.080 | 0.300 | NE | | | 089538-010 | SW846 6020 |
| | Selenium | 0.00141 | 0.001 | 0.005 | 0.050 | J | | 089538-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089538-010 | SW846 6020 |
| | Sodium | 49.3 | 0.080 | 0.250 | NE | | | 089538-010 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 089538-010 | SW846 6020 |
| | Uranium | 0.00556 | 0.00005 | 0.0002 | 0.030 | B | | 089538-010 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | | 089538-010 | SW846 6020 |
| | Zinc | 0.0122 | 0.0026 | 0.010 | NE | | 0.014U | 089538-010 | SW846 6020 |

Refer to footnotes on page 5A-35.

## Table 5A-6 *(Concluded)*
## Summary of Total Metal Results,
## Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW10** | Aluminum | ND | 0.010 | 0.030 | NE | U | | 089556-010 | SW846 6020 |
| 02-Sep-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 089556-010 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 089556-010 | SW846 6020 |
| | Barium | 0.0612 | 0.0005 | 0.002 | 2.00 | | | 089556-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089556-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 089556-010 | SW846 6020 |
| | Calcium | 61.9 | 0.100 | 1.00 | NE | | | 089556-010 | SW846 6020 |
| | Chromium | 0.0052 | 0.0025 | 0.010 | 0.100 | J | | 089556-010 | SW846 6020 |
| | Cobalt | ND | 0.0001 | 0.001 | NE | U | | 089556-010 | SW846 6020 |
| | Copper | ND | 0.0003 | 0.001 | NE | U | | 089556-010 | SW846 6020 |
| | Iron | 0.106 | 0.010 | 0.100 | NE | | | 089556-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089556-010 | SW846 6020 |
| | Magnesium | 19.2 | 0.005 | 0.015 | NE | | | 089556-010 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 089556-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 089556-010 | SW846 7470 |
| | Nickel | 0.00127 | 0.0005 | 0.002 | NE | J | | 089556-010 | SW846 6020 |
| | Potassium | 4.20 | 0.080 | 0.300 | NE | | | 089556-010 | SW846 6020 |
| | Selenium | 0.0028 | 0.001 | 0.005 | 0.050 | J | | 089556-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089556-010 | SW846 6020 |
| | Sodium | 63.7 | 0.400 | 1.25 | NE | B | | 089556-010 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 089556-010 | SW846 6020 |
| | Uranium | 0.0043 | 0.00005 | 0.0002 | 0.030 | B | | 089556-010 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | | 089556-010 | SW846 6020 |
| | Zinc | ND | 0.0026 | 0.010 | NE | U | | 089556-010 | SW846 6020 |

Refer to footnotes on page 5A-35.

## Table 5A-7
## Summary of Tritium, Gross Alpha, Gross Beta, and Gamma Spectroscopy Results, Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Activity[a] (pCi/L) | MDA[b] (pCi/L) | Critical Level[b] (pCi/L) | MCL[d] (pCi/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **AVN-1** | Americium-241 | 2.43 ± 4.63 | 7.87 | 3.94 | NE | U | BD | 089542-033 | EPA 901.1 |
| 26-Aug-10 | Cesium-137 | 0.180 ± 1.59 | 2.73 | 1.37 | NE | U | BD | 089542-033 | EPA 901.1 |
| | Cobalt-60 | -0.566 ± 1.69 | 2.81 | 1.41 | NE | U | BD | 089542-033 | EPA 901.1 |
| | Potassium-40 | -12.7 ± 30.7 | 40.6 | 20.3 | NE | U | BD | 089542-033 | EPA 901.1 |
| | Gross Alpha | 1.77 | NA | NA | 15 | NA | None | 089542-034 | EPA 900.0 |
| | Gross Beta | 3.28 ± 1.16 | 1.57 | 0.760 | 4mrem/yr | | J | 089542-034 | EPA 900.0 |
| | Tritium | 60.3 ± 67.2 | 111 | 50.6 | NE | U | BD | 089542-036 | EPA 906.0 M |
| **LWDS-MW1** | Americium-241 | 1.97 ± 5.66 | 9.31 | 4.66 | NE | U | BD | 089563-033 | EPA 901.1 |
| 13-Sep-10 | Cesium-137 | 0.711 ± 1.51 | 2.57 | 1.29 | NE | U | BD | 089563-033 | EPA 901.1 |
| | Cobalt-60 | 0.970 ± 1.67 | 2.89 | 1.45 | NE | U | BD | 089563-033 | EPA 901.1 |
| | Potassium-40 | -1.5 ± 38.0 | 38.7 | 19.4 | NE | U | BD | 089563-033 | EPA 901.1 |
| | Gross Alpha | 1.96 | NA | NA | 15 | NA | None | 089563-034 | EPA 900.0 |
| | Gross Beta | 12.9 ± 2.50 | 1.55 | 0.746 | 4mrem/yr | | | 089563-034 | EPA 900.0 |
| | Tritium | -38.5 ± 60.0 | 115 | 53.3 | NE | U | BD | 089563-036 | EPA 906.0 M |
| **LWDS-MW2** | Americium-241 | -21.3 ± 11.9 | 18.6 | 9.30 | NE | U | BD | 089559-033 | EPA 901.1 |
| 07-Sep-10 | Cesium-137 | -2.15 ± 1.90 | 3.00 | 1.50 | NE | U | BD | 089559-033 | EPA 901.1 |
| | Cobalt-60 | 1.13 ± 1.99 | 3.46 | 1.73 | NE | U | BD | 089559-033 | EPA 901.1 |
| | Potassium-40 | -35.6 ± 41.0 | 42.4 | 21.2 | NE | U | BD | 089559-033 | EPA 901.1 |
| | Gross Alpha | 3.13 | NA | NA | 15 | NA | None | 089559-034 | EPA 900.0 |
| | Gross Beta | 4.11 ± 1.40 | 1.92 | 0.936 | 4mrem/yr | | J | 089559-034 | EPA 900.0 |
| | Tritium | 75.2 ± 59.2 | 91.8 | 41.5 | NE | U | BD | 089559-036 | EPA 906.0 M |
| **TAV-MW2** | Americium-241 | 7.11 ± 10.3 | 18.3 | 9.18 | NE | U | BD | 089551-033 | EPA 901.1 |
| 31-Aug-10 | Cesium-137 | -0.751 ± 2.01 | 3.34 | 1.67 | NE | U | BD | 089551-033 | EPA 901.1 |
| | Cobalt-60 | 0.376 ± 2.15 | 3.61 | 1.81 | NE | U | BD | 089551-033 | EPA 901.1 |
| | Potassium-40 | 6.97 ± 44.8 | 52.2 | 26.1 | NE | U | BD | 089551-033 | EPA 901.1 |
| | Gross Alpha | 4.53 | NA | NA | 15 | NA | None | 089551-034 | EPA 900.0 |
| | Gross Beta | 5.47 ± 1.61 | 1.90 | 0.917 | 4mrem/yr | | J | 089551-034 | EPA 900.0 |
| | Tritium | 40.0 ± 62.8 | 107 | 49.0 | NE | U | BD | 089551-036 | EPA 906.0 M |
| **TAV-MW2** (Duplicate) | Americium-241 | -8.44 ± 11.5 | 19.1 | 9.57 | NE | U | BD | 089552-033 | EPA 901.1 |
| 31-Aug-10 | Cesium-137 | 0.302 ± 3.66 | 4.13 | 2.07 | NE | U | BD | 089552-033 | EPA 901.1 |
| | Cobalt-60 | 0.370 ± 1.89 | 3.26 | 1.63 | NE | U | BD | 089552-033 | EPA 901.1 |
| | Potassium-40 | 3.25 ± 41.7 | 44.2 | 22.1 | NE | U | BD | 089552-033 | EPA 901.1 |
| | Gross Alpha | 4.55 | NA | NA | 15 | NA | None | 089552-034 | EPA 900.0 |
| | Gross Beta | 3.03 ± 1.34 | 1.97 | 0.955 | 4mrem/yr | | J | 089552-034 | EPA 900.0 |
| | Tritium | 25.5 ± 63.3 | 111 | 50.9 | NE | U | BD | 089552-036 | EPA 906.0 M |

Refer to footnotes on page 5A-35.

**Table 5A-7** *(Continued)*
**Summary of Tritium, Gross Alpha, Gross Beta, and Gamma Spectroscopy Results, Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Activity[a] (pCi/L) | MDA[b] (pCi/L) | Critical Level[b] (pCi/L) | MCL[d] (pCi/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW3** | Americium-241 | -8.71 ± 10.2 | 17.4 | 8.72 | NE | U | BD | 089533-033 | EPA 901.1 |
| 23-Aug-10 | Cesium-137 | 1.03 ± 2.09 | 3.60 | 1.80 | NE | U | BD | 089533-033 | EPA 901.1 |
| | Cobalt-60 | 1.29 ± 2.17 | 3.76 | 1.88 | NE | U | BD | 089533-033 | EPA 901.1 |
| | Potassium-40 | 27.1 ± 43.6 | 56.8 | 28.4 | NE | U | BD | 089533-033 | EPA 901.1 |
| | Gross Alpha | 2.42 | NA | NA | 15 | NA | None | 089533-034 | EPA 900.0 |
| | Gross Beta | 6.31 ± 1.59 | 1.71 | 0.828 | 4mrem/yr | | | 089533-034 | EPA 900.0 |
| | Tritium | 21.5 ± 60.7 | 107 | 49.0 | NE | U | BD | 089533-036 | EPA 906.0 M |
| **TAV-MW4** | Americium-241 | -0.716 ± 5.21 | 8.82 | 4.41 | NE | U | BD | 089561-033 | EPA 901.1 |
| 09-Sep-10 | Cesium-137 | 0.363 ± 1.75 | 2.99 | 1.50 | NE | U | BD | 089561-033 | EPA 901.1 |
| | Cobalt-60 | 0.242 ± 1.88 | 3.18 | 1.59 | NE | U | BD | 089561-033 | EPA 901.1 |
| | Potassium-40 | 3.55 ± 43.9 | 46.7 | 23.4 | NE | U | BD | 089561-033 | EPA 901.1 |
| | Gross Alpha | 1.11 | NA | NA | 15 | NA | None | 089561-034 | EPA 900.0 |
| | Gross Beta | 3.10 ± 0.891 | 1.01 | 0.480 | 4mrem/yr | | | 089561-034 | EPA 900.0 |
| | Tritium | 40.8 ± 55.6 | 93.9 | 42.4 | NE | U | BD | 089561-036 | EPA 906.0 M |
| **TAV-MW5** | Americium-241 | -2.31 ± 5.36 | 7.92 | 3.96 | NE | U | BD | 089544-033 | EPA 901.1 |
| 27-Aug-10 | Cesium-137 | 0.444 ± 1.56 | 2.71 | 1.35 | NE | U | BD | 089544-033 | EPA 901.1 |
| | Cobalt-60 | 1.20 ± 1.63 | 2.91 | 1.46 | NE | U | BD | 089544-033 | EPA 901.1 |
| | Potassium-40 | -17.6 ± 34.5 | 39.6 | 19.8 | NE | U | BD | 089544-033 | EPA 901.1 |
| | Gross Alpha | 1.44 | NA | NA | 15 | NA | None | 089544-034 | EPA 900.0 |
| | Gross Beta | 2.16 ± 0.840 | 1.15 | 0.548 | 4mrem/yr | | J | 089544-034 | EPA 900.0 |
| | Tritium | 12.4 ± 60.4 | 108 | 49.6 | NE | U | BD | 089544-036 | EPA 906.0 M |
| **TAV-MW6** | Americium-241 | -7.94 ± 10.7 | 17.6 | 8.83 | NE | U | BD | 089554-033 | EPA 901.1 |
| 01-Sep-10 | Cesium-137 | 0.456 ± 1.87 | 3.19 | 1.60 | NE | U | BD | 089554-033 | EPA 901.1 |
| | Cobalt-60 | 0.549 ± 2.16 | 3.68 | 1.84 | NE | U | BD | 089554-033 | EPA 901.1 |
| | Potassium-40 | 40.2 ± 24.8 | 45.1 | 22.6 | NE | U | BD | 089554-033 | EPA 901.1 |
| | Gross Alpha | 1.09 | NA | NA | 15 | NA | None | 089554-034 | EPA 900.0 |
| | Gross Beta | 4.60 ± 1.23 | 1.42 | 0.685 | 4mrem/yr | | | 089554-034 | EPA 900.0 |
| | Tritium | 6.33 ± 60.7 | 110 | 50.4 | NE | U | BD | 089554-036 | EPA 906.0 M |
| **TAV-MW7** | Americium-241 | -16.2 ± 7.80 | 12.6 | 6.29 | NE | U | BD | 089540-033 | EPA 901.1 |
| 25-Aug-10 | Cesium-137 | 0.341 ± 1.77 | 3.00 | 1.50 | NE | U | BD | 089540-033 | EPA 901.1 |
| | Cobalt-60 | 2.18 ± 1.91 | 3.46 | 1.73 | NE | U | BD | 089540-033 | EPA 901.1 |
| | Potassium-40 | 13.7 ± 35.1 | 43.6 | 21.8 | NE | U | BD | 089540-033 | EPA 901.1 |
| | Gross Alpha | 3.35 | NA | NA | 15 | NA | None | 089540-034 | EPA 900.0 |
| | Gross Beta | 5.62 ± 1.46 | 1.63 | 0.788 | 4mrem/yr | | | 089540-034 | EPA 900.0 |
| | Tritium | 6.12 ± 58.7 | 107 | 48.8 | NE | U | BD | 089540-036 | EPA 906.0 M |

Refer to footnotes on page 5A-35.

## Table 5A-7 *(Concluded)*
## Summary of Tritium, Gross Alpha, Gross Beta, and Gamma Spectroscopy Results, Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Activity[a] (pCi/L) | MDA[b] (pCi/L) | Critical Level[b] (pCi/L) | MCL[d] (pCi/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TAV-MW8** | Americium-241 | 0.470 ± 2.42 | 3.95 | 1.98 | NE | U | BD | 089546-033 | EPA 901.1 |
| 30-Aug-10 | Cesium-137 | -0.888 ± 4.39 | 5.39 | 2.70 | NE | U | BD | 089546-033 | EPA 901.1 |
| | Cobalt-60 | -0.419 ± 2.07 | 3.45 | 1.73 | NE | U | BD | 089546-033 | EPA 901.1 |
| | Potassium-40 | 36.6 ± 23.5 | 42.9 | 21.5 | NE | U | BD | 089546-033 | EPA 901.1 |
| | Gross Alpha | 0.80 | NA | NA | 15 | NA | None | 089546-034 | EPA 900.0 |
| | Gross Beta | 2.92 ± 0.895 | 1.07 | 0.509 | 4mrem/yr | | J | 089546-034 | EPA 900.0 |
| | Tritium | 45.6 ± 62.9 | 106 | 48.5 | NE | U | BD | 089546-036 | EPA 906.0 M |
| **TAV-MW9** | Americium-241 | 5.81 ± 13.2 | 22.6 | 11.3 | NE | U | BD | 089537-033 | EPA 901.1 |
| 24-Aug-10 | Cesium-137 | -1.29 ± 1.96 | 3.18 | 1.59 | NE | U | BD | 089537-033 | EPA 901.1 |
| | Cobalt-60 | -0.709 ± 1.91 | 3.09 | 1.54 | NE | U | BD | 089537-033 | EPA 901.1 |
| | Potassium-40 | -17.9 ± 37.6 | 51.4 | 25.7 | NE | U | BD | 089537-033 | EPA 901.1 |
| | Gross Alpha | 2.00 | NA | NA | 15 | NA | None | 089537-034 | EPA 900.0 |
| | Gross Beta | 5.98 ± 1.62 | 1.89 | 0.922 | 4mrem/yr | | | 089537-034 | EPA 900.0 |
| | Tritium | 6.33 ± 60.8 | 110 | 50.5 | NE | U | BD | 089537-036 | EPA 906.0 M |
| **TAV-MW9** (Duplicate) | Americium-241 | -28.4 ± 11.4 | 17.8 | 8.92 | NE | U | BD | 089538-033 | EPA 901.1 |
| 24-Aug-10 | Cesium-137 | -0.292 ± 1.92 | 3.26 | 1.63 | NE | U | BD | 089538-033 | EPA 901.1 |
| | Cobalt-60 | 0.351 ± 1.95 | 3.36 | 1.68 | NE | U | BD | 089538-033 | EPA 901.1 |
| | Potassium-40 | -19.2 ± 43.5 | 46.1 | 23.1 | NE | U | BD | 089538-033 | EPA 901.1 |
| | Gross Alpha | 2.09 | NA | NA | 15 | NA | None | 089538-034 | EPA 900.0 |
| | Gross Beta | 4.81 ± 1.37 | 1.66 | 0.807 | 4mrem/yr | | J | 089538-034 | EPA 900.0 |
| | Tritium | 39.5 ± 62.1 | 106 | 48.5 | NE | U | BD | 089538-036 | EPA 906.0 M |
| **TAV-MW10** | Americium-241 | -0.111 ± 5.02 | 8.51 | 4.26 | NE | U | BD | 089556-033 | EPA 901.1 |
| 02-Sep-10 | Cesium-137 | -0.071 ± 1.79 | 3.02 | 1.51 | NE | U | BD | 089556-033 | EPA 901.1 |
| | Cobalt-60 | -1.56 ± 2.05 | 3.24 | 1.62 | NE | U | BD | 089556-033 | EPA 901.1 |
| | Potassium-40 | -4.81 ± 46.1 | 44.2 | 22.1 | NE | U | BD | 089556-033 | EPA 901.1 |
| | Gross Alpha | 2.32 | NA | NA | 15 | NA | None | 089556-034 | EPA 900.0 |
| | Gross Beta | 4.00 ± 1.02 | 0.995 | 0.470 | 4mrem/yr | | | 089556-034 | EPA 900.0 |
| | Tritium | -33.0 ± 56.3 | 110 | 50.1 | NE | U | BD | 089556-036 | EPA 906.0 M |

Refer to footnotes on page 5A-35.

## Table 5A-8
## Summary of Field Water Quality Measurements[h],
## Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Well ID | Sample Date | Temperature ($^0C$) | Specific Conductivity (µmho/cm) | Oxidation Reduction Potential (mV) | pH | Turbidity (NTU) | Dissolved Oxygen (% Sat) | Dissolved Oxygen (mg/L) |
|---|---|---|---|---|---|---|---|---|
| **AVN-1** | 08-Feb-10 | 17.12 | 411 | 154.1 | 7.53 | 1.20 | 40.8 | 3.93 |
| **LWDS-MW1** | 17-Feb-10 | 17.59 | 729 | 234.7 | 7.19 | 0.69 | 75.6 | 7.31 |
| **LWDS-MW2** | 05-Feb-10 | 18.05 | 468 | 203.3 | 7.41 | 0.42 | 49.4 | 4.66 |
| **TAV-MW2** | 10-Feb-10 | 17.00 | 715 | 183.1 | 7.18 | 0.45 | 58.2 | 5.61 |
| **TAV-MW3** | 02-Feb-10 | 17.97 | 541 | 220.4 | 7.32 | 0.61 | 70.4 | 6.66 |
| **TAV-MW4** | 11-Feb-10 | 16.02 | 514 | 236.4 | 7.39 | 0.64 | 70.1 | 6.99 |
| **TAV-MW5** | 04-Feb-10 | 17.23 | 485 | 206.1 | 7.38 | 0.16 | 47.7 | 4.58 |
| **TAV-MW6** | 12-Feb-10 | 16.41 | 679 | 211.2 | 7.25 | 0.63 | 74.5 | 7.31 |
| **TAV-MW7** | 03-Feb-10 | 17.47 | 600 | 136.1 | 7.25 | 1.39 | 2.7 | 0.26 |
| **TAV-MW8** | 09-Feb-10 | 18.12 | 575 | 200.5 | 7.34 | 0.68 | 66.0 | 6.22 |
| **TAV-MW9** | 01-Feb-10 | 18.61 | 591 | 170.1 | 7.11 | 1.65 | 16.1 | 1.50 |
| **TAV-MW10** | 15-Feb-10 | 16.31 | 655 | 235.1 | 7.22 | 0.21 | 85.3 | 8.34 |
| | | | | | | | | |
| **AVN-1** | 15-Jun-10 | 21.42 | 405 | 66.3 | 7.83 | 2.47 | 43.2 | 3.81 |
| **LWDS-MW1** | 25-Jun-10 | 23.06 | 700 | 183.9 | 7.41 | 0.24 | 84.5 | 7.22 |
| **LWDS-MW2** | 11-Jun-10 | 21.82 | 459 | 72.3 | 7.69 | 0.53 | 50.0 | 4.34 |
| **TAV-MW2** | 21-Jun-10 | 22.53 | 687 | 52.8 | 7.53 | 2.17 | 60.3 | 5.18 |
| **TAV-MW3** | 09-Jun-10 | 23.78 | 525 | 116.0 | 7.50 | 0.54 | 74.8 | 6.20 |
| **TAV-MW4** | 22-Jun-10 | 21.68 | 500 | 288.6 | 7.51 | 0.89 | 71.6 | 6.28 |
| **TAV-MW5** | 14-Jun-10 | 22.34 | 476 | 67.0 | 7.71 | 0.14 | 52.6 | 4.56 |
| **TAV-MW6** | 23-Jun-10 | 21.34 | 663 | 213.9 | 7.40 | 1.59 | 78.7 | 6.98 |
| **TAV-MW7** | 10-Jun-10 | 22.23 | 591 | 2.7 | 7.52 | 0.64 | 3.7 | 0.32 |
| **TAV-MW8** | 16-Jun-10 | 22.91 | 565 | 63.8 | 7.68 | 0.46 | 70.9 | 6.04 |
| **TAV-MW9** | 08-Jun-10 | 21.67 | 628 | 92.5 | 8.46 | 1.08 | 16.4 | 1.44 |
| **TAV-MW10** | 07-Jun-10 | 21.99 | 644 | 159.6 | 8.47 | 0.25 | 83.1 | 7.26 |
| | | | | | | | | |
| **AVN-1** | 26-Aug-10 | 22.74 | 393 | 154.1 | 7.56 | 1.67 | 36.6 | 3.28 |
| **LWDS-MW1** | 13-Sep-10 | 20.12 | 691 | 112.3 | 7.34 | 0.22 | 81.8 | 7.40 |
| **LWDS-MW2** | 07-Sep-10 | 22.54 | 454 | 173.3 | 7.45 | 0.09 | 50.9 | 4.41 |
| **TAV-MW2** | 31-Aug-10 | 22.47 | 679 | 186.8 | 7.19 | 0.42 | 66.5 | 5.76 |
| **TAV-MW3** | 23-Aug-10 | 22.61 | 516 | 144.6 | 7.39 | 0.73 | 74.8 | 6.45 |
| **TAV-MW4** | 09-Sep-10 | 21.78 | 495 | 177.9 | 7.47 | 0.45 | 75.4 | 6.63 |
| **TAV-MW5** | 27-Aug-10 | 22.92 | 464 | 163.8 | 7.42 | 0.16 | 54.1 | 4.65 |
| **TAV-MW6** | 01-Sep-10 | 21.87 | 645 | 193.5 | 7.29 | 0.39 | 80.5 | 7.11 |

Refer to footnotes on page 5A-35.

## Table 5A-8 *(Concluded)*
## Summary of Field Water Quality Measurements[h], Technical Area V Groundwater Monitoring, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Sample Date | Temperature ($^0$C) | Specific Conductivity (μmho/cm) | Oxidation Reduction Potential (mV) | pH | Turbidity (NTU) | Dissolved Oxygen (% Sat) | Dissolved Oxygen (mg/L) |
|---|---|---|---|---|---|---|---|---|
| **TAV-MW7** | 25-Aug-10 | 21.00 | 572 | 107.9 | 7.26 | 0.30 | 3.5 | 0.31 |
| **TAV-MW8** | 30-Aug-10 | 21.27 | 547 | 190.9 | 7.37 | 0.98 | 79.1 | 7.10 |
| **TAV-MW9** | 24-Aug-10 | 21.84 | 568 | 125.6 | 7.17 | 1.73 | 18.4 | 1.61 |
| **TAV-MW10** | 02-Sep-10 | 23.11 | 631 | 171.5 | 7.27 | 0.12 | 84.4 | 7.20 |
| | | | | | | | | |
| **AVN-1** | 12-Oct-10 | 21.00 | 400 | 195.7 | 7.68 | 0.95 | 43.2 | 3.84 |
| **LWDS-MW1** | 25-Oct-10 | 16.38 | 690 | 249.9 | 7.47 | 0.22 | 76.3 | 7.46 |
| **LWDS-MW2** | 11-Oct-10 | 20.80 | 452 | 232.2 | 7.59 | 0.21 | 49.7 | 4.43 |
| **TAV-MW2** | 14-Oct-10 | 20.37 | 688 | 277.6 | 7.31 | 0.58 | 58.4 | 5.26 |
| **TAV-MW3** | 04-Oct-10 | 21.45 | 528 | 154.5 | 7.46 | 0.20 | 75.0 | 6.64 |
| **TAV-MW4** | 18-Oct-10 | 20.43 | 497 | 215.4 | 7.56 | 0.41 | 71.8 | 6.48 |
| **TAV-MW5** | 07-Oct-10 | 21.27 | 471 | 228.3 | 7.53 | 0.11 | 50.9 | 4.49 |
| **TAV-MW6** | 19-Oct-10 | 19.17 | 652 | 214.7 | 7.40 | 0.61 | 74.3 | 6.85 |
| **TAV-MW7** | 06-Oct-10 | 20.79 | 582 | 214.9 | 7.37 | 0.27 | 3.4 | 0.30 |
| **TAV-MW8** | 13-Oct-10 | 19.99 | 555 | 225.1 | 7.50 | 0.90 | 69.1 | 6.26 |
| **TAV-MW9** | 05-Oct-10 | 22.46 | 605 | 144.9 | 7.27 | 1.47 | 17.3 | 1.50 |
| **TAV-MW10** | 20-Oct-10 | 20.58 | 629 | 206.8 | 7.42 | 0.08 | 76.9 | 7.00 |

Refer to footnotes on page 5A-35.

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## *Footnotes for Technical Area V Groundwater Monitoring Tables*

**[a]Result**

- Values in bold exceed the established MCL.
- ND = not detected (at method detection limit).
- Activities of zero or less are considered to be not detected.
- Gross alpha activity measurements were corrected by subtracting out the total uranium activity (40 CFR Parts 9, 141, and 142, Table 1-4)
- μg/L = micrograms per liter
- mg/L = milligrams per liter
- pCi/L = picocuries per liter

**[b]MDL or MDA**

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.

The 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.

NA = not applicable for gross alpha activities. The MDA could not be calculated as the gross alpha activity was corrected by subtracting out the total uranium activity.

**[c]PQL or Critical Level**

Practical quantitation limit. The lowest concentration of analytes in a sample that can be reliably determined within specified limits of precision and accuracy by that indicated method under routine laboratory operating conditions.

The minimum activity that can be measured and reported with 99% confidence that the analyte is greater than zero; analyte is matrix specific.

NA = not applicable for gross alpha activities. The critical level could not be calculated as the gross alpha activity was corrected by subtracting out the total uranium activity.

**[d]MCL**

- Maximum contaminant level. Established by the U.S. Environmental Protection Agency Primary Water Regulations (40 CFR 141.11[b]), National Primary Drinking Water Standards, EPA, July 2002.
- NE = not established.
- The following are the MCLs for gross alpha particles and beta particles in community water systems:
  15 pCi/L = Gross alpha particle activity, excluding total uranium (40 CFR Parts 9, 141, and 142, Table 1-4).
  4 mrem/yr = any combination of beta and/or gamma emitting radionuclides (as dose rate).

**[e]Laboratory Qualifier**

B = Analyte is detected in associated laboratory method blank.
J = Amount detected is below the practical quantitation limit (PQL).
NA = Not applicable for gross alpha activities.
U = Analyte is absent or below the method detection limit.

**[f]Validation Qualifier**

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.
BD = Below detection limit as used in radiochemistry to identify results that are not statistically different from zero.
J = The associate value is an estimated quantity.
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.

## *Footnotes for Technical Area V Groundwater Monitoring Tables (Concluded)*

**[g]Analytical Method**

- EPA, 1979, *Methods for Chemical Analysis of Water and Wastes*, EPA-600/4-79-020, U.S. Environmental Protection Agency, Cincinnati, Ohio.
- EPA, 1980, *Prescribed Procedures for Measurement of Radioactivity in Drinking Water*, EPA-600/4-80-032, U.S. Environmental Protection Agency, Cincinnati, Ohio
- EPA, 1996, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, 3rd ed., Rev. 1, U.S. Environmental Protection Agency, Washington, D.C.
- EPA, 1999, *Perchlorate in Drinking Water Using Ion Chromatography*, EPA 815/R-00-014, U.S. Environmental Protection Agency, Washington, D.C.

**[h]Field Water Quality Measurements**

- Field measurements collected prior to sampling.

| | | |
|---|---|---|
| °C | = | degrees Celsius. |
| % sat | = | present saturation. |
| μmho/cm | = | micromhos per centimeter. |
| mg/L | = | milligrams per liter. |
| mV | = | millivolts. |
| NTU | = | nephelometric turbidity units. |
| pH | = | potential of hydrogen (negative logarithm of the hydrogen ion concentration). |

# Attachment 5B
# Technical Area V
# Plots

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# Attachment 5B Plots

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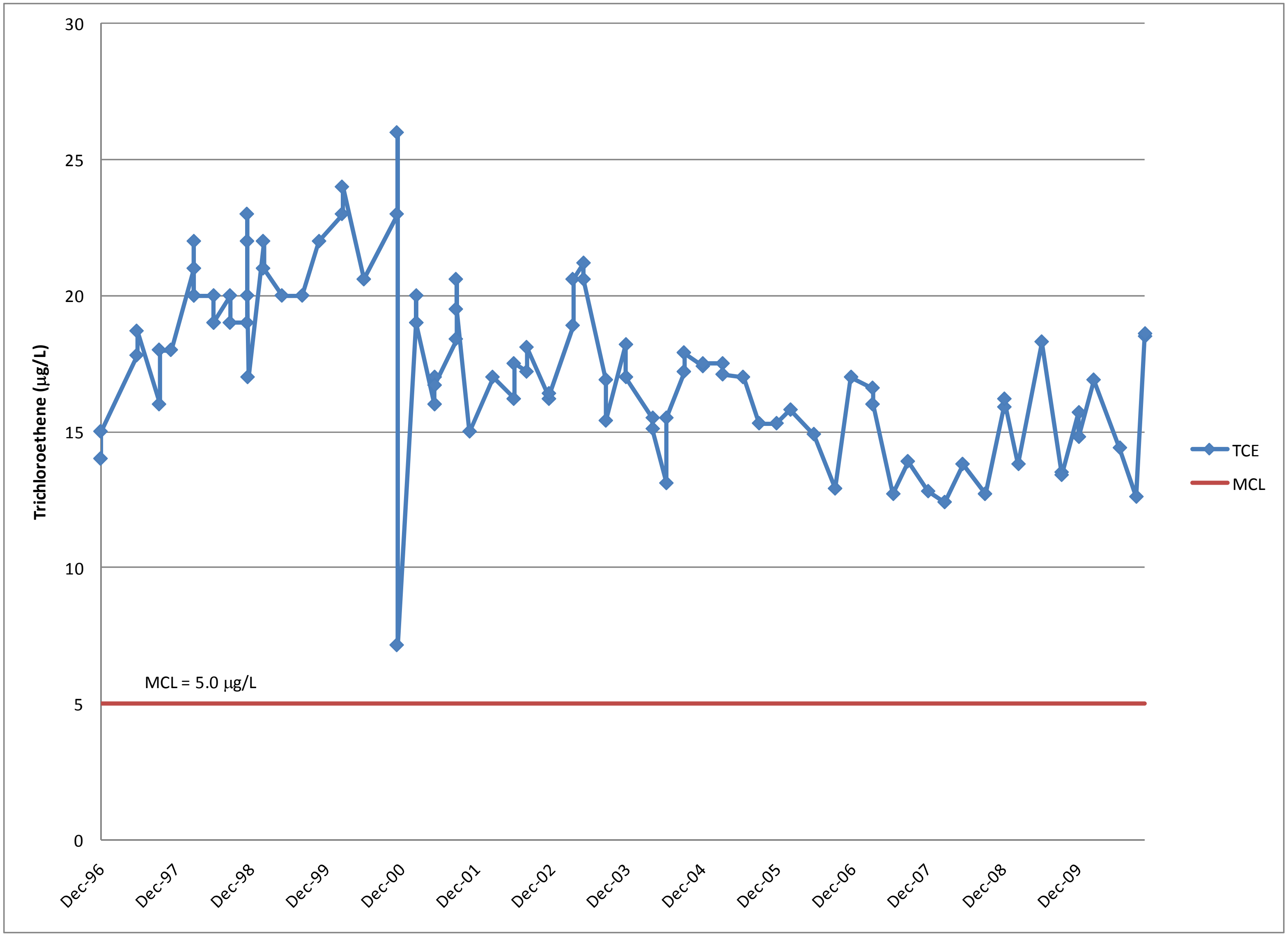


**Figure 5B-1. Trichloroethene Concentrations, LWDS-MW1**

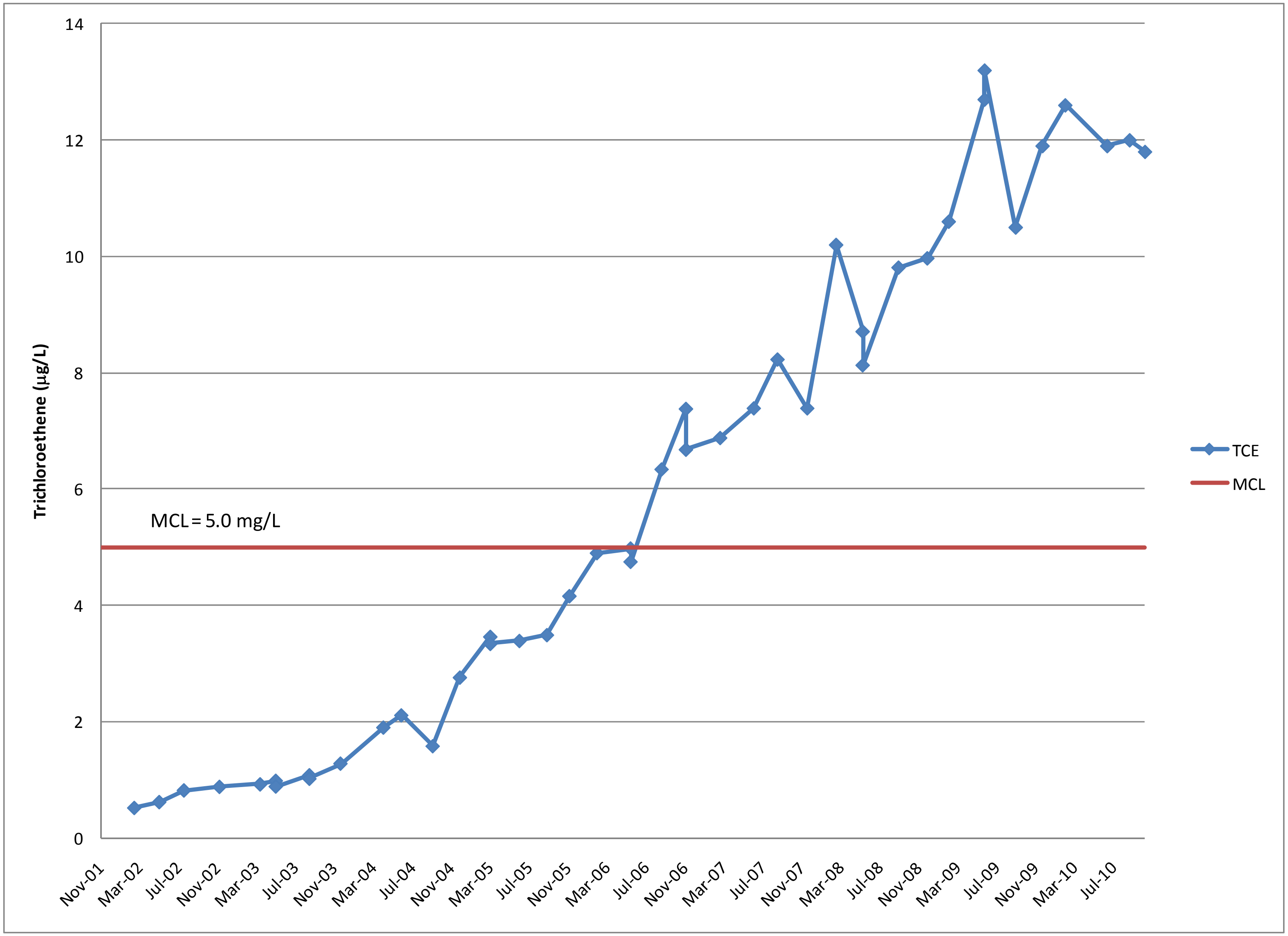


**Figure 5B-2. Trichloroethene Concentrations, TAV-MW6**

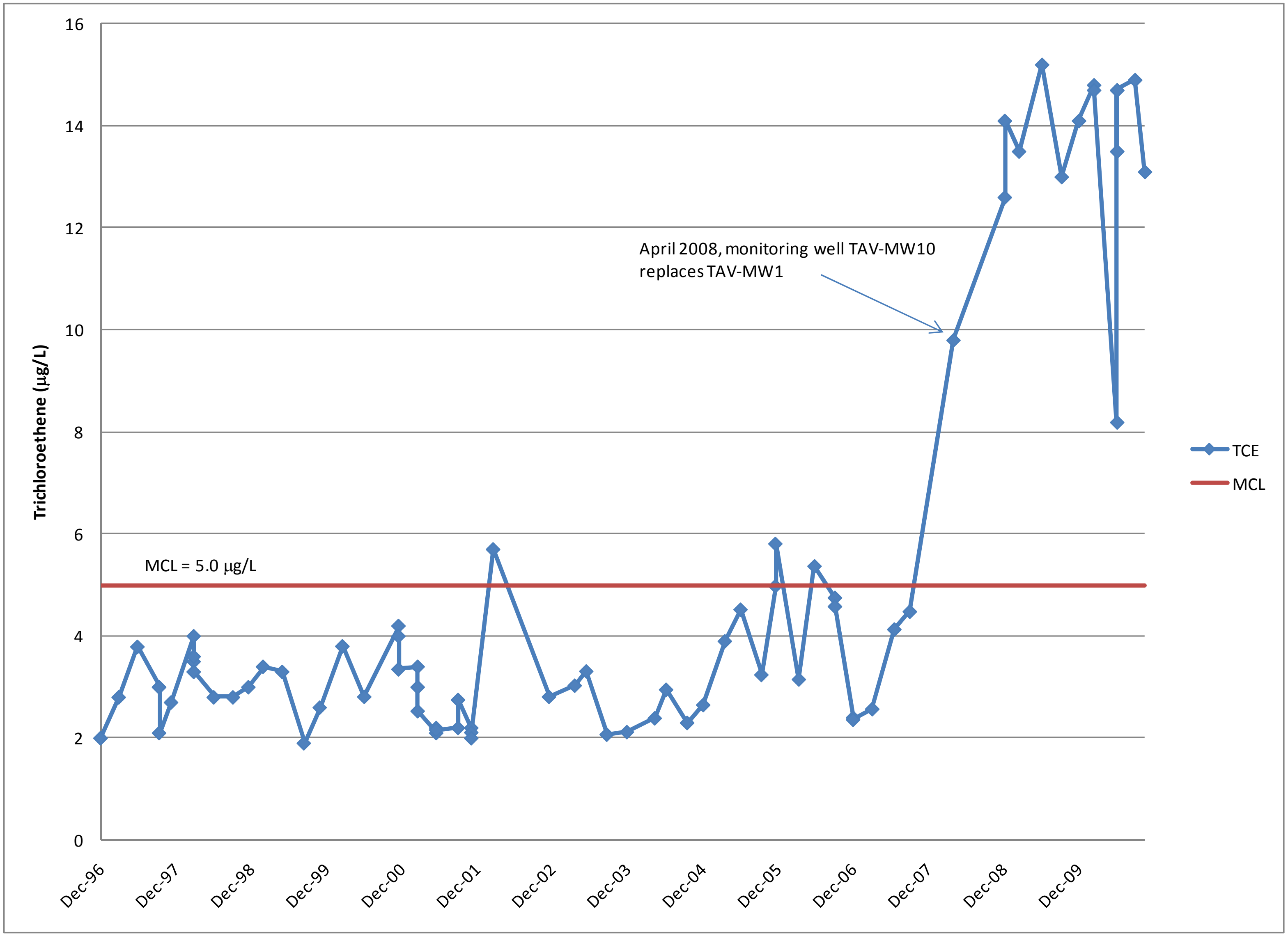


**Figure 5B-3. Trichloroethene Concentrations, TAV-MW10**

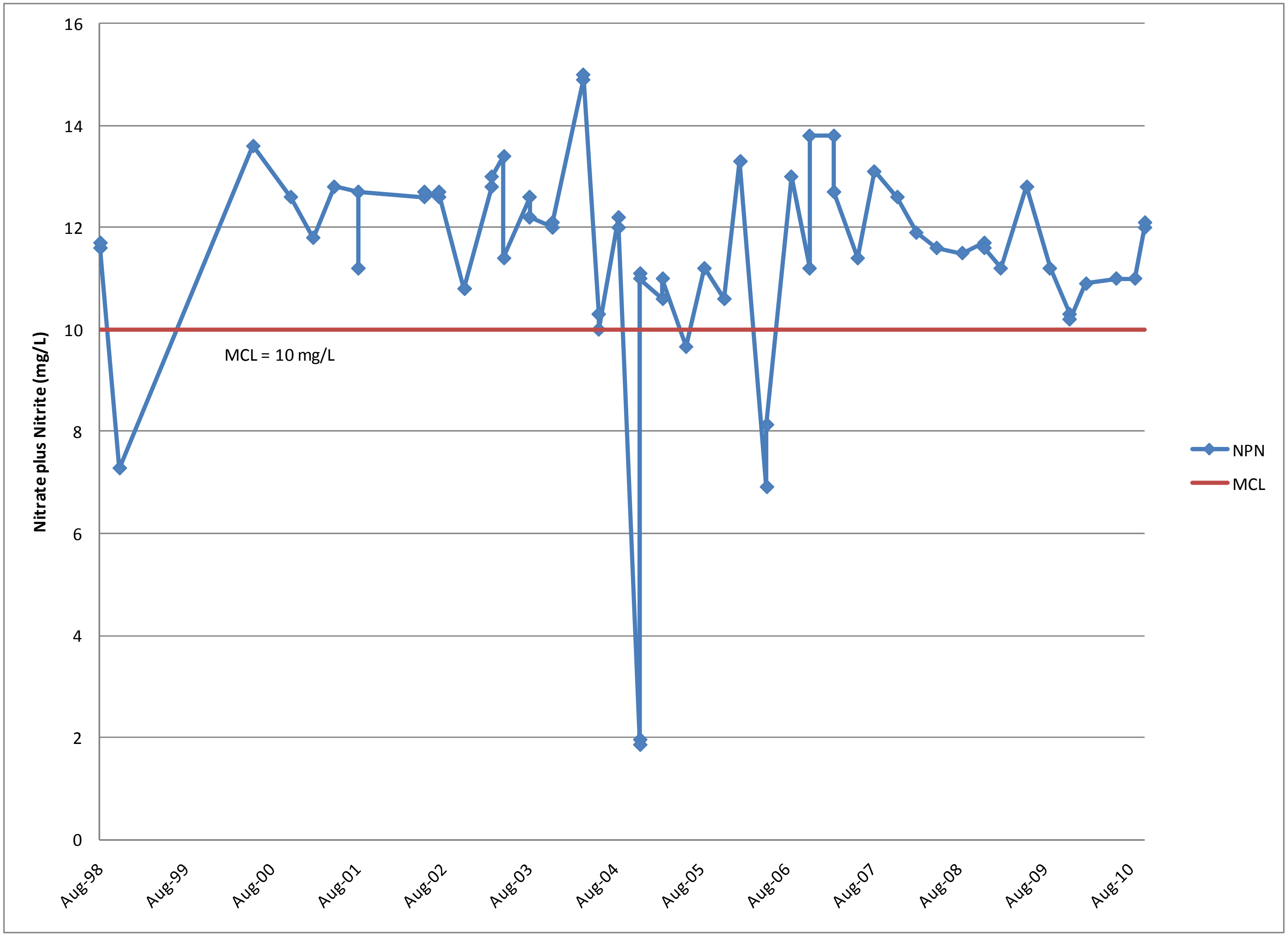


**Figure 5B-4. Nitrate plus Nitrite Concentrations, LWDS-MW1**

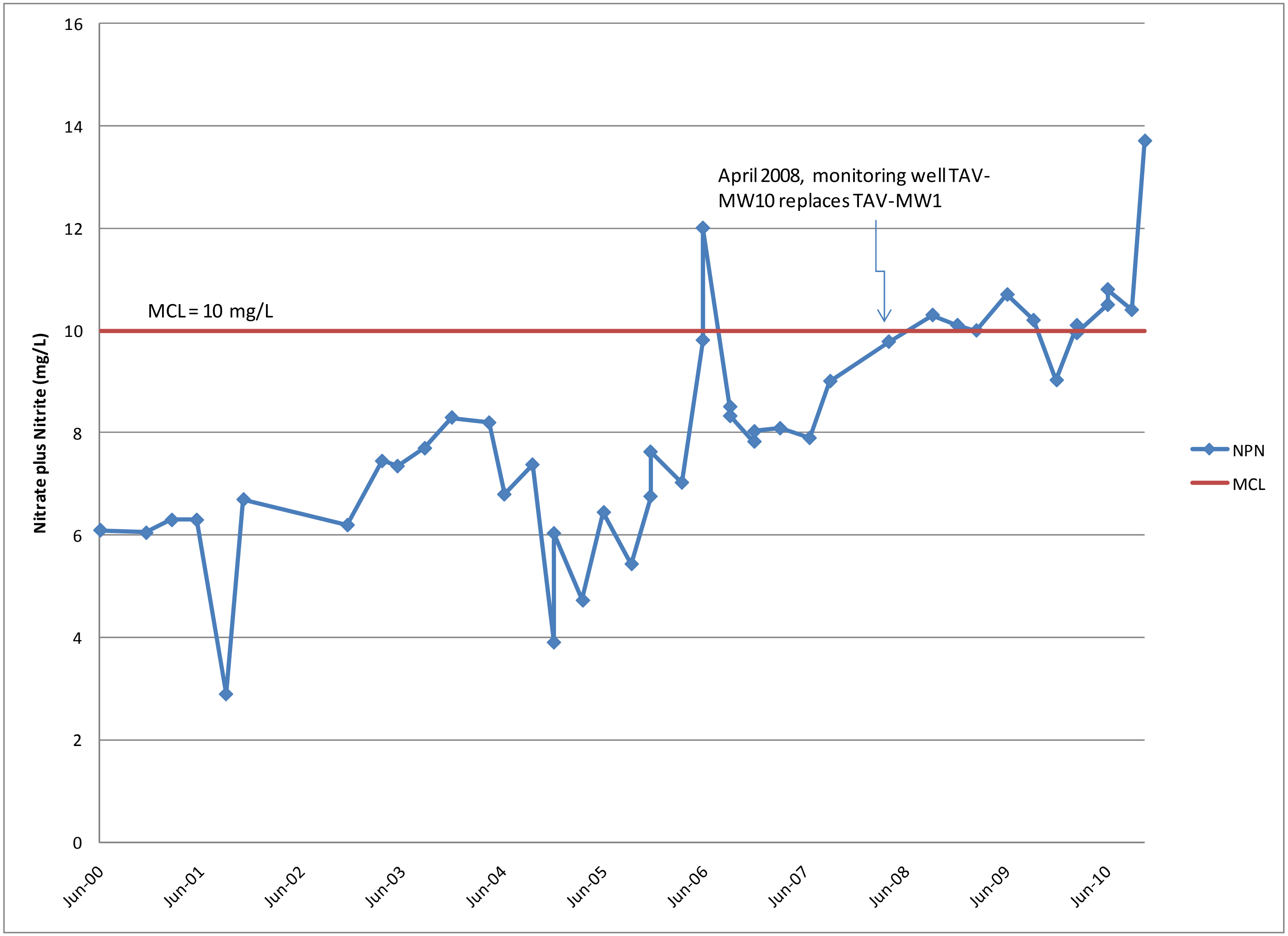


**Figure 5B-5. Nitrate plus Nitrite Concentrations, TAV-MW10**

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# Attachment 5C
# Technical Area V
# Hydrographs

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# Attachment 5C Hydrographs

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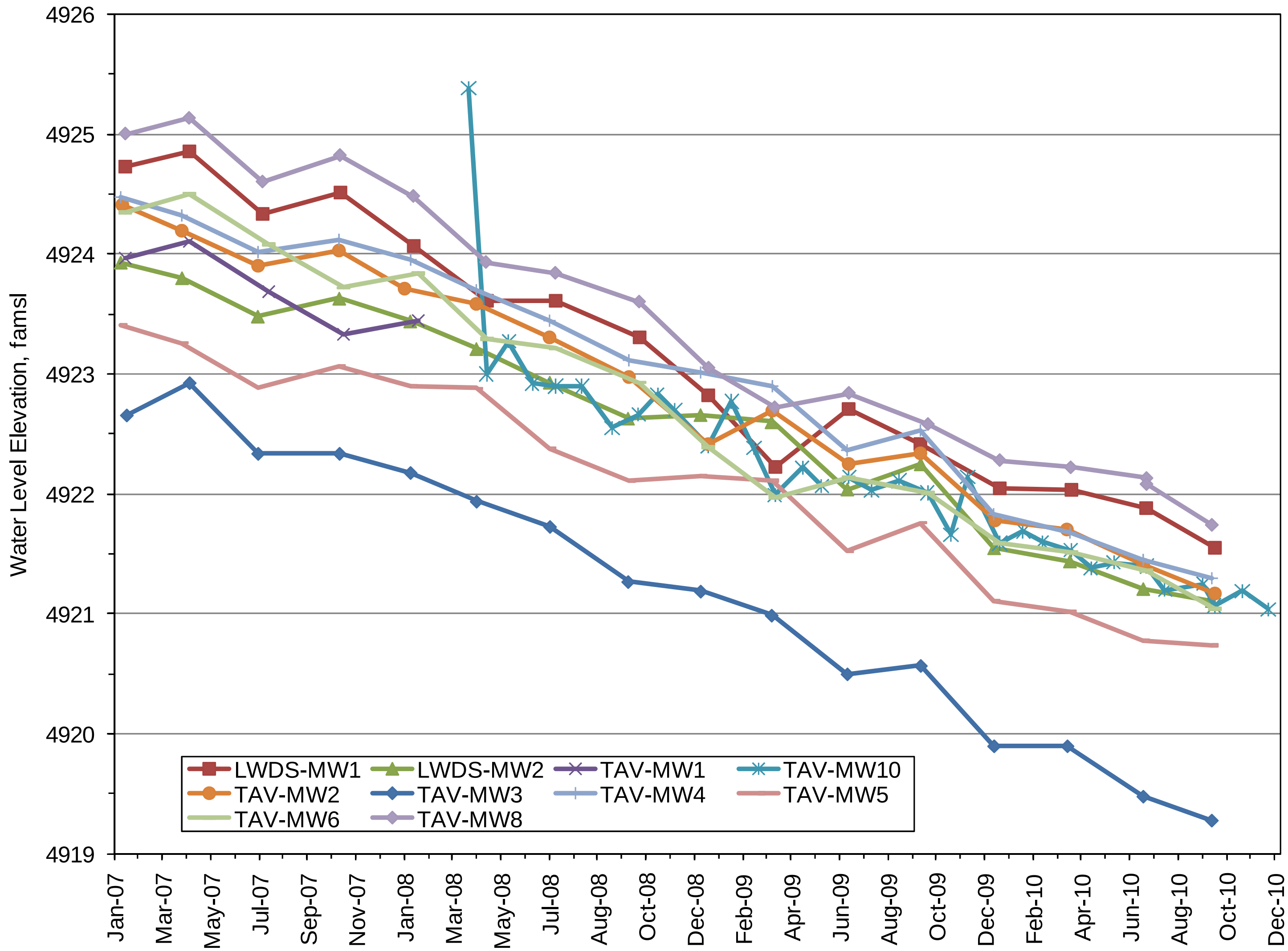


**Figure 5C-1. TA-V Study Area Water Table Completion Wells**

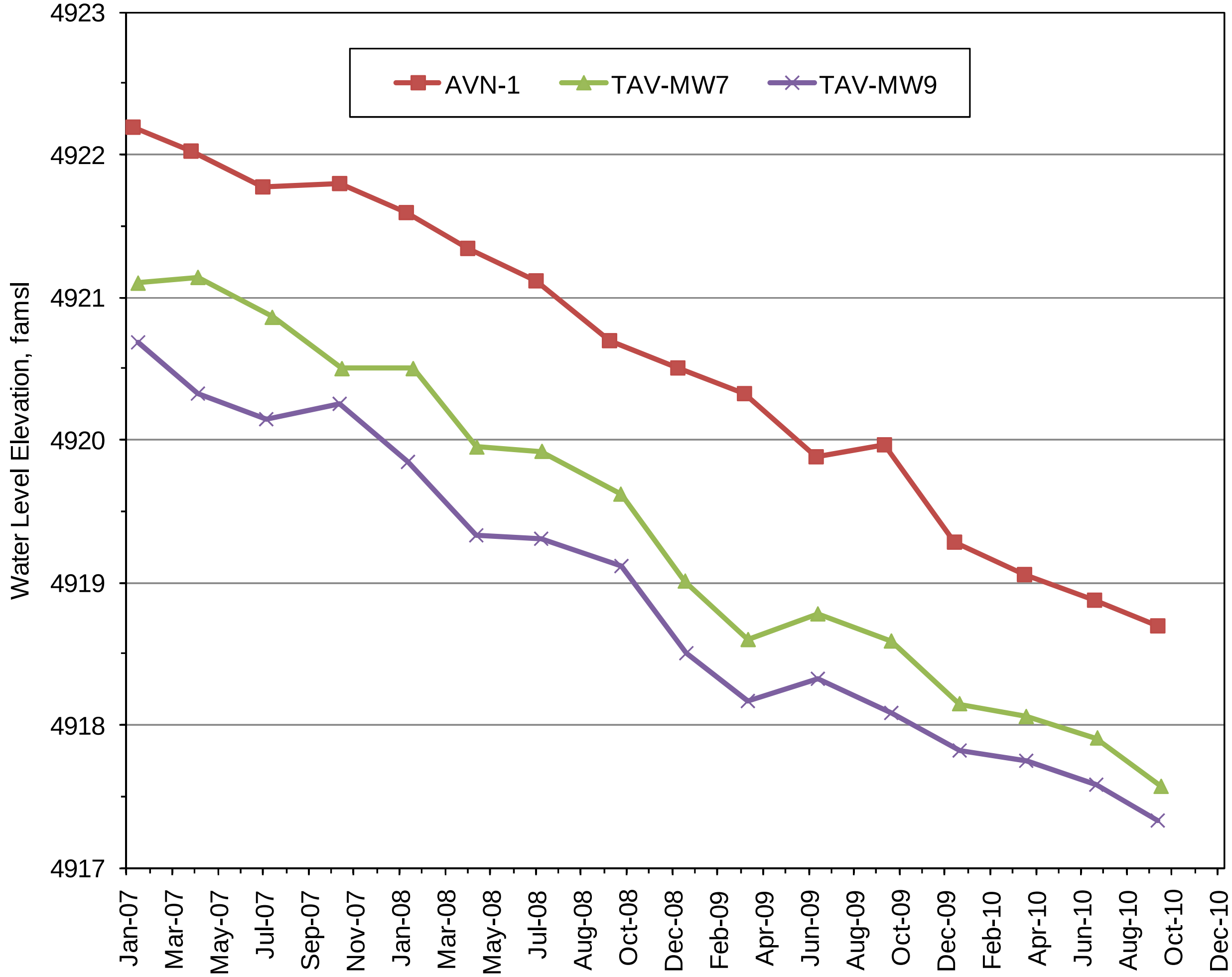


**Figure 5C-2. TA-V Study Area Deep Completion Wells**

# 6.0 Tijeras Arroyo Groundwater Study Area

## 6.1 Introduction

Trichloroethene (TCE) and nitrate have been identified as constituents of concern (COCs) in groundwater at the Tijeras Arroyo Groundwater (TAG) study area based on historical groundwater monitoring results. Detections of these COCs exceed the U.S. Environmental Protection Agency (EPA) maximum contaminant levels (MCLs) in samples collected from the TAG study area monitoring wells. Since August 1996, the historical maximum TCE concentration detected at the site has been 9.6 micrograms per liter (μg/L), and the maximum nitrate detection has been 49 milligrams per liter (mg/L). The EPA and State of New Mexico drinking water standards (MCLs) for TCE and nitrate are 5 μg/L and 10 mg/L (as nitrogen), respectively.

Unique features of the TAG study area include low concentrations of TCE at scattered locations in the perched groundwater system (PGWS), and low concentrations of nitrate at scattered locations in the PGWS and regional aquifer.

### 6.1.1 Location

The TAG study area encompasses approximately 40 square miles (sq mi) in the north-central portion of Kirtland Air Force Base (KAFB) (Figure 6-1). Three of the five Technical Areas (TAs) managed by Sandia National Laboratories, New Mexico (SNL/NM) are located in the TAG study area. Together, the three TAs (TA-I, TA-II, and TA-IV) encompass approximately 641 acres. The SNL/NM facility is a government-owned, contractor-operated, multi-program laboratory overseen by the U.S. Department of Energy (DOE), National Nuclear Security Administration through the Sandia Site Office in Albuquerque, New Mexico. Sandia Corporation (Sandia), a wholly owned subsidiary of Lockheed Martin Corporation, manages and operates SNL/NM under Contract DE-AC04-94AL85000.

The three parties identified as potentially responsible for groundwater contamination within the TAG area include Sandia, KAFB, and the City of Albuquerque (COA). KAFB controls facilities and properties with a variety of land uses along the north, west, south, and southeast boundaries of TA-I, TA-II, and TA-IV. The area located along the northern and western boundaries of the three TAs contains KAFB housing, office buildings, a fire station, training schools, machine workshops, storage yards, a brig, a diesel-fuel tank farm, an electromagnetic research facility, and inactive sewage lagoons. Bordering the southern and southeastern edges of the three TAs are undeveloped open spaces, active landfills, closed landfills, emergency-response training areas, and the Tijeras Arroyo Golf Course. The COA residential areas are located along most of the northern boundary of KAFB.

### 6.1.2 Site History

In early 1928, the first airport in Albuquerque was constructed where TA-I and TA-II are currently located. In the spring of 1946, during a dismantling operation, 2,250 military aircraft were dismantled adjacent to the taxiways. In July 1945, the “Z Division” of the Manhattan Engineers District, an extension of the original Los Alamos Laboratory, was established as the forerunner of SNL/NM. At that time, the primary mission of the Z Division was to provide engineering, production, stockpiling, and testing support for nuclear weapon components and systems. In the summer of 1949, the major weapons production was transferred to other manufacturing facilities and the early work of SNL/NM concentrated on prototype research and manufacturing of experimental devices. Since 1949, SNL/NM has grown from a factory-style ordnance facility to a national laboratory dedicated to research, development, and testing of both defense and nondefense components. The current work performed in TA-I and TA-II can be

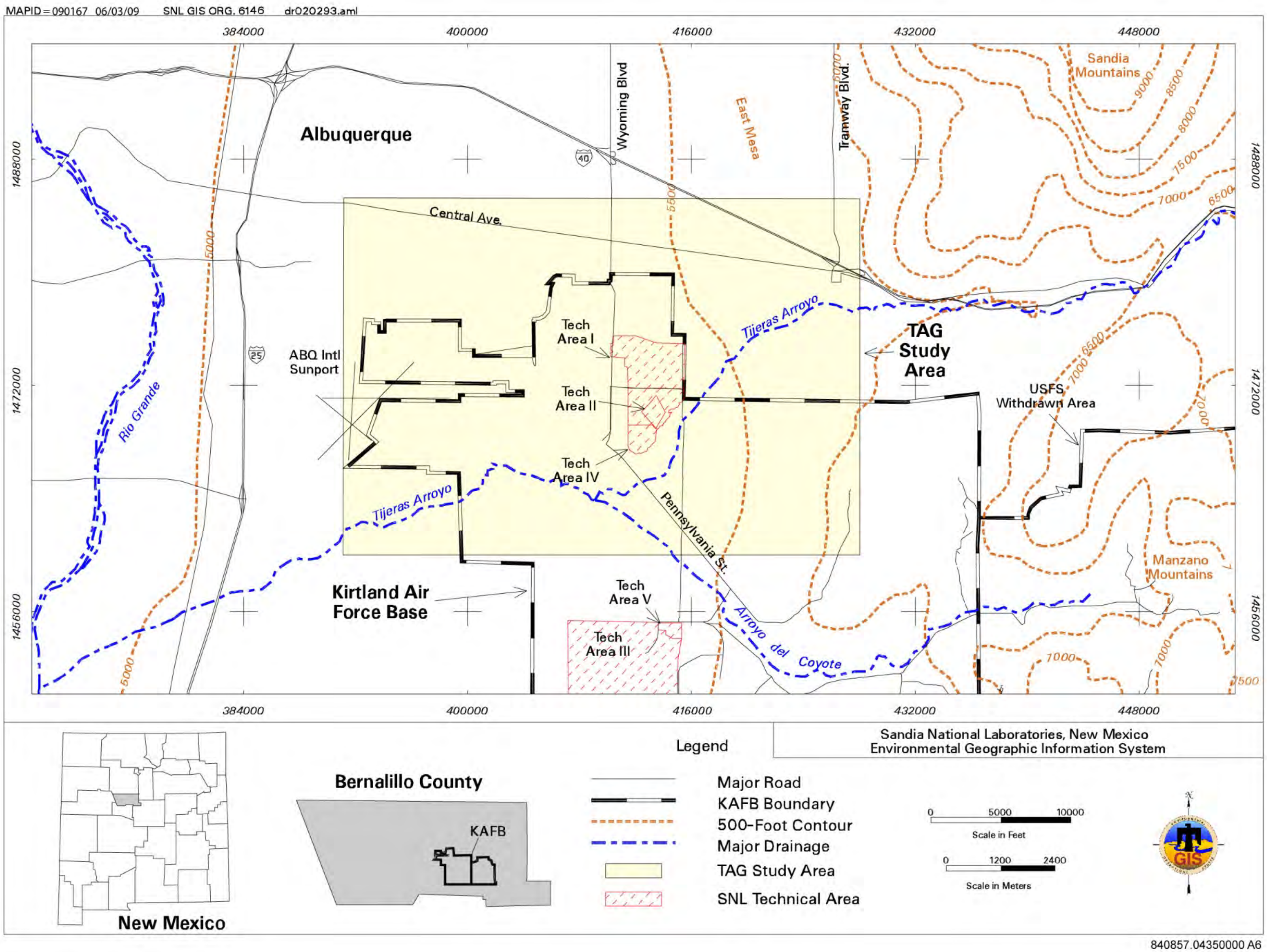


**Figure 6-1. Location of the TAG Study Area**

divided into four main types: nuclear weapon, nonnuclear weapon, technical support, and special research and development. Numerous SNL/NM facilities may have potentially released hazardous materials to the soil and groundwater; however, the current research-oriented mission of most SNL/NM operations has resulted in an inventory of numerous chemicals, which are generally stored and used indoors in small quantities.

SNL/NM Environmental Restoration (ER) Operations (formerly ER Project) has conducted numerous groundwater investigations in the TAG study area since 1992 (SNL November 2005) (Table 6-1). Many of these investigations were site-specific and conducted in support of various Solid Waste Management Unit (SWMU) assessments. Other investigations in the TAG study area were more regional studies conducted by the SNL/NM Site-Wide Hydrogeologic Characterization Project (SNL February 1998). Both KAFB and COA have also completed numerous groundwater investigations in the TAG study area, the results of which are presented in the *TAG Investigation Report* (SNL November 2005).

### 6.1.3 Monitoring History

Investigations of groundwater quality in the TAG study area have been conducted by Sandia over the past 18 years (Table 6-1). In 1992, Sandia began to investigate groundwater quality as part of the overall TA-II investigation with the installation of three groundwater monitoring wells. During this initial investigation, the PGWS was discovered at a depth of approximately 320 feet (ft) below ground surface (bgs). In October 1994, the analytical results for a groundwater sample from the PGWS showed TCE at a concentration of 1 μg/L, which caused Sandia to further investigate groundwater contamination in the study area.

Beginning in October 2000, meetings of the TAG High Performing Team (HPT) served as a forum for discussing TAG issues. During these meetings, members of the HPT debated the validity of using groundwater analytical results previously collected using low-flow sampling devices. Based on the perceived inadequacy of the sampling method, TAG quarterly groundwater sampling was temporarily suspended by Sandia until an alternative sampling method could be implemented. In June 2003, SNL/NM submitted the *TAG Investigation Work Plan* (SNL June 2003) to the New Mexico Environment Department (NMED). This work plan presented a comprehensive scope of work for groundwater investigations that are being jointly conducted by SNL/NM, KAFB, and COA. Based on the requirements of the work plan, Sandia resumed quarterly groundwater sampling in July 2003 using conventional groundwater purging/sampling techniques. The NMED approved the *TAG Investigation Work Plan* in September 2003 (NMED September 2003).

Since the initial discoveries of TCE and nitrate at the TAG study area, numerous characterization activities have been conducted (Table 6-1). The results of these characterization activities are summarized in the *TAG Investigation Report* (SNL November 2005). The November 2005 report presents a conceptual model that provides a comprehensive list of groundwater monitoring data sources used to support the investigations.

In April 2004, a Compliance Order on Consent (the Order) became effective between the DOE, Sandia and the NMED, specified that TAG was an area of groundwater contamination (NMED April 2004). In response to the Order, Sandia submitted the *TAG Corrective Measures Evaluation (CME) Work Plan* to the NMED in July 2004 (SNL July 2004). After fulfilling the requirements of the CME Work Plan, Sandia submitted the CME Report to the NMED (SNL/NM August 2005).

## Table 6-1. Historical Timeline of the TAG Study Area

| Month | Year | Event | Reference |
|---|---|---|---|
| November–July | 1992–1993 | SNL/NM began investigation of TA-II groundwater. PGWS discovered as first wells were installed (TA2-SW1-320, TA2-NW1-325, and TA2-NW1-595). | SNL March 1995a |
| March | 1994 | Groundwater sampling analytical results for TA-II wells reported in the Calendar Year 1993 SNL/NM Annual Groundwater Monitoring Report. | SNL March 1994 |
| March–July | 1994 | Installed monitoring wells TA2-W-01 and TJA-2. | SNL March 1995a |
| October | 1994 | Analytical results from groundwater sampling first detected TCE. | SNL March 1996a |
| March | 1995 | Groundwater sampling analytical results for TA-II wells reported in the Calendar Year 1994 SNL/NM Annual Groundwater Monitoring Report. | SNL March 1995b |
| August–September | 1995 | Installed monitoring wells WYO-1, WYO-2, and PGS-2. | SNL March 1996b |
| November | 1995 | Analytical results from groundwater sampling first detected TCE above the EPA MCL of 5 $\mu$g/L. | SNL March 1996b |
| November | 1995 | Installed monitoring well TA2-W-19. | SNL March 1996b |
| March | 1996 | Groundwater sampling analytical results for TA-II wells reported in the Calendar Year 1995 SNL/NM Annual Groundwater Monitoring Report. | SNL March 1996a |
| March | 1996 | Sandia North Groundwater Investigation Plan submitted to the NMED. | SNL March 1996b |
| September | 1996 | Shallow Water-Bearing Zone Hydrologic Evaluation prepared. | Wolford September 1996 |
| November | 1996 | Pressure transducer program initiated for select monitoring wells. | SNL March 1998a |
| November–December | 1996 | Installed TA-II soil-vapor monitoring wells TA2-VW-20 and TA2-VW-21. | IT January 1997 |
| March | 1997 | Groundwater sampling analytical results for Sandia North wells in TA-I and TA-II reported in the Calendar Year 1996 SNL/NM Annual Groundwater Monitoring Report. | SNL March 1997 |
| March | 1997 | Sandia North Geological Investigation Project Report prepared. | Fritts and Van Hart March 1997 |
| March–April | 1997 | Installed monitoring wells TAI-W-01 and TA2-W-25. | SNL March 1998a |
| August | 1997 | Borehole geophysical investigation (electromagnetic induction, neutron, and natural gamma) completed on 21 SNL/NM and KAFB monitoring wells. | SNL March 1998a |
| January–February | 1998 | Installed monitoring wells TAI-W-02, TAI-W-03, TAI-W-06, TA2-W-24, TA2-W-26, and TA2-W-27. | SNL June 2000 |
| March | 1998 | Groundwater sampling analytical results for Sandia North wells in TA-I and TA-II reported in the Calendar Year 1997 SNL/NM Annual Groundwater Monitoring Report. | SNL March 1998b |
| March | 1998 | Fiscal Year 1997 Sandia North Groundwater Investigation Annual Report submitted to the NMED. | SNL March 1998a |
| August–December | 1998 | Installed monitoring wells TAI-W-04, TAI-W-05, TAI-W-07, TJA-3, TJA-4, and TJA-5. | SNL June 2000 |
| March | 1999 | Groundwater sampling analytical results for Sandia North wells in TA-I and TA-II reported in the Fiscal Year 1998 SNL/NM Annual Groundwater Monitoring Report. | SNL March 1999 |
| May–June | 1999 | Colloidal borescope investigation performed on 18 SNL/NM and KAFB monitoring wells. | AquaVISION 1999 |
| October | 1999 | Analysis of the USGS aeromagnetic survey performed to revise the interpretation of the SNL/NM and KAFB area geologic structure. | Van Hart et al. October 1999 |
| March | 2000 | Groundwater sampling analytical results for Sandia North wells in TA-I and TA-II reported in the Fiscal Year 1999 SNL/NM Annual Groundwater Monitoring Report. | SNL March 2000 |
| June | 2000 | Fiscal Year 1998 Sandia North Groundwater Investigation Annual Report submitted to the NMED. | SNL June 2000 |

**Table 6-1. Historical Timeline of the TAG Study Area** *(Continued)*

| Month | Year | Event | Reference |
|---|---|---|---|
| October | 2000 | TAG High Performing Team convened for the first time. | SNL June 2003 |
| December | 2000 | Project name changed from the Sandia North to the Tijeras Arroyo Groundwater Investigation. | Collins 2000 |
| January–March | 2001 | Installed groundwater monitoring wells TJA-6 and TJA-7, and soil-vapor monitoring wells 46-VW-01, 46-VW-02, and 227-VW-01. | SNL November 2002 |
| February | 2001 | Preliminary model of the PGWS updated. | BGW February 2001 |
| April | 2001 | Groundwater sampling analytical results for TAG wells reported in the Fiscal Year 2000 SNL/NM Annual Groundwater Monitoring Report. | SNL April 2001 |
| June | 2001 | Geologic model of the PGWS updated. | Van Hart June 2001 |
| July | 2001 | Monitoring wells WYO-1 and WYO-2 plugged and abandoned, replaced by WYO-3 and WYO-4. | SNL June 2003 |
| October | 2001 | Monitoring well TA1-W-08 installed. | SNL November 2002 |
| March | 2002 | Groundwater sampling analytical results for TAG wells reported in the Fiscal Year 2001 SNL/NM Annual Groundwater Monitoring Report. | SNL March 2002 |
| November | 2002 | TAG Continuing Investigation Report submitted to the NMED. | SNL November 2002 |
| March | 2003 | Groundwater sampling analytical results for TAG wells reported in the Fiscal Year 2002 SNL/NM Annual Groundwater Monitoring Report. | SNL March 2003a |
| June | 2003 | Subsurface geology at KAFB, including the TAG area, updated. | Van Hart June 2003 |
| June | 2003 | TAG Investigation Work Plan submitted to the NMED. | SNL June 2003 |
| September | 2003 | TAG Investigation Work Plan approved by the NMED. | NMED September 2003 |
| December–January | 2003–2004 | ER Project conducts slug (hydraulic conductivity) tests at groundwater monitoring wells. | Collins 2004 |
| March | 2004 | Groundwater sampling analytical results for TAG wells reported in the Fiscal Year 2003 SNL/NM Annual Groundwater Monitoring Report. | SNL March 2004 |
| April | 2004 | NMED issues the Compliance Order on Consent (the Consent Order), which identified TAG as an area with groundwater contamination requiring a CME. | NMED April 2004 |
| July | 2004 | TAG CME Work Plan submitted to the NMED. | SNL July 2004 |
| July-August | 2004 | Monitoring wells TAG-SV-01 through TAG-SV-05 were installed. | SNL November 2005 |
| October | 2004 | TAG CME Work Plan for the SNL/NM Area of Responsibility approved by the NMED. | NMED October 2004 |
| September | 2005 | CME Report for TAG submitted to NMED. | SNL August 2005 |
| October | 2005 | Groundwater sampling analytical results for TAG wells reported in the Fiscal Year 2004 SNL/NM Annual Groundwater Monitoring Report. | SNL October 2005 |
| November | 2005 | SNL/NM submits TAG Investigation Report to the NMED. | SNL November 2005 |
| November | 2006 | Groundwater sampling analytical results for TAG wells reported in the Fiscal Year 2005 SNL/NM Annual Groundwater Monitoring Report. | SNL November 2006 |
| March | 2007 | Groundwater sampling analytical results for TAG wells reported in the Fiscal Year 2006 SNL/NM Annual Groundwater Monitoring Report. | SNL March 2007 |
| March | 2008 | Groundwater sampling analytical results for TAG wells reported in the Fiscal Year 2007 SNL/NM Annual Groundwater Monitoring Report. | SNL March 2008 |
| August | 2008 | NMED issues Notice of Disapproval on November 2005 TAG Investigation Report. | NMED August 2008 |
| February | 2009 | SNL/NM submits Response to NMED's August 2008 Notice of Disapproval on November 2005 TAG Investigation Report. | SNL February 2009 |

**Table 6-1. Historical Timeline of the TAG Study Area** *(Concluded)*

| Month | Year | Event | Reference |
|---|---|---|---|
| June | 2009 | Groundwater sampling analytical results for TAG wells reported in the Calendar Year 2008 SNL/NM Annual Groundwater Monitoring Report. | SNL June 2009 |
| April | 2009 | NMED requires characterization of perchlorate in groundwater in five wells in the TAG study area. | NMED April 2009 |
| August | 2009 | NMED issues Second Notice of Disapproval on November 2005 TAG Investigation Report. | NMED August 2009 |
| January | 2010 | SNL/NM submits Response to NMED's August 2009 Second Notice of Disapproval on November 2005 TAG Investigation Report | SNL January 2010 |
| February | 2010 | NMED issues Notice of Approval for the November 2005 TAG Investigation Report. | NMED February 2010 |
| October | 2010 | Groundwater sampling analytical results for TAG wells reported in the Calendar Year 2009 SNL/NM Annual Groundwater Monitoring Report. | SNL October 2010a |

**NOTES:**

BGW = Balleau Groundwater, Inc.
CME = Corrective Measures Evaluation
EPA = U.S. Environmental Protection Agency.
ER = Environmental Restoration.
IT = IT Corporation.
KAFB = Kirtland Air Force Base.
MCL = Maximum Contaminant Level.
μg/L = Microgram(s) per liter.
NMED = New Mexico Environment Department.
PGWS = Perched Groundwater System.
Sandia = Sandia Corporation.
SNL = Sandia National Laboratories.
SNL/NM = Sandia National Laboratories/New Mexico.
TA = Technical Area.
TAG = Tijeras Arroyo Groundwater.
TCE = Trichloroethene.
USGS = U.S. Geological Survey.

Table XI-1 of the Order (NMED April 2004) specifies the minimum sampling frequency for the groundwater monitoring and sampling schedule for TAG as: "Six events – after the TAG HPT Characterization Plans approved by the Department and starting no later than first quarter of Calendar Year 2004 . . . ." The six quarterly sampling events required by the work plan were completed at the end of Fiscal Year 2005. Having fulfilled those requirements, Sandia has continued groundwater monitoring on a voluntary basis, and TAG wells have been sampled quarterly, semiannually, or annually. All sampling continues to follow the procedures outlined in the NMED-approved work plan (SNL June 2003).

### 6.1.4 Current Monitoring Network

Currently, 21 wells in the TAG study area are being monitored for water quality, and 27 wells are monitored for water levels (Figure 6-2; Table 6-2). Two groundwater systems are present in the TAG study area: the PGWS at approximately 220 to 330 ft bgs, and the regional aquifer groundwater system at approximately 440 to 570 ft bgs. Groundwater monitoring wells are completed either in the PGWS or regional aquifer (Table 6-2).

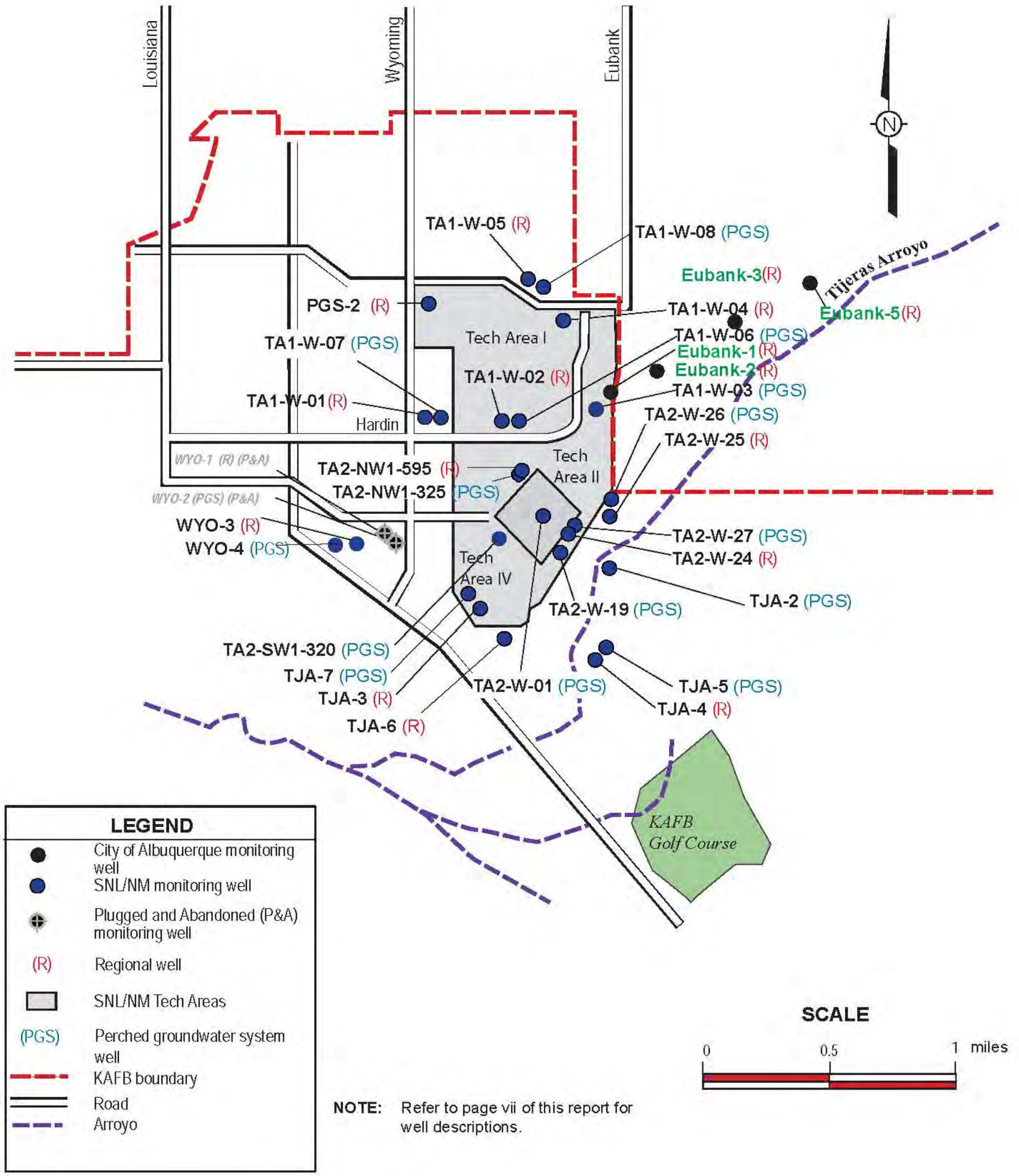


**Figure 6-2. Tijeras Arroyo Groundwater (TAG) Investigation Monitoring Well Locations**

**Table 6-2. Groundwater Monitoring Wells in the TAG Study Area**

| Well | Installation Year | WQ | WL | Comments |
|---|---|---|---|---|
| Eubank-1 | 1988 | | ✓ | Regional aquifer (COA well) |
| Eubank-2 | 1997 | | ✓ | Regional aquifer (COA well)[a] |
| Eubank-3 | 1997 | | ✓ | Regional aquifer (COA well)[a] |
| Eubank-5 | 1997 | | ✓ | Regional aquifer (COA well)[a] |
| PGS-2 | 1995 | ✓ | ✓ | Regional aquifer |
| TA1-W-01 | 1997 | ✓ | ✓ | Regional aquifer |
| TA1-W-02 | 1998 | ✓ | ✓ | Regional aquifer |
| TA1-W-03 | 1998 | ✓ | ✓ | PGWS |
| TA1-W-04 | 1998 | ✓ | ✓ | Regional aquifer |
| TA1-W-05 | 1998 | ✓ | ✓ | Regional aquifer |
| TA1-W-06 | 1998 | ✓ | ✓ | PGWS |
| TA1-W-08 | 2001 | ✓ | ✓ | PGWS |
| TA2-NW1-595 | 1993 | ✓ | ✓ | Regional aquifer |
| TA2-SW1-320 | 1992 | ✓ | ✓ | PGWS |
| TA2-W-01 | 1994 | ✓ | ✓ | PGWS |
| TA2-W-19 | 1995 | ✓ | ✓ | PGWS |
| TA2-W-25 | 1997 | | ✓ | Regional aquifer |
| TA2-W-26 | 1998 | ✓ | ✓ | PGWS |
| TA2-W-27 | 1998 | ✓ | ✓ | PGWS |
| TJA-2 | 1994 | ✓ | ✓ | PGWS |
| TJA-3 | 1998 | ✓ | ✓ | Regional aquifer |
| TJA-4 | 1998 | ✓ | ✓ | Regional aquifer |
| TJA-5 | 1998 | | ✓ | PGWS |
| TJA-6 | 2001 | ✓ | ✓ | Regional aquifer |
| TJA-7 | 2001 | ✓ | ✓ | PGWS |
| WYO-3 | 2001 | ✓ | ✓ | Regional aquifer |
| WYO-4 | 2001 | ✓ | ✓ | PGWS |

**NOTE:** Check marks in the WQ and WL columns indicate WQ sampling and WL measurements were obtained during this reporting period.

[a]WL data for Eubank-2, Eubank-3, and Eubank- 5 provided by Jake Daugherty, Environmental Service Division of the City of Albuquerque Environmental Health Department.

COA = City of Albuquerque.
PGWS = Perched Groundwater System.
TAG = Tijeras Arroyo Groundwater.
WL = Water level.
WQ = Water quality.

### 6.1.5 Summary of Calendar Year 2010 Activities

The following activities took place for the TAG investigation during Calendar Year (CY) 2010:

- Monthly or quarterly water level measurements were obtained from TAG wells.
- Quarterly groundwater sampling events were conducted at seven wells (TA2-SW1-320, TA2-W-19, TA2-W-26, TJA-2, TJA-4, TJA-7, and WYO-4) in January/February 2010, May 2010, July/August 2010, and October/November 2010 (SNL December 2009, April 2010, June 2010, and October 2010b).

- Semiannual groundwater sampling was conducted at four wells (TA2-W-01, TA2-W-27, TJA-3, and TJA-6) in January/February 2010 and July/August 2010 (SNL December 2009 and June 2010).

- Annual groundwater sampling was conducted at nine wells (PGS-2, TA1-W-01, TA1-W-02, TA1-W-04, TA1-W-05, TA1-W-06, TA1-W-08, TA2-NW1-595, and WYO-3) in July/August 2010 (SNL June 2010).

- Quarterly perchlorate screening groundwater sampling was conducted at up to five wells (TA1-W-03, TA1-W-06, TA1-W-08, TA2-W-01, and TA2-W-27) in January/February 2010, May 2010, July/August 2010, and October/November 2010 (SNL December 2009, April 2010, June 2010, and October 2010b).

- Responses to the NMED's second *Notice of Disapproval of November 2005 TAG Investigation Report* were submitted to the NMED (SNL January 2010).

- The *Approval of the November 2005 TAG Investigation Report* (NMED February 2010) was received from the NMED.

- Quarterly reporting of perchlorate analyses for TA1-W-03, TA1-W-06, TA1-W-08, TA2-W-01, and TA2-W-27 was conducted.

- Tables of analytical results (Attachment 6A), concentration versus time graphs (Attachment 6B), and hydrographs (Attachment 6C) were prepared in support of this report.

### 6.1.6 Summary of Future Activities.

The following activities are anticipated for the TAG Investigation during the next reporting period (CY 2011):

- Monthly or quarterly water level measurements from TAG wells.

- Quarterly groundwater sampling at seven wells: TA2-SW1-320, TA2-W-19, TA2-W-26, TJA-2, TJA-4, TJA-7, and WYO-4.

- Semiannual groundwater sampling at four wells: TA2-W-01, TA2-W-27, TJA-3, and TJA-6.

- Annual groundwater sampling at 10 wells: PGS-2, TA1-W-01, TA1-W-02, TA1-W-03, TA1-W-04, TA1-W-05, TA1-W-06, TA1-W-08, TA2-NW1-595, and WYO-3.

### 6.1.7 Current Conceptual Model

Two groundwater systems are present in the TAG study area: the PGWS at approximately 220 to 330 ft bgs, and the regional aquifer groundwater system at approximately 440 to 570 ft bgs. The uppermost saturated interval of the PGWS is between 10 and 30 ft in thickness. Water in the PGWS moves to the southeast and is assumed to merge with the underlying regional aquifer southeast of Tijeras Arroyo. Figure 6-3 presents a diagram of the TAG conceptual model.

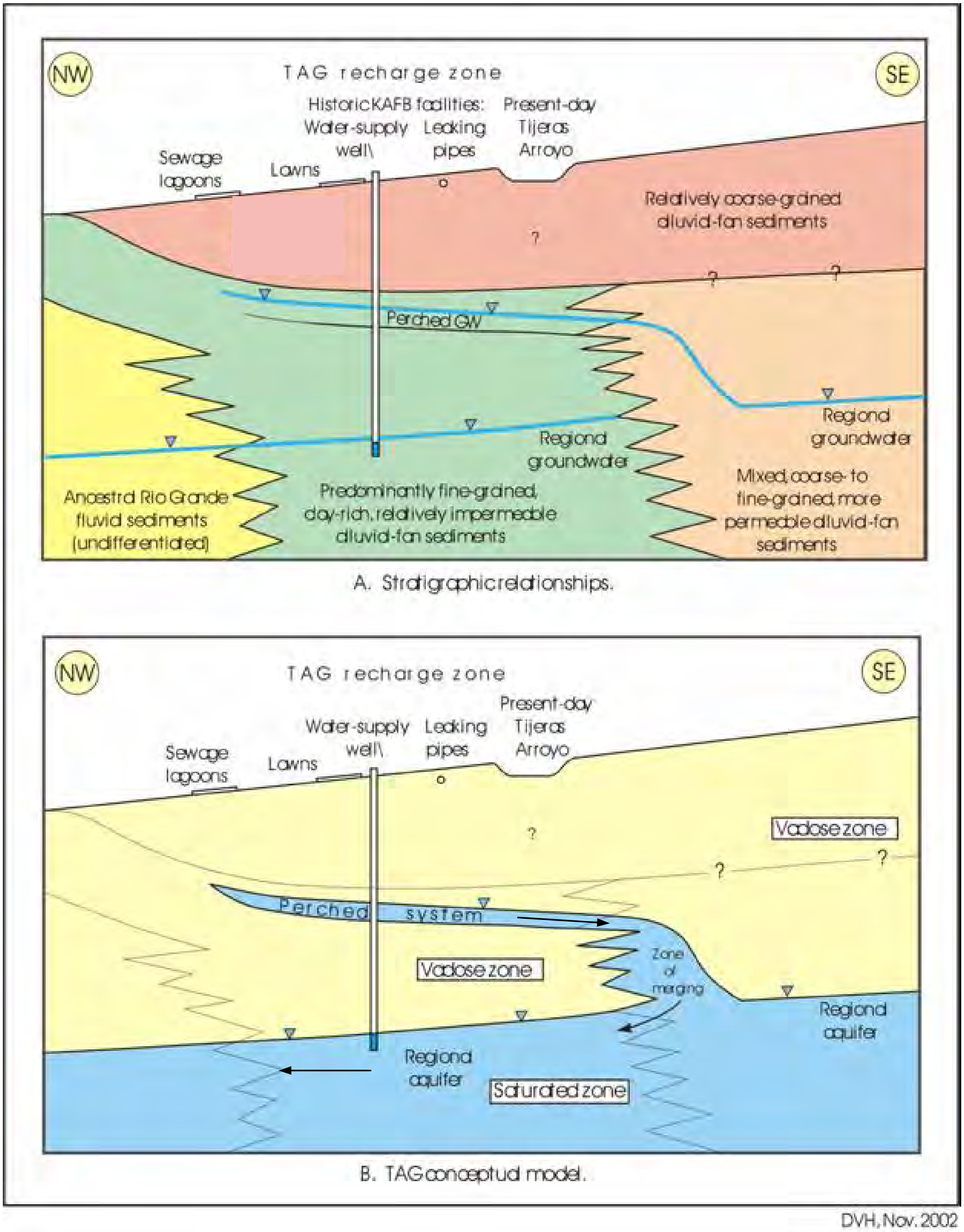


**Figure 6-3. TAG Conceptual Model Illustration**

Data pertaining to the hydrogeologic setting have been synthesized into the TAG conceptual model. The hydrogeologic setting for the TAG study area is well understood based on a significant number of monitoring wells. Groundwater occurs in both the PGWS and regional aquifer. However, the PGWS has a limited lateral extent that encompasses approximately 3.8 sq mi of north-central KAFB. The PGWS may extend northward across the KAFB boundary. In the TAG study area, the depth to groundwater for the PGWS ranges from 220 to 330 ft bgs. The uppermost saturated zone in the PGWS varies from approximately 10 to 30 ft in thickness, depending on the well location. Borehole geophysical surveys indicate that a few relatively damp intervals are present below the uppermost saturated zone, but borehole-yield testing has revealed that most of these deeper intervals are too thin to yield volumes of water sufficient for the construction of monitoring wells. The PGWS is not used as a water supply source.

The direction of groundwater flow in the PGWS is to the southeast. Groundwater flows through low-yield, alluvial fan sediments with an average hydraulic gradient of approximately 0.008 feet per foot (ft/ft). Groundwater elevations in the PGWS are decreasing in the northwestern portion of the study area but are increasing in the southeastern area. The PGWS is recharged by both artificial (leaking water supply/sewer lines and the former sewage lagoons) and natural sources (Tijeras Arroyo and possibly ancestral Tijeras Creek). Principal hydrogeologic controls on the PGWS include: (1) eastward bedding-plane dip attributed to the western limb of an inferred syncline; (2) stratigraphic variations (such as braided paleochannels); and (3) multiple recharge locations in the northwestern portion of the TAG study area.

Multiple overlapping lenses of low conductivity, mostly unsaturated sediments, serve as a perching horizon beneath the PGWS. Beneath the central TAG study area, a layer of approximately 180 to 280 ft of these unsaturated sediments separates the PGWS from the regional aquifer. Groundwater in the PGWS merges with the regional aquifer southeast of Tijeras Arroyo where the alluvial fan sediments are slightly more permeable.

The regional aquifer is more laterally extensive than the PGWS, underlying the entire TAG study area as well as the Albuquerque Basin. Across the TAG study area, the depth to the regional aquifer ranges from approximately 440 to 570 ft bgs. The regional aquifer is composed of both the Ancestral Rio Grande (ARG) fluvial facies and alluvial fan facies. Locally, groundwater in the regional aquifer flows to the northwest, in a nearly opposite direction to that of the PGWS. The gradient in the regional aquifer averages approximately 0.009 ft/ft across the TAG study area, but is steeper near the KAFB, COA, and Veterans Administration (VA) water supply wells. The regional aquifer is recharged on the eastern side of the study area by natural sources including mountain-front flow, Tijeras Arroyo, and the PGWS. Groundwater elevations are generally decreasing in the northwestern portion of the study area but are increasing in the southeastern area. Seasonal pumping variations cause sporadic water-level fluctuations near the water supply wells. The principal hydrogeologic control upon groundwater flow direction in the regional aquifer is the combined drawdown effect of the KAFB, COA, and VA water supply wells.

The aqueous geochemical signatures of the PGWS and the regional aquifer are distinctive. The geochemical signatures of the PGWS vary between well locations but tend to exhibit higher concentrations of calcium, sulfate, and chloride than those for the regional aquifer. Groundwater in the regional aquifer exhibits higher bicarbonate/alkalinity concentrations.

#### 6.1.7.1 Regional Hydrogeologic Conditions

Tijeras Arroyo is the most significant surface-water drainage feature on KAFB and trends southwest across KAFB to eventually drain into the Rio Grande, approximately 6 miles west of KAFB. Surface water flows in the arroyo several times per year as a result of storm events. The average annual precipitation for the area, as measured at the Albuquerque International Sunport, is 8.2 inches (SNL February 2001). During most rainfall events, rainfall quickly infiltrates into the soil in the study area. However, virtually all of the moisture subsequently undergoes evapotranspiration. Estimates of evapotranspiration for the KAFB area range from 95 to 99 percent of the annual rainfall (SNL February 1998).

The TAG study area overlies the eastern margin of the Albuquerque Basin where the basin-bounding faults mostly trend parallel to the Sandia-Manzanita-Manzano mountain front. The stratigraphic unit of greatest interest is the Upper Santa Fe Group, which is primarily composed of two interfingering lithofacies: an alluvial-fan lithofacies and a fluvial lithofacies. Both lithofacies are less than 5 million years old and are composed of unconsolidated to poorly cemented gravel, sand, silt, and clay (Stone et al. February 2000). The alluvial-fan lithofacies consists of poorly sorted piedmont-slope deposits derived from the Sandia, Manzanita, and Manzano Mountains east of the study area. Fine-grained units within the alluvial-fan lithofacies produce low-permeability zones that are capable of perching groundwater. The fluvial lithofacies is derived from the ARG to the north and is typically well sorted and medium- to coarse-grained.

#### 6.1.7.2 Hydrologic Conditions at the TAG Study Area

The thickness of the vadose zone is reduced in the central portion of the TAG study area where the PGWS is present. Discontinuous, yet overlapping multiple lenses of unsaturated alluvial-fan sediments serve as a perching horizon beneath the PGWS in that area. The PGWS is present at approximately 220 to 330 ft bgs, and the regional aquifer system is present at approximately 440 to 570 ft bgs. Groundwater in the PGWS most likely merges with the regional aquifer southeast of Tijeras Arroyo where the alluvial-fan sediments are slightly more permeable.

A comparison of aquifer characteristics for the PGWS and the regional aquifer in the TAG study area is provided in Table 6-3. The PGWS is presently understood to cover approximately 3.8 sq mi. Monitoring wells bound the PGWS on the western and southern margins. The northern margin of the PGWS has not been fully defined and may extend across the northern KAFB boundary (Figure 6-1). A southeastern margin is not discernible because the PGWS merges with the regional aquifer. The direction of groundwater flow in the PGWS is inferred to be principally to the southeast, with a horizontal gradient that varies from approximately 0.02 to 0.004 ft/ft. The vertical gradient is approximately 0.95 ft/ft over most of the PGWS, and continuous vertical flow is suggested by the merging of the two groundwater systems to the southeast.

#### 6.1.7.3 Local Direction of Flow

Figure 6-4 presents the current potentiometric surface for the PGWS (October 2010). Groundwater elevations presented in this potentiometric surface map reflect new survey coordinates. Until recently, ER Operations provided survey coordinates that were based on the New Mexico State Plane Coordinate System, Central Zone, North American Datum of 1927 and Northern Geographic Vertical Datum of 1929 for elevations. In order to be consistent with current SNL/NM Facilities and KAFB survey practices, ER Operations survey data now are based on New Mexico State Plane Coordinate System, Central Zone, North American Datum of 1983 (NAD83) and North American Vertical Datum of 1988 (NAVD88). Location information for wells surveyed before August 2010 has been mathematically converted to the new NAD83/NAVD88 coordinates using National Geodetic Survey-approved software.

The direction of groundwater flow in the PGWS is towards the southeast. The horizontal gradient of the PGWS varies from approximately 0.02 to 0.004 ft/ft. Historically, water levels in the PGWS have fluctuated across the study area (SNL November 2005). In the vicinity of the former sewage lagoons, water levels have been declining since 1987, apparently in response to the lagoons being removed from service. Conversely, water levels have increased southeast of Tijeras Arroyo (Attachment 6C, Figures 6C-1 through 6C-11).

**Table 6-3. Comparison of the Perched Groundwater System and the Regional Aquifer in the Tijeras Arroyo Groundwater Study Area (SNL November 2005)**

| Characteristic | PGWS | Regional Aquifer |
|---|---|---|
| Pressure Head | Unconfined (water table) conditions | Unconfined to semiconfined conditions |
| Lithofacies Distribution | Restricted to the alluvial-fan lithofacies | Contained within both the alluvial-fan lithofacies and the ARG fluvial lithofacies |
| Flow Direction | Primarily to the southeast | Primarily to the northwest |
| Horizontal Gradient | Approximate average of 0.007 ft/ft | Approximate average of 0.009 ft/ft, but steeper near water supply wells |
| Flow velocities | 4 to 10 ft/yr | 4 to 10 ft/yr |
| Usage | Not used for water supply purposes | Utilized for water supply by KAFB, COA, and VA |
| Lateral extent | Limited lateral extent across north-central KAFB | Laterally extensive across the Albuquerque Basin |
| Saturated Thickness | Uppermost saturated interval only about 10 to 30 ft in thickness | In excess of 1,000 ft thick across much of the study area |
| Geochemical Variability | Geochemical signatures variable between monitoring wells | Geochemical signatures consistent between monitoring wells |
| Geochemical | High chloride, nitrate, and sulfate concentrations | Low calcium concentrations but high bicarbonate/alkalinity concentrations |
| Water levels | Steadily declining water levels in the northwest, but increasing in the southeast part of the TAG study area | Steadily declining water levels in the northwest, but increasing in the southeast part of the TAG study area |
| Recharge | Recharged by both anthropogenic (leaking water supply/sewer lines, irrigated lawns, Tijeras Arroyo Golf Course), and natural sources such as Tijeras Arroyo | Recharged by natural sources including mountain front flow, the perched system, and Tijeras Arroyo |
| Principal Hydrologic Controls | Stratigraphic variations such as multiple overlapping lenses; several recharge locations; stratigraphic dip of the alluvial-fan sediments | Combined drawdown of KAFB, COA, and VA water supply wells |

**NOTES:**

ARG = Ancestral Rio Grande (facies).
COA = City of Albuquerque.
ft = Foot (feet).
ft/ft = Feet/foot.
ft/yr = Feet per year.
KAFB = Kirtland Air Force Base.
PGWS = Perched Groundwater System.
SNL = Sandia National Laboratories.
TAG = Tijeras Arroyo Groundwater.
VA = Veterans Administration.

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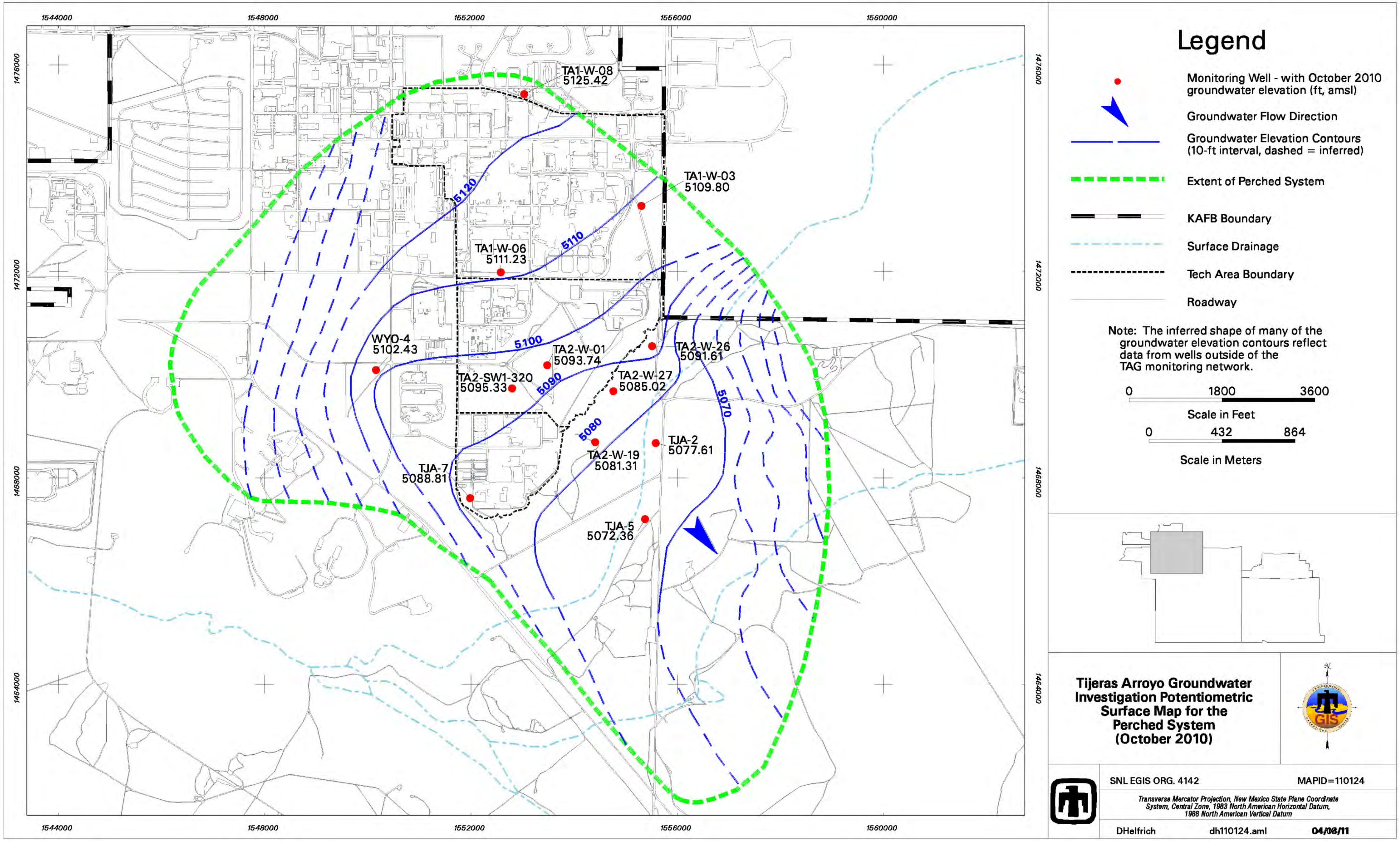


Figure 6-4. Tijeras Arroyo Groundwater Investigation Potentiometric Surface Map for the Perched Groundwater System (October 2010)

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Figure 6-5 presents the current potentiometric surface for the regional aquifer (October 2010). The direction of groundwater flow in the regional aquifer is to the northwest towards the KAFB, COA, and VA water supply wells. The horizontal gradient of the regional aquifer across the central portion of the study area is approximately 0.01 ft/ft. Vertical flow gradients within the TAG study area have not been measured but are inferred to be downward, consistent with TA-V groundwater studies.

Historically, water levels in the regional aquifer have fluctuated across the study area (SNL November 2005). A line of demarcation between increasing and declining water levels is evident along the eastern extent of the ARG-fluvial lithofacies. Declining water levels approaching 1.5 feet/year (ft/yr) are apparently associated with the KAFB, COA, and VA water supply wells. Increases in groundwater elevations of up to 1.8 ft/yr in the southeast portion of the study area reflect recharge of the regional aquifer from the PGWS, Tijeras Arroyo, the golf course, and the mountain front (Attachment 6C, Figures 6C-1 through 6C-11).

#### 6.1.7.4 Contaminant Sources

Sandia, the KAFB Installation Restoration Program (IRP), and the COA have evaluated a variety of potentially contaminated sites. The *TAG Investigation Report* (SNL November 2005) presents a comprehensive summary of the environmental investigations that have been conducted by these three parties. As described in the report, two potential TCE and three potential nitrate sources are believed to be the responsibility of Sandia. A brief description of each potential release site is provided as follows.

**SWMU 46 (Old Acid Waste Line Outfall)—TCE and Nitrate:** An estimated 1.3 billion gallons of wastewater from six TA-I research/office buildings (839, 840, 841, 860, 863, and 892) discharged into the three outfall ditches at the south end of SWMU 226. Possible TCE and nitrate were present in the wastewater. Septic water from possible cross-connects between the SWMU 226 waste line and sewer lines may have discharged at SWMU 46. In 2000, two soil-vapor monitoring wells were installed at SWMU 46, and soil-vapor sampling was conducted quarterly. Well 46-VW-01 is located near the waste-line outfall, and sampling ports are set at 50-ft intervals from 15 to 265 ft bgs. The maximum TCE concentration to date is 46,000 parts per billion by volume (ppbv) from 115 ft bgs. Well 46-VW-02, located 900 ft farther southeast, has sampling ports set at 50-ft intervals from 46 to 296 ft bgs. The maximum TCE concentration to date at this well is 650 ppbv from 96 ft bgs.

**SWMU 165 (Building 901 Septic System)—TCE and Nitrate:** The septic system leach field is connected to a personnel shower/laundry facility (Building 901) and small research/machine shop (Building 902). Possible TCE and high explosives were present in the wastewater. No significant contamination has been detected in soil samples. Groundwater samples from PGWS monitoring well TA2-SW1-320 have contained a maximum nitrate concentration of 44 mg/L.

**SWMU 187 (TA-I Sanitary Sewer System)—Nitrate:** The sanitary sewer system has sewer lines that are possibly leaking and several cross-connects with wastewater lines. The system is connected to numerous research/office buildings in TA-I. No significant contamination has been detected in soil samples.

Soil-vapor and soil samples collected from the vadose zone (land surface to the water table) during drilling operations and from the vapor monitoring network have indicated evidence of vapor-phase contaminants. However, no free-phase TCE and no water-saturated core samples have been encountered in any of the soil samples collected from the boreholes. The original source of the TCE was the aqueous phase (i.e., wastewater), and the current vapor phase contaminants partitioned from the aqueous phase. All anthropogenic sources of recharge (i.e., wastewater) have been removed from service and no longer contribute water to the vadose zone.

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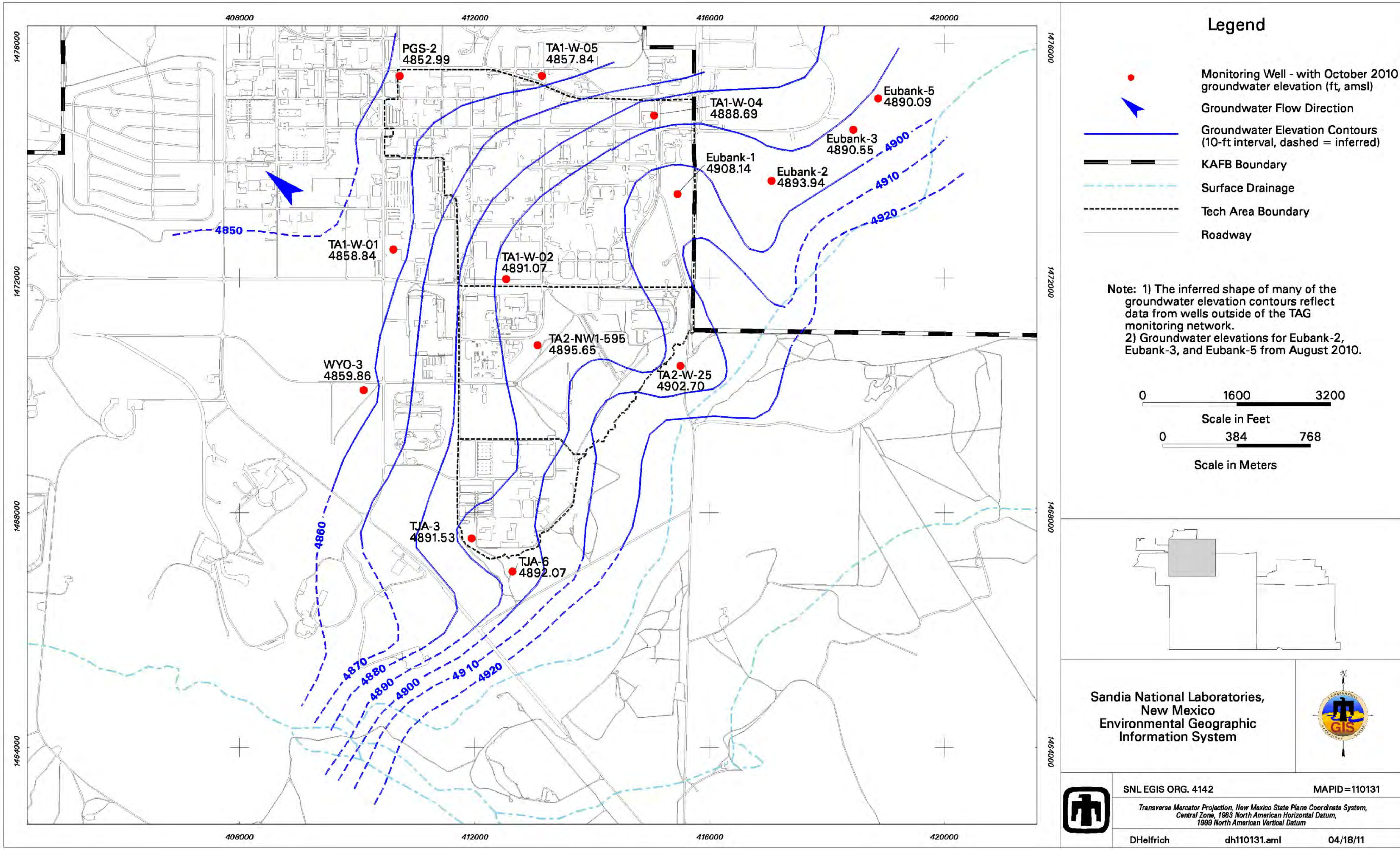


**Figure 6-5. Tijeras Arroyo Groundwater Investigation Potentiometric Surface Map for the Regional Aquifer (October 2010)**

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Based on soil-vapor data (SNL November 2005), the mass of TCE that the vapor phase is contributing to the aquifer is minimal. In addition, the consistency of soil-vapor concentration measurements over time indicates that this TCE vapor plume is immobile. Therefore, the only potential mechanism for transporting these contaminants to the aquifer would be through partitioning back into the aqueous phase of additional recharge that might move through the system. Given that both current anthropogenic and natural recharge to the PGWS is minimal, it is extremely unlikely that significant transport of the vadose zone TCE into the aquifer will ever occur. Therefore, the vapor phase TCE in the vadose zone is not considered to be a continuing source of contamination to the groundwater that needs to be addressed under the source control criteria defined in the *Resource Conservation and Recovery Act (RCRA) Corrective Action Plan* (EPA May 1994).

Nitrate was present in sewage wastewater discharged to septic systems and sanitary sewer lines in the area. The nitrate was transported to the PGWS water table by high volumes of wastewater disposed of at the sites. Because nitrate is extremely soluble and cannot exist as a separate phase (i.e., vapor or nonaqueous phase liquid), and because no water-saturated core samples have been encountered in any of the soil samples collected from boreholes, a secondary source of anthropogenic nitrate contamination in the vadose zone does not exist.

#### 6.1.7.5 Contaminant Distribution and Transport in Groundwater

**Perched Groundwater System**

The distribution of TCE is discontinuous across the PGWS and does not indicate a single release site. Based on the historic use of chlorinated solvents across SNL/NM and KAFB, the known extent of TCE in the PGWS is associated with multiple releases of aqueous-phase solvents and subsequent transport through the vadose zone.

The maximum historical concentration of TCE in the PGWS is 9.6 μg/L for well TA2-W-26; samples from only three TAG study area wells have exceeded the MCL for TCE (5 μg/L) (TA2-W-19, TA2-W-26, and WYO-4).

The maximum historical concentration of nitrate in the PGWS within the TAG study area is 44 mg/L for well TA2-SW1-320. Concentrations of nitrate in the PGWS exceeding the MCL for nitrate (10 mg/L) are scattered across the TAG study area. Historically, two plumes have been identified in the PGWS, consisting of Plume 3 beneath SNL/NM TA-II and Plume 4 beneath the Tijeras Arroyo Golf Course (MWH Americas, Inc. July 2003). However, the subsequent installation and sampling of several monitoring wells failed to identify a boundary between Plumes 3 and 4. Therefore, the perched aquifer nitrate plume is now shown as one contiguous plume and is referred to as Plume 4 (CH2M HILL, Inc. June 2009).

Plume 4, which originates near monitoring well TA2-SW1-320, is located underneath the southwest portion of TA-II and extends southward to the Tijeras Arroyo Golf Course. The plume is 2 miles long and 0.8 miles wide (CH2M HILL, Inc. June 2009), and the upgradient portion is considered to emanate from SWMU 165, the Building 901 Septic System.

**Regional Aquifer**

The regional aquifer monitoring wells have generally yielded no samples with detectable TCE concentrations except for low-level detections in samples from TJA-3. No samples from the SNL/NM TAG study area regional aquifer wells exceed the MCL of 5 μg/L for TCE.

In the regional aquifer, samples from nine SNL/NM TAG study area wells have exceeded the MCL for nitrate during at least one sampling event. The maximum historical concentration of nitrate for wells completed in the regional aquifer system is 49 mg/L for monitoring well TJA-4. The nitrate contamination in the regional aquifer southeast of TA-II forms what is referred to as Plume 2 (CH2M HILL, Inc. June 2009). Plume 2 is most likely responsible for the nitrate concentrations in samples from TJA-4, a well near where the PGWS and regional aquifer merge. Plume 2 is 3 miles long and 1.5 miles wide and the potential sources of nitrate contamination are not completely defined (CH2M HILL, Inc. June 2009).

Potential downgradient receptors for the TAG nitrate and TCE plumes are the COA and KAFB well fields to the north and northwest. Numerical simulations suggest that nitrate and TCE in the PGWS would migrate to the southeast, merge with the regional aquifer, and then travel back to the north and northwest. Additionally, downgradient nitrate and TCE concentrations are decreasing in groundwater to below levels of concern through dispersion and dilution as the plume moves into the more hydraulically conductive deposits at the COA and KAFB well fields.

## 6.2 Regulatory Criteria

The NMED Hazardous Waste Bureau provides regulatory oversight of SNL/NM ER Operations as well as implements and enforces federal regulations mandated by RCRA. All ER SWMUs and Areas of Concern (AOCs) are listed in Module IV of the SNL/NM RCRA Part B Operating Permit, *Special Conditions Pursuant to the 1984 Hazardous and Solid Waste Amendments (HSWA) to RCRA for Sandia National Laboratories* (NMED 1993).

All investigations and corrective action requirements pertaining to SWMUs and AOCs are contained in the Order (NMED April 2004). The groundwater monitoring activities for the TAG investigation are not associated with a single SWMU but are more regional in nature. Groundwater characterization activities for TAG were originally conducted voluntarily as proposed in the Groundwater Investigation Plan (SNL March 1996b). More recently TAG activities have been conducted as required by the NMED-approved *TAG Investigation Work Plan* (SNL June 2003).

The Order, effective in April 2004, transferred regulatory authority for corrective action requirements from the HSWA module to the Order. The TAG investigation must comply with requirements set forth in the Order for site characterization and the development of a CME. The Order also contains schedules that define dates for the delivery of plans and reports related to TAG. The NMED is the regulatory agency responsible for enforcing the requirements identified in the Order for the CME.

Although the Order requires that the DOE and Sandia evaluate the nature and extent of contamination in the TAG study area, no specific reporting requirements are prescribed in the Order. However, the *TAG Investigation Report* (SNL November 2005) specifies that data would continue to be presented in annual reports such as this Groundwater Protection Program (GWPP) Annual Groundwater Monitoring Report. The outline of this report is based on the required elements of a "Periodic Monitoring Report" described in Section X.D. of the Order (NMED April 2004).

In this report, TAG monitoring data are presented for both hazardous and radioactive constituents; however, the monitoring data for radionuclides (gamma spectroscopy, gross alpha/beta activity, and tritium) are provided voluntarily by the DOE/Sandia. The voluntary inclusion of such radionuclide information shall not be enforceable and shall not constitute the basis for any enforcement because such information falls wholly outside the requirements of the Order. Additional information on radionuclides and the scope of the Order is available in Section III.A of the Order (NMED April 2004).

## 6.3 Scope of Activities

The CY 2010 activities for the TAG investigation, including plans and reports, are listed in Section 6.1.5. However, the only field activity completed in the study area was groundwater monitoring. The four groundwater sampling events are summarized in Table 6-4, and the analytical parameters for each well and each sampling event are listed in Table 6-5.

Quality control (QC) samples are collected in the field at the time of environmental sample collection. Field QC samples include equipment blank (EB) samples, duplicate samples, split samples, and trip blank (TB) samples. Field QC samples are used to monitor the sampling process. EB samples are used to verify the effectiveness of sampling equipment decontamination procedures. Duplicate samples are used to measure the precision of the sampling process. Split samples are used to verify the performance of the analytical laboratory. TB samples are used to determine whether volatile organic compounds (VOCs) contaminated the sample during preparation, transportation, and handling prior to receipt by the analytical laboratory.

## 6.4 Field Methods and Measurements

The monitoring procedures, as conducted by ER Operations personnel, are consistent with procedures identified in the EPA technical enforcement guidance document (EPA 1986). The following sections provide an overview of the sampling and data collection procedures.

### 6.4.1 Groundwater Elevation

Throughout CY 2010, water level measurements were obtained to determine groundwater flow directions, hydraulic gradients, and changes in water table elevations. Water levels are periodically measured in TAG monitoring wells according to the instructions and requirements specified in SNL/NM Field Operating Procedure (FOP) 03-02, *Groundwater Level Data Acquisition and Management,* Rev. 02 (SNL November 2007). The water level information was used to create the potentiometric surface maps presented in Figures 6-4 and 6-5 and the hydrographs presented in Attachment 6C.

### 6.4.2 Well Purging and Water Quality Measurements

A portable Bennett™ groundwater sampling system was used to collect the groundwater samples from TAG wells. The wells are purged a minimum of one saturated screen volume. Field water quality measurements for turbidity, pH, temperature, specific conductance (SC), oxidation-reduction potential (ORP), and dissolved oxygen (DO) were recorded from the well prior to collecting groundwater samples, according to SNL/NM FOP 05-01 (SNL August 2007a). Groundwater temperature, SC, ORP, DO, and pH were measured using a YSI™ Model 620 water quality meter. Turbidity was measured with a HACH™ Model 2100P portable turbidity meter.

The amount of water required to achieve stability of field parameters is fairly consistent. However, the ability of the aquifer to produce water varies greatly from well to well. In accordance with the Mini-Sampling and Analysis Plans (SAPs) (Table 6-4), purging continued until four stable measurements for temperature, SC, pH, and turbidity were obtained. Groundwater stability is considered acceptable when measurements range within 10 percent or 5 nephelometric turbidity units, 0.1 pH units, 1.0 degree Celsius, and SC is within 5 percent. Associated Field Measurement Logs documenting details of well purging and water quality measurements for each sampling event have been submitted to the SNL/NM Customer Funded Records Center.

**Table 6-4. Groundwater Monitoring Well Network and Sampling Dates for the TAG Study Area, Calendar Year 2010**

| Date of Sampling Event | Wells Sampled[1] | | SAP |
|---|---|---|---|
| January/February 2010 | TA1-W-03<br>TA1-W-06<br>TA1-W-08<br>TA2-SW1-320<br>TA2-W-01<br>TA2-W-19<br>TA2-W-26 | TA2-W-27<br>TJA-2<br>TJA-3<br>TJA-4<br>TJA-6<br>TJA-7<br>WYO-4 | *Tijeras Arroyo Groundwater Investigation, Mini-SAP for FY10, 2nd Quarter Sampling, January 2010* (SNL December 2009) |
| May 2010 | TA1-W-03<br>TA1-W-06<br>TA1-W-08<br>TA2-W-01<br>TA2-SW1-320<br>TA2-W-19 | TA2-W-26<br>TJA-2<br>TJA-4<br>TJA-7<br>WYO-4 | *Tijeras Arroyo Groundwater Investigation, Mini-SAP for FY10, 3rd Quarter Sampling, May 2010* (SNL April 2010) |
| July/August 2010 | PGS-2<br>TA1-W-01<br>TA1-W-02<br>TA1-W-03<br>TA1-W-04<br>TA1-W-05<br>TA1-W-06<br>TA1-W-08<br>TA2-NW1-595<br>TA2-SW1-320<br>TA2-W-01 | TA2-W-19<br>TA2-W-26<br>TA2-W-27<br>TJA-2<br>TJA-3<br>TJA-4<br>TJA-6<br>TJA-7<br>WYO-3<br>WYO-4 | *Tijeras Arroyo Groundwater Investigation, Mini-SAP for FY10, 4th Quarter Sampling, July/August 2010* (SNL June 2010) |
| October/ November 2010 | TA1-W-03<br>TA2-SW1-320<br>TA2-W-19<br>TA2-W-26<br>TJA-2 | TJA-4<br>TJA-7<br>WYO-4 | *Tijeras Arroyo Groundwater Investigation, Mini-SAP for FY11, 1st Quarter Sampling, November 2010* (SNL October 2010b) |

**NOTE:** [1] Refer to page xviii of this report for well descriptions.
FY = Fiscal Year.
SAP = Sampling and Analysis Plan.
SNL = Sandia National Laboratories.
TAG = Tijeras Arroyo Groundwater.

### Table 6-5. Parameters Sampled at TAG Wells[1] for Each Sampling Event, Calendar Year 2010

| Parameter | January/February 2010 | | |
|---|---|---|---|
| NPN<br>VOCs | TA2-SW1-320 (QED™)<br>TA2-W-01<br>TA2-W-19<br>TA2-W-26<br>TA2-W-27 | TA2-W-27 (dup)<br>TJA-2<br>TJA-3<br>TJA-4<br>TJA-4 (dup) | TJA-6<br>TJA-7<br>WYO-4 |
| Perchlorate | TA1-W-06<br>TA1-W-08 | TA2-W-01<br>TA2-W-27 | TA2-W-27 (dup) |
| **Parameter** | **May 2010** | | |
| NPN<br>VOCs | TA2-SW1-320 (QED™)<br>TA2-W-19<br>TA2-W-26<br>TJA-2 | TJA-4<br>TJA-4 (dup)<br>TJA-7<br>WYO-4 | |
| Perchlorate | TA1-W-03<br>TA1-W-06<br>TA1-W-08 | TA1-W-08 (dup)<br>TA2-W-01<br>TA2-W-27 | |
| **Parameter** | **July/August 2010** | | |
| Alkalinity<br>Anions<br>Gamma Spec*<br>Gross alpha/beta<br>NPN<br>TAL Metals, plus Total Uranium<br>Tritium<br>VOCs | PGS-2 (QED™)<br>TA1-W-01<br>TA1-W-02<br>TA1-W-03<br>TA1-W-03 (dup)<br>TA1-W-04<br>TA1-W-05<br>TA1-W-06<br>TA1-W-08 | TA1-W-03 (dup)<br>TA2-NW1-595<br>TA2-SW1-320 (QED)<br>TA2-W-01<br>TA2-W-19<br>TA2-W-19 (dup)<br>TA2-W-26<br>TA2-W-27<br>TJA-2 | TJA-3<br>TJA-3 (dup)<br>TJA-4<br>TJA-6<br>TJA-7<br>WYO-3<br>WYO-4 |
| Perchlorate | TA1-W-03<br>TA1-W-03 (dup) | | |
| **Parameter** | **November 2010** | | |
| NPN<br>VOCs | TA2-SW1-320 (QED™)<br>TA2-W-19<br>TA2-W-26<br>TJA-2 | TJA-4<br>TJA-7<br>TJA-7 (dup)<br>WYO-4 | |
| Perchlorate | TA1-W-03 | | |

**NOTE:** [1] Refer to page xviii of this report for well descriptions.
dup = Duplicate sample.
Gamma Spec* = Gamma spectroscopy short list (Americium-241, Cesium-137, Cobalt-60, and Potassium-40).
NPN = Nitrate plus nitrite (reported as nitrogen).
QED™ = MicroPurge®, low-flow sampling method.
TAG = Tijeras Arroyo Groundwater.
TAL = Target Analyte List.
VOC = Volatile organic compound.

### 6.4.3 Pump Decontamination

A portable Bennett™ groundwater sampling system was used to collect groundwater samples from all wells. The sampling pump and tubing bundle were decontaminated prior to installation into monitoring wells according to procedures described in *Long-Term Environmental Stewardship Groundwater Sampling Equipment Decontamination*, SNL/NM FOP 05-03 (SNL August 2007b). An EB or rinsate sample was collected to verify the equipment decontamination process.

### 6.4.4 Sample Collection Sampling Procedures

Groundwater samples are collected using a nitrogen gas-powered portable piston pump (Bennett™) and/or a nitrogen gas-powered bladder pump (QED™) in accordance with SNL/NM FOP 05-01 (SNL August 2007a). Sample bottles are filled directly from the pump discharge line, with the VOC samples collected at the lowest achievable discharge rate.

### 6.4.5 Sample Handling and Shipment

The SNL/NM Sample Management Office (SMO) processes environmental samples collected by ER Operations personnel. The SMO reviews the Mini-SAPs, orders sample containers, issues sample control and tracking numbers, tracks the chain-of-custody, and reviews analytical results returned from the laboratories for laboratory contract compliance (SNL March 2003b and April 2007). All groundwater samples are analyzed by off-site laboratories using EPA-specified protocols.

QC samples are also prepared at the laboratory to determine whether contaminant chemicals are introduced into laboratory processes and procedures. These include method blanks, laboratory control samples, matrix spike duplicates, and surrogate spike samples. Reported laboratory analytical and QC data are reviewed against quality assurance requirements specified in the *Procedure for Completing the Contract Verification Review, SMO-05-03, Issue 03* (SNL April 2007) and Administrative Operating Procedure (AOP) 00-03, *Data Validation Procedure for Chemical and Radiochemical Data*, (SNL July 2007).

### 6.4.6 Waste Management

Purge and decontamination water generated from sampling activities were placed into 55-gallon containers and stored at the ER Operations Field Office waste accumulation area. All waste was managed in accordance with SNL/NM FOP 05-04 (SNL August 2007c) as nonregulated waste, based on historical sampling results and process knowledge of the monitoring well location. Results for associated environmental samples provide supplemental data for approval to discharge water to the sanitary sewer. All data were compared with COA discharge limits.

## 6.5 Analytical Methods

All groundwater samples are analyzed by off-site laboratories using EPA-specified protocols. Groundwater samples were submitted to GEL Laboratories, Inc. for analysis. Samples were analyzed in accordance with applicable EPA methods (Tables-6-6 and 6-7), including the following:

- *The Determination of Inorganic Anions in Water by Ion Chromatography-Method 300.0* (EPA 1983)
- *Perchlorate in Drinking Water Using Ion Chromatography* (EPA, 1999)
- *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (EPA 1996).
- *Prescribed Procedures for Measurement of Radioactivity in Drinking Water* (EPA 1980).

## 6.6 Summary of Analytical Results

This section discusses monitoring results, exceedances of standards, and pertinent trends in concentrations for COCs in the TAG study area that exceed standards. The analytical results and field measurements for all TAG sampling events are presented in Attachment 6A, Tables 6A-1 through 6A-8; concentration trend plots for COCs that exceed the MCLs are presented in Attachment 6B, Figures 6B-1 through 6B-6. A summary of detected VOC results are presented in Table 6A-1. The method detection limits (MDLs) for all analyzed VOCs are listed in Table 6A-2.

**Table 6-6. TAG Study Area Chemical Analytical Methods**

| Analyte | Analytical Method[a,b,c] |
|---|---|
| Anions | SW846-9056 |
| NPN | EPA 353.2 |
| Perchlorate | EPA 314.0 |
| TAL Metals, plus Total Uranium | SW846-6020/7470 |
| VOCs | SW846-8260 |

**NOTES:** [a]U.S. Environmental Protection Agency, 1996, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, 3rd ed., Rev. 1 (and all updates), U.S. Environmental Protection Agency, Washington, D.C.
[b]U.S. Environmental Protection Agency, 1983, *The Determination of Inorganic Anions in Water by Ion Chromatography-Method 300.0*, EPA-600/4-84-017.
[c]U.S. Environmental Protection Agency, 1999, *Perchlorate in Drinking Water Using Ion Chromatography,* EPA 815/R-00-014.
EPA = U.S. Environmental Protection Agency.
NPN = Nitrate plus nitrite (reported as nitrogen).
SW = Solid waste.
TAG = Tijeras Arroyo Groundwater.
TAL = Target Analyte List.
VOC = Volatile organic compound.

**Table 6-7. TAG Study Area Radiochemical Analytical Methods**

| Analyte | Analytical Method[a] |
|---|---|
| Gamma Spectroscopy (short list) | EPA 901.0 |
| Gross Alpha/Beta Activity | EPA 900.0 |
| Tritium | EPA 906.0 |

**NOTES:** [a]U.S. Environmental Protection Agency, 1980. *Prescribed Procedures for Measurement of Radioactivity in Drinking Water*, EPA-600/4-80-032, U.S. Environmental Protection Agency, Cincinnati, Ohio.
EPA = U.S. Environmental Protection Agency.
TAG = Tijeras Arroyo Groundwater.

The VOCs detected at low concentrations in groundwater samples from TAG study area monitoring wells include the following:

- 1,1-Dichloroethane
- Carbon Disulfide
- Chloroform
- Chloromethane
- *cis*-1,2-Dichloroethene
- Tetrachloroethene (PCE)
- Toluene
- TCE

Nine VOCs were detected during CY 2010. Four of these VOCs have promulgated MCLs. Only TCE exceeded its MCL of 5 µg/L (Table 6A-1). TCE was detected in the sample from one PGWS well, WYO-4. The maximum concentration of TCE reported for WYO-4 during this reporting period is 8.94 µg/L in the sample collected during the October/November 2010 sampling event. Figure 6B-1 (Attachment 6B) shows that the TCE concentrations in samples from WYO-4 have slightly exceeded the MCL, and the trend is level to slightly increasing over time.

The analytical results for nitrate plus nitrite (NPN) (reported as nitrogen) are presented in Table 6A-3 (Attachment 6A). The NPN results exceed the MCL of 10 mg/L in samples from TA2-SW1-320, TA2-W-19, TJA-2, TJA-4, and TJA-7. The maximum concentration of NPN detected during this reporting period is 33.3 mg/L in the sample from TJA-7 collected during the October/November 2010 sampling event. Figures 6B-2 through 6B-6 (Attachment 6B) show that the NPN concentrations in wells TA2-SW1-320, TJA-4, and TJA-7 have generally exceeded the MCL for the life of the wells, and trends are slightly increasing to slightly decreasing over time. In contrast, NPN concentrations in TA2-W-19 and TJA-2 only occasionally exceed the MCL, and trends are slightly increasing over time.

Analytical results for anions and alkalinity are presented in Table 6A-4; no anion concentrations exceed established MCLs. Analytical results for perchlorate are presented in Table 6A-5; no perchlorate was detected above the MDL. Total metal analytical results are presented in Table 6A-6; no metal results exceed established MCLs. Groundwater samples were analyzed for tritium, gross alpha/beta activity, and gamma spectroscopy. The results are presented in Table 6A-7. All radionuclide activities are below MCLs, where established.

Field water quality parameters are measured during purging of each well prior to sampling and include temperature, SC, ORP, pH, turbidity, and DO. The parameter measurements obtained immediately before collecting the samples are presented in Table 6A-8.

## 6.7 Quality Control Results

Field and laboratory QC samples were prepared to determine the accuracy of the methods used and to detect inadvertent sample contamination that may have occurred during the sampling and analysis process. All chemical data were reviewed and qualified in accordance with AOP 00-03, *Data Validation Procedure for Chemical and Radiochemical Data* (SNL July 2007). Although some analytical results were qualified during the data validation process, no significant data quality problems were noted for TAG study area COCs. Data validation qualifiers are provided with the analytical results in Tables 6A-1 through 6A-7 (Attachment 6A). The data validation report associated with each sampling event has been submitted to the SNL/NM Customer Funded Records Center. The following sections discuss the results for each QC sample and the impact on data quality for the TAG quarterly sampling events.

### 6.7.1 Field Quality Control Samples

Field QC samples included environmental duplicate, EB, and TB samples. The field QC samples were submitted for analysis along with the groundwater samples in accordance with QC procedures specified in the Mini-SAPs (SNL December 2009, April 2010, June 2010, and October 2010b).

#### 6.7.1.1 Duplicate Environmental Samples

Duplicate environmental samples were analyzed in order to estimate the overall reproducibility of the sampling and analytical process. A duplicate sample is collected immediately after the original environmental sample, in order to reduce variability caused by time and/or sampling mechanics. The results for duplicate sample analyses (detected parameters only) are used to calculate relative percent difference (RPD) values. Duplicate sample results for all wells and all sampling periods show good correlation (RPD values less than 20) for all calculated parameters, with the following exceptions:

- **January/February 2010 Sampling Event—**The RPD for PCE in the TA2-W-27 sample was calculated at 21. Although analytical results were not duplicated, the reported concentrations for PCE are comparable to historical values.

- **July/August 2010 Sampling Event—**The RPD for *cis*-1, 2-dichloroethene in the sample from TA2-W-19 was calculated at 27. This RPD value is considered estimated, as reported concentrations were below associated practical quantitation limits (PQLs).

- **November 2010 Sampling Event—**The RPD for TCE in the TJA-7 sample was calculated at 27. This RPD value is considered estimated, as reported concentrations were below associated PQLs.

#### 6.7.1.2 Equipment Blank Samples

A portable Bennett™ groundwater sampling system was used to collect groundwater samples from all wells except TA2-SW1-320, which is fitted with a dedicated pumping system. The portable Bennett™ sampling pump and tubing bundle were decontaminated prior to installation into monitoring wells according to procedures described in SNL/NM FOP 05-03 (SNL August 2007b). An EB or rinsate sample was collected to verify the effectiveness of the equipment decontamination process. The results for the EB analyses are as follows:

- **January/February 2010 Sampling Event—**The EB sample was collected prior to sampling wells TA2-W-27 and TJA-4. Bromodichloromethane, chloroform, chloromethane, and dibromochloromethane were detected in the EB samples. No corrective action was required for bromodichloromethane, chloromethane, or dibromochloromethane as these compounds were not detected in the associated environmental samples. The result for chloroform was qualified as not detected in the TA2-W-27 EB sample during data validation because the result for the environmental sample was reported at a concentration less than the EB result.

- **May 2010 Sampling Event—**An EB sample was collected prior to sampling wells TA1-W-08 and TJA-4. Bromodichloromethane, bromoform, chloroform, dibromochloromethane, and NPN were detected in the EB sample associated with TJA-4. No corrective action was required for bromodichloromethane, bromoform, chloroform, or dibromochloromethane as these compounds were not detected in the associated environmental samples. No corrective action was required for NPN because NPN was reported in the associated environmental samples at concentrations greater than 10 times the EB result.

- **July/August 2010 Sampling Event—**EB samples were collected prior to sampling wells TA1-W-03, TA2-W-19, and TJA-3 and submitted for analysis of VOCs, total metals, anions, NPN, gamma spectroscopy, gross alpha, gross beta, and tritium. The analytical parameters bromodichloromethane, chloroform, dibromochloromethane, alkalinity, calcium, copper, iron, magnesium, nickel, NPN, sodium, and zinc were detected in EB samples. The result for chloroform was qualified as not detected during data validation in the TA1-W-03 environmental and duplicate samples, as the blank contamination was within five times the environmental sample concentration. The results for copper, nickel, and zinc were qualified as not detected during data validation because the results for these metals in the environmental samples were at concentrations less than five times the associated EB result. No corrective action was required for bromodichloromethane, dibromochloromethane, alkalinity, calcium, iron, magnesium, NPN, or sodium. These parameters either were not detected in environmental samples or detected at concentrations greater than five times the EB result.

- **November 2010 Sampling Event—**One EB sample was collected prior to sampling monitoring well TJA-7 and submitted for analysis of VOCs and NPN. The organic compounds bromodichloromethane, bromoform, chloroform, and dibromochloromethane were detected in the EB sample. No corrective action was required as these compounds were not detected in the associated environmental sample. The result for NPN was qualified as not detected during data validation due to associated laboratory method blank and calibration blank contamination.

#### 6.7.1.3 Trip Blank Samples

TB samples are submitted whenever samples are collected for VOC analysis to assess whether contamination of the samples has occurred during shipment and storage. The TB samples consist of laboratory reagent grade water with hydrochloric acid preservative contained in 40-milliliter volatile organic analysis vials prepared by the analytical laboratory, which accompany the empty sample containers supplied by the laboratory. TBs were brought to the field and accompanied each sample shipment. TB qualifiers are provided with the analytical results in Table 6A-1 (Attachment 6A).

### 6.7.2 Laboratory Quality Control Samples

Internal laboratory QC samples, including method blanks and duplicate laboratory control samples were analyzed concurrently with all groundwater samples. All chemical data were reviewed and qualified in accordance with AOP 00-03, *Data Validation Procedure for Chemical and Radiochemical Data* (SNL July 2007). Laboratory data qualifiers are provided with the analytical results in Tables 6A-1 through 6A-7 (Attachment 6A).

## 6.8 Variances and Nonconformances

No variances or nonconformances from field or sampling requirements specified in the TAG Investigation Mini-SAPs (SNL December 2009, April 2010, June 2010, and October 2010b) were noted during sampling activities. However, project-specific issues associated with these sampling events are noted as follows:

- **All sampling events—**(1) WYO-4 was purged dry prior to sampling. This well was allowed to recover to a minimum of 80 percent of the original water level and then samples were collected. (2) A MicroPurge®, low-flow (QED™) sampling system was used to collect a groundwater sample from TA2-SW1-320. Conventional sampling equipment cannot be lowered to the proper sampling depth due to well construction issues. The pump intake was set at 279 ft bgs in TA2-W-19 due to sediment at the bottom of the well. (3) The field team was unable to set the pump in monitoring well TA2-W-01 at the selected depth of 334 ft below the top of the well casing due to sediment within the well screen interval. The portable system was removed from the well, the pump was cleaned of fine-grained sand and silt, and the pump was then lowered back into the well to a depth of 332.5 to 333 ft below the top of the well casing.

- **January/February 2010 Sampling Event—**On February 26, 2010, a perchlorate sample was collected from monitoring well TA1-W-03, as required by the letter from the NMED Hazardous Waste Bureau, dated April 30, 2009 (NMED April 2009). Prior sampling has been unsuccessful due to unstable turbidity readings, and in early February 2010, monitoring well TA1-W-03 was redeveloped to remove sediment from the well.

## 6.9 Summary and Conclusions

This section provides a brief summary of activities, discussion of COCs that exceed standards, trends of concentrations versus time, the current conceptual model, and plans for studies to be completed during CY 2011 at the TAG study area.

The TAG study area encompasses an area of approximately 40 sq mi in the north-central portion of KAFB. Groundwater investigations were initiated in 1992, and the current monitoring network consists of 21 monitoring wells for water quality analysis and 27 wells for water level measurements. For this reporting period, wells were sampled in January/February 2010, May 2010, July/August 2010, and October/November 2010. The samples were analyzed for VOCs, NPN, anions, alkalinity, perchlorate, Target Analyte List metals (plus uranium), gross alpha/beta activity, tritium, and radionuclides by gamma spectroscopy. Depending on their locations and historical concentrations of COCs, wells were sampled quarterly, semiannually, or annually during this reporting period.

Only NPN and TCE were detected above MCLs in samples from TAG study area wells. NPN concentrations exceeded the MCL of 10 mg/L in samples from TA2-SW1-320, TJA-2, TJA-4, and TJA-7 during all sampling events, with a maximum concentration of 33.3 mg/L in the sample from TJA-7 collected during the November 2010 sampling event. NPN concentrations occasionally exceeded the MCL in samples from TA2-W-19.

TCE exceeded the MCL of 5 µg/L in samples from well WYO-4, completed in the PGWS. The maximum concentration of TCE detected during this reporting period was 8.94 µg/L detected in the sample from WYO-4 collected during the November 2010 sampling event. TCE concentrations in WYO-4 have barely exceeded the MCL for the life of the well, and the trend is level to slightly increasing over time.

The analytical results for this reporting period are consistent with historical concentrations. The following conclusions are based on a comprehensive review of available information for current groundwater contamination conditions in the TAG study area:

- The distribution of TCE in the PGWS is sporadic across the study area and reflects multiple release sites and the effect of subsurface heterogeneity.
- Based on the historical use and disposal of chlorinated solvents, the extent of TCE in groundwater is probably associated with multiple aqueous releases of solvents and subsequent vapor-phase transport through the vadose zone.
- The distribution of nitrate above the background level is laterally widespread in the PGWS.
- In the regional aquifer, concentrations of nitrate above the MCL occur in the western and southeastern portions of the TAG study area.
- The potential sources of TCE and/or nitrate in the TAG study area include sewage lagoons, wastewater outfalls, septic systems, landfills, sewer lines, and the golf course.
- The current conceptual model described in Section 6.1.7 does not require modification based on the analytical results for this reporting period.

DOE/Sandia recommend the following approach as part of the ongoing environmental studies of the TAG study area:

- Continue collection of groundwater samples at the 21 TAG groundwater monitoring wells on a quarterly, semiannual, and annual basis. At a minimum, the analytes for groundwater sampling will consist of VOCs and nitrate.
- Continue periodic measurements of groundwater elevations in all TAG monitoring wells.
- Maintain contact with the KAFB IRP personnel with respect to the results of TCE and nitrate abatement studies.

- As available, obtain groundwater results from both KAFB and the COA.

- Continue to integrate SNL/NM, KAFB, and COA data into the CME process currently underway for the SNL/NM Area of Responsibility.

- Continue to report future TAG investigation results in the SNL/NM GWPP Annual Groundwater Monitoring Report.

- Upon NMED approval of the TAG CME Report (SNL August 2005), prepare a Corrective Measures Implementation Plan.

## 6.10 References


**AquaVISION 1999** AquaVISION, July 1999. *Colloidal Borescope Investigation of the Sandia North Site*, Albuquerque, New Mexico, July 21, 1999.

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# Attachment 6A
# Tijeras Arroyo Groundwater
# Analytical Results Tables

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# Attachment 6A Tables

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# Table 6A-1
# Summary of Detected Volatile Organic Compounds,
# Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Well ID | Analyte | Result[a] (µg/L) | MDL[b] (µg/L) | PQL[c] (µg/L) | MCL[d] (µg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TA2-W-01** | Tetrachloroethene | 0.392 | 0.300 | 1.00 | 5.00 | J | | 088016-001 | SW846-8260B |
| 13-Jan-10 | Trichloroethene | 1.41 | 0.250 | 1.00 | 5.00 | | | 088016-001 | SW846-8260B |
| **TA2-W-19** | 1,1-Dichloroethane | 0.510 | 0.300 | 1.00 | NE | J | | 088032-001 | SW846-8260B |
| 21-Jan-10 | Trichloroethene | 4.49 | 0.250 | 1.00 | 5.00 | | | 088032-001 | SW846-8260B |
| | cis-1,2-Dichloroethene | 0.590 | 0.300 | 1.00 | 70.0 | J | | 088032-001 | SW846-8260B |
| **TA2-W-26** | Chloroform | 0.250 | 0.250 | 1.00 | NE | J | | 088030-001 | SW846-8260B |
| 20-Jan-10 | Tetrachloroethene | 0.790 | 0.300 | 1.00 | 5.00 | J | | 088030-001 | SW846-8260B |
| | Trichloroethene | 0.940 | 0.250 | 1.00 | 5.00 | J | | 088030-001 | SW846-8260B |
| **TA2-W-27** | Tetrachloroethene | 1.23 | 0.300 | 1.00 | 5.00 | | | 088020-001 | SW846-8260B |
| 14-Jan-10 | Trichloroethene | 0.733 | 0.250 | 1.00 | 5.00 | J | | 088020-001 | SW846-8260B |
| **TA2-W-27** (Duplicate) | Chloroform | 0.266 | 0.250 | 1.00 | NE | J | 1.0U | 088021-001 | SW846-8260B |
| 14-Jan-10 | Tetrachloroethene | 0.992 | 0.300 | 1.00 | 5.00 | J | | 088021-001 | SW846-8260B |
| | Trichloroethene | 0.783 | 0.250 | 1.00 | 5.00 | J | | 088021-001 | SW846-8260B |
| **TJA-2** | Carbon Disulfide | 2.00 | 1.25 | 5.00 | NE | J | | 088041-001 | SW846-8260B |
| 28-Jan-10 | Trichloroethene | 3.58 | 0.250 | 1.00 | 5.00 | | | 088041-001 | SW846-8260B |
| | cis-1,2-Dichloroethene | 0.490 | 0.300 | 1.00 | 70.0 | J | | 088041-001 | SW846-8260B |
| **TJA-4** (Duplicate) 27-Jan-10 | Chloromethane | 0.300 | 0.300 | 1.00 | NE | J | 1.0UJ | 088039-001 | SW846-8260B |
| **TJA-7** 29-Jan-10 | Trichloroethene | 0.353 | 0.250 | 1.00 | 5.00 | J | | 088043-001 | SW846-8260B |
| **WYO-4** | 1,1-Dichloroethane | 0.980 | 0.300 | 1.00 | NE | J | | 088034-001 | SW846-8260B |
| 26-Jan-10 | Trichloroethene | **8.34** | 0.250 | 1.00 | 5.00 | | | 088034-001 | SW846-8260B |
| | cis-1,2-Dichloroethene | 1.77 | 0.300 | 1.00 | 70.0 | | | 088034-001 | SW846-8260B |
| | | | | | | | | | |
| **TA2-W-19** | 1,1-Dichloroethane | 0.520 | 0.300 | 1.00 | NE | J | | 088987-001 | SW846-8260B |
| 14-May-10 | Toluene | 0.250 | 0.250 | 1.00 | 1000 | J | | 088987-001 | SW846-8260B |
| | Trichloroethene | 4.09 | 0.250 | 1.00 | 5.00 | | | 088987-001 | SW846-8260B |
| | cis-1,2-Dichloroethene | 0.540 | 0.300 | 1.00 | 70.0 | J | | 088987-001 | SW846-8260B |
| **TA2-W-26** | Chloroform | 0.280 | 0.250 | 1.00 | NE | J | | 088985-001 | SW846-8260B |
| 13-May-10 | Tetrachloroethene | 0.760 | 0.300 | 1.00 | 5.00 | J | | 088985-001 | SW846-8260B |
| | Trichloroethene | 0.920 | 0.250 | 1.00 | 5.00 | J | | 088985-001 | SW846-8260B |
| **TJA-2** | 1,1-Dichloroethane | 0.420 | 0.300 | 1.00 | NE | J | | 088996-001 | SW846-8260B |
| 20-May-10 | Trichloroethene | 3.17 | 0.250 | 1.00 | 5.00 | | | 088996-001 | SW846-8260B |
| | cis-1,2-Dichloroethene | 0.500 | 0.300 | 1.00 | 70.0 | J | | 088996-001 | SW846-8260B |
| **TJA-4** (Duplicate) 19-May-10 | Chloromethane | 31.8 | 0.300 | 1.00 | NE | | | 088994-001 | SW846-8260B |

Refer to footnotes on page 6A-49.

## **Table 6A-1** *(Continued)*
## Summary of Detected Volatile Organic Compounds, Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Result[a] (µg/L) | MDL[b] (µg/L) | PQL[c] (µg/L) | MCL[d] (µg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TJA-7** 24-May-10 | Trichloroethene | 0.440 | 0.250 | 1.00 | 5.00 | J | | 088998-001 | SW846-8260B |
| **WYO-4** | 1,1-Dichloroethane | 0.740 | 0.300 | 1.00 | NE | J | | 088989-001 | SW846-8260B |
| 18-May-10 | Chloromethane | 0.400 | 0.300 | 1.00 | NE | J | | 088989-001 | SW846-8260B |
| | Trichloroethene | **6.47** | 0.250 | 1.00 | 5.00 | | | 088989-001 | SW846-8260B |
| | cis-1,2-Dichloroethene | 1.51 | 0.300 | 1.00 | 70.0 | | | 088989-001 | SW846-8260B |
| | | | | | | | | | |
| **TA1-W-03** 22-Jul-10 | Chloroform | 0.360 | 0.250 | 1.00 | NE | J | 1.0U | 089435-001 | SW846-8260B |
| **TA1-W-03** (Duplicate) 22-Jul-10 | Chloroform | 0.430 | 0.250 | 1.00 | NE | J | 1.0U | 089436-001 | SW846-8260B |
| **TA1-W-06** 27-Jul-10 | 1,1-Dichloroethene | 0.640 | 0.300 | 1.00 | 7.00 | J | | 089442-001 | SW846-8260B |
| **TA2-W-01** | Tetrachloroethene | 0.320 | 0.300 | 1.00 | 5.00 | J | | 089460-001 | SW846-8260B |
| 09-Aug-10 | Trichloroethene | 1.47 | 0.250 | 1.00 | 5.00 | | | 089460-001 | SW846-8260B |
| **TA2-W-19** | 1,1-Dichloroethane | 0.550 | 0.300 | 1.00 | NE | J | | 089466-001 | SW846-8260B |
| 11-Aug-10 | Trichloroethene | 3.53 | 0.250 | 1.00 | 5.00 | | | 089466-001 | SW846-8260B |
| | cis-1,2-Dichloroethene | 0.420 | 0.300 | 1.00 | 70.0 | J | | 089466-001 | SW846-8260B |
| **TA2-W-19** (Duplicate) | Trichloroethene | 3.93 | 0.250 | 1.00 | 5.00 | | | 089467-001 | SW846-8260B |
| 11-Aug-10 | cis-1,2-Dichloroethene | 0.550 | 0.300 | 1.00 | 70.0 | J | | 089467-001 | SW846-8260B |
| **TA2-W-26** | Chloroform | 0.260 | 0.250 | 1.00 | 5.00 | J | | 089462-001 | SW846-8260B |
| 10-Aug-10 | Tetrachloroethene | 0.850 | 0.300 | 1.00 | 5.00 | J | | 089462-001 | SW846-8260B |
| | Trichloroethene | 0.830 | 0.250 | 1.00 | 5.00 | J | | 089462-001 | SW846-8260B |
| | cis-1,2-Dichloroethene | 0.310 | 0.300 | 1.00 | 70.0 | J | | 089462-001 | SW846-8260B |
| **TA2-W-27** | Tetrachloroethene | 0.990 | 0.300 | 1.00 | 5.00 | J | | 089456-001 | SW846-8260B |
| 04-Aug-10 | Trichloroethene | 0.750 | 0.250 | 1.00 | 5.00 | J | | 089456-001 | SW846-8260B |
| **TJA-2** | 1,1-Dichloroethane | 0.400 | 0.300 | 1.00 | NE | J | | 089469-001 | SW846-8260B |
| 12-Aug-10 | Trichloroethene | 2.97 | 0.250 | 1.00 | 5.00 | | | 089469-001 | SW846-8260B |
| | cis-1,2-Dichloroethene | 0.490 | 0.300 | 1.00 | 70.0 | J | | 089469-001 | SW846-8260B |
| **TJA-3** 29-Jul-10 | Trichloroethene | 0.870 | 0.250 | 1.00 | 5.00 | J | | 089448-001 | SW846-8260B |
| **TJA-3** (Duplicate) 29-Jul-10 | Trichloroethene | 0.980 | 0.250 | 1.00 | 5.00 | J | | 089449-001 | SW846-8260B |
| **TJA-7** 18-Aug-10 | Trichloroethene | 0.400 | 0.250 | 1.00 | 5.00 | J | | 089475-001 | SW846-8260B |

Refer to footnotes on page 6A-49.

## Table 6A-1 *(Concluded)*
## Summary of Detected Volatile Organic Compounds,
## Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Result[a] (µg/L) | MDL[b] (µg/L) | PQL[c] (µg/L) | MCL[d] (µg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **WYO-3** 02-Aug-10 | Toluene | 0.290 | 0.250 | 1.00 | 1000 | J | 1.0U | 089451-001 | SW846-8260B |
| **WYO-4** 16-Aug-10 | 1,1-Dichloroethane | 1.04 | 0.300 | 1.00 | NE | | | 089471-001 | SW846-8260B |
| | Trichloroethene | **8.80** | 0.250 | 1.00 | 5.00 | | | 089471-001 | SW846-8260B |
| | cis-1,2-Dichloroethene | 1.90 | 0.300 | 1.00 | 70.0 | | | 089471-001 | SW846-8260B |
| | | | | | | | | | |
| **TA2-W-19** 11-Nov-10 | 1,1-Dichloroethane | 0.390 | 0.300 | 1.00 | NE | J | | 089842-001 | SW846-8260B |
| | Trichloroethene | 3.09 | 0.250 | 1.00 | 5.00 | | | 089842-001 | SW846-8260B |
| | cis-1,2-Dichloroethene | 0.410 | 0.300 | 1.00 | 70.0 | J | | 089842-001 | SW846-8260B |
| **TA2-W-26** 10-Nov-10 | Chloroform | 0.370 | 0.250 | 1.00 | NE | J | | 089840-001 | SW846-8260B |
| | Tetrachloroethene | 0.910 | 0.300 | 1.00 | 5.00 | J | | 089840-001 | SW846-8260B |
| | Trichloroethene | 1.07 | 0.250 | 1.00 | 5.00 | | | 089840-001 | SW846-8260B |
| **TJA-2** 15-Nov-10 | 1,1-Dichloroethane | 0.620 | 0.300 | 1.00 | NE | J | J | 089847-001 | SW846-8260B |
| | Trichloroethene | 3.97 | 0.250 | 1.00 | 5.00 | | J | 089847-001 | SW846-8260B |
| | cis-1,2-Dichloroethene | 0.630 | 0.300 | 1.00 | 70.0 | J | J | 089847-001 | SW846-8260B |
| **TJA-7** 16-Nov-10 | Trichloroethene | 0.590 | 0.250 | 1.00 | 5.00 | J | J | 089851-001 | SW846-8260B |
| **TJA-7** (Duplicate) 16-Nov-10 | Trichloroethene | 0.450 | 0.250 | 1.00 | 5.00 | J | J | 089852-001 | SW846-8260B |
| **WYO-4** 18-Nov-10 | 1,1-Dichloroethane | 1.17 | 0.300 | 1.00 | NE | | J | 089854-001 | SW846-8260B |
| | Chloromethane | 0.350 | 0.300 | 1.00 | NE | J | J | 089854-001 | SW846-8260B |
| | Toluene | 0.250 | 0.250 | 1.00 | 1000 | J | 1.0U | 089854-001 | SW846-8260B |
| | Trichloroethene | **8.94** | 0.250 | 1.00 | 5.00 | | J | 089854-001 | SW846-8260B |
| | cis-1,2-Dichloroethene | 2.09 | 0.300 | 1.00 | 70.0 | | J | 089854-001 | SW846-8260B |

Refer to footnotes on page 6A-49.

## Table 6A-2
## Method Detection Limits for Volatile Organic Compounds (EPA Method[g] 8260), Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Analyte | MDL[b] ($\mu$g/L) |
|---|---|
| 1,1,1-Trichloroethane | 0.325 |
| 1,1,2,2-Tetrachloroethane | 0.250 |
| 1,1,2-Trichloroethane | 0.250 |
| 1,1-Dichloroethane | 0.300 |
| 1,1-Dichloroethene | 0.300 |
| 1,2-Dichloroethane | 0.250 |
| 1,2-Dichloropropane | 0.250 |
| 2-Butanone | 1.25 |
| 2-Hexanone | 1.25 |
| 4-methyl-, 2-Pentanone | 1.25 |
| Acetone | 3.50 |
| Benzene | 0.300 |
| Bromodichloromethane | 0.250 |
| Bromoform | 0.250 |
| Bromomethane | 0.300 |
| Carbon disulfide | 1.25 |
| Carbon tetrachloride | 0.300 |
| Chlorobenzene | 0.250 |
| Chloroethane | 0.300 |
| Chloroform | 0.250 |
| Chloromethane | 0.300 |
| Dibromochloromethane | 0.300 |
| Ethyl benzene | 0.250 |
| Methylene chloride | 3.00 |
| Styrene | 0.250 |
| Tetrachloroethene | 0.300 |
| Toluene | 0.250 |
| Trichloroethene | 0.250 |
| Vinyl acetate | 1.50 |
| Vinyl chloride | 0.500 |
| Xylene | 0.300 |
| cis-1,2-Dichloroethene | 0.300 |
| cis-1,3-Dichloropropene | 0.250 |
| trans-1,2-Dichloroethene | 0.300 |
| trans-1,3-Dichloropropene | 0.250 |

Refer to footnotes on page 6A-49.

## Table 6A-3
## Summary of Nitrate plus Nitrite Results,
## Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TA2-SW1-320** 19-Jan-10 | Nitrate plus nitrite as N | **21.6** | 0.250 | 1.25 | 10 | | | 088028-018 | EPA 353.2 |
| **TA2-W-01** 13-Jan-10 | Nitrate plus nitrite as N | 5.09 | 0.100 | 0.500 | 10 | B | | 088016-018 | EPA 353.2 |
| **TA2-W-19** 21-Jan-10 | Nitrate plus nitrite as N | 9.80 | 0.250 | 1.25 | 10 | | | 088032-018 | EPA 353.2 |
| **TA2-W-26** 20-Jan-10 | Nitrate plus nitrite as N | 4.78 | 0.250 | 1.25 | 10 | | | 088030-018 | EPA 353.2 |
| **TA2-W-27** 14-Jan-10 | Nitrate plus nitrite as N | 4.10 | 0.100 | 0.500 | 10 | B | | 088020-018 | EPA 353.2 |
| **TA2-W-27** (Duplicate) 14-Jan-10 | Nitrate plus nitrite as N | 4.44 | 0.100 | 0.500 | 10 | B | | 088021-018 | EPA 353.2 |
| **TJA-2** 28-Jan-10 | Nitrate plus nitrite as N | **10.5** | 0.250 | 1.25 | 10 | | | 088041-018 | EPA 353.2 |
| **TJA-3** 15-Jan-10 | Nitrate plus nitrite as N | 2.42 | 0.100 | 0.500 | 10 | | | 088023-018 | EPA 353.2 |
| **TJA-4** 27-Jan-10 | Nitrate plus nitrite as N | **29.5** | 0.500 | 2.50 | 10 | | | 088038-018 | EPA 353.2 |
| **TJA-4** (Duplicate) 27-Jan-10 | Nitrate plus nitrite as N | **29.2** | 0.500 | 2.50 | 10 | | | 088039-018 | EPA 353.2 |
| **TJA-6** 18-Jan-10 | Nitrate plus nitrite as N | 2.48 | 0.100 | 0.500 | 10 | | | 088026-018 | EPA 353.2 |
| **TJA-7** 29-Jan-10 | Nitrate plus nitrite as N | **21.0** | 0.250 | 1.25 | 10 | | | 088043-018 | EPA 353.2 |
| **WYO-4** 26-Jan-10 | Nitrate plus nitrite as N | 3.00 | 0.100 | 0.500 | 10 | | | 088034-018 | EPA 353.2 |
| | | | | | | | | | |
| **TA2-SW1-320** 12-May-10 | Nitrate plus nitrite as N | **23.0** | 0.250 | 1.25 | 10 | B | | 088983-018 | EPA 353.2 |
| **TA2-W-19** 14-May-10 | Nitrate plus nitrite as N | **10.1** | 0.250 | 1.25 | 10 | | | 088987-018 | EPA 353.2 |
| **TA2-W-26** 13-May-10 | Nitrate plus nitrite as N | 5.06 | 0.100 | 0.500 | 10 | B | | 088985-018 | EPA 353.2 |
| **TJA-2** 20-May-10 | Nitrate plus nitrite as N | **10.4** | 0.250 | 1.25 | 10 | | | 088996-018 | EPA 353.2 |

Refer to footnotes on page 6A-49.

## **Table 6A-3** *(Continued)*
## Summary of Nitrate plus Nitrite Results,
## Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TJA-4** 19-May-10 | Nitrate plus nitrite as N | **28.0** | 1.00 | 5.00 | 10 | | | 088993-018 | EPA 353.2 |
| **TJA-4** (Duplicate) 19-May-10 | Nitrate plus nitrite as N | **28.4** | 0.500 | 2.50 | 10 | | | 088994-018 | EPA 353.2 |
| **TJA-7** 24-May-10 | Nitrate plus nitrite as N | **23.7** | 0.500 | 2.50 | 10 | | | 088998-018 | EPA 353.2 |
| **WYO-4** 18-May-10 | Nitrate plus nitrite as N | 2.96 | 0.100 | 0.500 | 10 | | | 088989-018 | EPA 353.2 |
| | | | | | | | | | |
| **PGS-2** 16-Jul-10 | Nitrate plus nitrite as N | 0.900 | 0.050 | 0.250 | 10 | | | 089426-018 | EPA 353.2 |
| **TA1-W-01** 06-Aug-10 | Nitrate plus nitrite as N | 2.73 | 0.100 | 0.500 | 10 | | | 089429-018 | EPA 353.2 |
| **TA1-W-02** 21-Jul-10 | Nitrate plus nitrite as N | 1.02 | 0.050 | 0.250 | 10 | | | 089431-018 | EPA 353.2 |
| **TA1-W-03** 22-Jul-10 | Nitrate plus nitrite as N | 6.40 | 0.250 | 1.25 | 10 | | | 089435-018 | EPA 353.2 |
| **TA1-W-03** (Duplicate) 22-Jul-10 | Nitrate plus nitrite as N | 6.40 | 0.250 | 1.25 | 10 | | | 089436-018 | EPA 353.2 |
| **TA1-W-04** 23-Jul-10 | Nitrate plus nitrite as N | 1.68 | 0.100 | 0.500 | 10 | | | 089438-018 | EPA 353.2 |
| **TA1-W-05** 26-Jul-10 | Nitrate plus nitrite as N | 1.31 | 0.050 | 0.250 | 10 | | | 089440-018 | EPA 353.2 |
| **TA1-W-06** 27-Jul-10 | Nitrate plus nitrite as N | 3.42 | 0.100 | 0.500 | 10 | | | 089442-018 | EPA 353.2 |
| **TA1-W-08** 28-Jul-10 | Nitrate plus nitrite as N | 7.00 | 0.250 | 1.25 | 10 | | | 089444-018 | EPA 353.2 |
| **TA2-NW1-595** 03-Aug-10 | Nitrate plus nitrite as N | 4.05 | 0.250 | 1.25 | 10 | | | 089453-018 | EPA 353.2 |
| **TA2-SW1-320** 15-Jul-10 | Nitrate plus nitrite as N | **21.4** | 0.500 | 2.50 | 10 | B | J | 089424-018 | EPA 353.2 |
| **TA2-W-01** 09-Aug-10 | Nitrate plus nitrite as N | 4.65 | 0.100 | 0.500 | 10 | | | 089460-018 | EPA 353.2 |

Refer to footnotes on page 6A-49.

## Table 6A-3 *(Continued)*
## Summary of Nitrate plus Nitrite Results,
## Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TA2-W-19**<br>11-Aug-10 | Nitrate plus nitrite as N | **10.5** | 0.250 | 1.25 | 10 | | | 089466-018 | EPA 353.2 |
| **TA2-W-19** (Duplicate)<br>11-Aug-10 | Nitrate plus nitrite as N | **10.6** | 0.250 | 1.25 | 10 | | | 089467-018 | EPA 353.2 |
| **TA2-W-26**<br>10-Aug-10 | Nitrate plus nitrite as N | 4.83 | 0.100 | 0.500 | 10 | | | 089462-018 | EPA 353.2 |
| **TA2-W-27**<br>04-Aug-10 | Nitrate plus nitrite as N | 4.23 | 0.250 | 1.25 | 10 | | | 089456-018 | EPA 353.2 |
| **TJA-2**<br>12-Aug-10 | Nitrate plus nitrite as N | **10.8** | 0.250 | 1.25 | 10 | | | 089469-018 | EPA 353.2 |
| **TJA-3**<br>29-Jul-10 | Nitrate plus nitrite as N | 2.57 | 0.100 | 0.500 | 10 | | | 089448-018 | EPA 353.2 |
| **TJA-3** (Duplicate)<br>29-Jul-10 | Nitrate plus nitrite as N | 2.61 | 0.100 | 0.500 | 10 | | | 089449-018 | EPA 353.2 |
| **TJA-4**<br>17-Aug-10 | Nitrate plus nitrite as N | **27.7** | 1.00 | 5.00 | 10 | | J | 089473-018 | EPA 353.2 |
| **TJA-6**<br>05-Aug-10 | Nitrate plus nitrite as N | 2.60 | 0.250 | 1.25 | 10 | | | 089458-018 | EPA 353.2 |
| **TJA-7**<br>18-Aug-10 | Nitrate plus nitrite as N | **22.9** | 1.00 | 5.00 | 10 | | J | 089475-018 | EPA 353.2 |
| **WYO-3**<br>02-Aug-10 | Nitrate plus nitrite as N | 2.27 | 0.100 | 0.500 | 10 | | | 089451-018 | EPA 353.2 |
| **WYO-4**<br>16-Aug-10 | Nitrate plus nitrite as N | 2.87 | 0.100 | 0.500 | 10 | | | 089471-018 | EPA 353.2 |
| | | | | | | | | | |
| **TA2-SW1-320**<br>09-Nov-10 | Nitrate plus nitrite as N | **22.4** | 0.500 | 2.50 | 10 | | | 089838-018 | EPA 353.2 |
| **TA2-W-19**<br>11-Nov-10 | Nitrate plus nitrite as N | **10.1** | 0.250 | 1.25 | 10 | | | 089842-018 | EPA 353.2 |
| **TA2-W-26**<br>10-Nov-10 | Nitrate plus nitrite as N | 4.93 | 0.100 | 0.500 | 10 | | | 089840-018 | EPA 353.2 |
| **TJA-2**<br>15-Nov-10 | Nitrate plus nitrite as N | **14.1** | 2.50 | 12.5 | 10 | B | 30U | 089847-018 | EPA 353.2 |

Refer to footnotes on page 6A-49.

**Table 6A-3** *(Concluded)*
**Summary of Nitrate plus Nitrite Results,**
**Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TJA-4** 12-Nov-10 | Nitrate plus nitrite as N | **30.0** | 2.50 | 12.5 | 10 | B | 30U | 089845-018 | EPA 353.2 |
| **TJA-7** 16-Nov-10 | Nitrate plus nitrite as N | **27.3** | 2.50 | 12.5 | 10 | B | 30U | 089851-018 | EPA 353.2 |
| **TJA-7** (Duplicate) 16-Nov-10 | Nitrate plus nitrite as N | **33.3** | 2.50 | 12.5 | 10 | B | | 089852-018 | EPA 353.2 |
| **WYO-4** 18-Nov-10 | Nitrate plus nitrite as N | 0.730 | 0.050 | 0.250 | 10 | B | J | 089854-018 | EPA 353.2 |

Refer to footnotes on page 6A-49.

## Table 6A-4
## Summary of Anion and Alkalinity Results,
## Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **PGS-2** | Bromide | 0.170 | 0.066 | 0.200 | NE | J | | 089426-016 | SW846 9056 |
| 16-Jul-10 | Chloride | 14.6 | 0.066 | 0.200 | NE | | | 089426-016 | SW846 9056 |
| | Fluoride | 0.227 | 0.033 | 0.100 | 4.0 | | | 089426-016 | SW846 9056 |
| | Sulfate | 63.6 | 0.500 | 2.00 | NE | | | 089426-016 | SW846 9056 |
| | Alkalinity, Total | 161 | 0.725 | 1.00 | NE | B | | 089426-016 | SM 2320B |
| **TA1-W-01** | Bromide | 0.206 | 0.066 | 0.200 | NE | | | 089429-016 | SW846 9056 |
| 06-Aug-10 | Chloride | 16.3 | 0.066 | 0.200 | NE | | | 089429-016 | SW846 9056 |
| | Fluoride | 0.498 | 0.033 | 0.100 | 4.0 | | | 089429-016 | SW846 9056 |
| | Sulfate | 76.8 | 1.00 | 4.00 | NE | | | 089429-016 | SW846 9056 |
| | Alkalinity, Total | 168 | 0.725 | 1.00 | NE | B | | 089429-016 | SM 2320B |
| **TA1-W-02** | Bromide | 0.180 | 0.066 | 0.200 | NE | J | | 089431-016 | SW846 9056 |
| 21-Jul-10 | Chloride | 15.1 | 0.066 | 0.200 | NE | | | 089431-016 | SW846 9056 |
| | Fluoride | 0.478 | 0.033 | 0.100 | 4.0 | | | 089431-016 | SW846 9056 |
| | Sulfate | 76.7 | 0.500 | 2.00 | NE | | | 089431-016 | SW846 9056 |
| | Alkalinity, Total | 176 | 0.725 | 1.00 | NE | B | | 089431-016 | SM 2320B |
| **TA1-W-03** | Bromide | 3.29 | 0.066 | 0.200 | NE | | | 089435-016 | SW846 9056 |
| 22-Jul-10 | Chloride | 264 | 1.65 | 5.00 | NE | | | 089435-016 | SW846 9056 |
| | Fluoride | 0.263 | 0.033 | 0.100 | 4.0 | | | 089435-016 | SW846 9056 |
| | Sulfate | 503 | 2.50 | 10.0 | NE | | | 089435-016 | SW846 9056 |
| | Alkalinity, Total | 71.1 | 0.725 | 1.00 | NE | B | | 089435-016 | SM 2320B |
| **TA1-W-03** (Duplicate) | Bromide | 3.32 | 0.066 | 0.200 | NE | | | 089436-016 | SW846 9056 |
| 22-Jul-10 | Chloride | 260 | 1.65 | 5.00 | NE | | | 089436-016 | SW846 9056 |
| | Fluoride | 0.262 | 0.033 | 0.100 | 4.0 | | | 089436-016 | SW846 9056 |
| | Sulfate | 497 | 2.50 | 10.0 | NE | | | 089436-016 | SW846 9056 |
| | Alkalinity, Total | 72.1 | 0.725 | 1.00 | NE | B | | 089436-016 | SM 2320B |
| **TA1-W-04** | Bromide | 0.191 | 0.066 | 0.200 | NE | J | | 089438-016 | SW846 9056 |
| 23-Jul-10 | Chloride | 15.3 | 0.066 | 0.200 | NE | | | 089438-016 | SW846 9056 |
| | Fluoride | 0.476 | 0.033 | 0.100 | 4.0 | | | 089438-016 | SW846 9056 |
| | Sulfate | 65.4 | 0.200 | 0.800 | NE | | | 089438-016 | SW846 9056 |
| | Alkalinity, Total | 174 | 0.725 | 1.00 | NE | B | | 089438-016 | SM 2320B |
| **TA1-W-05** | Bromide | 0.167 | 0.066 | 0.200 | NE | J | | 089440-016 | SW846 9056 |
| 26-Jul-10 | Chloride | 11.2 | 0.066 | 0.200 | NE | | | 089440-016 | SW846 9056 |
| | Fluoride | 0.359 | 0.033 | 0.100 | 4.0 | | | 089440-016 | SW846 9056 |
| | Sulfate | 98.1 | 0.500 | 2.00 | NE | | | 089440-016 | SW846 9056 |
| | Alkalinity, Total | 212 | 0.725 | 1.00 | NE | B | | 089440-016 | SM 2320B |

Refer to footnotes on page 6A-49.

## Table 6A-4 *(Continued)*
## Summary of Anion and Alkalinity Results,
## Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TA1-W-06** | Bromide | 1.27 | 0.066 | 0.200 | NE | | | 089442-016 | SW846 9056 |
| 27-Jul-10 | Chloride | 102 | 0.660 | 2.00 | NE | | | 089442-016 | SW846 9056 |
| | Fluoride | 0.350 | 0.033 | 0.100 | 4.0 | | | 089442-016 | SW846 9056 |
| | Sulfate | 206 | 1.00 | 4.00 | NE | | | 089442-016 | SW846 9056 |
| | Alkalinity, Total | 87.8 | 0.725 | 1.00 | NE | B | | 089442-016 | SM 2320B |
| **TA1-W-08** | Bromide | 2.53 | 0.066 | 0.200 | NE | | | 089444-016 | SW846 9056 |
| 28-Jul-10 | Chloride | 199 | 3.30 | 10.0 | NE | | J | 089444-016 | SW846 9056 |
| | Fluoride | 0.269 | 0.033 | 0.100 | 4.0 | | | 089444-016 | SW846 9056 |
| | Sulfate | 731 | 5.00 | 20.0 | NE | | J | 089444-016 | SW846 9056 |
| | Alkalinity, Total | 85.7 | 0.725 | 1.00 | NE | B | | 089444-016 | SM 2320B |
| **TA2-NW1-595** | Bromide | 1.33 | 0.066 | 0.200 | NE | | | 089453-016 | SW846 9056 |
| 03-Aug-10 | Chloride | 97.2 | 0.660 | 2.00 | NE | | | 089453-016 | SW846 9056 |
| | Fluoride | 0.378 | 0.033 | 0.100 | 4.0 | | | 089453-016 | SW846 9056 |
| | Sulfate | 107 | 1.00 | 4.00 | NE | | | 089453-016 | SW846 9056 |
| | Alkalinity, Total | 133 | 0.725 | 1.00 | NE | B | | 089453-016 | SM 2320B |
| **TA2-SW1-320** | Bromide | 0.547 | 0.066 | 0.200 | NE | | | 089424-016 | SW846 9056 |
| 15-Jul-10 | Chloride | 30.0 | 0.660 | 2.00 | NE | | | 089424-016 | SW846 9056 |
| | Fluoride | 0.471 | 0.033 | 0.100 | 4.0 | | | 089424-016 | SW846 9056 |
| | Sulfate | 13.8 | 0.100 | 0.400 | NE | | | 089424-016 | SW846 9056 |
| | Alkalinity, Total | 124 | 0.725 | 1.00 | NE | B | | 089424-016 | SM 2320B |
| **TA2-W-01** | Bromide | 1.48 | 0.066 | 0.200 | NE | | | 089460-016 | SW846 9056 |
| 09-Aug-10 | Chloride | 99.7 | 0.660 | 2.00 | NE | | | 089460-016 | SW846 9056 |
| | Fluoride | 0.414 | 0.033 | 0.100 | 4.0 | | | 089460-016 | SW846 9056 |
| | Sulfate | 51.5 | 1.00 | 4.00 | NE | | | 089460-016 | SW846 9056 |
| | Alkalinity, Total | 96.0 | 0.725 | 1.00 | NE | B | | 089460-016 | SM 2320B |
| **TA2-W-19** | Bromide | 0.927 | 0.066 | 0.200 | NE | | | 089466-016 | SW846 9056 |
| 11-Aug-10 | Chloride | 64.7 | 0.660 | 2.00 | NE | | | 089466-016 | SW846 9056 |
| | Fluoride | 0.409 | 0.033 | 0.100 | 4.0 | | | 089466-016 | SW846 9056 |
| | Sulfate | 54.0 | 1.00 | 4.00 | NE | | | 089466-016 | SW846 9056 |
| | Alkalinity, Total | 105 | 0.725 | 1.00 | NE | B | | 089466-016 | SM 2320B |
| **TA2-W-19** (Duplicate) | Bromide | 0.913 | 0.066 | 0.200 | NE | | | 089467-016 | SW846 9056 |
| 11-Aug-10 | Chloride | 65.2 | 0.660 | 2.00 | NE | | | 089467-016 | SW846 9056 |
| | Fluoride | 0.409 | 0.033 | 0.100 | 4.0 | | | 089467-016 | SW846 9056 |
| | Sulfate | 54.2 | 1.00 | 4.00 | NE | | | 089467-016 | SW846 9056 |
| | Alkalinity, Total | 104 | 0.725 | 1.00 | NE | B | | 089467-016 | SM 2320B |

Refer to footnotes on page 6A-49.

**Table 6A-4** *(Continued)*
**Summary of Anion and Alkalinity Results,**
**Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TA2-W-26** | Bromide | 2.20 | 0.066 | 0.200 | NE | | | 089462-016 | SW846 9056 |
| 10-Aug-10 | Chloride | 165 | 1.65 | 5.00 | NE | | | 089462-016 | SW846 9056 |
| | Fluoride | 0.313 | 0.033 | 0.100 | 4.0 | | | 089462-016 | SW846 9056 |
| | Sulfate | 334 | 2.50 | 10.0 | NE | | | 089462-016 | SW846 9056 |
| | Alkalinity, Total | 82.0 | 0.725 | 1.00 | NE | B | | 089462-016 | SM 2320B |
| **TA2-W-27** | Bromide | 1.58 | 0.066 | 0.200 | NE | | | 089456-016 | SW846 9056 |
| 04-Aug-10 | Chloride | 114 | 0.660 | 2.00 | NE | | | 089456-016 | SW846 9056 |
| | Fluoride | 0.403 | 0.033 | 0.100 | 4.0 | | | 089456-016 | SW846 9056 |
| | Sulfate | 179 | 1.00 | 4.00 | NE | | | 089456-016 | SW846 9056 |
| | Alkalinity, Total | 69.0 | 0.725 | 1.00 | NE | B | | 089456-016 | SM 2320B |
| **TJA-2** | Bromide | 0.906 | 0.066 | 0.200 | NE | | | 089469-016 | SW846 9056 |
| 12-Aug-10 | Chloride | 63.0 | 0.660 | 2.00 | NE | | | 089469-016 | SW846 9056 |
| | Fluoride | 0.403 | 0.033 | 0.100 | 4.0 | | | 089469-016 | SW846 9056 |
| | Sulfate | 51.8 | 1.00 | 4.00 | NE | | | 089469-016 | SW846 9056 |
| | Alkalinity, Total | 104 | 0.725 | 1.00 | NE | B | | 089469-016 | SM 2320B |
| **TJA-3** | Bromide | 0.182 | 0.066 | 0.200 | NE | J | | 089448-016 | SW846 9056 |
| 29-Jul-10 | Chloride | 13.3 | 0.066 | 0.200 | NE | | | 089448-016 | SW846 9056 |
| | Fluoride | 0.422 | 0.033 | 0.100 | 4.0 | | | 089448-016 | SW846 9056 |
| | Sulfate | 77.6 | 0.500 | 2.00 | NE | | | 089448-016 | SW846 9056 |
| | Alkalinity, Total | 168 | 0.725 | 1.00 | NE | B | | 089448-016 | SM 2320B |
| **TJA-3** (Duplicate) | Bromide | 0.183 | 0.066 | 0.200 | NE | J | | 089449-016 | SW846 9056 |
| 23-Jul-10 | Chloride | 13.3 | 0.066 | 0.200 | NE | | | 089449-016 | SW846 9056 |
| | Fluoride | 0.421 | 0.033 | 0.100 | 4.0 | | | 089449-016 | SW846 9056 |
| | Sulfate | 77.4 | 0.500 | 2.00 | NE | | | 089449-016 | SW846 9056 |
| | Alkalinity, Total | 169 | 0.725 | 1.00 | NE | B | | 089449-016 | SM 2320B |
| **TJA-4** | Bromide | 0.365 | 0.066 | 0.200 | NE | | | 089473-016 | SW846 9056 |
| 17-Aug-10 | Chloride | 20.2 | 0.330 | 1.00 | NE | | | 089473-016 | SW846 9056 |
| | Fluoride | 0.450 | 0.033 | 0.100 | 4.0 | | | 089473-016 | SW846 9056 |
| | Sulfate | 17.8 | 0.100 | 0.400 | NE | | | 089473-016 | SW846 9056 |
| | Alkalinity, Total | 138 | 0.725 | 1.00 | NE | B | | 089473-016 | SM 2320B |
| **TJA-6** | Bromide | 0.199 | 0.066 | 0.200 | NE | J | | 089458-016 | SW846 9056 |
| 05-Aug-10 | Chloride | 15.3 | 0.066 | 0.200 | NE | | | 089458-016 | SW846 9056 |
| | Fluoride | 0.500 | 0.033 | 0.100 | 4.0 | | | 089458-016 | SW846 9056 |
| | Sulfate | 62.9 | 1.00 | 4.00 | NE | | | 089458-016 | SW846 9056 |
| | Alkalinity, Total | 158 | 0.725 | 1.00 | NE | B | | 089458-016 | SM 2320B |

Refer to footnotes on page 6A-49.

**Table 6A-4** *(Concluded)*
**Summary of Anion and Alkalinity Results,**
**Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TJA-7** | Bromide | 0.434 | 0.066 | 0.200 | NE | | | 089475-016 | SW846 9056 |
| 18-Aug-10 | Chloride | 23.2 | 0.330 | 1.00 | NE | | | 089475-016 | SW846 9056 |
| | Fluoride | 0.447 | 0.033 | 0.100 | 4.0 | | | 089475-016 | SW846 9056 |
| | Sulfate | 20.8 | 0.100 | 0.400 | NE | | | 089475-016 | SW846 9056 |
| | Alkalinity, Total | 128 | 0.725 | 1.00 | NE | B | | 089475-016 | SM 2320B |
| **WYO-3** | Bromide | 0.214 | 0.066 | 0.200 | NE | | | 089451-016 | SW846 9056 |
| 02-Aug-10 | Chloride | 17.2 | 0.066 | 0.200 | NE | | | 089451-016 | SW846 9056 |
| | Fluoride | 0.521 | 0.033 | 0.100 | 4.0 | | | 089451-016 | SW846 9056 |
| | Sulfate | 79.0 | 1.00 | 4.00 | NE | | | 089451-016 | SW846 9056 |
| | Alkalinity, Total | 161 | 0.725 | 1.00 | NE | B | | 089451-016 | SM 2320B |
| **WYO-4** | Bromide | 1.31 | 0.066 | 0.200 | NE | | | 089471-016 | SW846 9056 |
| 16-Aug-10 | Chloride | 107 | 0.660 | 2.00 | NE | | | 089471-016 | SW846 9056 |
| | Fluoride | 0.412 | 0.033 | 0.100 | 4.0 | | | 089471-016 | SW846 9056 |
| | Sulfate | 49.5 | 1.00 | 4.00 | NE | | | 089471-016 | SW846 9056 |
| | Alkalinity, Total | 99.5 | 0.725 | 1.00 | NE | B | | 089471-016 | SM 2320B |

Refer to footnotes on page 6A-49.

# Table 6A-5
## Summary of Perchlorate Results,
## Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Well ID | Analyte | Result[a] (µg/L) | MDL[b] (µg/L) | PQL[c] (µg/L) | MCL[d] (µg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TA1-W-03** 26-Feb-10 | Perchlorate | ND | 4.0 | 12 | NE | U | | 088220-020 | EPA 314.0 |
| **TA1-W-06** 11-Jan-10 | Perchlorate | ND | 4.0 | 12 | NE | U | | 088014-020 | EPA 314.0 |
| **TA1-W-08** 12-Jan-10 | Perchlorate | ND | 4.0 | 12 | NE | U | | 088015-020 | EPA 314.0 |
| **TA2-W-01** 13-Jan-10 | Perchlorate | ND | 4.0 | 12 | NE | U | | 088016-020 | EPA 314.0 |
| **TA2-W-27** 14-Jan-10 | Perchlorate | ND | 4.0 | 12 | NE | U | | 088020-020 | EPA 314.0 |
| **TA2-W-27** (Duplicate) 14-Jan-10 | Perchlorate | ND | 4.0 | 12 | NE | U | | 088021-020 | EPA 314.0 |
| | | | | | | | | | |
| **TA1-W-03** 03-May-10 | Perchlorate | ND | 4.0 | 12 | NE | U | | 088976-020 | EPA 314.0 |
| **TA1-W-06** 04-May-10 | Perchlorate | ND | 4.0 | 12 | NE | U | | 088977-020 | EPA 314.0 |
| **TA1-W-08** 05-May-10 | Perchlorate | ND | 4.0 | 12 | NE | U | | 088979-020 | EPA 314.0 |
| **TA1-W-08** (Duplicate) 05-May-10 | Perchlorate | ND | 4.0 | 12 | NE | U | | 088980-020 | EPA 314.0 |
| **TA2-W-01** 06-May-10 | Perchlorate | ND | 4.0 | 12 | NE | U | | 088981-020 | EPA 314.0 |
| **TA2-W-27** 11-May-10 | Perchlorate | ND | 4.0 | 12 | NE | U | | 088982-020 | EPA 314.0 |
| | | | | | | | | | |
| **TA1-W-03** 22-Jul-10 | Perchlorate | ND | 4.0 | 12 | NE | U | | 089435-020 | EPA 314.0 |
| **TA1-W-03** (Duplicate) 22-Jul-10 | Perchlorate | ND | 4.0 | 12 | NE | U | | 089436-020 | EPA 314.0 |
| | | | | | | | | | |
| **TA1-W-03** 08-Nov-10 | Perchlorate | ND | 4.0 | 12 | NE | U | | 089837-020 | EPA 314.0 |

Refer to footnotes on page 6A-49.

## Table 6A-6
## Summary of Total Metal Results,
## Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **PGS-2** | Aluminum | 0.0103 | 0.010 | 0.030 | NE | J | | 089426-010 | SW846 6020 |
| 16-Jul-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 089426-010 | SW846 6020 |
| | Arsenic | 0.00218 | 0.0015 | 0.005 | 0.010 | J | | 089426-010 | SW846 6020 |
| | Barium | 0.0602 | 0.0005 | 0.002 | 2.00 | | | 089426-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089426-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 089426-010 | SW846 6020 |
| | Calcium | 64.1 | 0.200 | 2.00 | NE | B | | 089426-010 | SW846 6020 |
| | Chromium | 0.00501 | 0.0025 | 0.010 | 0.100 | J | | 089426-010 | SW846 6020 |
| | Cobalt | 0.000189 | 0.0001 | 0.001 | NE | J | | 089426-010 | SW846 6020 |
| | Copper | 0.00136 | 0.0003 | 0.001 | NE | | | 089426-010 | SW846 6020 |
| | Iron | 0.172 | 0.010 | 0.100 | NE | | | 089426-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089426-010 | SW846 6020 |
| | Magnesium | 11.7 | 0.005 | 0.015 | NE | | | 089426-010 | SW846 6020 |
| | Manganese | 0.00318 | 0.001 | 0.005 | NE | J | | 089426-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | UJ | 089426-010 | SW846 7470 |
| | Nickel | 0.00857 | 0.0005 | 0.002 | NE | | | 089426-010 | SW846 6020 |
| | Potassium | 2.60 | 0.080 | 0.300 | NE | | | 089426-010 | SW846 6020 |
| | Selenium | 0.00225 | 0.001 | 0.005 | 0.050 | B, J | 0.0062U | 089426-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089426-010 | SW846 6020 |
| | Sodium | 30.9 | 0.080 | 0.250 | NE | | | 089426-010 | SW846 6020 |
| | Thallium | 0.000395 | 0.0003 | 0.001 | 0.002 | J | 0.0018U | 089426-010 | SW846 6020 |
| | Uranium | 0.00111 | 0.00005 | 0.0002 | 0.030 | | | 089426-010 | SW846 6020 |
| | Vanadium | 0.00674 | 0.003 | 0.010 | NE | J | | 089426-010 | SW846 6020 |
| | Zinc | 0.00481 | 0.0026 | 0.010 | NE | J | | 089426-010 | SW846 6020 |

Refer to footnotes on page 6A-49.

# Table 6A-6 *(Continued)*
## Summary of Total Metal Results,
## Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TA1-W-01** | Aluminum | ND | 0.010 | 0.030 | NE | U | | 089429-010 | SW846 6020 |
| 06-Aug-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 089429-010 | SW846 6020 |
| | Arsenic | 0.00241 | 0.0015 | 0.005 | 0.010 | B, J | 0.012U | 089429-010 | SW846 6020 |
| | Barium | 0.0488 | 0.0005 | 0.002 | 2.00 | | | 089429-010 | SW846 6020 |
| | Beryllium | 0.000104 | 0.0001 | 0.0005 | 0.004 | B, J | 0.00093U | 089429-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 089429-010 | SW846 6020 |
| | Calcium | 69.9 | 0.100 | 1.00 | NE | B | | 089429-010 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 089429-010 | SW846 6020 |
| | Cobalt | 0.000146 | 0.0001 | 0.001 | NE | B, J | 0.00072U | 089429-010 | SW846 6020 |
| | Copper | 0.000636 | 0.0003 | 0.001 | NE | J | | 089429-010 | SW846 6020 |
| | Iron | 0.149 | 0.010 | 0.100 | NE | B | J | 089429-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089429-010 | SW846 6020 |
| | Magnesium | 14.2 | 0.005 | 0.015 | NE | | | 089429-010 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 089429-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 089429-010 | SW846 7470 |
| | Nickel | 0.0013 | 0.0005 | 0.002 | NE | J | | 089429-010 | SW846 6020 |
| | Potassium | 2.08 | 0.080 | 0.300 | NE | | | 089429-010 | SW846 6020 |
| | Selenium | 0.00134 | 0.001 | 0.005 | 0.050 | J | | 089429-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089429-010 | SW846 6020 |
| | Sodium | 26.9 | 0.080 | 0.250 | NE | | | 089429-010 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 089429-010 | SW846 6020 |
| | Uranium | 0.0034 | 0.00005 | 0.0002 | 0.030 | | | 089429-010 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | | 089429-010 | SW846 6020 |
| | Zinc | 0.00317 | 0.0026 | 0.010 | NE | J | | 089429-010 | SW846 6020 |

Refer to footnotes on page 6A-49.

## Table 6A-6 *(Continued)*
## Summary of Total Metal Results,
## Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TA1-W-02** | Aluminum | ND | 0.010 | 0.030 | NE | U | | 089431-010 | SW846 6020 |
| 21-Jul-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 089431-010 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 089431-010 | SW846 6020 |
| | Barium | 0.0478 | 0.0005 | 0.002 | 2.00 | | | 089431-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089431-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 089431-010 | SW846 6020 |
| | Calcium | 77.3 | 0.200 | 2.00 | NE | B | | 089431-010 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 089431-010 | SW846 6020 |
| | Cobalt | ND | 0.0001 | 0.001 | NE | U | | 089431-010 | SW846 6020 |
| | Copper | 0.000576 | 0.0003 | 0.001 | NE | J | | 089431-010 | SW846 6020 |
| | Iron | 0.119 | 0.010 | 0.100 | NE | | | 089431-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089431-010 | SW846 6020 |
| | Magnesium | 13.6 | 0.005 | 0.015 | NE | | | 089431-010 | SW846 6020 |
| | Manganese | 0.00116 | 0.001 | 0.005 | NE | J | | 089431-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | UJ | 089431-010 | SW846 7470 |
| | Nickel | 0.00105 | 0.0005 | 0.002 | NE | J | | 089431-010 | SW846 6020 |
| | Potassium | 2.28 | 0.080 | 0.300 | NE | | | 089431-010 | SW846 6020 |
| | Selenium | 0.00136 | 0.001 | 0.005 | 0.050 | B, J | 0.0062U | 089431-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089431-010 | SW846 6020 |
| | Sodium | 24.4 | 0.080 | 0.250 | NE | | | 089431-010 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 089431-010 | SW846 6020 |
| | Uranium | 0.00337 | 0.00005 | 0.0002 | 0.030 | | | 089431-010 | SW846 6020 |
| | Vanadium | 0.00336 | 0.003 | 0.010 | NE | J | | 089431-010 | SW846 6020 |
| | Zinc | 0.00377 | 0.0026 | 0.010 | NE | J | | 089431-010 | SW846 6020 |

Refer to footnotes on page 6A-49.

**Table 6A-6** *(Continued)*
**Summary of Total Metal Results,**
**Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TA1-W-03** | Aluminum | 0.0175 | 0.010 | 0.030 | NE | J | | 089435-010 | SW846 6020 |
| 22-Jul-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 089435-010 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 089435-010 | SW846 6020 |
| | Barium | 0.027 | 0.0005 | 0.002 | 2.00 | | | 089435-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089435-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 089435-010 | SW846 6020 |
| | Calcium | 306 | 0.200 | 2.00 | NE | B | | 089435-010 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 089435-010 | SW846 6020 |
| | Cobalt | 0.000175 | 0.0001 | 0.001 | NE | J | | 089435-010 | SW846 6020 |
| | Copper | 0.00164 | 0.0003 | 0.001 | NE | | 0.011U | 089435-010 | SW846 6020 |
| | Iron | 0.458 | 0.010 | 0.100 | NE | | | 089435-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089435-010 | SW846 6020 |
| | Magnesium | 33.4 | 0.005 | 0.015 | NE | | | 089435-010 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 089435-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | UJ | 089435-010 | SW846 7470 |
| | Nickel | 0.00298 | 0.0005 | 0.002 | NE | | 0.0069U | 089435-010 | SW846 6020 |
| | Potassium | 2.74 | 0.080 | 0.300 | NE | | | 089435-010 | SW846 6020 |
| | Selenium | 0.0304 | 0.001 | 0.005 | 0.050 | B | | 089435-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089435-010 | SW846 6020 |
| | Sodium | 50.0 | 0.080 | 0.250 | NE | | | 089435-010 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 089435-010 | SW846 6020 |
| | Uranium | 0.00122 | 0.00005 | 0.0002 | 0.030 | | | 089435-010 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | | 089435-010 | SW846 6020 |
| | Zinc | 0.00372 | 0.0026 | 0.010 | NE | J | 0.016U | 089435-010 | SW846 6020 |

Refer to footnotes on page 6A-49.

## Table 6A-6 *(Continued)*
## Summary of Total Metal Results,
## Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TA1-W-03** (Duplicate) 22-Jul-10 | Aluminum | ND | 0.010 | 0.030 | NE | U | | 089436-010 | SW846 6020 |
| | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 089436-010 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 089436-010 | SW846 6020 |
| | Barium | 0.0267 | 0.0005 | 0.002 | 2.00 | | | 089436-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089436-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 089436-010 | SW846 6020 |
| | Calcium | 281 | 0.200 | 2.00 | NE | B | | 089436-010 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 089436-010 | SW846 6020 |
| | Cobalt | 0.000154 | 0.0001 | 0.001 | NE | J | | 089436-010 | SW846 6020 |
| | Copper | 0.00148 | 0.0003 | 0.001 | NE | | 0.011U | 089436-010 | SW846 6020 |
| | Iron | 0.455 | 0.010 | 0.100 | NE | | | 089436-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089436-010 | SW846 6020 |
| | Magnesium | 34.4 | 0.005 | 0.015 | NE | | | 089436-010 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 089436-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | UJ | 089436-010 | SW846 7470 |
| | Nickel | 0.00293 | 0.0005 | 0.002 | NE | | 0.0069U | 089436-010 | SW846 6020 |
| | Potassium | 2.82 | 0.080 | 0.300 | NE | | | 089436-010 | SW846 6020 |
| | Selenium | 0.0302 | 0.001 | 0.005 | 0.050 | B | | 089436-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089436-010 | SW846 6020 |
| | Sodium | 49.0 | 0.080 | 0.250 | NE | | | 089436-010 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 089436-010 | SW846 6020 |
| | Uranium | 0.00123 | 0.00005 | 0.0002 | 0.030 | | | 089436-010 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | | 089436-010 | SW846 6020 |
| | Zinc | 0.00312 | 0.0026 | 0.010 | NE | J | 0.016U | 089436-010 | SW846 6020 |

Refer to footnotes on page 6A-49.

## Table 6A-6 *(Continued)*
## Summary of Total Metal Results,
## Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TA1-W-04** | Aluminum | ND | 0.010 | 0.030 | NE | U | | 089438-010 | SW846 6020 |
| 23-Jul-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 089438-010 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 089438-010 | SW846 6020 |
| | Barium | 0.0505 | 0.0005 | 0.002 | 2.00 | | | 089438-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089438-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 089438-010 | SW846 6020 |
| | Calcium | 65.2 | 0.100 | 1.00 | NE | B | | 089438-010 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 089438-010 | SW846 6020 |
| | Cobalt | ND | 0.0001 | 0.001 | NE | U | | 089438-010 | SW846 6020 |
| | Copper | 0.000737 | 0.0003 | 0.001 | NE | J | | 089438-010 | SW846 6020 |
| | Iron | 0.243 | 0.010 | 0.100 | NE | | | 089438-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089438-010 | SW846 6020 |
| | Magnesium | 10.6 | 0.005 | 0.015 | NE | | | 089438-010 | SW846 6020 |
| | Manganese | 0.00104 | 0.001 | 0.005 | NE | J | | 089438-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 089438-010 | SW846 7470 |
| | Nickel | 0.00116 | 0.0005 | 0.002 | NE | J | | 089438-010 | SW846 6020 |
| | Potassium | 2.01 | 0.080 | 0.300 | NE | | | 089438-010 | SW846 6020 |
| | Selenium | ND | 0.001 | 0.005 | 0.050 | U | UJ | 089438-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089438-010 | SW846 6020 |
| | Sodium | 22.2 | 0.080 | 0.250 | NE | | | 089438-010 | SW846 6020 |
| | Thallium | 0.000512 | 0.0003 | 0.001 | 0.002 | J | 0.0034U | 089438-010 | SW846 6020 |
| | Uranium | 0.00322 | 0.00005 | 0.0002 | 0.030 | | | 089438-010 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | | 089438-010 | SW846 6020 |
| | Zinc | 0.00323 | 0.0026 | 0.010 | NE | J | | 089438-010 | SW846 6020 |

Refer to footnotes on page 6A-49.

**Table 6A-6** *(Continued)*
**Summary of Total Metal Results,**
**Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TA1-W-05** | Aluminum | ND | 0.010 | 0.030 | NE | U | | 089440-010 | SW846 6020 |
| 26-Jul-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 089440-010 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 089440-010 | SW846 6020 |
| | Barium | 0.0371 | 0.0005 | 0.002 | 2.00 | | | 089440-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089440-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 089440-010 | SW846 6020 |
| | Calcium | 83.9 | 0.100 | 1.00 | NE | B | | 089440-010 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 089440-010 | SW846 6020 |
| | Cobalt | 0.000116 | 0.0001 | 0.001 | NE | J | | 089440-010 | SW846 6020 |
| | Copper | 0.00091 | 0.0003 | 0.001 | NE | J | | 089440-010 | SW846 6020 |
| | Iron | 0.310 | 0.010 | 0.100 | NE | | | 089440-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089440-010 | SW846 6020 |
| | Magnesium | 12.1 | 0.005 | 0.015 | NE | | | 089440-010 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 089440-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 089440-010 | SW846 7470 |
| | Nickel | 0.00142 | 0.0005 | 0.002 | NE | J | | 089440-010 | SW846 6020 |
| | Potassium | 2.25 | 0.080 | 0.300 | NE | | | 089440-010 | SW846 6020 |
| | Selenium | ND | 0.001 | 0.005 | 0.050 | U | UJ | 089440-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089440-010 | SW846 6020 |
| | Sodium | 29.4 | 0.080 | 0.250 | NE | | | 089440-010 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 089440-010 | SW846 6020 |
| | Uranium | 0.00401 | 0.00005 | 0.0002 | 0.030 | | | 089440-010 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | | 089440-010 | SW846 6020 |
| | Zinc | 0.0057 | 0.0026 | 0.010 | NE | J | | 089440-010 | SW846 6020 |

Refer to footnotes on page 6A-49.

# Table 6A-6 *(Continued)*
# Summary of Total Metal Results,
# Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TA1-W-06** | Aluminum | ND | 0.010 | 0.030 | NE | U | | 089442-010 | SW846 6020 |
| 27-Jul-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 089442-010 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 089442-010 | SW846 6020 |
| | Barium | 0.0266 | 0.0005 | 0.002 | 2.00 | | | 089442-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089442-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 089442-010 | SW846 6020 |
| | Calcium | 128 | 0.100 | 1.00 | NE | B | | 089442-010 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 089442-010 | SW846 6020 |
| | Cobalt | 0.00019 | 0.0001 | 0.001 | NE | J | J+ | 089442-010 | SW846 6020 |
| | Copper | 0.00133 | 0.0003 | 0.001 | NE | | | 089442-010 | SW846 6020 |
| | Iron | 0.470 | 0.010 | 0.100 | NE | | | 089442-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089442-010 | SW846 6020 |
| | Magnesium | 16.8 | 0.005 | 0.015 | NE | | | 089442-010 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 089442-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 089442-010 | SW846 7470 |
| | Nickel | 0.00216 | 0.0005 | 0.002 | NE | | J+ | 089442-010 | SW846 6020 |
| | Potassium | 2.24 | 0.080 | 0.300 | NE | | | 089442-010 | SW846 6020 |
| | Selenium | 0.00777 | 0.001 | 0.005 | 0.050 | | J- | 089442-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089442-010 | SW846 6020 |
| | Sodium | 32.3 | 0.080 | 0.250 | NE | | | 089442-010 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 089442-010 | SW846 6020 |
| | Uranium | 0.00137 | 0.00005 | 0.0002 | 0.030 | | | 089442-010 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | | 089442-010 | SW846 6020 |
| | Zinc | 0.00292 | 0.0026 | 0.010 | NE | J | J+ | 089442-010 | SW846 6020 |

Refer to footnotes on page 6A-49.

**Table 6A-6** *(Continued)*
**Summary of Total Metal Results,**
**Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TA1-W-08** | Aluminum | ND | 0.010 | 0.030 | NE | U | | 089444-010 | SW846 6020 |
| 28-Jul-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 089444-010 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 089444-010 | SW846 6020 |
| | Barium | 0.0196 | 0.0005 | 0.002 | 2.00 | | | 089444-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089444-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 089444-010 | SW846 6020 |
| | Calcium | 334 | 0.200 | 2.00 | NE | B | | 089444-010 | SW846 6020 |
| | Chromium | 0.00346 | 0.0025 | 0.010 | 0.100 | J | | 089444-010 | SW846 6020 |
| | Cobalt | 0.000588 | 0.0001 | 0.001 | NE | J | J+ | 089444-010 | SW846 6020 |
| | Copper | 0.00405 | 0.0003 | 0.001 | NE | | | 089444-010 | SW846 6020 |
| | Iron | 1.41 | 0.010 | 0.100 | NE | | | 089444-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089444-010 | SW846 6020 |
| | Magnesium | 40.1 | 0.005 | 0.015 | NE | | | 089444-010 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 089444-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 089444-010 | SW846 7470 |
| | Nickel | 0.00717 | 0.0005 | 0.002 | NE | | J+ | 089444-010 | SW846 6020 |
| | Potassium | 2.97 | 0.080 | 0.300 | NE | | | 089444-010 | SW846 6020 |
| | Selenium | 0.0275 | 0.001 | 0.005 | 0.050 | | J- | 089444-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089444-010 | SW846 6020 |
| | Sodium | 83.1 | 0.800 | 2.50 | NE | | | 089444-010 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 089444-010 | SW846 6020 |
| | Uranium | 0.00215 | 0.00005 | 0.0002 | 0.030 | | | 089444-010 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | | 089444-010 | SW846 6020 |
| | Zinc | 0.00533 | 0.0026 | 0.010 | NE | J | J+ | 089444-010 | SW846 6020 |

Refer to footnotes on page 6A-49.

**Table 6A-6** *(Continued)*
**Summary of Total Metal Results,**
**Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TA2-NW1-595** | Aluminum | ND | 0.010 | 0.030 | NE | U | | 089453-010 | SW846 6020 |
| 03-Aug-10 | Antimony | 0.000638 | 0.0005 | 0.003 | 0.006 | J | | 089453-010 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 089453-010 | SW846 6020 |
| | Barium | 0.0424 | 0.0005 | 0.002 | 2.00 | | | 089453-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089453-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 089453-010 | SW846 6020 |
| | Calcium | 104 | 0.200 | 2.00 | NE | | | 089453-010 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 089453-010 | SW846 6020 |
| | Cobalt | 0.000116 | 0.0001 | 0.001 | NE | J | J+ | 089453-010 | SW846 6020 |
| | Copper | 0.000636 | 0.0003 | 0.001 | NE | J | J+ | 089453-010 | SW846 6020 |
| | Iron | 0.215 | 0.010 | 0.100 | NE | | | 089453-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089453-010 | SW846 6020 |
| | Magnesium | 18.9 | 0.005 | 0.015 | NE | | | 089453-010 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 089453-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 089453-010 | SW846 7470 |
| | Nickel | 0.00296 | 0.0005 | 0.002 | NE | | J+ | 089453-010 | SW846 6020 |
| | Potassium | 2.37 | 0.080 | 0.300 | NE | | | 089453-010 | SW846 6020 |
| | Selenium | 0.00863 | 0.001 | 0.005 | 0.050 | | | 089453-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089453-010 | SW846 6020 |
| | Sodium | 28.8 | 0.080 | 0.250 | NE | | | 089453-010 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 089453-010 | SW846 6020 |
| | Uranium | 0.0022 | 0.00005 | 0.0002 | 0.030 | | | 089453-010 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | | 089453-010 | SW846 6020 |
| | Zinc | ND | 0.0026 | 0.010 | NE | U | | 089453-010 | SW846 6020 |

Refer to footnotes on page 6A-49.

**Table 6A-6** *(Continued)*
**Summary of Total Metal Results,**
**Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TA2-SW1-320** | Aluminum | 0.196 | 0.010 | 0.030 | NE | | J | 089424-010 | SW846 6020 |
| 15-Jul-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 089424-010 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 089424-010 | SW846 6020 |
| | Barium | 0.212 | 0.0005 | 0.002 | 2.00 | | | 089424-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089424-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 089424-010 | SW846 6020 |
| | Calcium | 64.8 | 0.400 | 4.00 | NE | | J | 089424-010 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 089424-010 | SW846 6020 |
| | Cobalt | 0.000187 | 0.0001 | 0.001 | NE | J | | 089424-010 | SW846 6020 |
| | Copper | 0.000638 | 0.0003 | 0.001 | NE | J | | 089424-010 | SW846 6020 |
| | Iron | 0.294 | 0.010 | 0.100 | NE | | | 089424-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089424-010 | SW846 6020 |
| | Magnesium | 11.2 | 0.005 | 0.015 | NE | | | 089424-010 | SW846 6020 |
| | Manganese | 0.00731 | 0.001 | 0.005 | NE | | | 089424-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 089424-010 | SW846 7470 |
| | Nickel | 0.00145 | 0.0005 | 0.002 | NE | J | | 089424-010 | SW846 6020 |
| | Potassium | 1.88 | 0.080 | 0.300 | NE | | | 089424-010 | SW846 6020 |
| | Selenium | 0.00326 | 0.001 | 0.005 | 0.050 | J | | 089424-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089424-010 | SW846 6020 |
| | Sodium | 18.2 | 0.080 | 0.250 | NE | | | 089424-010 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 089424-010 | SW846 6020 |
| | Uranium | 0.00138 | 0.00005 | 0.0002 | 0.030 | | | 089424-010 | SW846 6020 |
| | Vanadium | 0.00403 | 0.003 | 0.010 | NE | J | | 089424-010 | SW846 6020 |
| | Zinc | 0.0049 | 0.0026 | 0.010 | NE | J | | 089424-010 | SW846 6020 |

Refer to footnotes on page 6A-49.

**Table 6A-6** *(Continued)*
**Summary of Total Metal Results,**
**Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TA2-W-01** | Aluminum | 0.505 | 0.010 | 0.030 | NE | | | 089460-010 | SW846 6020 |
| 09-Aug-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 089460-010 | SW846 6020 |
| | Arsenic | 0.0041 | 0.0015 | 0.005 | 0.010 | B, J | 0.012U | 089460-010 | SW846 6020 |
| | Barium | 0.123 | 0.0005 | 0.002 | 2.00 | | | 089460-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089460-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 089460-010 | SW846 6020 |
| | Calcium | 86.0 | 0.100 | 1.00 | NE | B | | 089460-010 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 089460-010 | SW846 6020 |
| | Cobalt | 0.00025 | 0.0001 | 0.001 | NE | B, J | 0.00072U | 089460-010 | SW846 6020 |
| | Copper | 0.00115 | 0.0003 | 0.001 | NE | | | 089460-010 | SW846 6020 |
| | Iron | 0.819 | 0.010 | 0.100 | NE | B | J | 089460-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089460-010 | SW846 6020 |
| | Magnesium | 12.8 | 0.005 | 0.015 | NE | | | 089460-010 | SW846 6020 |
| | Manganese | 0.0127 | 0.001 | 0.005 | NE | | | 089460-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 089460-010 | SW846 7470 |
| | Nickel | 0.00206 | 0.0005 | 0.002 | NE | | | 089460-010 | SW846 6020 |
| | Potassium | 1.89 | 0.080 | 0.300 | NE | | | 089460-010 | SW846 6020 |
| | Selenium | 0.00653 | 0.001 | 0.005 | 0.050 | | | 089460-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089460-010 | SW846 6020 |
| | Sodium | 20.3 | 0.080 | 0.250 | NE | | | 089460-010 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 089460-010 | SW846 6020 |
| | Uranium | 0.000942 | 0.00005 | 0.0002 | 0.030 | | | 089460-010 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | | 089460-010 | SW846 6020 |
| | Zinc | 0.00389 | 0.0026 | 0.010 | NE | J | | 089460-010 | SW846 6020 |

Refer to footnotes on page 6A-49.

**Table 6A-6** *(Continued)*
**Summary of Total Metal Results,**
**Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TA2-W-19** | Aluminum | ND | 0.010 | 0.030 | NE | U | | 089466-010 | SW846 6020 |
| 11-Aug-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 089466-010 | SW846 6020 |
| | Arsenic | 0.00369 | 0.0015 | 0.005 | 0.010 | B, J | 0.012U | 089466-010 | SW846 6020 |
| | Barium | 0.0428 | 0.0005 | 0.002 | 2.00 | | | 089466-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089466-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 089466-010 | SW846 6020 |
| | Calcium | 78.2 | 0.100 | 1.00 | NE | B | | 089466-010 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 089466-010 | SW846 6020 |
| | Cobalt | ND | 0.0001 | 0.001 | NE | U | | 089466-010 | SW846 6020 |
| | Copper | 0.00057 | 0.0003 | 0.001 | NE | J | 0.0057UJ | 089466-010 | SW846 6020 |
| | Iron | 0.162 | 0.010 | 0.100 | NE | B | J | 089466-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089466-010 | SW846 6020 |
| | Magnesium | 13.8 | 0.005 | 0.015 | NE | | | 089466-010 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 089466-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 089466-010 | SW846 7470 |
| | Nickel | 0.00143 | 0.0005 | 0.002 | NE | J | | 089466-010 | SW846 6020 |
| | Potassium | 1.56 | 0.080 | 0.300 | NE | | | 089466-010 | SW846 6020 |
| | Selenium | 0.00445 | 0.001 | 0.005 | 0.050 | J | | 089466-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089466-010 | SW846 6020 |
| | Sodium | 21.0 | 0.080 | 0.250 | NE | | | 089466-010 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 089466-010 | SW846 6020 |
| | Uranium | 0.00101 | 0.00005 | 0.0002 | 0.030 | | | 089466-010 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | | 089466-010 | SW846 6020 |
| | Zinc | 0.00508 | 0.0026 | 0.010 | NE | J | 0.016U | 089466-010 | SW846 6020 |

Refer to footnotes on page 6A-49.

## Table 6A-6 *(Continued)*
## Summary of Total Metal Results,
## Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TA2-W-19** (Duplicate) 11-Aug-10 | Aluminum | ND | 0.010 | 0.030 | NE | U | | 089467-010 | SW846 6020 |
| | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 089467-010 | SW846 6020 |
| | Arsenic | 0.0042 | 0.0015 | 0.005 | 0.010 | B, J | 0.012U | 089467-010 | SW846 6020 |
| | Barium | 0.0438 | 0.0005 | 0.002 | 2.00 | | | 089467-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089467-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 089467-010 | SW846 6020 |
| | Calcium | 78.5 | 0.100 | 1.00 | NE | B | | 089467-010 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 089467-010 | SW846 6020 |
| | Cobalt | ND | 0.0001 | 0.001 | NE | U | | 089467-010 | SW846 6020 |
| | Copper | 0.000528 | 0.0003 | 0.001 | NE | J | 0.0057UJ | 089467-010 | SW846 6020 |
| | Iron | 0.152 | 0.010 | 0.100 | NE | B | J | 089467-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089467-010 | SW846 6020 |
| | Magnesium | 13.0 | 0.005 | 0.015 | NE | | | 089467-010 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 089467-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 089467-010 | SW846 7470 |
| | Nickel | 0.00139 | 0.0005 | 0.002 | NE | J | | 089467-010 | SW846 6020 |
| | Potassium | 1.62 | 0.080 | 0.300 | NE | | | 089467-010 | SW846 6020 |
| | Selenium | 0.00413 | 0.001 | 0.005 | 0.050 | J | | 089467-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089467-010 | SW846 6020 |
| | Sodium | 20.5 | 0.080 | 0.250 | NE | | | 089467-010 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 089467-010 | SW846 6020 |
| | Uranium | 0.00105 | 0.00005 | 0.0002 | 0.030 | | | 089467-010 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | | 089467-010 | SW846 6020 |
| | Zinc | 0.00372 | 0.0026 | 0.010 | NE | J | 0.016U | 089467-010 | SW846 6020 |

Refer to footnotes on page 6A-49.

## Table 6A-6 *(Continued)*
## Summary of Total Metal Results,
## Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TA2-W-26** | Aluminum | 0.0109 | 0.010 | 0.030 | NE | J | | 089462-010 | SW846 6020 |
| 10-Aug-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 089462-010 | SW846 6020 |
| | Arsenic | 0.00345 | 0.0015 | 0.005 | 0.010 | B, J | 0.012U | 089462-010 | SW846 6020 |
| | Barium | 0.0653 | 0.0005 | 0.002 | 2.00 | | | 089462-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089462-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | UJ | 089462-010 | SW846 6020 |
| | Calcium | 198 | 0.100 | 1.00 | NE | B | | 089462-010 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 089462-010 | SW846 6020 |
| | Cobalt | 0.00021 | 0.0001 | 0.001 | NE | B, J | 0.00072U | 089462-010 | SW846 6020 |
| | Copper | 0.00241 | 0.0003 | 0.001 | NE | | J+ | 089462-010 | SW846 6020 |
| | Iron | 0.394 | 0.010 | 0.100 | NE | B | J | 089462-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089462-010 | SW846 6020 |
| | Magnesium | 28.2 | 0.005 | 0.015 | NE | | | 089462-010 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 089462-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 089462-010 | SW846 7470 |
| | Nickel | 0.00299 | 0.0005 | 0.002 | NE | | J+ | 089462-010 | SW846 6020 |
| | Potassium | 2.30 | 0.080 | 0.300 | NE | | | 089462-010 | SW846 6020 |
| | Selenium | 0.0156 | 0.001 | 0.005 | 0.050 | | | 089462-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089462-010 | SW846 6020 |
| | Sodium | 34.1 | 0.080 | 0.250 | NE | | | 089462-010 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 089462-010 | SW846 6020 |
| | Uranium | 0.0011 | 0.00005 | 0.0002 | 0.030 | | | 089462-010 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | | 089462-010 | SW846 6020 |
| | Zinc | 0.00301 | 0.0026 | 0.010 | NE | J | J+ | 089462-010 | SW846 6020 |

Refer to footnotes on page 6A-49.

**Table 6A-6** *(Continued)*
**Summary of Total Metal Results,**
**Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TA2-W-27** | Aluminum | ND | 0.010 | 0.030 | NE | U | | 089456-010 | SW846 6020 |
| 04-Aug-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 089456-010 | SW846 6020 |
| | Arsenic | 0.00151 | 0.0015 | 0.005 | 0.010 | J | | 089456-010 | SW846 6020 |
| | Barium | 0.0579 | 0.0005 | 0.002 | 2.00 | | | 089456-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089456-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 089456-010 | SW846 6020 |
| | Calcium | 119 | 0.200 | 2.00 | NE | | | 089456-010 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 089456-010 | SW846 6020 |
| | Cobalt | 0.00013 | 0.0001 | 0.001 | NE | J | J+ | 089456-010 | SW846 6020 |
| | Copper | 0.000847 | 0.0003 | 0.001 | NE | J | J+ | 089456-010 | SW846 6020 |
| | Iron | 0.256 | 0.010 | 0.100 | NE | | | 089456-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089456-010 | SW846 6020 |
| | Magnesium | 19.4 | 0.005 | 0.015 | NE | | | 089456-010 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 089456-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 089456-010 | SW846 7470 |
| | Nickel | 0.00349 | 0.0005 | 0.002 | NE | | J+ | 089456-010 | SW846 6020 |
| | Potassium | 2.07 | 0.080 | 0.300 | NE | | | 089456-010 | SW846 6020 |
| | Selenium | 0.010 | 0.001 | 0.005 | 0.050 | | | 089456-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089456-010 | SW846 6020 |
| | Sodium | 29.2 | 0.080 | 0.250 | NE | | | 089456-010 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 089456-010 | SW846 6020 |
| | Uranium | 0.00113 | 0.00005 | 0.0002 | 0.030 | | | 089456-010 | SW846 6020 |
| | Vanadium | 0.00306 | 0.003 | 0.010 | NE | J | | 089456-010 | SW846 6020 |
| | Zinc | 0.00292 | 0.0026 | 0.010 | NE | J | J+ | 089456-010 | SW846 6020 |

Refer to footnotes on page 6A-49.

**Table 6A-6** *(Continued)*
**Summary of Total Metal Results,**
**Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TJA-2** | Aluminum | ND | 0.010 | 0.030 | NE | U | | 089469-010 | SW846 6020 |
| 12-Aug-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 089469-010 | SW846 6020 |
| | Arsenic | 0.00375 | 0.0015 | 0.005 | 0.010 | B, J | 0.012U | 089469-010 | SW846 6020 |
| | Barium | 0.0415 | 0.0005 | 0.002 | 2.00 | | | 089469-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089469-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 089469-010 | SW846 6020 |
| | Calcium | 145 | 0.100 | 1.00 | NE | B | | 089469-010 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 089469-010 | SW846 6020 |
| | Cobalt | ND | 0.0001 | 0.001 | NE | U | | 089469-010 | SW846 6020 |
| | Copper | 0.000524 | 0.0003 | 0.001 | NE | J | | 089469-010 | SW846 6020 |
| | Iron | 0.153 | 0.010 | 0.100 | NE | B | J | 089469-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089469-010 | SW846 6020 |
| | Magnesium | 13.3 | 0.005 | 0.015 | NE | | | 089469-010 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 089469-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 089469-010 | SW846 7470 |
| | Nickel | 0.00133 | 0.0005 | 0.002 | NE | J | | 089469-010 | SW846 6020 |
| | Potassium | 1.70 | 0.080 | 0.300 | NE | | | 089469-010 | SW846 6020 |
| | Selenium | 0.00383 | 0.001 | 0.005 | 0.050 | J | | 089469-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089469-010 | SW846 6020 |
| | Sodium | 21.0 | 0.080 | 0.250 | NE | | | 089469-010 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 089469-010 | SW846 6020 |
| | Uranium | 0.00125 | 0.00005 | 0.0002 | 0.030 | | | 089469-010 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | | 089469-010 | SW846 6020 |
| | Zinc | ND | 0.0026 | 0.010 | NE | U | | 089469-010 | SW846 6020 |

Refer to footnotes on page 6A-49.

**Table 6A-6** *(Continued)*
**Summary of Total Metal Results,**
**Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TJA-3** | Aluminum | ND | 0.010 | 0.030 | NE | U | | 089448-010 | SW846 6020 |
| 29-Jul-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 089448-010 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 089448-010 | SW846 6020 |
| | Barium | 0.0441 | 0.0005 | 0.002 | 2.00 | | | 089448-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089448-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 089448-010 | SW846 6020 |
| | Calcium | 73.3 | 0.100 | 1.00 | NE | B | | 089448-010 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 089448-010 | SW846 6020 |
| | Cobalt | ND | 0.0001 | 0.001 | NE | U | | 089448-010 | SW846 6020 |
| | Copper | 0.00152 | 0.0003 | 0.001 | NE | | 0.0067UJ | 089448-010 | SW846 6020 |
| | Iron | 0.248 | 0.010 | 0.100 | NE | | | 089448-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089448-010 | SW846 6020 |
| | Magnesium | 12.4 | 0.025 | 0.075 | NE | | | 089448-010 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 089448-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 089448-010 | SW846 7470 |
| | Nickel | 0.00133 | 0.0005 | 0.002 | NE | J | | 089448-010 | SW846 6020 |
| | Potassium | 1.84 | 0.080 | 0.300 | NE | | | 089448-010 | SW846 6020 |
| | Selenium | ND | 0.001 | 0.005 | 0.050 | U | UJ | 089448-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089448-010 | SW846 6020 |
| | Sodium | 24.6 | 0.400 | 1.25 | NE | | | 089448-010 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 089448-010 | SW846 6020 |
| | Uranium | 0.00288 | 0.00005 | 0.0002 | 0.030 | | | 089448-010 | SW846 6020 |
| | Vanadium | 0.00304 | 0.003 | 0.010 | NE | J | | 089448-010 | SW846 6020 |
| | Zinc | ND | 0.0026 | 0.010 | NE | U | | 089448-010 | SW846 6020 |

Refer to footnotes on page 6A-49.

## Table 6A-6 *(Continued)*
## Summary of Total Metal Results,
## Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TJA-3** (Duplicate) 23-Jul-10 | Aluminum | ND | 0.010 | 0.030 | NE | U | | 089449-010 | SW846 6020 |
| | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 089449-010 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 089449-010 | SW846 6020 |
| | Barium | 0.0387 | 0.0005 | 0.002 | 2.00 | | | 089449-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089449-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 089449-010 | SW846 6020 |
| | Calcium | 68.5 | 0.100 | 1.00 | NE | B | | 089449-010 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 089449-010 | SW846 6020 |
| | Cobalt | ND | 0.0001 | 0.001 | NE | U | | 089449-010 | SW846 6020 |
| | Copper | 0.000861 | 0.0003 | 0.001 | NE | J | 0.0067UJ | 089449-010 | SW846 6020 |
| | Iron | 0.241 | 0.010 | 0.100 | NE | | | 089449-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089449-010 | SW846 6020 |
| | Magnesium | 11.3 | 0.025 | 0.075 | NE | | | 089449-010 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 089449-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 089449-010 | SW846 7470 |
| | Nickel | 0.00129 | 0.0005 | 0.002 | NE | J | | 089449-010 | SW846 6020 |
| | Potassium | 1.72 | 0.080 | 0.300 | NE | | | 089449-010 | SW846 6020 |
| | Selenium | ND | 0.001 | 0.005 | 0.050 | U | UJ | 089449-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089449-010 | SW846 6020 |
| | Sodium | 23.8 | 0.400 | 1.25 | NE | | | 089449-010 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 089449-010 | SW846 6020 |
| | Uranium | 0.0028 | 0.00005 | 0.0002 | 0.030 | | | 089449-010 | SW846 6020 |
| | Vanadium | 0.00328 | 0.003 | 0.010 | NE | J | | 089449-010 | SW846 6020 |
| | Zinc | 0.00295 | 0.0026 | 0.010 | NE | J | | 089449-010 | SW846 6020 |

Refer to footnotes on page 6A-49.

**Table 6A-6** *(Continued)*
**Summary of Total Metal Results,**
**Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TJA-4** | Aluminum | ND | 0.010 | 0.030 | NE | U | | 089473-010 | SW846 6020 |
| 17-Aug-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 089473-010 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 089473-010 | SW846 6020 |
| | Barium | 0.187 | 0.0025 | 0.010 | 2.00 | | | 089473-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089473-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 089473-010 | SW846 6020 |
| | Calcium | 70.1 | 0.200 | 2.00 | NE | B | | 089473-010 | SW846 6020 |
| | Chromium | 0.00302 | 0.0025 | 0.010 | 0.100 | J | | 089473-010 | SW846 6020 |
| | Cobalt | 0.000149 | 0.0001 | 0.001 | NE | J | 0.00062U | 089473-010 | SW846 6020 |
| | Copper | 0.000874 | 0.0003 | 0.001 | NE | J | | 089473-010 | SW846 6020 |
| | Iron | 0.200 | 0.010 | 0.100 | NE | | | 089473-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089473-010 | SW846 6020 |
| | Magnesium | 14.2 | 0.005 | 0.015 | NE | | | 089473-010 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 089473-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 089473-010 | SW846 7470 |
| | Nickel | 0.00216 | 0.0005 | 0.002 | NE | | | 089473-010 | SW846 6020 |
| | Potassium | 3.34 | 0.080 | 0.300 | NE | | | 089473-010 | SW846 6020 |
| | Selenium | 0.00342 | 0.001 | 0.005 | 0.050 | J | | 089473-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089473-010 | SW846 6020 |
| | Sodium | 25.9 | 0.080 | 0.250 | NE | | | 089473-010 | SW846 6020 |
| | Thallium | 0.00055 | 0.0003 | 0.001 | 0.002 | J | 0.0039U | 089473-010 | SW846 6020 |
| | Uranium | 0.00298 | 0.00005 | 0.0002 | 0.030 | | | 089473-010 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | | 089473-010 | SW846 6020 |
| | Zinc | ND | 0.0026 | 0.010 | NE | U | | 089473-010 | SW846 6020 |

Refer to footnotes on page 6A-49.

**Table 6A-6** *(Continued)*
**Summary of Total Metal Results,**
**Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TJA-6** | Aluminum | 0.0284 | 0.010 | 0.030 | NE | J | | 089458-010 | SW846 6020 |
| 05-Aug-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 089458-010 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 089458-010 | SW846 6020 |
| | Barium | 0.0634 | 0.0005 | 0.002 | 2.00 | | | 089458-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089458-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 089458-010 | SW846 6020 |
| | Calcium | 64.8 | 0.100 | 1.00 | NE | | | 089458-010 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 089458-010 | SW846 6020 |
| | Cobalt | ND | 0.0001 | 0.001 | NE | U | | 089458-010 | SW846 6020 |
| | Copper | 0.000555 | 0.0003 | 0.001 | NE | J | | 089458-010 | SW846 6020 |
| | Iron | 0.165 | 0.010 | 0.100 | NE | | | 089458-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089458-010 | SW846 6020 |
| | Magnesium | 13.6 | 0.005 | 0.015 | NE | | | 089458-010 | SW846 6020 |
| | Manganese | 0.00108 | 0.001 | 0.005 | NE | J | | 089458-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 089458-010 | SW846 7470 |
| | Nickel | 0.00191 | 0.0005 | 0.002 | NE | J | | 089458-010 | SW846 6020 |
| | Potassium | 2.33 | 0.080 | 0.300 | NE | | | 089458-010 | SW846 6020 |
| | Selenium | 0.00106 | 0.001 | 0.005 | 0.050 | J | | 089458-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089458-010 | SW846 6020 |
| | Sodium | 23.0 | 0.080 | 0.250 | NE | | | 089458-010 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 089458-010 | SW846 6020 |
| | Uranium | 0.00305 | 0.00005 | 0.0002 | 0.030 | | | 089458-010 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | | 089458-010 | SW846 6020 |
| | Zinc | ND | 0.0026 | 0.010 | NE | U | | 089458-010 | SW846 6020 |

Refer to footnotes on page 6A-49.

## Table 6A-6 *(Continued)*
## Summary of Total Metal Results,
## Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TJA-7** | Aluminum | 0.115 | 0.010 | 0.030 | NE | | | 089475-010 | SW846 6020 |
| 18-Aug-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 089475-010 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 089475-010 | SW846 6020 |
| | Barium | 0.232 | 0.0025 | 0.010 | 2.00 | | | 089475-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089475-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 089475-010 | SW846 6020 |
| | Calcium | 73.4 | 0.200 | 2.00 | NE | B | | 089475-010 | SW846 6020 |
| | Chromium | 0.00306 | 0.0025 | 0.010 | 0.100 | J | | 089475-010 | SW846 6020 |
| | Cobalt | 0.000686 | 0.0001 | 0.001 | NE | J | | 089475-010 | SW846 6020 |
| | Copper | 0.000593 | 0.0003 | 0.001 | NE | J | | 089475-010 | SW846 6020 |
| | Iron | 0.267 | 0.010 | 0.100 | NE | | | 089475-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089475-010 | SW846 6020 |
| | Magnesium | 13.1 | 0.005 | 0.015 | NE | | | 089475-010 | SW846 6020 |
| | Manganese | 0.00198 | 0.001 | 0.005 | NE | J | | 089475-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 089475-010 | SW846 7470 |
| | Nickel | 0.00217 | 0.0005 | 0.002 | NE | | | 089475-010 | SW846 6020 |
| | Potassium | 2.16 | 0.080 | 0.300 | NE | | | 089475-010 | SW846 6020 |
| | Selenium | 0.00555 | 0.001 | 0.005 | 0.050 | | | 089475-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089475-010 | SW846 6020 |
| | Sodium | 19.5 | 0.080 | 0.250 | NE | | | 089475-010 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 089475-010 | SW846 6020 |
| | Uranium | 0.00176 | 0.00005 | 0.0002 | 0.030 | | | 089475-010 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | | 089475-010 | SW846 6020 |
| | Zinc | ND | 0.0026 | 0.010 | NE | U | | 089475-010 | SW846 6020 |

Refer to footnotes on page 6A-49.

**Table 6A-6** *(Continued)*
**Summary of Total Metal Results,**
**Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **WYO-3** | Aluminum | 0.0232 | 0.010 | 0.030 | NE | J | | 089451-010 | SW846 6020 |
| 02-Aug-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 089451-010 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 089451-010 | SW846 6020 |
| | Barium | 0.0476 | 0.0005 | 0.002 | 2.00 | | | 089451-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089451-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 089451-010 | SW846 6020 |
| | Calcium | 64.9 | 0.100 | 1.00 | NE | | | 089451-010 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 089451-010 | SW846 6020 |
| | Cobalt | ND | 0.0001 | 0.001 | NE | U | | 089451-010 | SW846 6020 |
| | Copper | 0.000766 | 0.0003 | 0.001 | NE | J | | 089451-010 | SW846 6020 |
| | Iron | 0.160 | 0.010 | 0.100 | NE | | | 089451-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089451-010 | SW846 6020 |
| | Magnesium | 14.5 | 0.005 | 0.015 | NE | | | 089451-010 | SW846 6020 |
| | Manganese | 0.00147 | 0.001 | 0.005 | NE | J | | 089451-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 089451-010 | SW846 7470 |
| | Nickel | 0.00203 | 0.0005 | 0.002 | NE | | | 089451-010 | SW846 6020 |
| | Potassium | 2.46 | 0.080 | 0.300 | NE | | | 089451-010 | SW846 6020 |
| | Selenium | ND | 0.001 | 0.005 | 0.050 | U | | 089451-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089451-010 | SW846 6020 |
| | Sodium | 24.2 | 0.080 | 0.250 | NE | | | 089451-010 | SW846 6020 |
| | Thallium | 0.000316 | 0.0003 | 0.001 | 0.002 | J | 0.002U | 089451-010 | SW846 6020 |
| | Uranium | 0.00361 | 0.00005 | 0.0002 | 0.030 | | | 089451-010 | SW846 6020 |
| | Vanadium | 0.00401 | 0.003 | 0.010 | NE | J | | 089451-010 | SW846 6020 |
| | Zinc | 0.00437 | 0.0026 | 0.010 | NE | J | | 089451-010 | SW846 6020 |

Refer to footnotes on page 6A-49.

**Table 6A-6** *(Concluded)*
**Summary of Total Metal Results,**
**Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **WYO-4** | Aluminum | 0.0129 | 0.010 | 0.030 | NE | J | | 089471-010 | SW846 6020 |
| 16-Aug-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 089471-010 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 089471-010 | SW846 6020 |
| | Barium | 0.182 | 0.0025 | 0.010 | 2.00 | | | 089471-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089471-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 089471-010 | SW846 6020 |
| | Calcium | 90.2 | 0.200 | 2.00 | NE | B | | 089471-010 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 089471-010 | SW846 6020 |
| | Cobalt | 0.00019 | 0.0001 | 0.001 | NE | J | 0.00062U | 089471-010 | SW846 6020 |
| | Copper | 0.00195 | 0.0003 | 0.001 | NE | | | 089471-010 | SW846 6020 |
| | Iron | 0.251 | 0.010 | 0.100 | NE | | | 089471-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089471-010 | SW846 6020 |
| | Magnesium | 15.7 | 0.005 | 0.015 | NE | | | 089471-010 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 089471-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 089471-010 | SW846 7470 |
| | Nickel | 0.00291 | 0.0005 | 0.002 | NE | | | 089471-010 | SW846 6020 |
| | Potassium | 2.19 | 0.080 | 0.300 | NE | | | 089471-010 | SW846 6020 |
| | Selenium | 0.00637 | 0.001 | 0.005 | 0.050 | | | 089471-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089471-010 | SW846 6020 |
| | Sodium | 22.2 | 0.080 | 0.250 | NE | | | 089471-010 | SW846 6020 |
| | Thallium | 0.000669 | 0.0003 | 0.001 | 0.002 | J | 0.0039U | 089471-010 | SW846 6020 |
| | Uranium | 0.0013 | 0.00005 | 0.0002 | 0.030 | | | 089471-010 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | | 089471-010 | SW846 6020 |
| | Zinc | ND | 0.0026 | 0.010 | NE | U | | 089471-010 | SW846 6020 |

Refer to footnotes on page 6A-49.

## Table 6A-7
## Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, and Tritium Results, Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Activity[a] (pCi/L) | MDA[b] (pCi/L) | Critical Level[c] (pCi/L) | MCL[d] (pCi/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **PGS-2** | Americium-241 | -0.283 ± 12.2 | 20.2 | 10.1 | NE | U | BD | 089426-033 | EPA 901.1 |
| 16-Jul-10 | Cesium-137 | 1.86 ± 2.31 | 4.07 | 2.04 | NE | U | BD | 089426-033 | EPA 901.1 |
| | Cobalt-60 | -0.854 ± 2.25 | 3.70 | 1.85 | NE | U | BD | 089426-033 | EPA 901.1 |
| | Potassium-40 | 28.8 ± 41.4 | 59.0 | 29.5 | NE | U | BD | 089426-033 | EPA 901.1 |
| | Gross Alpha | 1.33 | NA | NA | 15 | NA | None | 089426-034 | EPA 900.0 |
| | Gross Beta | 2.91 ± 0.885 | 1.10 | 0.530 | 4mrem/yr | | J | 089426-034 | EPA 900.0 |
| | Tritium | 61.4 ± 92.6 | 156 | 75.3 | NE | U | BD | 089426-036 | EPA 906.0 M |
| **TA1-W-01** | Americium-241 | -2.35 ± 5.00 | 8.30 | 4.15 | NE | U | BD | 089429-033 | EPA 901.1 |
| 06-Aug-10 | Cesium-137 | 0.892 ± 1.57 | 2.76 | 1.38 | NE | U | BD | 089429-033 | EPA 901.1 |
| | Cobalt-60 | -0.262 ± 1.61 | 2.71 | 1.36 | NE | U | BD | 089429-033 | EPA 901.1 |
| | Potassium-40 | -28.2 ± 36.1 | 40.9 | 20.5 | NE | U | BD | 089429-033 | EPA 901.1 |
| | Gross Alpha | 1.90 | NA | NA | 15 | NA | None | 089429-034 | EPA 900.0 |
| | Gross Beta | 1.99 ± 1.07 | 1.61 | 0.775 | 4mrem/yr | | J | 089429-034 | EPA 900.0 |
| | Tritium | -18.6 ± 63.7 | 119 | 54.9 | NE | U | BD | 089429-036 | EPA 906.0 M |
| **TA1-W-02** | Americium-241 | -0.735 ± 12.2 | 20.9 | 10.4 | NE | U | BD | 089431-033 | EPA 901.1 |
| 21-Jul-10 | Cesium-137 | 0.221 ± 3.66 | 4.48 | 2.24 | NE | U | BD | 089431-033 | EPA 901.1 |
| | Cobalt-60 | -1.75 ± 2.07 | 3.23 | 1.61 | NE | U | BD | 089431-033 | EPA 901.1 |
| | Potassium-40 | -34.4 ± 46.9 | 46.6 | 23.3 | NE | U | BD | 089431-033 | EPA 901.1 |
| | Gross Alpha | 2.06 | NA | NA | 15 | NA | None | 089431-034 | EPA 900.0 |
| | Gross Beta | 4.09 ± 1.03 | 1.06 | 0.508 | 4mrem/yr | | | 089431-034 | EPA 900.0 |
| | Tritium | 81.4 ± 94.2 | 156 | 75.6 | NE | U | BD | 089431-036 | EPA 906.0 M |
| **TA1-W-03** | Americium-241 | -0.797 ± 5.08 | 8.59 | 4.30 | NE | U | BD | 089435-033 | EPA 901.1 |
| 22-Jul-10 | Cesium-137 | 0.530 ± 1.72 | 2.95 | 1.48 | NE | U | BD | 089435-033 | EPA 901.1 |
| | Cobalt-60 | -1.23 ± 1.98 | 3.16 | 1.58 | NE | U | BD | 089435-033 | EPA 901.1 |
| | Potassium-40 | 6.21 ± 41.3 | 45.0 | 22.5 | NE | U | BD | 089435-033 | EPA 901.1 |
| | Gross Alpha | 0.27 | NA | NA | 15 | NA | None | 089435-034 | EPA 900.0 |
| | Gross Beta | 0.824 ± 2.26 | 3.85 | 1.87 | 4mrem/yr | U | BD | 089435-034 | EPA 900.0 |
| | Tritium | 53.2 ± 91.8 | 155 | 75.0 | NE | U | BD | 089435-036 | EPA 906.0 M |
| **TA1-W-03** (Duplicate) | Americium-241 | -1.89 ± 12.6 | 18.6 | 9.31 | NE | U | BD | 089436-033 | EPA 901.1 |
| 22-Jul-10 | Cesium-137 | -0.0267 ± 1.88 | 3.16 | 1.58 | NE | U | BD | 089436-033 | EPA 901.1 |
| | Cobalt-60 | -0.396 ± 2.10 | 3.46 | 1.73 | NE | U | BD | 089436-033 | EPA 901.1 |
| | Potassium-40 | -0.752 ± 40.2 | 45.6 | 22.8 | NE | U | BD | 089436-033 | EPA 901.1 |
| | Gross Alpha | -1.01 | NA | NA | 15 | NA | None | 089436-034 | EPA 900.0 |
| | Gross Beta | 7.35 ± 2.47 | 3.25 | 1.56 | 4mrem/yr | | J | 089436-034 | EPA 900.0 |
| | Tritium | 27.7 ± 90.9 | 156 | 75.3 | NE | U | BD | 089436-036 | EPA 906.0 M |

Refer to footnotes on page 6A-49.

## Table 6A-7 *(Continued)*
## Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, and Tritium Results, Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Activity[a] (pCi/L) | MDA[b] (pCi/L) | Critical Level[c] (pCi/L) | MCL[d] (pCi/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TA1-W-04** | Americium-241 | -0.726 ± 13.1 | 22.9 | 11.5 | NE | U | BD | 089438-033 | EPA 901.1 |
| 23-Jul-10 | Cesium-137 | -0.392 ± 2.80 | 4.70 | 2.35 | NE | U | BD | 089438-033 | EPA 901.1 |
| | Cobalt-60 | -0.379 ± 2.81 | 4.61 | 2.31 | NE | U | BD | 089438-033 | EPA 901.1 |
| | Potassium-40 | 31.7 ± 52.0 | 71.7 | 35.9 | NE | U | BD | 089438-033 | EPA 901.1 |
| | Gross Alpha | 0.86 | NA | NA | 15 | NA | None | 089438-034 | EPA 900.0 |
| | Gross Beta | 2.11 ± 0.957 | 1.40 | 0.672 | 4mrem/yr | | J | 089438-034 | EPA 900.0 |
| | Tritium | 20.4 ± 111 | 191 | 92.3 | NE | U | BD | 089438-036 | EPA 906.0 M |
| **TA1-W-05** | Americium-241 | 3.74 ± 14.3 | 22.0 | 11.0 | NE | U | BD | 089440-033 | EPA 901.1 |
| 26-Jul-10 | Cesium-137 | -1.82 ± 1.84 | 2.96 | 1.48 | NE | U | BD | 089440-033 | EPA 901.1 |
| | Cobalt-60 | 0.365 ± 2.09 | 3.58 | 1.79 | NE | U | BD | 089440-033 | EPA 901.1 |
| | Potassium-40 | -2.90 ± 40.4 | 49.2 | 24.6 | NE | U | BD | 089440-033 | EPA 901.1 |
| | Gross Alpha | 4.27 | NA | NA | 15 | NA | None | 089440-034 | EPA 900.0 |
| | Gross Beta | 11.5 ± 2.38 | 1.94 | 0.940 | 4mrem/yr | | | 089440-034 | EPA 900.0 |
| | Tritium | 5.16 ± 111 | 193 | 93.3 | NE | U | BD | 089440-036 | EPA 906.0 M |
| **TA1-W-06** | Americium-241 | -2.80 ± 6.51 | 9.56 | 4.78 | NE | U | BD | 089442-033 | EPA 901.1 |
| 27-Jul-10 | Cesium-137 | -2.61 ± 2.77 | 2.75 | 1.38 | NE | U | BD | 089442-033 | EPA 901.1 |
| | Cobalt-60 | 0.431 ± 1.69 | 2.84 | 1.42 | NE | U | BD | 089442-033 | EPA 901.1 |
| | Potassium-40 | 6.57 ± 31.4 | 40.1 | 20.1 | NE | U | BD | 089442-033 | EPA 901.1 |
| | Gross Alpha | -0.56 | NA | NA | 15 | NA | None | 089442-034 | EPA 900.0 |
| | Gross Beta | 0.0388 ± 1.44 | 2.48 | 1.20 | 4mrem/yr | U | BD | 089442-034 | EPA 900.0 |
| | Tritium | 63.2 ± 112 | 189 | 91.5 | NE | U | BD | 089442-036 | EPA 906.0 M |
| **TA1-W-08** | Americium-241 | -2.04 ± 8.57 | 12.9 | 6.44 | NE | U | BD | 089444-033 | EPA 901.1 |
| 28-Jul-10 | Cesium-137 | 0.659 ± 1.86 | 3.19 | 1.60 | NE | U | BD | 089444-033 | EPA 901.1 |
| | Cobalt-60 | 0.940 ± 1.82 | 3.16 | 1.58 | NE | U | BD | 089444-033 | EPA 901.1 |
| | Potassium-40 | -12.4 ± 41.9 | 44.2 | 22.1 | NE | U | BD | 089444-033 | EPA 901.1 |
| | Gross Alpha | -5.82 | NA | NA | 15 | NA | None | 089444-034 | EPA 900.0 |
| | Gross Beta | 1.16 ± 3.06 | 5.20 | 2.52 | 4mrem/yr | U | BD | 089444-034 | EPA 900.0 |
| | Tritium | 2.55 ± 110 | 191 | 92.2 | NE | U | BD | 089444-036 | EPA 906.0 M |
| **TA2-NW1-595** | Americium-241 | -3.06 ± 5.19 | 8.58 | 4.29 | NE | U | BD | 089453-033 | EPA 901.1 |
| 03-Aug-10 | Cesium-137 | -0.152 ± 1.50 | 2.55 | 1.28 | NE | U | BD | 089453-033 | EPA 901.1 |
| | Cobalt-60 | -0.686 ± 1.61 | 2.66 | 1.33 | NE | U | BD | 089453-033 | EPA 901.1 |
| | Potassium-40 | -8.24 ± 30.5 | 38.5 | 19.3 | NE | U | BD | 089453-033 | EPA 901.1 |
| | Gross Alpha | 0.62 | NA | NA | 15 | NA | None | 089453-034 | EPA 900.0 |
| | Gross Beta | 4.26 ± 1.68 | 2.41 | 1.17 | 4mrem/yr | | J | 089453-034 | EPA 900.0 |
| | Tritium | -19.3 ± 66.0 | 123 | 56.8 | NE | U | BD | 089453-036 | EPA 906.0 M |

Refer to footnotes on page 6A-49.

**Table 6A-7** *(Continued)*
**Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, and Tritium Results, Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Activity[a] (pCi/L) | MDA[b] (pCi/L) | Critical Level[c] (pCi/L) | MCL[d] (pCi/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TA2-SW1-320** | Americium-241 | -0.797 ± 7.28 | 11.6 | 5.78 | NE | U | BD | 089424-033 | EPA 901.1 |
| 15-Jul-10 | Cesium-137 | 1.95 ± 1.67 | 2.91 | 1.46 | NE | U | BD | 089424-033 | EPA 901.1 |
| | Cobalt-60 | 0.0393 ± 1.65 | 2.73 | 1.36 | NE | U | BD | 089424-033 | EPA 901.1 |
| | Potassium-40 | -32.5 ± 37.8 | 39.4 | 19.7 | NE | U | BD | 089424-033 | EPA 901.1 |
| | Gross Alpha | 1.64 | NA | NA | 15 | NA | None | 089424-034 | EPA 900.0 |
| | Gross Beta | 4.21 ± 1.03 | 0.982 | 0.466 | 4mrem/yr | | | 089424-034 | EPA 900.0 |
| | Tritium | 37.5 ± 91.1 | 155 | 75.1 | NE | U | BD | 089424-036 | EPA 906.0 M |
| **TA2-W-01** | Americium-241 | -20.7 ± 7.95 | 12.5 | 6.28 | NE | U | BD | 089460-033 | EPA 901.1 |
| 09-Aug-10 | Cesium-137 | -0.578 ± 1.80 | 2.97 | 1.48 | NE | U | BD | 089460-033 | EPA 901.1 |
| | Cobalt-60 | 1.09 ± 1.95 | 3.40 | 1.70 | NE | U | BD | 089460-033 | EPA 901.1 |
| | Potassium-40 | -9.92 ± 32.7 | 41.7 | 20.9 | NE | U | BD | 089460-033 | EPA 901.1 |
| | Gross Alpha | 1.29 | NA | NA | 15 | NA | None | 089460-034 | EPA 900.0 |
| | Gross Beta | 0.779 ± 0.839 | 1.38 | 0.658 | 4mrem/yr | U | BD | 089460-034 | EPA 900.0 |
| | Tritium | 6.29 ± 67.0 | 121 | 55.7 | NE | U | BD | 089460-036 | EPA 906.0 M |
| **TA2-W-19** | Americium-241 | -16.5 ± 11.9 | 18.9 | 9.46 | NE | U | BD | 089466-033 | EPA 901.1 |
| 11-Aug-10 | Cesium-137 | 1.19 ± 2.00 | 3.50 | 1.75 | NE | U | BD | 089466-033 | EPA 901.1 |
| | Cobalt-60 | -0.80 ± 2.26 | 3.73 | 1.87 | NE | U | BD | 089466-033 | EPA 901.1 |
| | Potassium-40 | 14.6 ± 51.6 | 51.1 | 25.6 | NE | U | BD | 089466-033 | EPA 901.1 |
| | Gross Alpha | 0.91 | NA | NA | 15 | NA | None | 089466-034 | EPA 900.0 |
| | Gross Beta | 1.38 ± 0.901 | 1.41 | 0.672 | 4mrem/yr | U | BD | 089466-034 | EPA 900.0 |
| | Tritium | 21.6 ± 67.3 | 119 | 54.8 | NE | U | BD | 089466-036 | EPA 906.0 M |
| **TA2-W-19** (Duplicate) | Americium-241 | 2.85 ± 10.1 | 17.7 | 8.86 | NE | U | BD | 089467-033 | EPA 901.1 |
| 11-Aug-10 | Cesium-137 | 0.410 ± 2.04 | 3.48 | 1.74 | NE | U | BD | 089467-033 | EPA 901.1 |
| | Cobalt-60 | 0.608 ± 2.21 | 3.74 | 1.87 | NE | U | BD | 089467-033 | EPA 901.1 |
| | Potassium-40 | 7.17 ± 46.1 | 54.2 | 27.1 | NE | U | BD | 089467-033 | EPA 901.1 |
| | Gross Alpha | 1.52 | NA | NA | 15 | NA | None | 089467-034 | EPA 900.0 |
| | Gross Beta | 1.32 ± 0.924 | 1.46 | 0.699 | 4mrem/yr | U | BD | 089467-034 | EPA 900.0 |
| | Tritium | 21.6 ± 67.3 | 119 | 54.7 | NE | U | BD | 089467-036 | EPA 906.0 M |
| **TA2-W-26** | Americium-241 | 6.22 ± 11.9 | 17.8 | 8.93 | NE | U | BD | 089462-033 | EPA 901.1 |
| 10-Aug-10 | Cesium-137 | -0.55 ± 1.94 | 3.27 | 1.64 | NE | U | BD | 089462-033 | EPA 901.1 |
| | Cobalt-60 | 1.80 ± 1.99 | 3.54 | 1.77 | NE | U | BD | 089462-033 | EPA 901.1 |
| | Potassium-40 | 12.4 ± 33.7 | 46.7 | 23.3 | NE | U | BD | 089462-033 | EPA 901.1 |
| | Gross Alpha | 1.45 | NA | NA | 15 | NA | None | 089462-034 | EPA 900.0 |
| | Gross Beta | 2.32 ± 1.60 | 2.53 | 1.21 | 4mrem/yr | U | BD | 089462-034 | EPA 900.0 |
| | Tritium | 15.8 ± 68.2 | 121 | 56.0 | NE | U | BD | 089462-036 | EPA 906.0 M |

Refer to footnotes on page 6A-49.

## Table 6A-7 *(Continued)*
## Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, and Tritium Results, Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Activity[a] (pCi/L) | MDA[b] (pCi/L) | Critical Level[c] (pCi/L) | MCL[d] (pCi/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TA2-W-27** | Americium-241 | 1.18 ± 5.33 | 9.00 | 4.50 | NE | U | BD | 089456-033 | EPA 901.1 |
| 04-Aug-10 | Cesium-137 | -0.525 ± 1.60 | 2.70 | 1.35 | NE | U | BD | 089456-033 | EPA 901.1 |
| | Cobalt-60 | -0.0257 ± 1.54 | 2.62 | 1.31 | NE | U | BD | 089456-033 | EPA 901.1 |
| | Potassium-40 | 3.33 ± 31.3 | 38.6 | 19.3 | NE | U | BD | 089456-033 | EPA 901.1 |
| | Gross Alpha | -0.68 | NA | NA | 15 | NA | None | 089456-034 | EPA 900.0 |
| | Gross Beta | 2.71 ± 1.51 | 2.35 | 1.14 | 4mrem/yr | | J | 089456-034 | EPA 900.0 |
| | Tritium | 6.37 ± 67.8 | 122 | 56.4 | NE | U | ND | 089456-036 | EPA 906.0 M |
| **TJA-2** | Americium-241 | 1.05 ± 5.19 | 8.86 | 4.43 | NE | U | BD | 089469-033 | EPA 901.1 |
| 12-Aug-10 | Cesium-137 | 1.33 ± 1.65 | 2.90 | 1.45 | NE | U | BD | 089469-033 | EPA 901.1 |
| | Cobalt-60 | 0.169 ± 2.03 | 3.41 | 1.71 | NE | U | BD | 089469-033 | EPA 901.1 |
| | Potassium-40 | -2.27 ± 35.7 | 46.0 | 23.0 | NE | U | BD | 089469-033 | EPA 901.1 |
| | Gross Alpha | 1.32 | NA | NA | 15 | NA | None | 089469-034 | EPA 900.0 |
| | Gross Beta | 0.650 ± 0.920 | 1.54 | 0.739 | 4mrem/yr | U | BD | 089469-034 | EPA 900.0 |
| | Tritium | -28.2 ± 63.5 | 120 | 55.5 | NE | U | BD | 089469-036 | EPA 906.0 M |
| **TJA-3** | Americium-241 | 0.583 ± 2.61 | 4.26 | 2.13 | NE | U | BD | 089448-033 | EPA 901.1 |
| 29-Jul-10 | Cesium-137 | -5.30 ± 4.86 | 5.75 | 2.88 | NE | U | BD | 089448-033 | EPA 901.1 |
| | Cobalt-60 | 0.244 ± 2.14 | 3.65 | 1.83 | NE | U | BD | 089448-033 | EPA 901.1 |
| | Potassium-40 | 3.06 ± 46.6 | 49.6 | 24.8 | NE | U | BD | 089448-033 | EPA 901.1 |
| | Gross Alpha | 1.19 | NA | NA | 15 | NA | None | 089448-034 | EPA 900.0 |
| | Gross Beta | 1.47 ± 0.776 | 1.15 | 0.550 | 4mrem/yr | | J | 089448-034 | EPA 900.0 |
| | Tritium | 69.4 ± 114 | 192 | 93.0 | NE | U | BD | 089448-036 | EPA 906.0 M |
| **TJA-3** (Duplicate) | Americium-241 | -31.7 ± 11.5 | 17.7 | 8.86 | NE | U | BD | 089449-033 | EPA 901.1 |
| 23-Jul-10 | Cesium-137 | -0.625 ± 1.85 | 3.12 | 1.56 | NE | U | BD | 089449-033 | EPA 901.1 |
| | Cobalt-60 | 0.602 ± 1.88 | 3.27 | 1.63 | NE | U | BD | 089449-033 | EPA 901.1 |
| | Potassium-40 | -1.34 ± 35.7 | 46.2 | 23.1 | NE | U | BD | 089449-033 | EPA 901.1 |
| | Gross Alpha | 0.74 | NA | NA | 15 | NA | None | 089449-034 | EPA 900.0 |
| | Gross Beta | 3.11 ± 1.01 | 1.30 | 0.626 | 4mrem/yr | | J | 089449-034 | EPA 900.0 |
| | Tritium | -51.2 ± 108 | 191 | 92.5 | NE | U | BD | 089449-036 | EPA 906.0 M |
| **TJA-4** | Americium-241 | -2.61 ± 13.5 | 22.8 | 11.4 | NE | U | BD | 089473-033 | EPA 901.1 |
| 17-Aug-10 | Cesium-137 | 0.374 ± 1.82 | 3.14 | 1.57 | NE | U | BD | 089473-033 | EPA 901.1 |
| | Cobalt-60 | 0.442 ± 1.96 | 3.36 | 1.68 | NE | U | BD | 089473-033 | EPA 901.1 |
| | Potassium-40 | -6.72 ± 40.0 | 52.4 | 26.2 | NE | U | BD | 089473-033 | EPA 901.1 |
| | Gross Alpha | 0.53 | NA | NA | 15 | NA | None | 089473-034 | EPA 900.0 |
| | Gross Beta | 1.76 ± 0.746 | 1.05 | 0.499 | 4mrem/yr | | J | 089473-034 | EPA 900.0 |
| | Tritium | -29.9 ± 56.7 | 110 | 50.2 | NE | U | BD | 089473-036 | EPA 906.0 M |

Refer to footnotes on page 6A-49.

## Table 6A-7 *(Concluded)*
## Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, and Tritium Results, Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Activity[a] (pCi/L) | MDA[b] (pCi/L) | Critical Level[c] (pCi/L) | MCL[d] (pCi/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **TJA-6** | Americium-241 | -18.6 ± 7.70 | 12.0 | 6.01 | NE | U | BD | 089458-033 | EPA 901.1 |
| 05-Aug-10 | Cesium-137 | 0.798 ± 1.90 | 3.22 | 1.61 | NE | U | BD | 089458-033 | EPA 901.1 |
| | Cobalt-60 | 0.969 ± 2.12 | 3.67 | 1.84 | NE | U | BD | 089458-033 | EPA 901.1 |
| | Potassium-40 | 3.87 ± 33.6 | 42.6 | 21.3 | NE | U | BD | 089458-033 | EPA 901.1 |
| | Gross Alpha | 1.12 | NA | NA | 15 | NA | None | 089458-034 | EPA 900.0 |
| | Gross Beta | 3.52 ± 1.15 | 1.52 | 0.738 | 4mrem/yr | | J | 089458-034 | EPA 900.0 |
| | Tritium | 16.0 ± 69.0 | 123 | 56.6 | NE | U | BD | 089458-036 | EPA 906.0 M |
| **TJA-7** | Americium-241 | 1.10 ± 5.95 | 9.72 | 4.86 | NE | U | BD | 089475-033 | EPA 901.1 |
| 18-Aug-10 | Cesium-137 | 1.36 ± 1.57 | 2.72 | 1.36 | NE | U | BD | 089475-033 | EPA 901.1 |
| | Cobalt-60 | -1.65 ± 1.72 | 2.59 | 1.30 | NE | U | BD | 089475-033 | EPA 901.1 |
| | Potassium-40 | 55.9 ± 20.3 | 55.9 | 19.3 | NE | U | BD | 089475-033 | EPA 901.1 |
| | Gross Alpha | 3.05 | NA | NA | 15 | NA | None | 089475-034 | EPA 900.0 |
| | Gross Beta | 1.08 ± 0.711 | 1.11 | 0.530 | 4mrem/yr | U | BD | 089475-034 | EPA 900.0 |
| | Tritium | -3.1 ± 58.6 | 108 | 49.4 | NE | U | BD | 089475-036 | EPA 906.0 M |
| **WYO-3** | Americium-241 | -19.4 ± 7.72 | 12.0 | 5.99 | NE | U | BD | 089451-033 | EPA 901.1 |
| 02-Aug-10 | Cesium-137 | 0.172 ± 1.89 | 3.15 | 1.58 | NE | U | BD | 089451-033 | EPA 901.1 |
| | Cobalt-60 | -0.219 ± 2.04 | 3.40 | 1.70 | NE | U | BD | 089451-033 | EPA 901.1 |
| | Potassium-40 | 14.3 ± 34.3 | 45.1 | 22.6 | NE | U | BD | 089451-033 | EPA 901.1 |
| | Gross Alpha | 3.15 | NA | NA | 15 | NA | None | 089451-034 | EPA 900.0 |
| | Gross Beta | 4.11± 1.47 | 2.06 | 1.00 | 4mrem/yr | | J | 089451-034 | EPA 900.0 |
| | Tritium | 18.5 ± 67.0 | 119 | 54.7 | NE | U | BD | 089451-036 | EPA 906.0 M |
| **WYO-4** | Americium-241 | -3.97 ± 11.8 | 19.6 | 9.79 | NE | U | BD | 089471-033 | EPA 901.1 |
| 16-Aug-10 | Cesium-137 | 1.86 ± 1.97 | 3.44 | 1.72 | NE | U | BD | 089471-033 | EPA 901.1 |
| | Cobalt-60 | 1.81 ± 2.01 | 3.56 | 1.78 | NE | U | BD | 089471-033 | EPA 901.1 |
| | Potassium-40 | -41.0 ± 49.4 | 44.4 | 22.2 | NE | U | BD | 089471-033 | EPA 901.1 |
| | Gross Alpha | -0.08 | NA | NA | 15 | NA | None | 089471-034 | EPA 900.0 |
| | Gross Beta | 0.143 ± 0.579 | 1.00 | 0.475 | 4mrem/yr | U | BD | 089471-034 | EPA 900.0 |
| | Tritium | 41.8 ± 65.7 | 112 | 51.3 | NE | U | BD | 089471-036 | EPA 906.0 M |

Refer to footnotes on page 6A-49.

# Table 6A-8
## Summary of Field Water Quality Measurements[h], Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Well ID | Sample Date | Temperature ($^{0}$C) | Specific Conductivity (μmho/cm) | Oxidation Reduction Potential (mV) | pH | Turbidity (NTU) | Dissolved Oxygen (% Sat) | Dissolved Oxygen (mg/L) |
|---|---|---|---|---|---|---|---|---|
| **TA1-W-03** | 26-Feb-10 | 14.20 | 1626 | 209.6 | 7.50 | 0.74 | 77.3 | 7.89 |
| **TA1-W-06** | 11-Jan-10 | 17.39 | 826 | 215.1 | 7.36 | 0.52 | 86.1 | 8.20 |
| **TA1-W-08** | 12-Jan-10 | 17.33 | 1841 | 218.9 | 7.21 | 0.46 | 78.6 | 7.49 |
| **TA2-SW1-320** | 19-Jan-10 | 13.90 | 472 | 274.9 | 7.52 | 19.0 | 83.9 | 8.65 |
| **TA2-W-01** | 13-Jan-10 | 16.95 | 603 | 244.8 | 7.40 | 1.88 | 83.5 | 8.07 |
| **TA2-W-19** | 21-Jan-10 | 15.63 | 563 | 239.8 | 7.47 | 0.16 | 83.8 | 8.32 |
| **TA2-W-26** | 20-Jan-10 | 14.11 | 1148 | 237.6 | 7.35 | 0.29 | 78.7 | 8.09 |
| **TA2-W-27** | 14-Jan-10 | 16.00 | 799 | 226.5 | 7.36 | 0.40 | 72.6 | 7.00 |
| **TJA-2** | 28-Jan-10 | 12.32 | 562 | 239.7 | 7.45 | 0.26 | 82.1 | 8.79 |
| **TJA-3** | 15-Jan-10 | 18.52 | 475 | 210.0 | 7.25 | 0.27 | 76.1 | 7.12 |
| **TJA-4** | 27-Jan-10 | 16.79 | 524 | 229.8 | 7.39 | 0.32 | 56.0 | 5.47 |
| **TJA-6** | 18-Jan-10 | 17.64 | 446 | 240.8 | 7.28 | 0.64 | 64.2 | 6.11 |
| **TJA-7** | 29-Jan-10 | 13.93 | 498 | 252.2 | 7.44 | 1.19 | 79.9 | 8.23 |
| **WYO-4** | 26-Jan-10 | 12.78 | 610 | 261.4 | 7.49 | 0.37 | 77.3 | 8.18 |
| | | | | | | | | |
| **TA1-W-03** | 03-May-10 | 15.83 | 1585 | 300.2 | 7.35 | 0.36 | 82.0 | 8.08 |
| **TA1-W-06** | 04-May-10 | 19.79 | 812 | 276.3 | 7.37 | 1.81 | 85.7 | 7.81 |
| **TA1-W-08** | 05-May-10 | 19.87 | 1813 | 264.4 | 7.26 | 0.23 | 81.0 | 7.34 |
| **TA2-SW1-320** | 12-May-10 | 16.64 | 467 | 258.6 | 7.50 | 6.63 | 80.9 | 7.88 |
| **TA2-W-01** | 06-May-10 | 19.71 | 597 | 244.9 | 7.40 | 2.30 | 85.8 | 7.83 |
| **TA2-W-19** | 14-May-10 | 19.25 | 556 | 205.6 | 7.40 | 0.17 | 89.1 | 8.19 |
| **TA2-W-26** | 13-May-10 | 18.69 | 1142 | 218.4 | 7.33 | 0.21 | 81.7 | 7.61 |
| **TA2-W-27** | 11-May-10 | 19.67 | 784 | 289.8 | 7.34 | 0.22 | 90.0 | 8.26 |
| **TJA-2** | 20-May-10 | 19.31 | 553 | 219.9 | 7.36 | 0.29 | 88.1 | 8.11 |
| **TJA-4** | 19-May-10 | 19.85 | 521 | 170.0 | 7.31 | 0.15 | 56.9 | 5.20 |
| **TJA-7** | 24-May-10 | 18.69 | 491 | 193.9 | 7.41 | 5.19 | 85.0 | 7.92 |
| **WYO-4** | 18-May-10 | 18.30 | 597 | 157.3 | 7.57 | 0.31 | 81.9 | 7.69 |

Refer to footnotes on page 6A-49.

# Table 6A-8 *(Concluded)*
## Summary of Field Water Quality Measurements[h], Tijeras Arroyo Groundwater Investigation, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Well ID | Sample Date | Temperature ($^{0}$C) | Specific Conductivity ($\mu$mho/cm) | Oxidation Reduction Potential (mV) | pH | Turbidity (NTU) | Dissolved Oxygen (% Sat) | Dissolved Oxygen (mg/L) |
|---|---|---|---|---|---|---|---|---|
| **PGS-2** | 16-Jul-10 | 23.10 | 429 | 162.7 | 8.16 | 1.18 | 14.4 | 1.24 |
| **TA1-W-01** | 06-Aug-10 | 21.12 | 487 | 159.1 | 7.56 | 0.27 | 70.9 | 6.32 |
| **TA1-W-02** | 21-Jul-10 | 21.91 | 472 | 144.1 | 7.53 | 0.89 | 62.2 | 5.44 |
| **TA1-W-03** | 22-Jul-10 | 19.53 | 1588 | 180.6 | 7.58 | 0.21 | 88.1 | 8.04 |
| **TA1-W-04** | 23-Jul-10 | 20.69 | 447 | 157.9 | 7.55 | 0.35 | 64.6 | 6.18 |
| **TA1-W-05** | 26-Jul-10 | 19.71 | 547 | 226.9 | 7.40 | 0.17 | 79.8 | 7.38 |
| **TA1-W-06** | 27-Jul-10 | 19.61 | 803 | 158.9 | 7.66 | 0.84 | 81.6 | 7.50 |
| **TA1-W-08** | 28-Jul-10 | 20.83 | 1823 | 158.9 | 7.48 | 0.30 | 84.2 | 7.48 |
| **TA2-NW1-595** | 03-Aug-10 | 20.79 | 730 | 143.7 | 7.49 | 0.30 | 87.6 | 7.82 |
| **TA2-SW1-320** | 15-Jul-10 | 20.94 | 472 | 191.3 | 7.76 | 2.67 | 89.5 | 8.00 |
| **TA2-W-01** | 09-Aug-10 | 21.60 | 595 | 160.9 | 7.73 | 6.23 | 88.4 | 7.80 |
| **TA2-W-19** | 11-Aug-10 | 22.49 | 557 | 155.4 | 7.73 | 0.14 | 94.1 | 8.14 |
| **TA2-W-26** | 10-Aug-10 | 20.82 | 1154 | 144.8 | 7.59 | 0.36 | 81.3 | 7.25 |
| **TA2-W-27** | 04-Aug-10 | 22.85 | 790 | 149.5 | 7.64 | 0.19 | 94.9 | 8.14 |
| **TJA-2** | 12-Aug-10 | 21.42 | 554 | 157.7 | 7.72 | 0.22 | 92.4 | 8.24 |
| **TJA-3** | 29-Jul-10 | 20.86 | 470 | 159.7 | 7.58 | 0.07 | 78.2 | 6.99 |
| **TJA-4** | 17-Aug-10 | 20.42 | 522 | 135.9 | 7.67 | 0.20 | 62.0 | 5.58 |
| **TJA-6** | 05-Aug-10 | 22.04 | 441 | 158.3 | 7.62 | 1.92 | 63.8 | 5.56 |
| **TJA-7** | 18-Aug-10 | 20.75 | 489 | 162.9 | 7.72 | 2.20 | 90.1 | 8.06 |
| **WYO-3** | 02-Aug-10 | 21.49 | 476 | 134.4 | 7.70 | 0.66 | 76.1 | 6.71 |
| **WYO-4** | 16-Aug-10 | 20.07 | 601 | 127.4 | 7.76 | 0.11 | 86.4 | 7.83 |
| | | | | | | | | |
| **TA1-W-03** | 08-Nov-10 | 16.72 | 1569 | 299.9 | 7.51 | 0.19 | 80.7 | 7.81 |
| **TA2-SW1-320** | 09-Nov-10 | 13.84 | 463 | 323.1 | 7.77 | 14.2 | 76.9 | 7.93 |
| **TA2-W-19** | 11-Nov-10 | 18.00 | 535 | 257.4 | 7.65 | 0.22 | 89.8 | 8.49 |
| **TA2-W-26** | 10-Nov-10 | 17.67 | 1149 | 296.6 | 7.52 | 0.25 | 77.1 | 7.32 |
| **TJA-2** | 15-Nov-10 | 15.34 | 540 | 236.7 | 7.67 | 0.20 | 84.1 | 8.41 |
| **TJA-4** | 12-Nov-10 | 17.33 | 512 | 237.6 | 7.60 | 0.18 | 55.0 | 5.27 |
| **TJA-7** | 16-Nov-10 | 17.61 | 478 | 226.5 | 7.66 | 1.86 | 82.6 | 7.87 |
| **WYO-4** | 18-Nov-10 | 15.36 | 588 | 245.0 | 7.74 | 0.68 | 78.9 | 7.89 |

Refer to footnotes on page 6A-49.

## *Footnotes for Tijeras Arroyo Groundwater Investigation Tables*

**[a]Result**

- Values in bold exceed the established MCL.
- ND = not detected (at method detection limit).
- Activities of zero or less are considered to be not detected.
- Gross alpha activity measurements were corrected by subtracting out the total uranium activity (40 CFR Parts 9, 141, and 142, Table 1-4)
- μg/L = micrograms per liter.
- mg/L = milligrams per liter.
- pCi/L = picocuries per liter.

**[b]MDL or MDA**

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.

The minimum 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.

NA = not applicable for gross alpha activities. The MDA could not be calculated as the gross alpha activity was corrected by subtracting out the total uranium activity.

**[c]PQL or Critical Level**

Practical quantitation limit. The lowest concentration of analytes in a sample that can be reliably determined within specified limits of precision and accuracy by that indicated method under routine laboratory operating conditions.

The minimum activity that can be measured and reported with 99% confidence that the analyte is greater than zero; analyte is matrix specific.

NA = not applicable for gross alpha activities. The critical level could not be calculated as the gross alpha activity was corrected by subtracting out the total uranium activity.

**[d]MCL**

- Maximum contaminant level. Established by the U.S. Environmental Protection Agency Primary Water Regulations (40 CFR 141.11, Subpart B), National Primary Drinking Water Standards, EPA, July 2002.
- NE = not established.
- The following are the MCLs for gross alpha particles and beta particles in community water systems:
  15 pCi/L = Gross alpha particle activity, excluding total uranium (40 CFR Parts 9, 141, and 142, Table 1-4).
  4 mrem/yr = any combination of beta and/or gamma emitting radionuclides (as dose rate).

**[e]Laboratory Qualifier**

B = Analyte is detected in associated laboratory method blank.
J = Amount detected is below the practical quantitation limit (PQL).
NA = Not applicable.
U = Analyte is absent or below the method detection limit.

**[f]Validation Qualifier**

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.
BD = Below detection limit as used in radiochemistry to identify results that are not statistically different from zero.
J = The associate value is an estimated quantity.
J+ = The associated numerical value is an estimated quantity with suspected positive bias.
J- = The associated numerical value is an estimated quantity with a suspected negative bias.
None = No data validation for corrected gross alpha activity.

## *Footnotes for Tijeras Arroyo Groundwater Investigation Tables (Concluded)*

**[f]Validation Qualifier (continued)**

| | | |
|---|---|---|
| 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. |

**[g]Analytical Method**

- EPA, 1980, *Prescribed Procedures for Measurement of Radioactivity in Drinking Water* EPA-600/4-80-032, U.S. Environmental Protection Agency, Cincinnati, Ohio.
- EPA, 1983, *The Determination of Inorganic Anions in Water by Ion Chromatography- Method 300.00,* EPA-600/4-80-032, U.S. Environmental Protection Agency, Cincinnati, Ohio.
- EPA, 1996, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,* SW-846, 3rd ed., Rev. 1, U.S. Environmental Protection Agency, Washington, D.C.
- U.S. Environmental Protection Agency, Washington, D.C.; or Clesceri, Greenburg, and Eaton, 1998, *Standard Methods for the Examination of Water and Wastewater*, 20th ed., Method 2320B.
- EPA, 1999, *Perchlorate in Drinking Water Using Ion Chromatography,* EPA 815/R-00-014, U.S. Environmental Protection Agency, Washington, D.C.

**[h]Field Water Quality Measurements**

- Field measurements collected prior to sampling.

| | | |
|---|---|---|
| °C | = | degrees Celsius. |
| % sat | = | present saturation. |
| μmho/cm | = | micromhos per centimeter. |
| mg/L | = | milligrams per liter. |
| mV | = | millivolts. |
| NTU | = | nephelometric turbidity units. |
| pH | = | potential of hydrogen (negative logarithm of the hydrogen ion concentration). |

# Attachment 6B
# Tijeras Arroyo Groundwater
# Plots

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# Attachment 6B Plots

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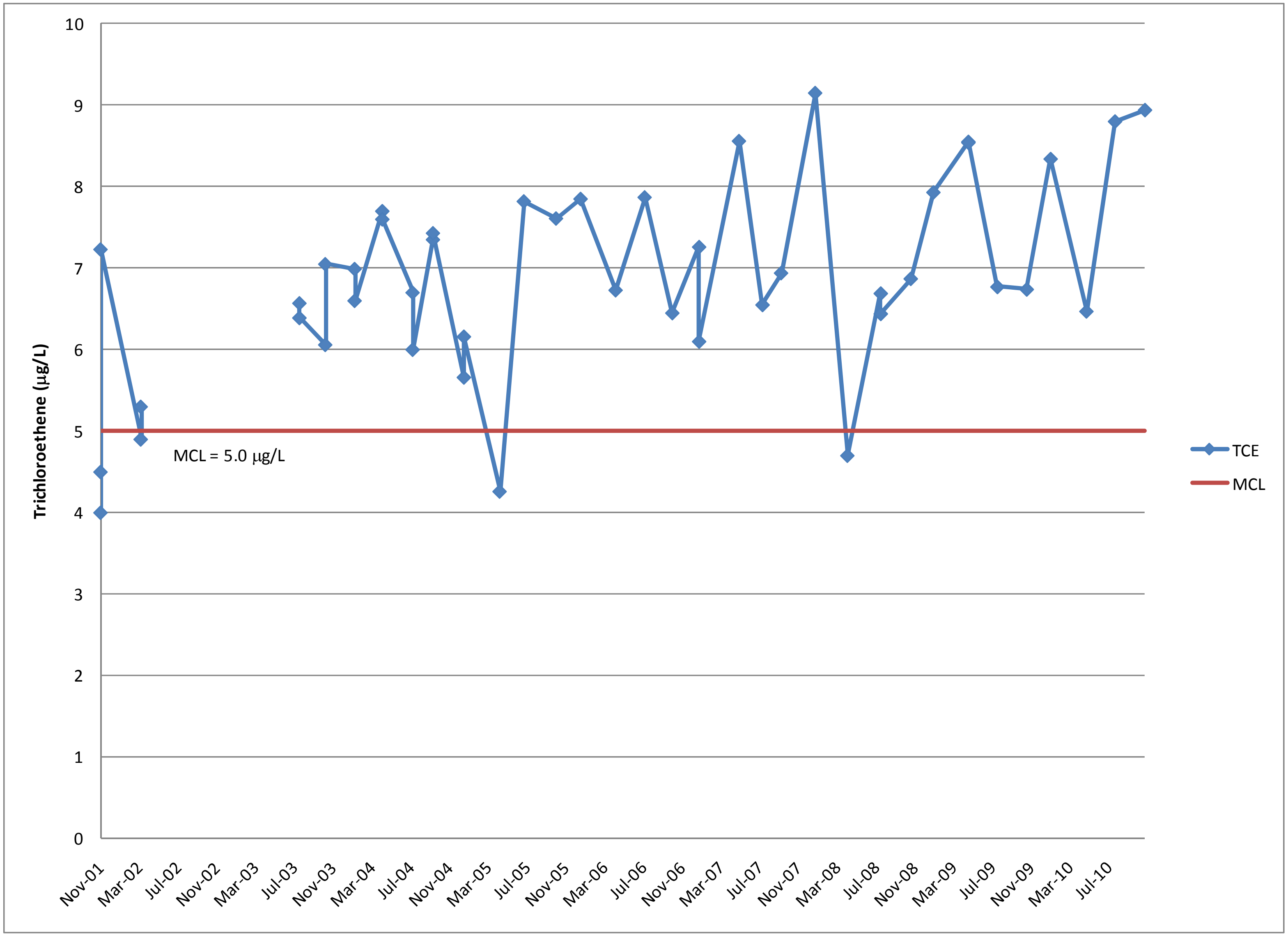


**Figure 6B-1. Trichloroethene Concentrations, WYO-4**

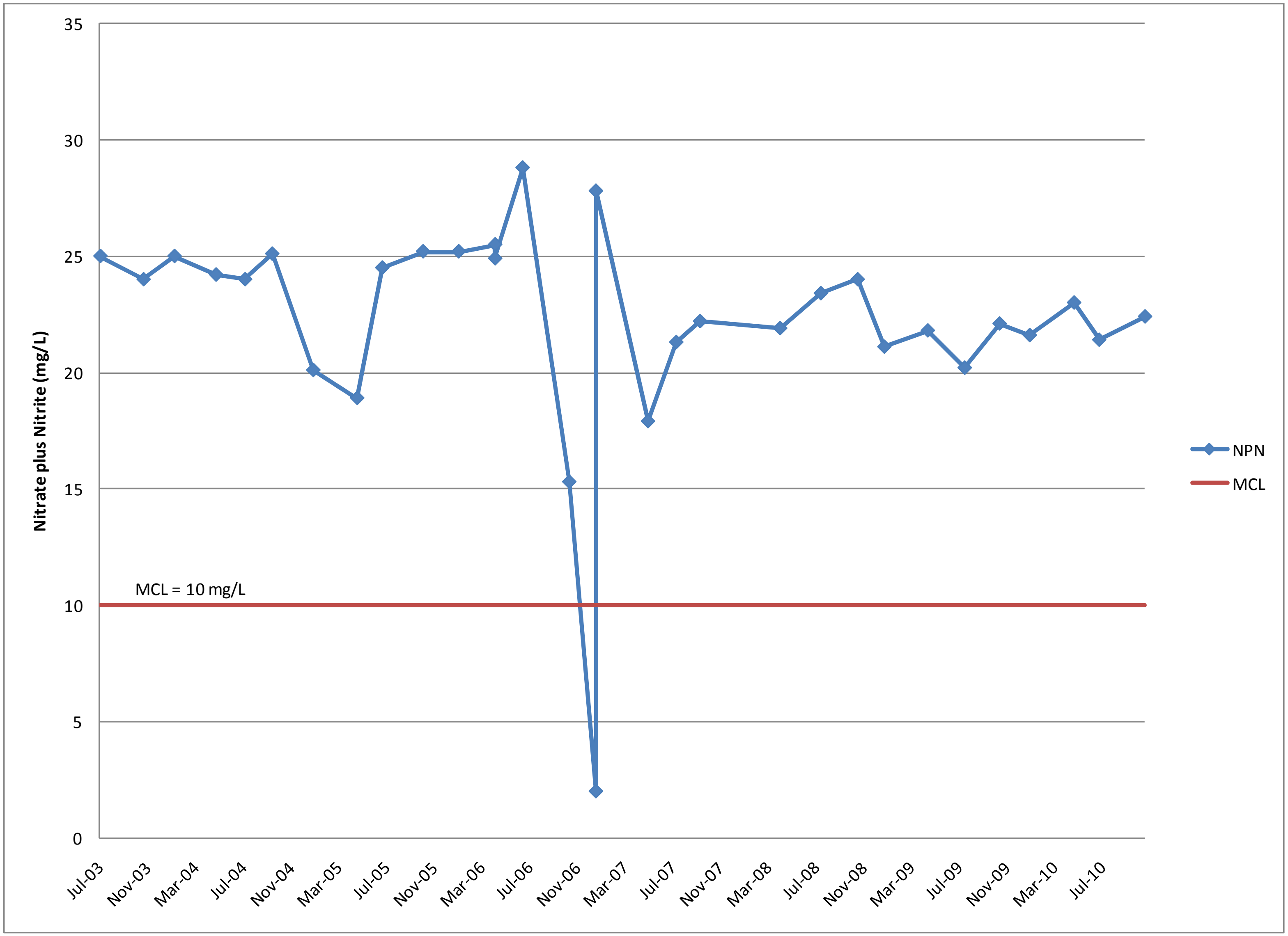


**Figure 6B-2. Nitrate plus Nitrite Concentrations, TA2-SW1-320**

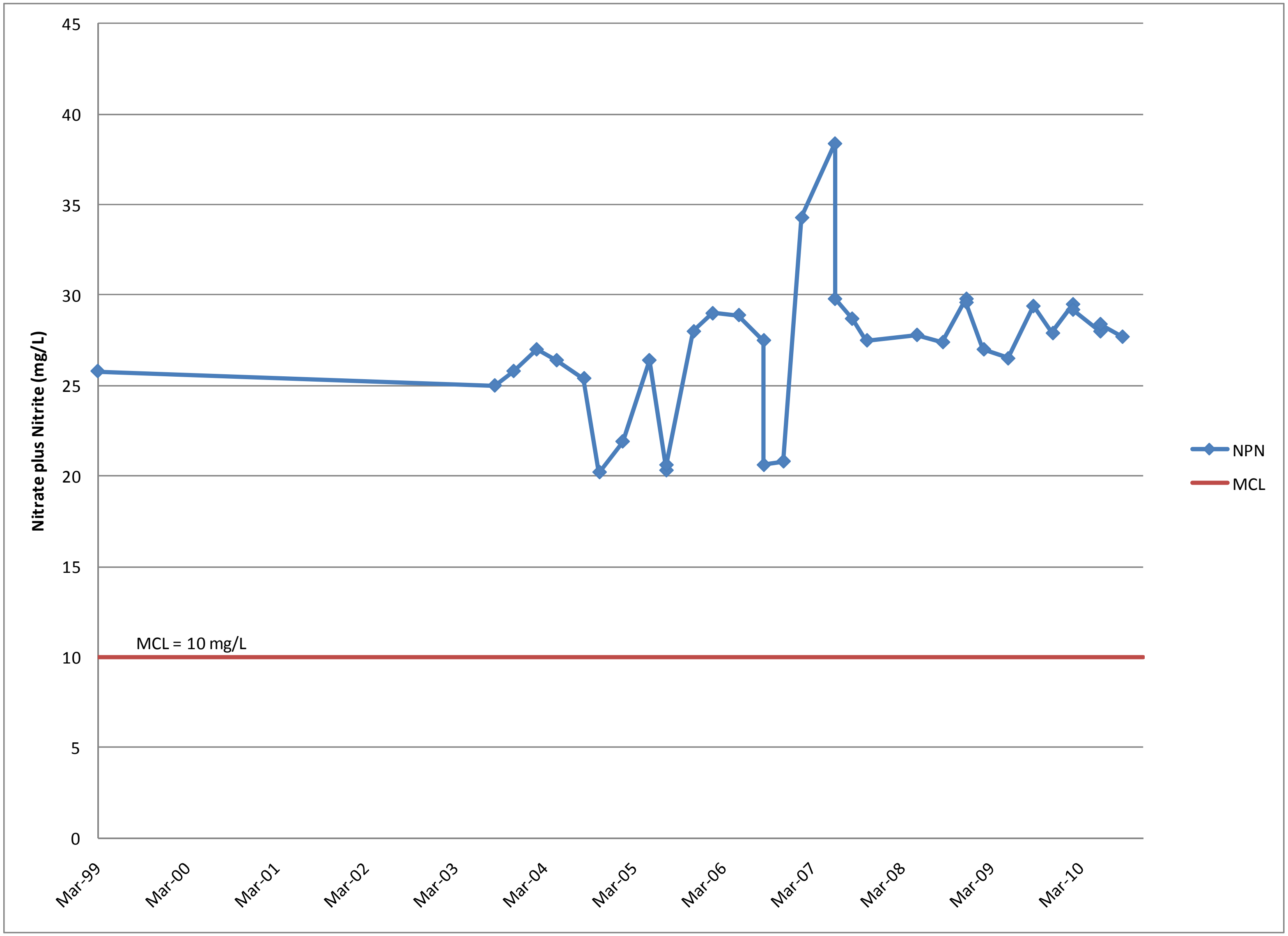


**Figure 6B-3. Nitrate plus Nitrite Concentrations, TJA-4**

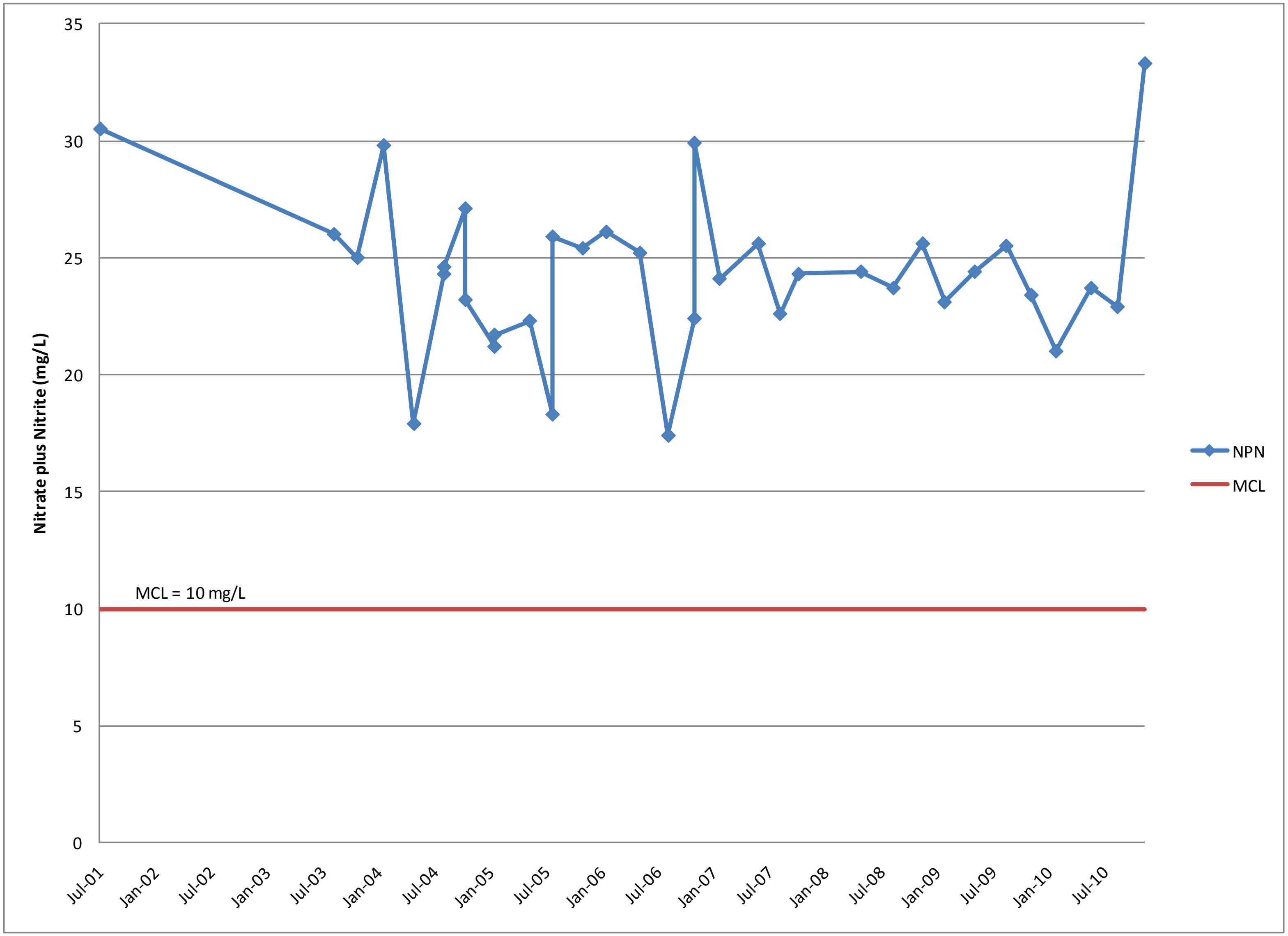


**Figure 6B-4. Nitrate plus Nitrite Concentrations, TJA-7**

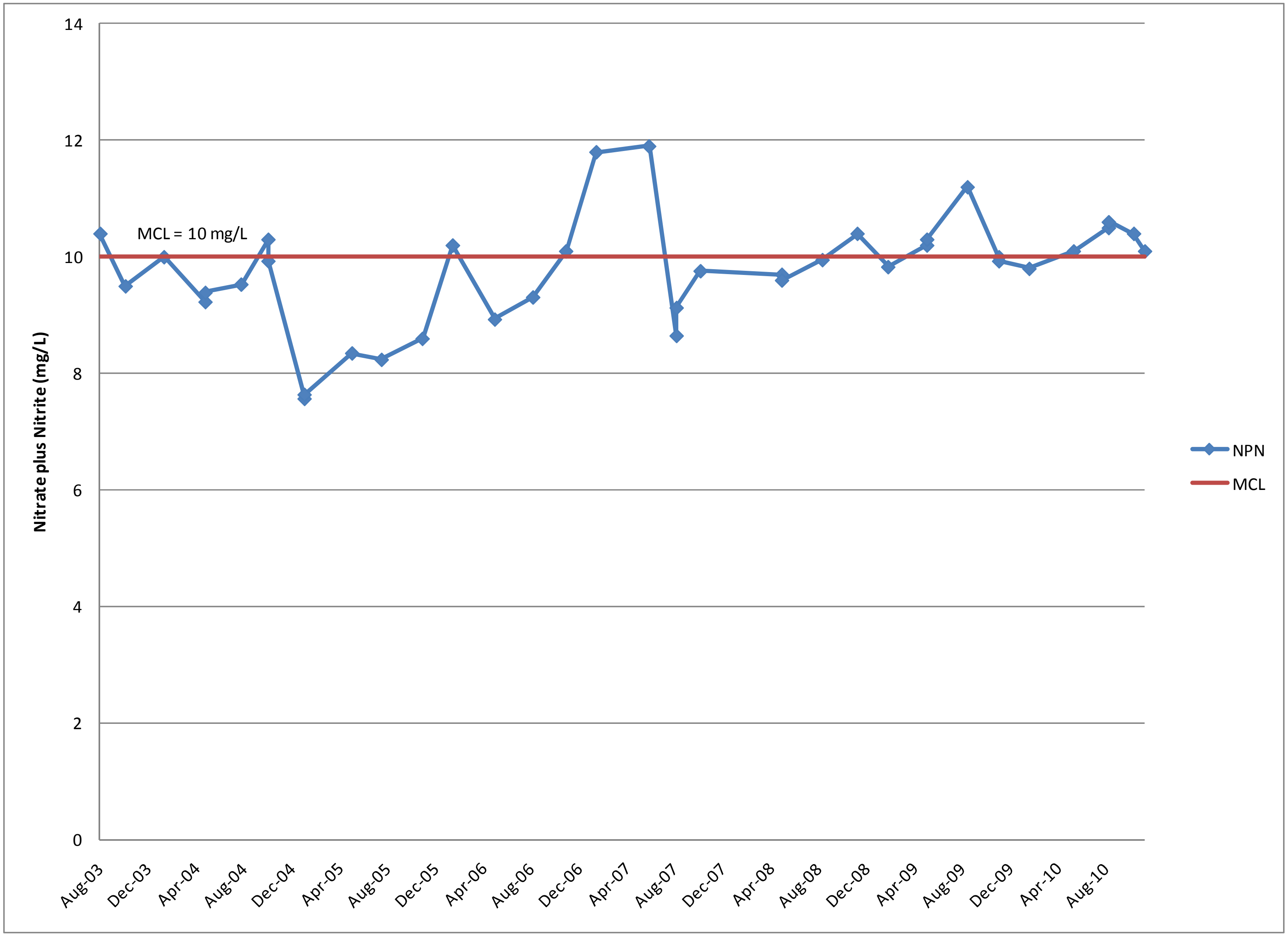


**Figure 6B-5. Nitrate plus Nitrite Concentrations, TA2-W-19**

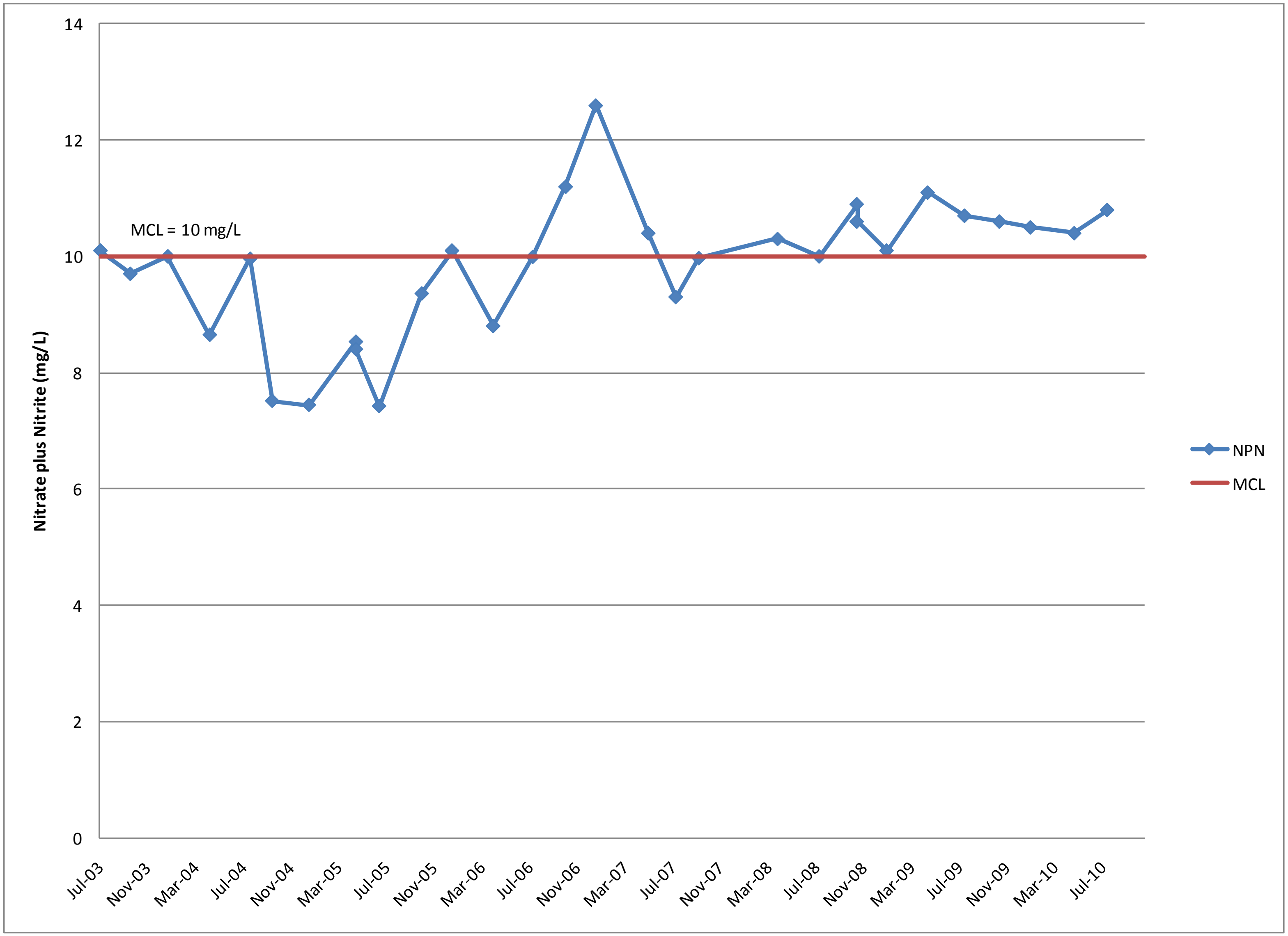


**Figure 6B-6. Nitrate plus Nitrite Concentrations, TJA-2**

# Attachment 6C
# Tijeras Arroyo Groundwater Hydrographs

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# Attachment 6C Hydrographs

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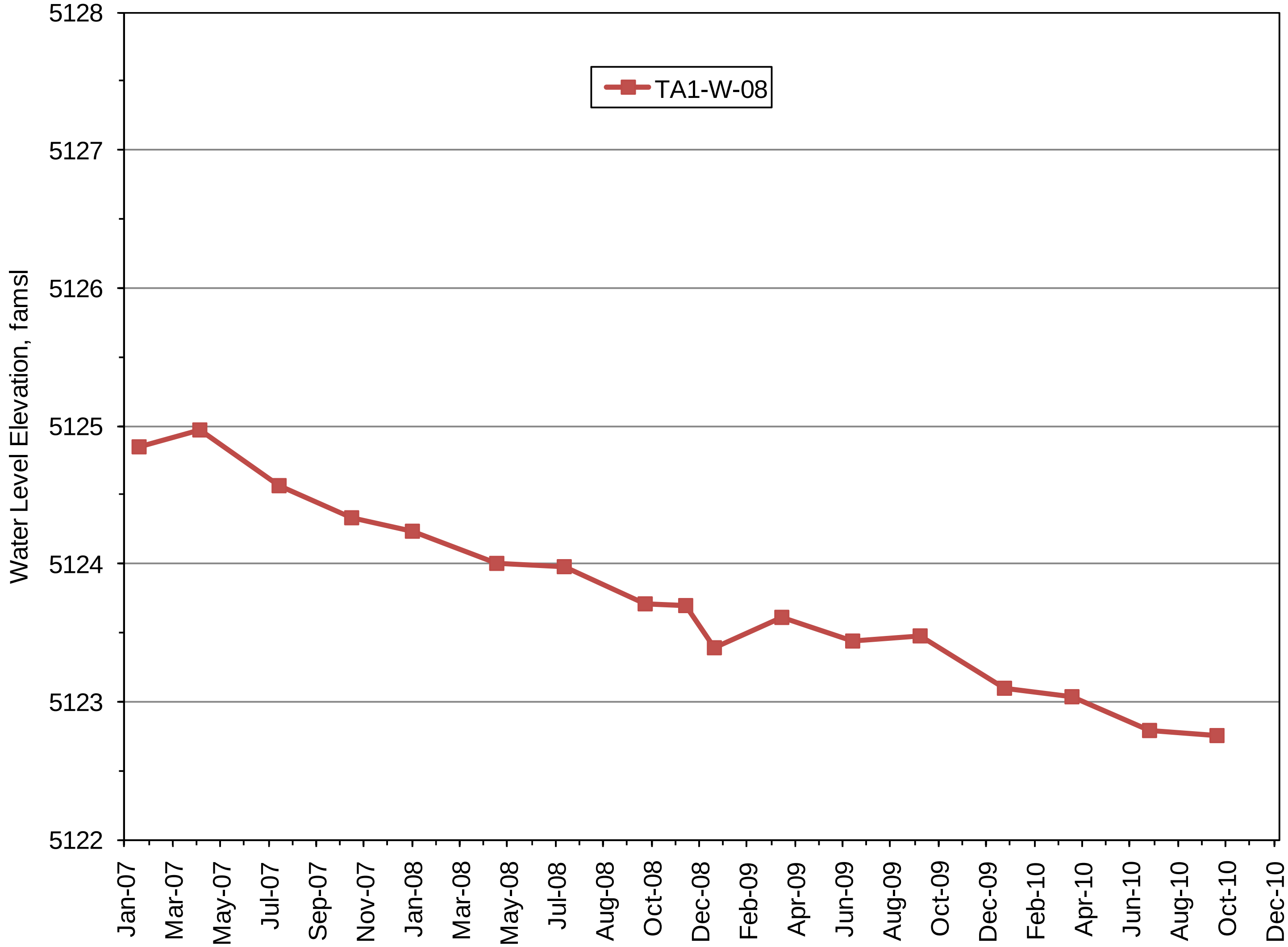


**Figure 6C-1. TAG Study Area PGWS Wells (1 of 6)**

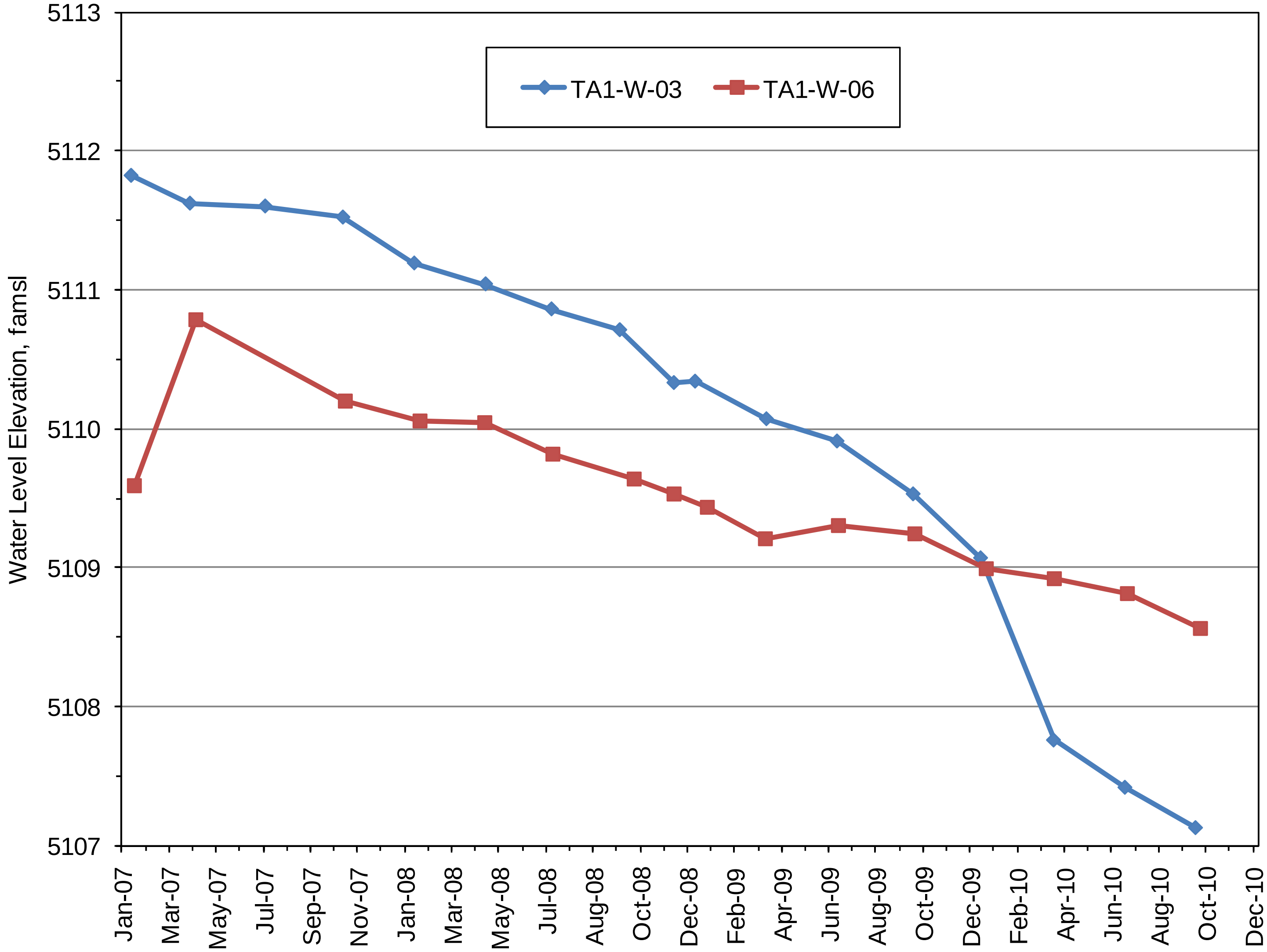


**Figure 6C-2. TAG Study Area PGWS Wells (2 of 6)**


**Figure 6C-3. TAG Study Area PGWS Wells (3 of 6)**

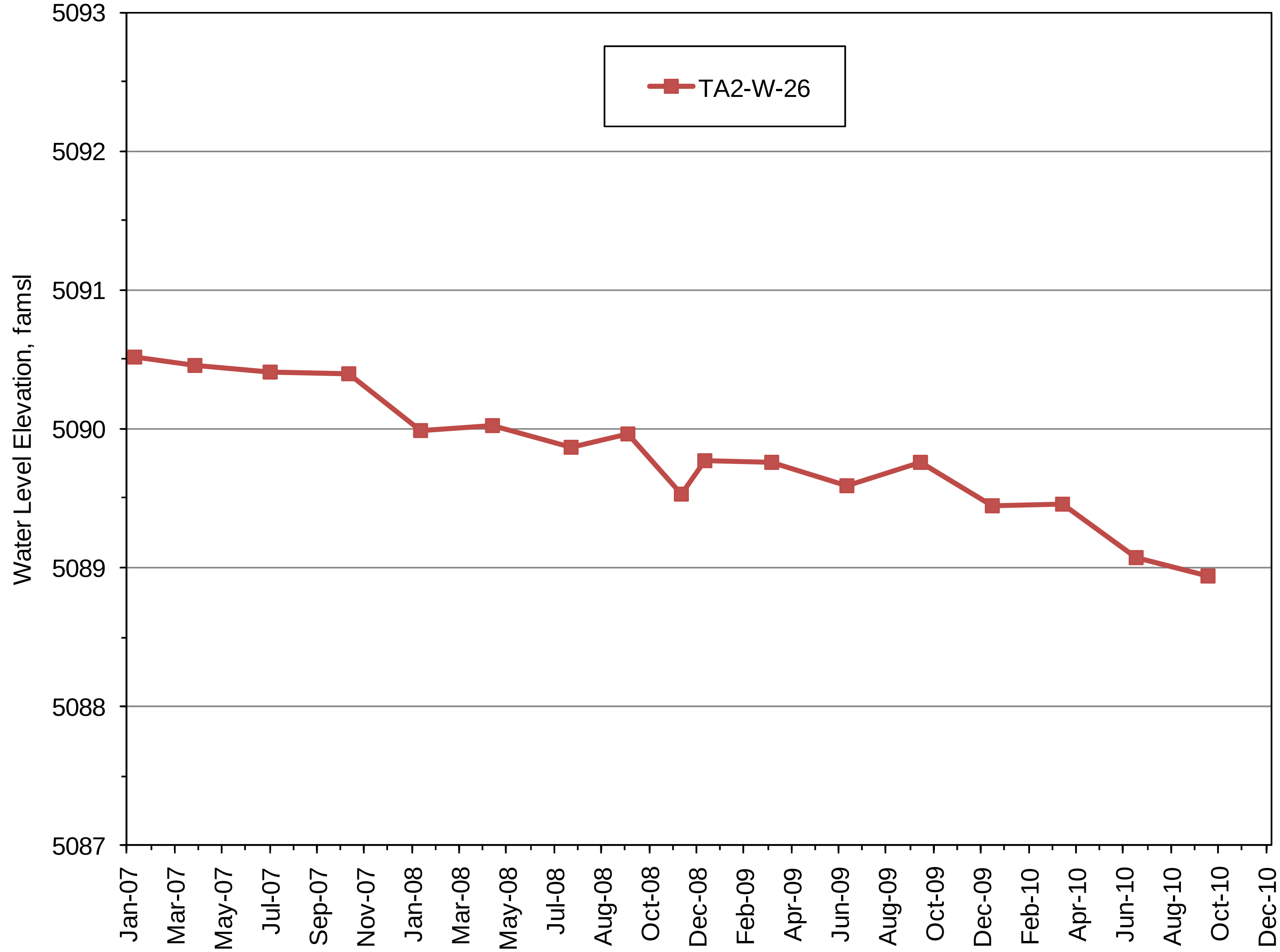


**Figure 6C-4. TAG Study Area PGWS Wells (4 of 6)**

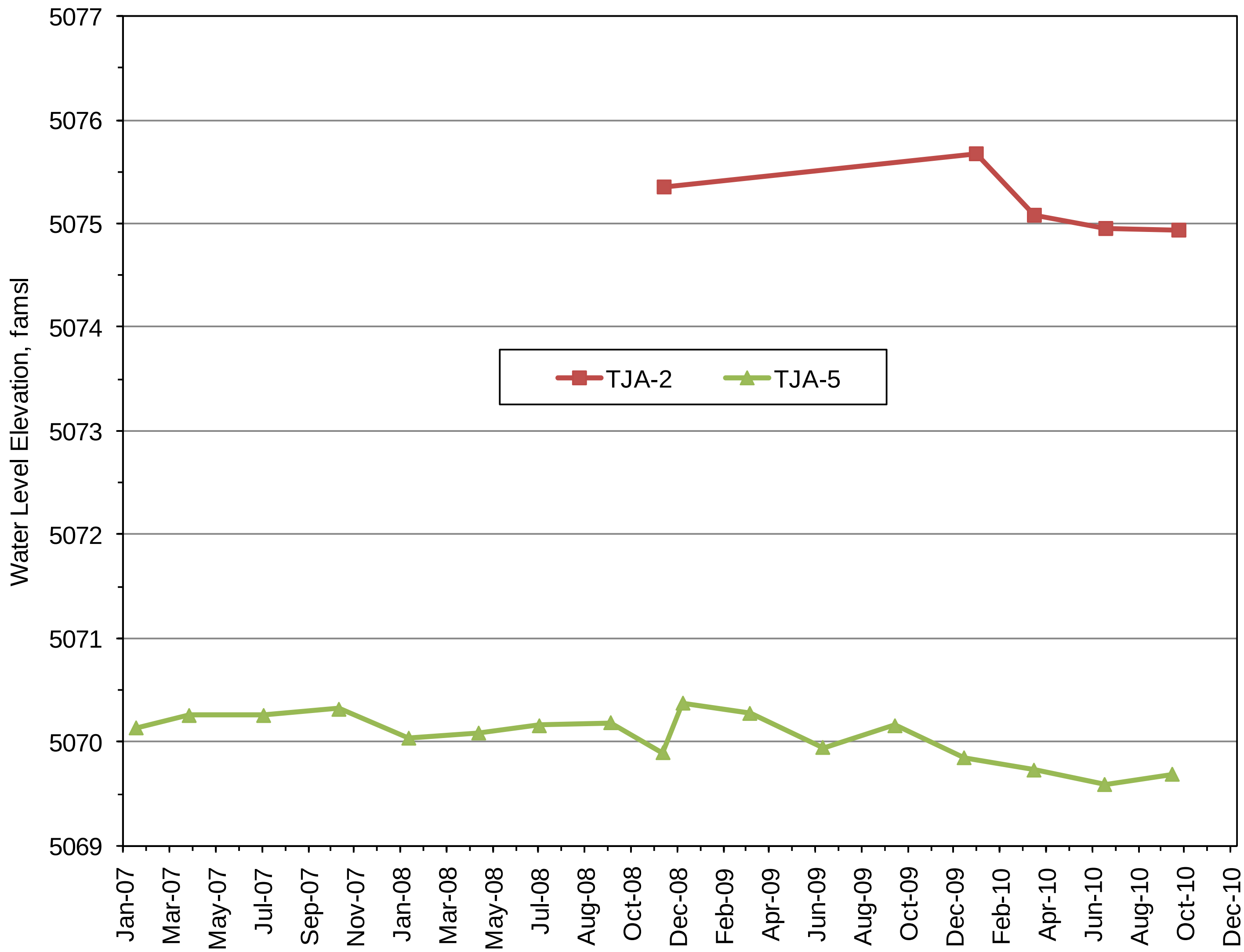


**Figure 6C-5. TAG Study Area PGWS Wells (5 of 6)**

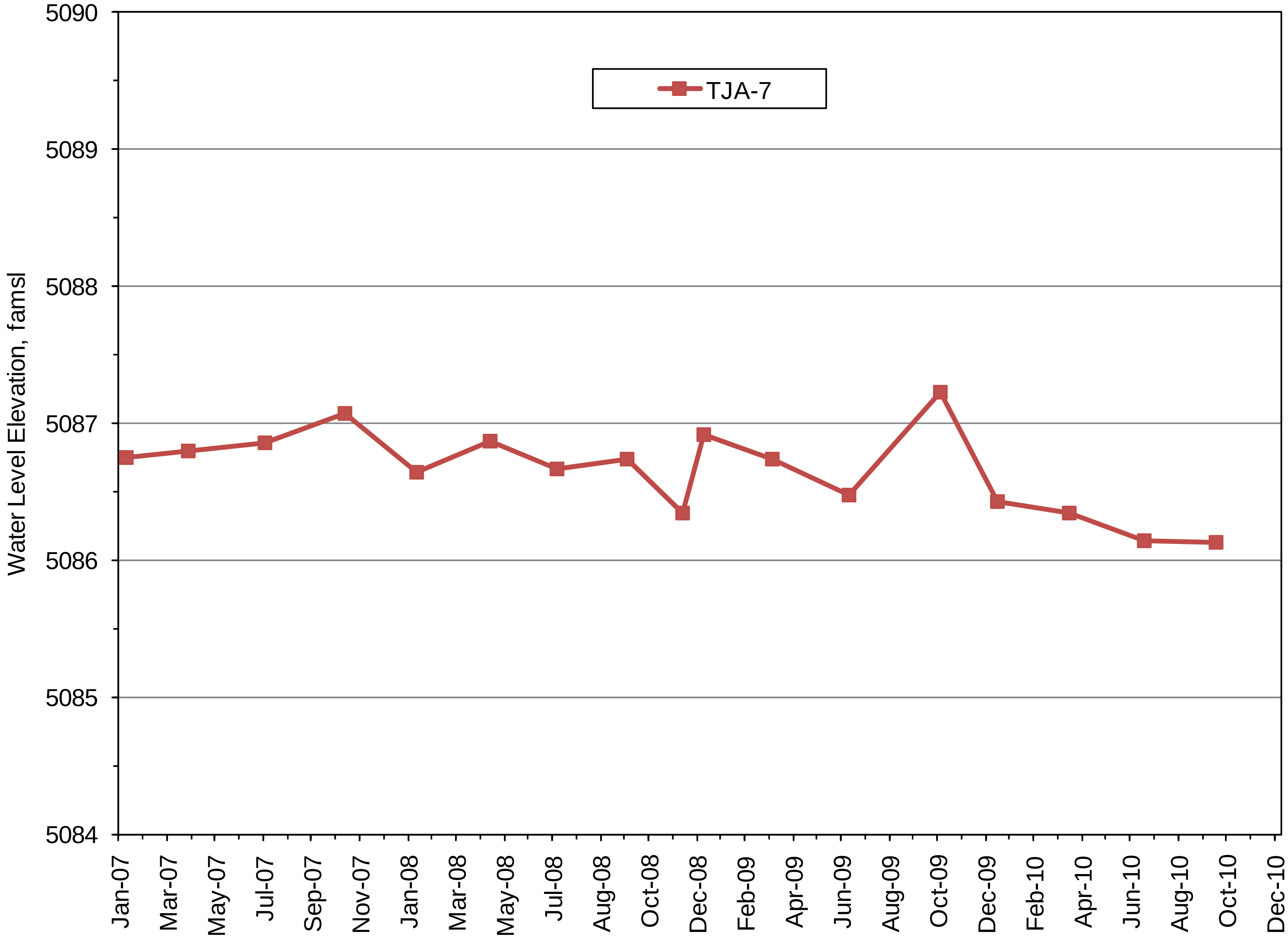


**Figure 6C-6. TAG Study Area PGWS Wells (6 of 6)**

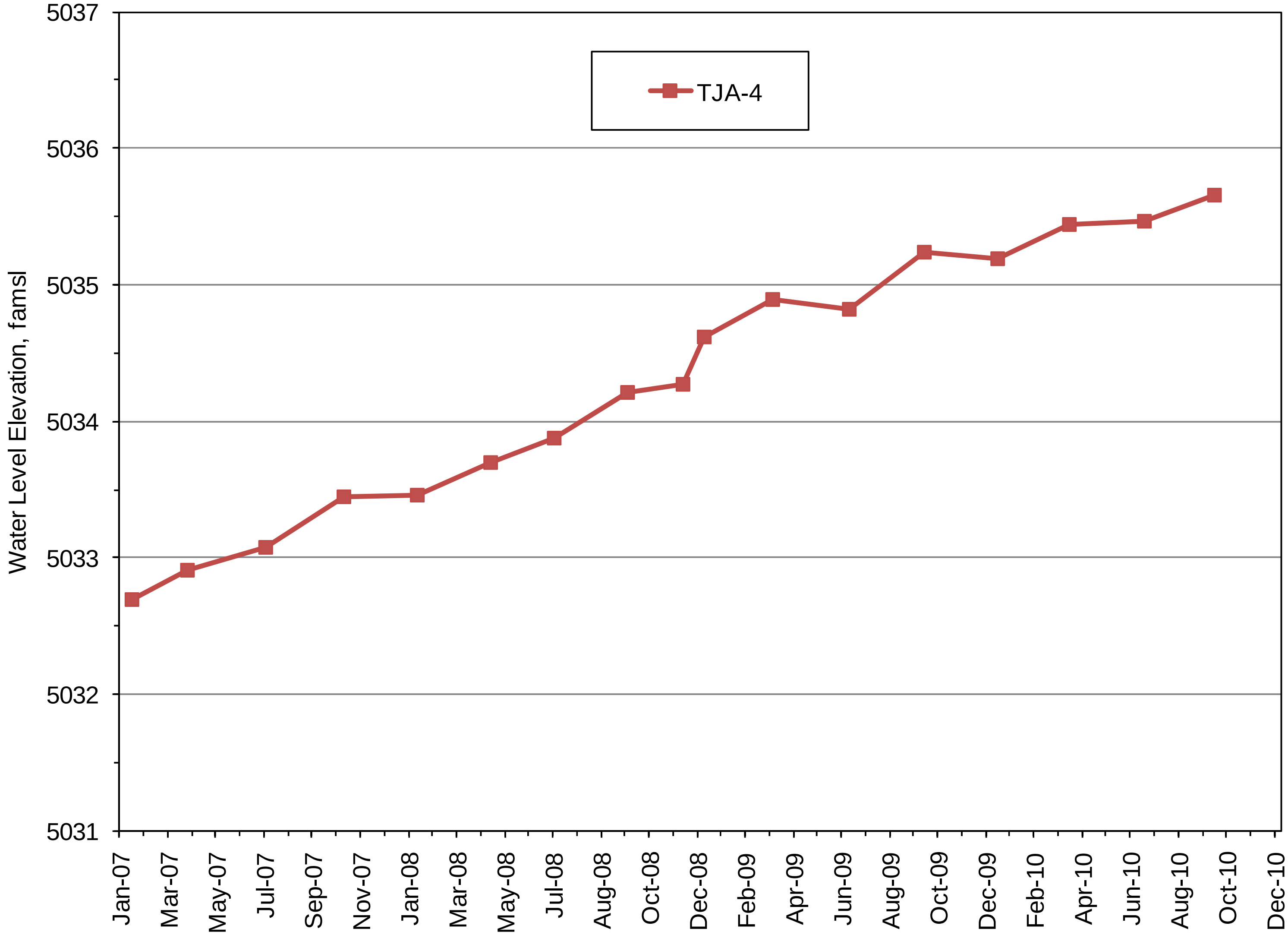


**Figure 6C-7. TAG Study Area Regional Aquifer Wells (1 of 5)**

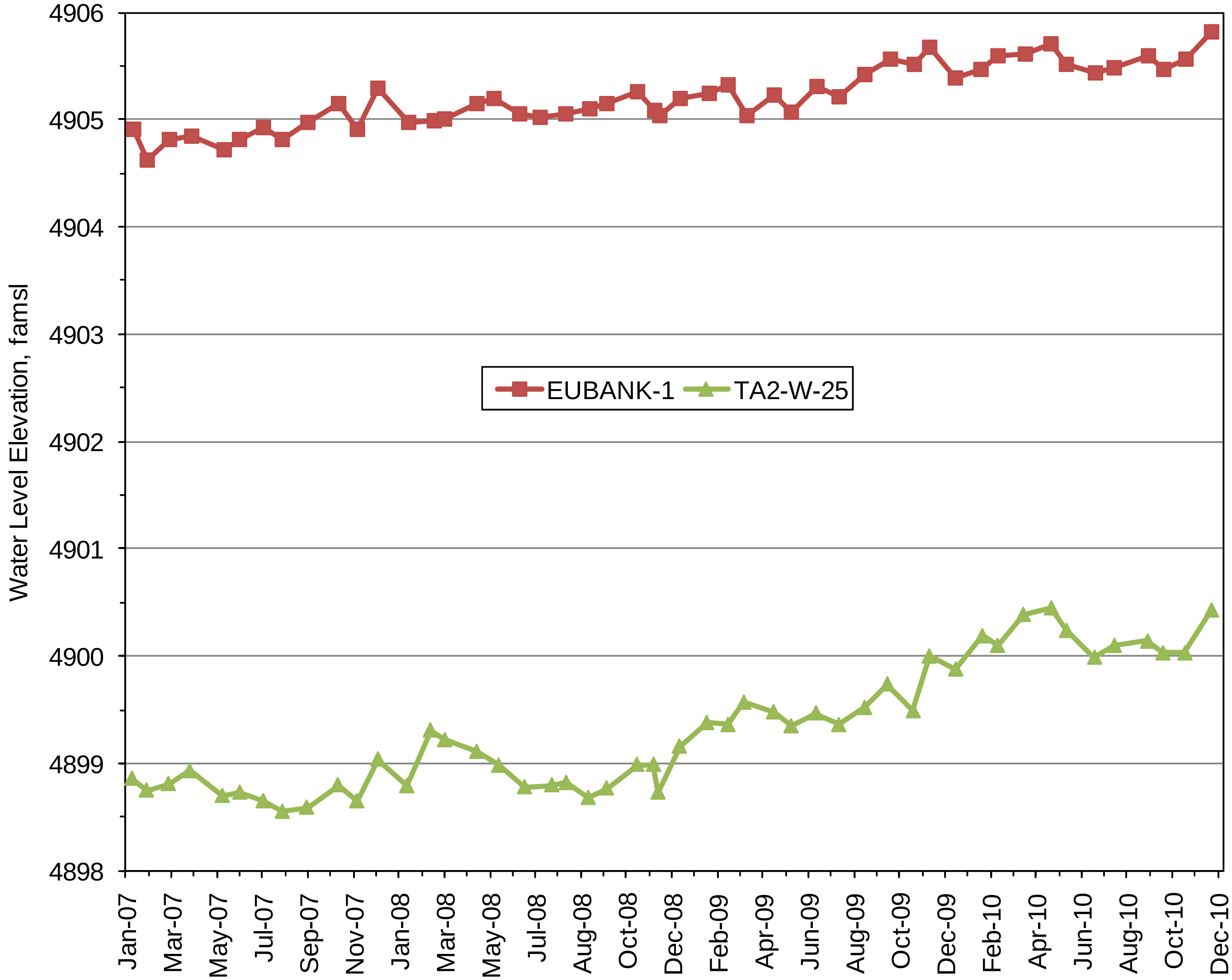


**Figure 6C-8. TAG Study Area Regional Aquifer Wells (2 of 5)**

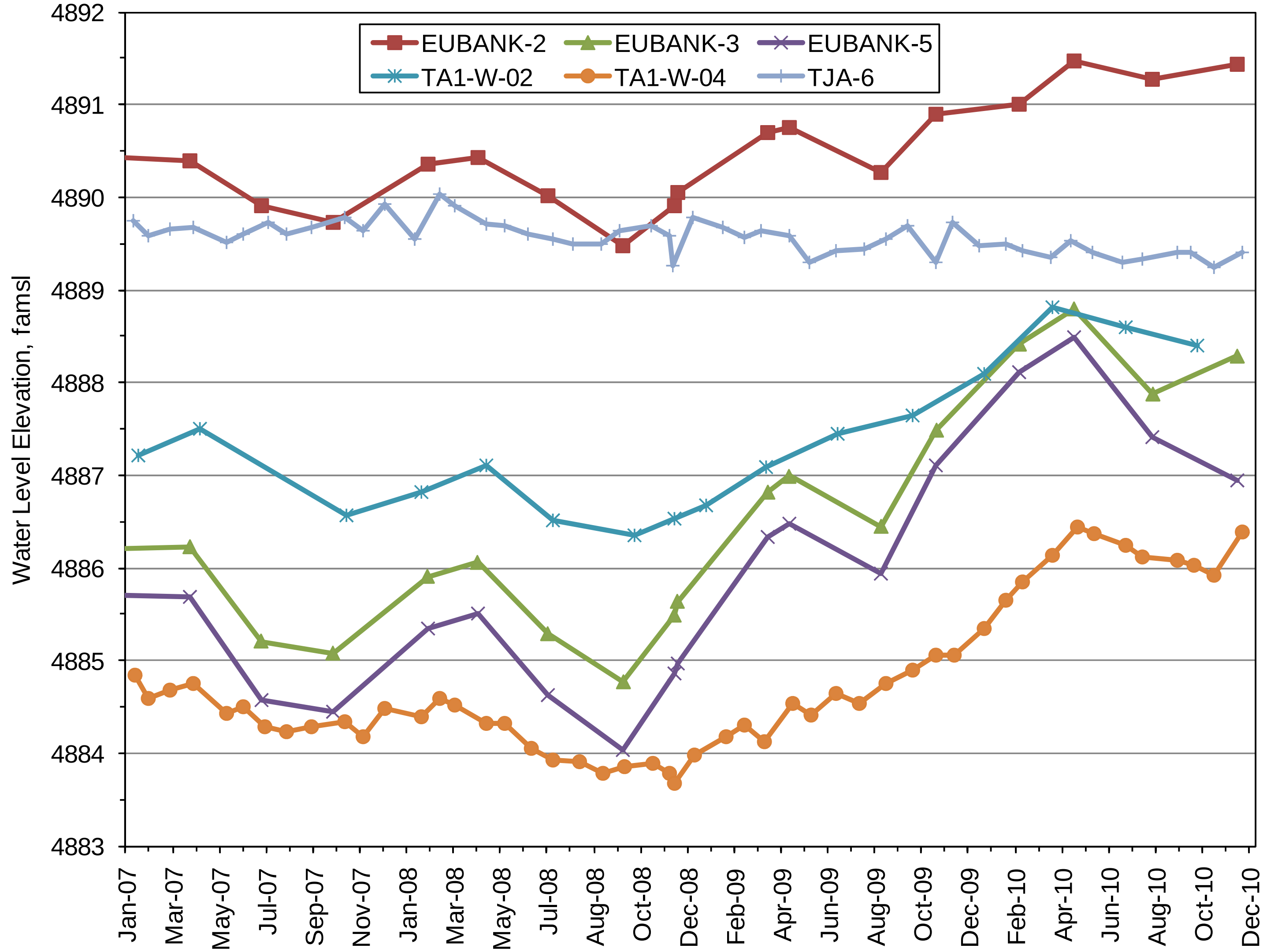


**Figure 6C-9. TAG Study Area Regional Aquifer Wells (3 of 5)**

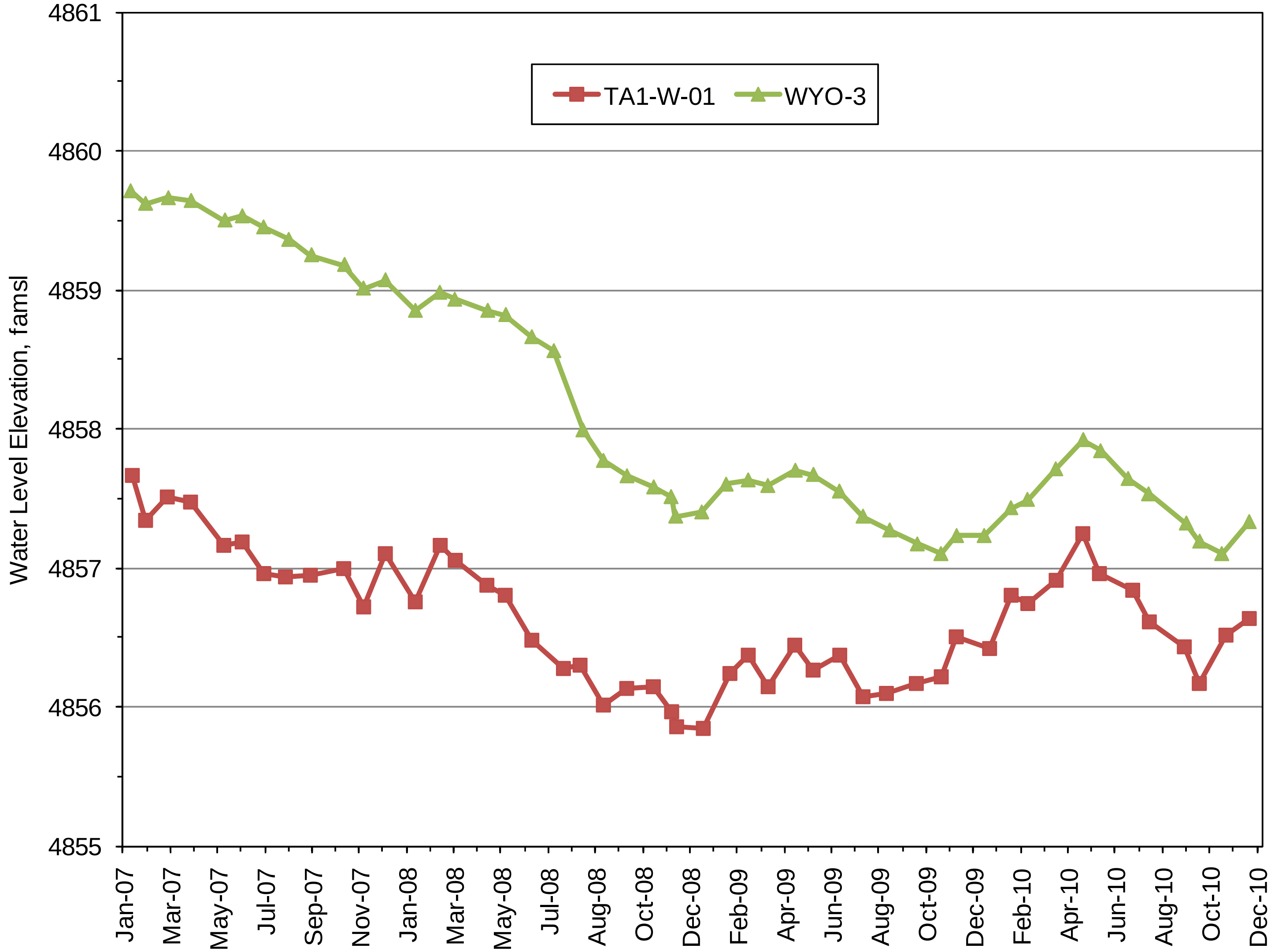


**Figure 6C-10. TAG Study Area Regional Aquifer Wells (4 of 5)**


**Figure 6C-11. TAG Study Area Regional Aquifer Wells (5 of 5)**

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# 7.0 Burn Site Groundwater Study Area

## 7.1 Introduction

Unique features of the Burn Site Groundwater (BSG) study area, located in the Manzanita Mountains (Figure 7-1), include low concentrations of nitrate and perchlorate in a fractured bedrock aquifer. Nitrate has been identified as a constituent of concern (COC) in groundwater at the study area based on detections above the U.S. Environmental Protection Agency (EPA) maximum contaminant level (MCL) in samples collected from monitoring wells. Since August 1998, the maximum concentration of nitrate detected in the study area has been 29.3 milligrams per liter (mg/L). The EPA and State of New Mexico drinking water standard (MCL) for nitrate is 10 mg/L (as nitrogen).

Perchlorate has also been identified as a COC in groundwater at the BSG study area. Currently there is no EPA MCL or State of New Mexico drinking water standard for perchlorate. However, Section IV.B of the Compliance Order on Consent (the Order), between the New Mexico Environment Department (NMED), the U.S. Department of Energy (DOE), and Sandia Corporation (Sandia) stipulates that a select group of groundwater monitoring wells be sampled for perchlorate using a screening level/method detection limit (MDL) of 4 micrograms per liter (μg/L) (NMED April 2004). Furthermore, the Order requires that for detections equal to or greater than 4 μg/L, the DOE/Sandia will evaluate the nature and extent of perchlorate contamination. Perchlorate has been detected in samples from one well and, since March 2006, the maximum concentration of perchlorate in the study area has been 8.93 μg/L.

### 7.1.1 Location

Sandia National Laboratories, New Mexico (SNL/NM) manages the Coyote Canyon Test Area in the eastern portion of Kirtland Air Force Base (KAFB). The SNL/NM facility is a government-owned, contractor-operated, multi-program laboratory overseen by the DOE, National Nuclear Security Administration through the Sandia Site Office in Albuquerque, New Mexico. Sandia, a wholly owned subsidiary of Lockheed Martin Corporation, manages and operates SNL/NM under Contract DE-AC04-94AL85000.

The Burn Site is located in Lurance Canyon, one of three canyons that are located on the eastern edge of the Coyote Canyon Test Area and within the Manzanita Mountains. Two other canyons, Madera Canyon and Sol se Mete Canyon, intersect Lurance Canyon to the west of the Burn Site. These three canyons are the headwaters of Arroyo del Coyote. Testing activities at the Lurance Canyon Burn Facility, which includes the Burn Site, began in 1967.

The BSG study area is located along the eastern margin of the Albuquerque Basin, and the terrain is characterized by large topographic relief, exceeding 500 feet (ft). Lurance Canyon, deeply incised into Paleozoic and Precambrian rocks, provides local westward drainage of ephemeral surface-water flows to Arroyo del Coyote.

### 7.1.2 Site History

The Lurance Canyon Burn Site (Solid Waste Management Unit [SWMU] 94) and the nearby Lurance Canyon Explosive Test Site (SWMU 65) have been used since 1967. Most research has involved testing the fire survivability of transportation containers, weapon components, simulated weapons, and satellite components. Historical operations also include open detonation of high explosives (HE) (Table 7-1) and the open burning of HE materials, liquid propellants, and solid propellants. Most HE testing occurred

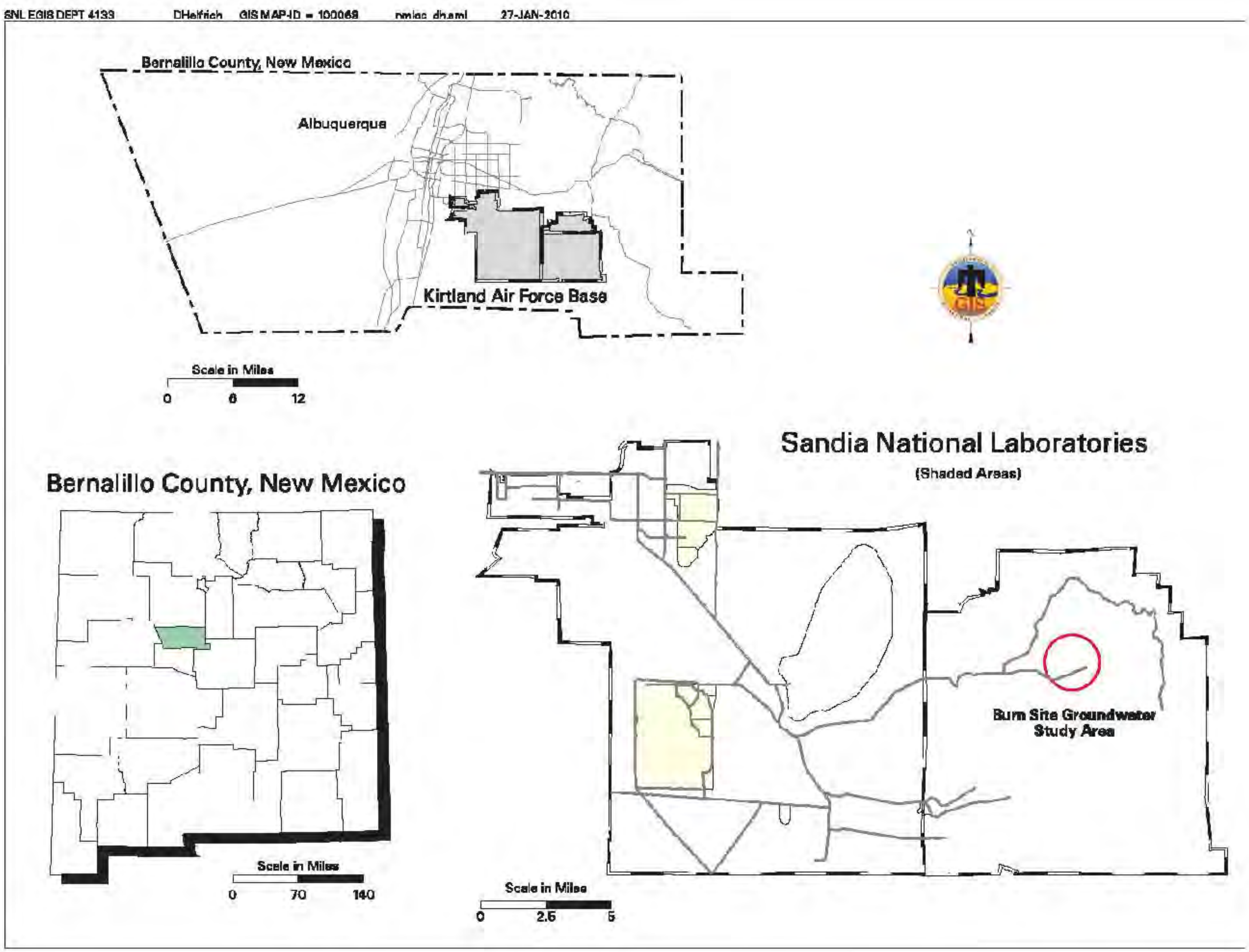


**Figure 7-1. Location of the Burn Site Groundwater Study Area**

## Table 7-1. Historical Timeline of the Burn Site Groundwater Study Area

| Month | Year | Event | Reference |
|---|---|---|---|
| | 1967-early 1980s | HE testing at 18 SWMUs conducted within the BSG study area until early 1980s. Burn testing began in 1970s using excavation pits and portable burn pans with JP-4. Wastewater discharged into unlined pits. Nitrate and diesel range organics identified as potential COCs. | SNL November 2001 |
| February | 1998 | Site-Wide Hydrogeologic Characterization Project, Calendar Year 1995 Annual Report containing description of BSG hydrogeology submitted. | SNL February 1998 |
| | 1996 | Burn Site Well showed elevated nitrate levels (25 mg/L). | SNL January 2005 |
| July | 1997 | NMED/DOE/OB and SNL/NM agree on installation of deep and shallow monitoring wells and one year of quarterly sampling. | SNL July 1997 |
| November | 1997 | Monitoring well CYN-MW1D and piezometers CYN-MW2S and 12AUP-01 installed. | SNL June 1998 |
| March | 1999 | GWPP Fiscal Year 1998 Annual Groundwater Monitoring Report provided BSG analytical data. | SNL March 1999 |
| June | 1999 | Monitoring wells CYN-MW3 and CYN-MW4 installed. | SNL November 2001 |
| | Various (e.g., 1994) | BSG study area SWMUs 94 and 65 proposed and approved for NFA/CAC. | Numerous references, for example: SNL February 2004 |
| March | 2000 | GWPP Fiscal Year 1999 Annual Groundwater Monitoring Report provided BSG analytical data. | SNL March 2000 |
| April | 2001 | GWPP Fiscal Year 2000 Annual Groundwater Monitoring Report provided BSG analytical data. | SNL April 2001 |
| November | 2001 | Comprehensive BSG Investigation Report documenting hydrogeologic characteristics of the study area prepared. | SNL November 2001 |
| March | 2002 | GWPP Fiscal Year 2001 Annual Groundwater Monitoring Report provided BSG analytical data. | SNL March 2002 |
| March | 2003 | GWPP Fiscal Year 2002 Annual Groundwater Monitoring Report provided BSG analytical data. | SNL March 2003a |
| June | 2003 | Further refinements of the hydrogeologic setting of the BSG study area are presented. | Van Hart June 2003 |
| March | 2004 | GWPP Fiscal Year 2003 Annual Groundwater Monitoring Report provided BSG analytical data. | SNL March 2004 |
| April | 2004 | Compliance Order on Consent lists BSG as an Area of Concern that requires a CME. | NMED April 2004 |
| June | 2004 | A revised conceptual site model of the BSG study area prepared. | SNL June 2004a |
| June | 2004 | A CME work plan for the BSG study area prepared. | SNL June 2004b |
| January | 2005 | Nitrate source evaluation of deep soil in the BSG study area performed. | SNL January 2005 |
| February | 2005 | NMED requires additional site characterization and the preparation of an Interim Measures Work Plan. | NMED February 2005 |
| May | 2005 | BSG Interim Measures Work Plan submitted. | SNL May 2005 |
| July | 2005 | NMED requires supplemental information for the Interim Measures Work Plan. | NMED July 2005 |
| August | 2005 | SNL/NM submits response for RSI. | SNL August 2005 |
| October | 2005 | GWPP Fiscal Year 2004 Annual Groundwater Monitoring Report provided BSG analytical data. | SNL October 2005 |
| October | 2006 | CYN-MW6, CYN-MW7, and CYN-MW8 installed. | SNL October 2006 |

**Table 7-1. Historical Timeline of the Burn Site Groundwater Study Area** *(Concluded)*

| Month | Year | Event | Reference |
|---|---|---|---|
| March | 2007 | GWPP Fiscal Year 2006 Annual Groundwater Monitoring Report provided BSG analytical data. | SNL March 2007 |
| April | 2008 | BSG Current Conceptual Site Model resubmitted. | SNL April 2008a |
| April | 2008 | BSG CME Work Plan resubmitted. | SNL April 2008b |
| March | 2008 | GWPP Fiscal Year 2007 Annual Groundwater Monitoring Report provided BSG analytical data. | SNL March 2008 |
| April | 2009 | NMED requires supplemental characterization of soil and groundwater in the BSG study area. | NMED April 2009 |
| November | 2009 | BSG Characterization Work Plan submitted. | SNL November 2009 |
| June | 2009 | GWPP Calendar Year 2008 Annual Groundwater Monitoring Report provided BSG analytical data. | SNL June 2009a |
| February | 2010 | Received notice of conditional approval for the November 2009 BSG Characterization Work Plan. | NMED February 2010 |
| July | 2010 | Completed subsurface soil sampling at 10 deep soil boring locations to determine contaminant sources. | SNL November 2009 |
| July | 2010 | Installed four groundwater monitoring wells to determine extent of groundwater contamination. | SNL November 2009 |
| September | 2010 | Submitted an extension request for the BSG CME Report. | SNL September 2010 |
| September | 2010 | Initial sampling at groundwater monitoring wells CYN-MW9, CYN-MW10, CYN-MW11, and CYN-MW12. | SNL August 2010 |
| October | 2010 | Received approval of a time extension for submittal of the BSG CME Report. | NMED October 2010 |
| October | 2010 | GWPP Calendar Year 2009 Annual Groundwater Monitoring Report provided BSG analytical data. | SNL October 2010a |

**NOTES:**

BSG = Burn Site Groundwater.
CAC = Corrective Action Complete.
CME = Corrective Measures Evaluation.
COC = Constituent of concern.
DOE = U.S. Department of Energy.
GWPP = Groundwater Protection Program.
HE = High explosive(s).
JP-4 = Jet propellant fuel composition 4
mg/L = Milligram(s) per liter.
NFA = No Further Action.
NMED = New Mexico Environment Department.
OB = Oversight Bureau.
RSI = Request for Supplemental Information.
SNL/NM = Sandia National Laboratories/New Mexico.
SWMU = Solid Waste Management Unit.

between 1967 and 1975 and was completely phased out by the 1980s. Burn testing began in the early 1970s and has continued to the present. Early burn testing was conducted in unlined pits excavated in native soil. By 1975, portable, steel, burn pans were used for open burning mostly using JP-4 (jet propellant fuel composition 4). The Light Air Transport Accident Resistant Container Unit was constructed in 1980, and other engineered burn units were constructed by 1983. These burn units used jet fuel, gasoline, and diesel for the burn tests.

### 7.1.3 Monitoring History

Groundwater samples collected during 1996 from the Burn Site Well (a nonpotable production well used for fire suppression) contained elevated concentrations of nitrate (24.3 mg/L in November 1996). In 1997, the NMED, DOE, and Sandia agreed to investigate the source of this contamination. Later in 1997, monitoring well CYN-MW1D and piezometer CYN-MW2S were installed downgradient of the Burn Site Well (Table 7-2). Samples from well CYN-MW1D contained nitrate concentrations exceeding the MCL. Two more wells, CYN-MW3 and CYN-MW4, were installed between 1999 and 2001 to further characterize the study area. Based on regulatory requirements (discussed further in Section 7.2), monitoring wells CYN-MW6, CYN-MW7, and CYN-MW8 were installed in 2006.

**Table 7-2. Groundwater Monitoring Wells and Piezometers at the Burn Site Groundwater Study Area**

| Well | Installation Year | WQ | WL | Comments |
|---|---|---|---|---|
| 2AUP-01 | 1996 | | √ | Underflow piezometer (typically dry) |
| Burn Site Well | 1986 | | | Nonpotable production well |
| CYN-MW1D | 1997 | √ | √ | Bedrock groundwater well |
| CYN-MW2S | 1997 | | √ | Underflow piezometer (typically dry) |
| CYN-MW3 | 1999 | √ | √ | Bedrock groundwater well |
| CYN-MW4 | 1999 | √ | √ | Bedrock groundwater well |
| CYN-MW6 | 2006 | √ | √ | Bedrock groundwater well |
| CYN-MW7 | 2006 | √ | √ | Bedrock groundwater well |
| CYN-MW8 | 2006 | √ | √ | Bedrock groundwater well |
| CYN-MW9 | 2010 | √ | √ | Bedrock groundwater well |
| CYN-MW10 | 2010 | √ | √ | Bedrock groundwater well |
| CYN-MW11 | 2010 | √ | √ | Bedrock groundwater well |
| CYN-MW12 | 2010 | √ | √ | Bedrock groundwater well |

**NOTE:** Check marks in the WQ and WL columns indicate WQ sampling and WL measurements were obtained during this reporting period.
WL = Water level.
WQ = Water Quality.

Previous monitoring reports include analytical results for CYN-MW5. Groundwater monitoring well CYN-MW5 was installed in 2001 as part of the investigation of Drain and Septic System (DSS) sites. This well was sampled for eight quarters as part of the DSS investigation and was then incorporated into the BSG study area investigation as a downgradient well. However, in its February 2005 letter, the NMED stated that it "will not consider monitoring well CYN-MW5 as a downgradient well because it is located over two miles away from the Burn Site" (NMED February 2005). Based on the NMED determination, CYN-MW5 has not been sampled since the third quarter of Fiscal Year (FY) 2005.

Since the initial discovery of nitrate at the BSG study area, numerous characterization activities have been conducted (Table 7-1). The results of these characterization activities are summarized in two versions of the *Current Conceptual Model of Groundwater Flow and Contaminant Transport at Sandia National Laboratories/New Mexico Burn Site* (SNL June 2004a and April 2008a). These two versions of the BSG conceptual site model provide a comprehensive list of groundwater monitoring data sources used to support the summary of investigations.

In April 2004, a Compliance Order on Consent (the Order) became effective between the DOE, Sandia and the NMED. The Order specified the Burn Site as an area of groundwater contamination (NMED April 2004). In response to the Order, DOE/Sandia submitted the Corrective Measures Evaluation (CME) Work Plan for the BSG study area to the NMED in June 2004 (SNL June 2004b). Based on requirements stipulated by the NMED (discussed in Section 7.2), DOE/Sandia submitted the BSG Interim Measures Work Plan (IMWP) (SNL May 2005) on May 30, 2005. As detailed in the IMWP, three monitoring wells (CYN-MW6, CYN-MW7, and CYN-MW8) were installed near the Burn Site during December 2005 to January 2006 at locations shown in Figure 7-2. Quarterly sampling for eight quarters began for these three monitoring wells in March 2006 and was completed in December 2007. Samples from the wells downgradient of CYN-MW1D (CYN-MW7 and CYN-MW8) were analyzed for nitrate.

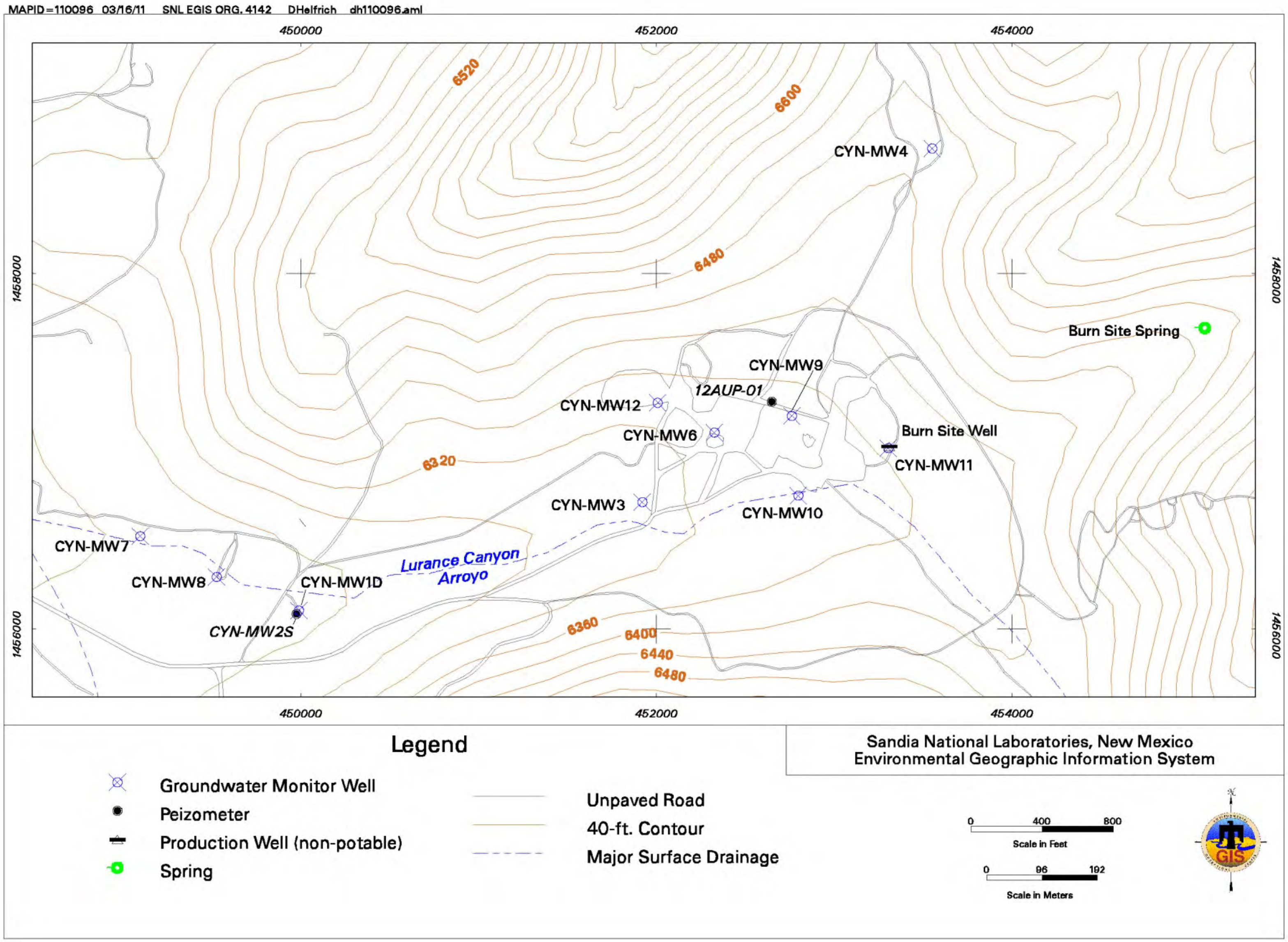


**Figure 7-2. Wells and Piezometers in the Burn Site Groundwater Study Area (10 Active Wells)**

Samples from the newly installed well adjacent to SWMU 94F (CYN-MW6) were analyzed for nitrate, total petroleum hydrocarbons (TPH) as gasoline range organics (GRO) and diesel range organics (DRO), and other parameters. Groundwater monitoring programs have continued as outlined in the IMWP (SNL May 2005).

Based on a letter received from the NMED (NMED April 2009), DOE/Sandia were required to further characterize the nature and extent of the perchlorate contamination at the BSG study area. DOE/Sandia prepared the BSG Characterization Work Plan (SNL/NM November 2009) that was approved by NMED (NMED February 2010). In July 2010, DOE/Sandia implemented the requirements of the work plan and installed four new groundwater monitoring wells (CYN-MW9, CYN-MW10, CYN-MW11, and CYN-MW12) to determine the extent of groundwater contamination (Section 7.1.5). These four new wells were sampled for the first time in September 2010.

### 7.1.4 Current Monitoring Network

Currently 10 wells in the BSG study area are monitored for water quality, including CYN-MW1D, CYN-MW3, CYN-MW4, CYN-MW6, CYN-MW7, CYN-MW8, CYN-MW9, CYN-MW10, CYN-MW11, and CYN-MW12 (Figure 7-2). Two shallow piezometers (12AUP-01 and CYN-MW2S) were installed in 1997 to determine whether any ephemeral flow was occurring at the alluvium-bedrock interface. Both piezometers have been predominately dry since installation.

### 7.1.5 Summary of Calendar Year Activities

The following activities took place for the BSG study area investigation during Calendar Year (CY) 2010 (January through December 2010):

- Semiannual groundwater sampling was conducted at six wells (CYN-MW1D, CYN-MW3, CYN-MW4, CYN-MW6, CYN-MW7, and CYN-MW8) in February/March 2010, May/June 2010, and September 2010.

- Quarterly groundwater sampling was conducted at four wells (CYN-MW9, CYN-MW10, CYN-MW11, and CYN-MW12) in September 2010 and October/November 2010.

- The *Burn Site Groundwater Characterization Work Plan, Installation of Groundwater Monitoring Wells CYN-MW9, CYN-MW10, and CYN-MW11, Collection of Subsurface Soil Samples* (SNL November 2009) was conditionally approved by the NMED (February 2010).

- Subsurface soil sampling was completed in July 2010 at 10 deep soil boring locations to determine contaminant sources.

- Four groundwater monitoring wells (CYN-MW9, CYN-MW10, CYN-MW11, and CYN-MW12) were installed in July 2010 to determine the extent of groundwater contamination.

- Semiannual reporting of perchlorate analyses for CYN-MW6 was conducted.

- Tables of analytical results (Attachment 7A), concentration versus time graphs (Attachment 7B), and hydrographs (Attachment 7C) were prepared in support of this report.

### 7.1.6 Summary of Future Activities

The following activities are anticipated for the BSG study area investigation during CY 2011:

- Quarterly groundwater sampling will be conducted at four wells (CYN-MW9, CYN-MW10, CYN-MW11, and CYN-MW12) during CY 2011.
- Semiannual groundwater sampling will be conducted at six wells (CYN-MW1D, CYN-MW3, CYN-MW4, CYN-MW6, CYN-MW7, and CYN-MW8) during the second and fourth quarters of CY 2011.
- A report describing the subsurface soil sampling and well installation field activities will be prepared and submitted to the NMED.
- Semiannual reporting of perchlorate analyses for CYN-MW6 will be performed.

### 7.1.7 Current Conceptual Model

Groundwater flow in the BSG study area is controlled by the local geologic framework and structural features described in the following sections.

#### 7.1.7.1 Regional Hydrogeologic Conditions

The Manzanita Mountains are composed of a complex sequence of uplifted Precambrian metamorphic and granitic units that were subjected to significant deformation. These units are capped by Paleozoic sandstones, shales, and limestones of the Sandia Formation and Madera Group. The geologic history of the Manzanita Mountains is thoroughly described in the *Groundwater Investigation, Canyons Test Area, Operable Unit 1333, Burn Site, Lurance Canyon* (SNL November 2001) and utilizes the model presented by Brown et al. (1999). The local geology is also summarized in the *Current Conceptual Model of Groundwater Flow and Contaminant Transport at Sandia National Laboratories/New Mexico Burn Site* (SNL June 2004a and April 2008a).

Groundwater in the Manzanita Mountains predominantly occurs in fractured metamorphic and intrusive units that consist of metavolcanics, quartzite, metasediments (schists and phyllites), and the Manzanita Granite. Groundwater migrates through bedrock fractures in a generally westward direction. The only perennial spring in the area, the Burn Site Spring, is located upgradient of the testing facilities at a limestone outcrop. The permeability of the fractured bedrock units is low and well yields are minimal. Groundwater discharges to small ephemeral springs located at the base of the Manzanita Mountains approximately 3 miles west of the Burn Site. Additionally, some groundwater may discharge as underflow to unconsolidated sedimentary deposits of the Albuquerque Basin.

The Precambrian metamorphic rocks typically are fractured as a result of the long and complex history of regional deformation. Drill core data and exposures indicate that the fractures in shallow bedrock are filled with chemical precipitates such as calcium carbonate. The carbonate precipitation likely occurred when the water table was elevated prior to the development of the Rio Grande. As chemical precipitates filled the fractures, permeability was effectively reduced, creating a semiconfined unit above underlying bedrock with open fractures.

The Burn Site is bisected by a north-south–trending system of faults, consisting locally of several high-angle normal faults that are downfaulted to the east. Faults (where exposed) are characterized by zones of crushing and brecciation. The Burn Site fault trends north to south in the vicinity of the Burn Site Well and well CYN-MW4. Nearby outcrops indicate that the fault displacement is approximately 160 ft.

The canyon floor at the BSG study area consists of unconsolidated alluvial fill deposits over bedrock. These deposits typically are sand and gravel derived from erosion of upslope colluvium and bedrock. These alluvial deposits range in thickness from 21 to 55 ft as evidenced in borings drilled at the BSG study area.

#### 7.1.7.2 Hydrogeologic Conditions at the BSG Study Area

When the Burn Site Well was drilled in 1986, the depth to groundwater-bearing strata was approximately 222 ft below ground surface. Following completion of the well in fractured bedrock, the water level rose approximately 150 ft due to positive head. The fractured rocks of the Manzanita Mountains are recharged by infiltration of precipitation, largely occurring from summer thundershowers and, to a lesser degree, winter snowfall on the higher elevations. Groundwater recharge is restricted by high evapotranspiration rates (losses to the atmosphere by evaporation and plant transpiration) and low permeability of the fractured bedrock.

Regionally, groundwater in the western Manzanita Mountains flows generally toward the west from a groundwater flow divide located east of the BSG study area (SNL November 2001). Westward groundwater flow across Lurance Canyon discharges primarily as direct underflow to the unconsolidated basin-fill deposits of the Albuquerque Basin. Based on field observations, some discharge also occurs at springs along the mountain front. Much of the flow that discharges from these springs undergoes evapotranspiration. Some flow from the springs infiltrates nearby alluvial deposits.

Annual precipitation in the Manzanita Mountains is in the form of rainfall and minor snowfall. July and August are typically the wettest months; 45 to 62 percent of annual precipitation falls during summer thunderstorms from July to October (National Weather Service, 2002). The average annual precipitation in this drainage basin is estimated to range between 12 and 16 inches (SNL April 2008a). Annual potential evapotranspiration in the Albuquerque area greatly exceeds annual precipitation. Because much of the rainfall in the Lurance Canyon drainage occurs during the summer, losses to evapotranspiration are high. A small percentage may infiltrate into the exposed bedrock or into alluvial deposits along the canyon floor.

Ephemeral surface-water flows occur in response to precipitation in the drainage basin. Two piezometers (Figure 7-2) were constructed in Lurance Canyon to monitor moisture within the channel deposits at the contact with underlying Precambrian bedrock. No water was detected in either piezometer until September 2, 2004. After a series of rain events, between 1 and 2 inches of water was measured in 12AUP-01. The water level remained fairly constant through September 2004. However, more recent water level measurements show no measurable water in 12AUP-01. It is likely that significant saturation in the vadose zone occurs only after a series of significant rain events. Episodic accumulation of precipitation, as evidenced by the occurrence of water in the piezometer, may provide a mechanism for recharging the brecciated fault zones and uncemented fractures in the underlying bedrock.

#### 7.1.7.3 Local Direction of Flow

Figure 7-3 presents the current potentiometric surface for the BSG monitoring well network (October 2010). Groundwater elevations presented in this potentiometric surface map reflect new survey coordinates. Until recently, Environmental Restoration (ER) Operations (formerly ER Project) survey coordinates were based on the New Mexico State Plane Coordinate System, Central Zone, North American Datum of 1927 and Northern Geographic Vertical Datum of 1929 for elevations. In order to be consistent with current SNL/NM Facilities and KAFB survey practices, ER Operations survey data now

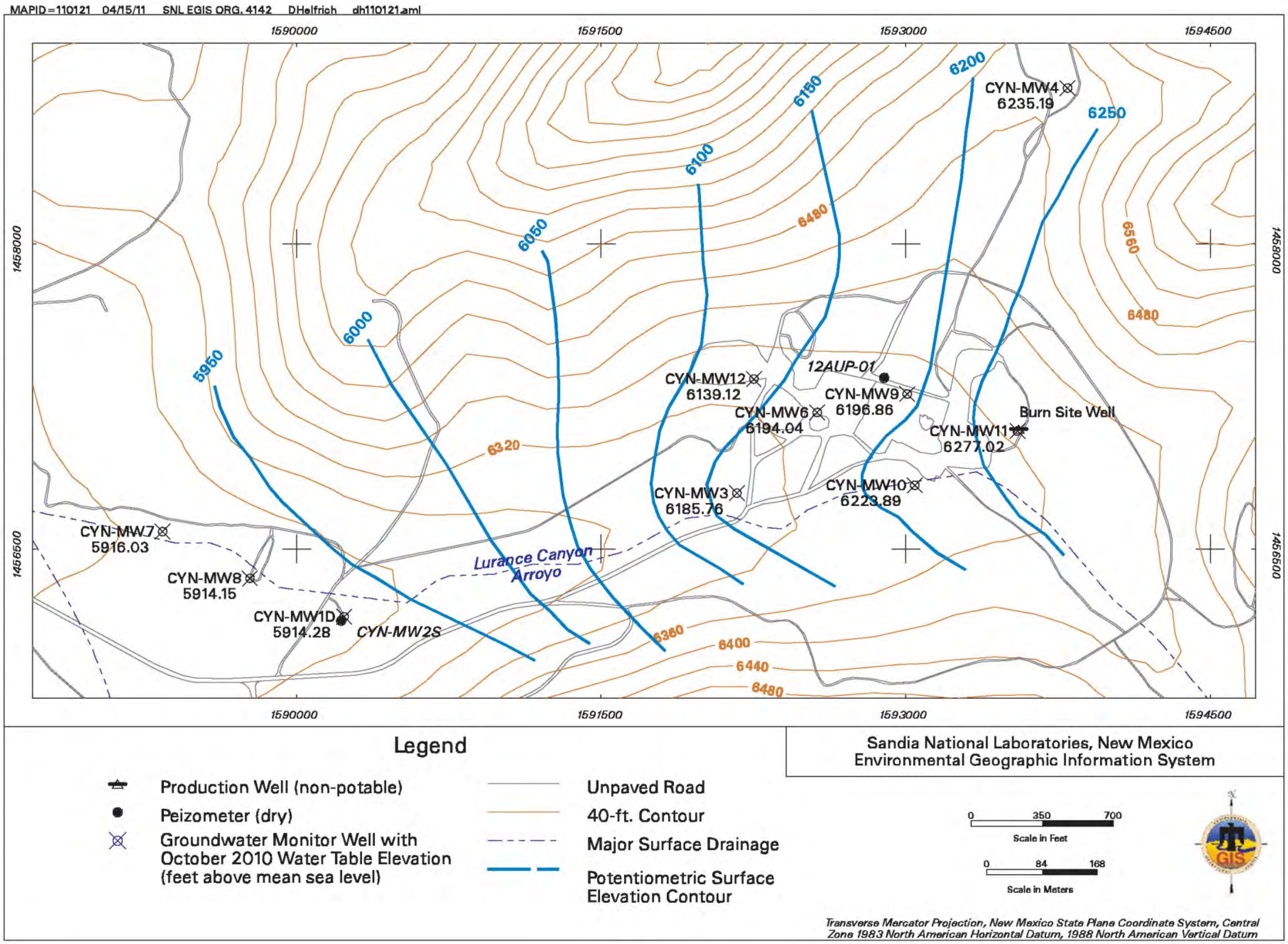


**Figure 7-3. Burn Site Groundwater Potentiometric Surface Map (October 2010)**

are based on New Mexico State Plane Coordinate System, Central Zone, North American Datum of 1983 (NAD83) and North American Vertical Datum of 1988 (NAVD88) coordinates. Location information for wells surveyed before August 2010 has been mathematically converted to the new NAD83/NAVD88 coordinates using National Geodetic Survey-approved software.

The general direction of groundwater flow beneath the BSG study area is to the west-southwest as indicated by the potentiometric surface. No water supply wells are located near the BSG study area, except for the Burn Site Well that is used only rarely (last pumped in 2003) for nonpotable applications such as fire suppression. Groundwater levels in the Paleozoic rocks near the BSG study area are not influenced by regional water supply well pumping from the basin-fill deposits of the Albuquerque Basin.

The apparent horizontal groundwater gradient based on BSG monitoring wells, piezometers, and springs varies from approximately 0.004 to 0.14 feet per foot (SNL April 2008a). The hydraulic gradient west of the BSG study area flattens substantially.

The wide range of hydraulic gradients in Lurance Canyon indicate that localized groundwater systems associated with brecciated fault zones in the low-permeability fractured bedrock at the BSG study area are poorly connected and are effectively compartmentalized. Limited groundwater flow velocity information is based on COC first-arrival estimates. Based on contaminant releases from SWMU 94F arriving at well CYN-MW1D, the minimum apparent velocity of the COCs is estimated to be approximately 160 ft/year (ft/yr) (SNL April 2008a). No information is available about vertical flow velocity within the fractured rocks at the BSG study area. However, vertical movement of water to the water table within the brecciated fault zones probably occurs as rapid, partially saturated to saturated flow. Filled fractures within the upper portion of metamorphic rock act as a semiconfined unit restricting vertical flow.

Water levels have been routinely monitored in BSG wells since 1999. Figures 7C-1 through 7C-4 (Attachment 7C) show groundwater levels in BSG wells that are completed in bedrock. No substantial seasonal variation in water levels is evident in these wells. The wide range of hydraulic gradients in Lurance Canyon and the lack of correlation between water level fluctuations in these wells support the assessment that the low-permeability fractured groundwater system at the BSG study area is poorly connected. Water level fluctuations may be a result of local heterogeneities in hydraulic properties related to the fractured system. The BSG monitoring wells have shown significant groundwater declines over the past three to four years, with decreases in water levels ranging from 0.7 to 2.8 ft/yr. Declining water levels may be due to reduced amounts of precipitation.

#### 7.1.7.4 Contaminant Sources

Nitrate in the BSG study area may be derived from both natural and anthropogenic sources. The NMED-specified background concentration for nitrate in groundwater is 4 mg/L. Potential natural sources include the weathering of sedimentary rocks and atmospheric deposition. Evaporation and transpiration of rainwater that has infiltrated canyon alluvial sediments can increase nitrate concentrations. Potential anthropogenic nitrate sources include septic systems and the degradation of HE materials.

Some evidence indicates that evaporation and transpiration may concentrate nitrate in sediments beneath ephemeral drainages in the vicinity of the Manzanita Mountains. This evidence includes nitrate concentrations that exceed the MCL in groundwater beneath these drainages and a chloride to nitrate ratio in groundwater that is similar to the chloride to nitrate ratio in rainfall.

SWMU 65 is located in the center of the BSG study area and contains open-air detonation areas where nitrate-based explosives were used. The detonations may have dispersed HE materials across the ground surface, and subsequent degradation (weathering) of these HE materials most likely released nitrate. SWMU 94 testing also involved burning HE material and propellants. Nitrate is highly soluble in water, and precipitation can enhance the migration of nitrate to groundwater. In addition to nitrate, petroleum products were detected in soil samples; therefore, the potential for petroleum products in groundwater required further evaluation.

#### 7.1.7.5 Contaminant Distribution and Transport in Groundwater

Nitrate was first detected above the MCL of 10 mg/L in groundwater samples from the Burn Site Well. Since the completion of wells CYN-MW1D (December 1997), CYN-MW3 (June 1999), CYN-MW6 (February 2006), CYN-MW9, CYN-MW10, and CYN-MW12 (July 2010), nitrate concentrations that exceed the MCL have been consistently detected in samples from these six wells. Nitrate concentrations in samples from CYN-MW11 are near or just above the MCL. Nitrate concentrations in groundwater samples from wells CYN-MW4, CYN-MW7, and CYN-MW8 have not exceeded the MCL.

Nitrate concentrations in groundwater samples from the Burn Site Well decreased from 24.3 mg/L in 1996 to 5.5 mg/L in 2001. Concentrations in groundwater samples from well CYN-MW6, approximately 1,000 ft downgradient of the Burn Site Well, have ranged from 22.9 to 39.9 mg/L since 2006. Concentrations in groundwater samples from well CYN-MW3, located approximately 1,400 ft downgradient of the Burn Site Well, have ranged from less than 5 to 15 mg/L since 1999. Nitrate concentrations have increased from approximately 10 to more than 25 mg/L from 1998 to 2008 in groundwater samples from well CYN-MW1D, located approximately 3,400 ft downgradient of the Burn Site Well.

Potential downgradient receptors for the nitrate plume are Coyote Springs, approximately 3 miles west of the study area, and the City of Albuquerque (COA) and KAFB well fields, approximately 12 miles to the west-northwest of the study area. Numerical simulations suggest nitrate concentrations will be decreasing in groundwater to below the MCL at Coyote Springs and to below MDLs through dispersion and dilution as the plume moves into the more hydraulically conductive Ancestral Rio Grande deposits west of Coyote Springs. Numerical simulations also show that contaminant travel times exceed 600 years from the study area to the COA and KAFB well fields (SNL May 2005).

## 7.2 Regulatory Criteria

The NMED Hazardous Waste Bureau provides regulatory oversight of SNL/NM ER Operations as well as implements and enforces federal regulations mandated by the Resource Conservation and Recovery Act (RCRA). All ER SWMUs and Areas of Concern (AOCs) are listed in Module IV of the SNL/NM RCRA Part B Operating Permit, *Special Conditions Pursuant to the 1984 Hazardous and Solid Waste Amendments (HSWA) to RCRA for Sandia National Laboratories* (NMED 1993).

All investigations and corrective action requirements pertaining to SWMUs and AOCs are contained in the Order (NMED April 2004). The groundwater monitoring activities for BSG are not associated with a single SWMU but are more regional in nature. Before the effectiveness of the Order in April 2004, groundwater investigations at the BSG study area had been conducted voluntarily by ER Operations.

Initially, groundwater monitoring for the BSG was initiated to satisfy the requirements of the SNL/NM HSWA permit for characterization of SWMUs. The Order transferred regulatory authority for corrective action requirements from the HSWA module to the Order. The BSG investigation must comply with requirements set forth in the Order for site characterization and the development of a CME.

In response to the Order, DOE/Sandia submitted the following two documents to the NMED: (1) *Current Conceptual Model of Groundwater Flow and Contaminant Transport at Sandia National Laboratories/New Mexico Burn Site* (SNL June 2004a), and (2) *Corrective Measures Evaluation Work Plan for Sandia National Laboratories/New Mexico Burn Site* (SNL June 2004b). The current conceptual site model provides site-specific characteristics by which remedial alternatives were evaluated. The CME Work Plan provides a description and justification of which remedial alternatives were considered and the methods and criteria to be used in the evaluation. The CME Work Plan was completed to comply with requirements set forth in the Order and with the guidance of the RCRA Corrective Action Plan (EPA 1994).

On March 1, 2005, the DOE and Sandia received a letter from the NMED (February 2005) that rejected the CME Work Plan and stipulated the following requirements:

- DOE/Sandia must prepare and submit an IMWP within 90 days from the receipt of the letter (by May 30, 2005).

- The NMED requires additional characterization of the nitrate-contaminated groundwater near the BSG study area. Specifically, the downgradient extent of groundwater with nitrate concentrations greater than 10 mg/L shall be determined.

- The NMED does not accept the *Corrective Measures Evaluation Work Plan for Sandia National Laboratories/New Mexico Burn Site* (SNL June 2004b) because it is not satisfied with the existing characterization of nitrate-contaminated groundwater near the BSG study area.

- The NMED also requires the installation of one additional monitoring well "adjacent to SWMU-94F in order to establish groundwater conditions in this petroleum-contamination source area."

The DOE and Sandia submitted an IMWP to the NMED in May 2005 that proposed the installation of additional groundwater monitoring wells to characterize the extent of nitrate contamination in the bedrock aquifer downgradient of CYN-MW1D and fuel-related compounds downgradient of SWMU 94F (SNL May 2005). The selected interim measures described in the IMWP included additional well installation, groundwater monitoring, and institutional controls. These interim measures were proposed to serve three purposes: (1) provide data to support the CME; (2) monitor the migration of the nitrate plume in order to provide an early warning system to trigger an action if a danger to downgradient ecological receptors (Coyote Springs) becomes apparent; and (3) protect human health and the environment by limiting exposure to contaminated groundwater by restricting access to the monitoring wells.

In support of the selected interim measures, the IMWP included the following reports as attachments: (1) Remedial Alternatives Data Gaps Review, (2) Nitrate Source Evaluation, and (3) Evaluation of Contaminant Transport. The Data Gaps Review document included detailed definitions of remedial alternatives and a preliminary evaluation of remedial alternatives with the purpose of identifying data gaps. One of the data gaps identified included determining background nitrate concentrations and evaluating the potential for a residual source of nitrate in the vadose zone. The investigation initiated to fill this data gap and the analytical results were presented in the Nitrate Source Evaluation. The Evaluation of Contaminant Transport consisted of a simplified cross-sectional modeling approach to simulate transport and dilution of nitrate between the current location of nitrate in BSG and potential human and ecological receptors (SNL May 2005).

Data collected as part of additional characterization required by the IMWP were incorporated into an updated version of the conceptual site model (SNL April 2008a). The updated conceptual site model provides the basis for a technically defensible remediation program that was developed and documented in the CME Work Plan (SNL April 2008b), the results of which will eventually be documented in the CME Report. The April 2008 CME Work Plan was developed to address the concerns outlined in the letter from the NMED (February 2005) and to comply with requirements of the Order. The work plan provides information and data gathered during interim measures and performance and compliance goals and objectives for the remediation of the BSG.

A letter was received from the NMED by DOE/Sandia on April 30, 2009, entitled, *Perchlorate Contamination in Groundwater, Sandia National Laboratories, EPA ID #NM5890110518* (NMED April 2009). The NMED's letter discussed the occurrence of perchlorate in groundwater at concentrations at or greater than 1 µg/L at various locations at SNL/NM. The letter also states that DOE/Sandia must characterize the nature and extent of the perchlorate contamination at the BSG study area and submit to the NMED a plan for such characterization. DOE/Sandia met with the NMED in June and July 2009 (SNL June 2009b and July 2009) and submitted a letter requesting an extension to November 30, 2009 (DOE July 2009). The results of the discussions at the June and July meetings (SNL June 2009b and July 2009) have been incorporated into the BSG Characterization Work Plan (SNL/NM November 2009).

In February 2010, DOE/Sandia received notice of conditional approval for the November 2009 BSG Characterization Work Plan (NMED February 2010). In July 2010, DOE/Sandia implemented the requirements of the work plan and completed subsurface soil sampling at 10 deep soil boring locations to determine contaminant sources and installed four groundwater monitoring wells to determine the extent of groundwater contamination. Based on an outstanding schedule commitment, DOE/Sandia submitted an extension request for the BSG CME Report in September 2010 (SNL September 2010), which was approved by the NMED (October 2010).

In this report, BSG monitoring data are being presented for both hazardous and radioactive constituents; however, the monitoring data for radionuclides (gamma spectroscopy, gross/beta activity, and tritium) are provided voluntarily by the DOE/Sandia. The voluntary inclusion of such radionuclide information shall not be enforceable and shall not constitute the basis for any enforcement because such information falls wholly outside the requirements of the Order. Additional information on radionuclides and the scope of the Order is available in Section III.A of the Order (NMED April 2004).

### 7.3 Scope of Activities

The activities for the BSG investigation conducted during this reporting period, including plans and reports, are listed in Section 7.1.5. The field activity discussed in this section is groundwater monitoring sampling and analysis, including the February/March through October/November 2010 sampling events (Table 7-3). The analytical parameters for each well and each sampling event are listed in Table 7-4.

Quality control (QC) samples are collected in the field at the time of environmental sample collection. Field QC samples include duplicate samples, split samples, equipment blank (EB), field blank (FB), and trip blank (TB) samples. Duplicate samples are used to measure the precision of the sampling process. Split samples are used to verify the performance of the analytical laboratory. EB samples are used to verify the effectiveness of sampling equipment decontamination procedures. FB samples provide a check for potential ambient sources of sample contamination during the sampling process and/or sampling error. TB samples are used to determine whether volatile organic compounds (VOCs) contaminated the sample during preparation, transportation, and handling prior to receipt by the analytical laboratory.

**Table 7-3. Groundwater Monitoring Well Network and Sampling Dates for the Burn Site Groundwater Study Area, Calendar Year 2010**

| Date of Sampling Event | Wells Sampled[1] | SAP |
|---|---|---|
| February and March 2010 | CYN-MW1D<br>CYN-MW3<br>CYN-MW4<br>CYN-MW6<br>CYN-MW7<br>CYN-MW8 | *Burn Site Groundwater Monitoring, Mini-SAP for Second Quarter Fiscal Year 2010* (SNL February 2010) |
| May and June 2010 | CYN-MW1D<br>CYN-MW3<br>CYN-MW4<br>CYN-MW6<br>CYN-MW7<br>CYN-MW8 | *Burn Site Groundwater Monitoring, Mini-SAP for Third Quarter Fiscal Year 2010* (SNL May 2010) |
| September 2010 | CYN-MW1D CYN-MW8<br>CYN-MW3 CYN-MW9<br>CYN-MW4 CYN-MW10<br>CYN-MW6 CYN-MW11<br>CYN-MW7 CYN-MW12 | *Burn Site Groundwater Monitoring, Mini-SAP for Fourth Quarter Fiscal Year 2010* (SNL August 2010) |
| October and November 2010 | CYN-MW9<br>CYN-MW10<br>CYN-MW11<br>CYN-MW12 | *Burn Site Groundwater Monitoring, Mini-SAP for First Quarter Fiscal Year 2011* (SNL October 2010b) |

**NOTE:** [1] Refer to page xviii of this report for well descriptions.
SAP = Sampling and analysis Plan.
SNL = Sandia National Laboratories.

**Table 7-4. Parameters Sampled at Burn Site Groundwater Study Area Wells(1) for Each Sampling Event, Calendar Year 2010**

| Parameter | February/March 2010 |
|---|---|
| NPN<br>TPH-DRO<br>TPH-GRO | CYN-MW1D<br>CYN-MW3<br>CYN-MW4<br>CYN-MW6<br>CYN-MW7<br>CYN-MW7 (dup)<br>CYN-MW8 |
| Perchlorate | CYN-MW6 |
| **Parameter** | **May/June 2010** |
| TPH-GRO | CYN-MW1D<br>CYN-MW3<br>CYN-MW4<br>CYN-MW6<br>CYN-MW7<br>CYN-MW7 (dup)<br>CYN-MW8 |
| **Parameter** | **September 2010** |
| Anions<br>Bicarbonate/carbonates<br>Cations<br>Gamma Spec*<br>Gross Alpha<br>Gross Beta<br>Isotopic Uranium<br>NPN<br>TAL Metals, plus Total Uranium<br>TPH-DRO<br>TPH-GRO<br>Tritium<br>VOCs | CYN-MW1D<br>CYN-MW3<br>CYN-MW4<br>CYN-MW4 (dup)<br>CYN-MW6<br>CYN-MW7<br>CYN-MW8<br>CYN-MW9<br>CYN-MW9 (dup)<br>CYN-MW10<br>CYN-MW11<br>CYN-MW12 |
| SVOCs<br>HE | CYN-MW9<br>CYN-MW9 (dup)<br>CYN-MW10<br>CYN-MW11<br>CYN-MW12 |
| Perchlorate | CYN-MW6<br>CYN-MW9<br>CYN-MW9 (dup)<br>CYN-MW10<br>CYN-MW11<br>CYN-MW12 |
| **Parameter** | **October/November 2010** |
| HE<br>NPN<br>Perchlorate<br>SVOCs<br>TPH-DRO<br>TPH-GRO<br>VOCs | CYN-MW9<br>CYN-MW10<br>CYN-MW10 (dup)<br>CYN-MW11<br>CYN-MW12 |

**NOTE:** (1) Refer to page xviii of this report for well descriptions.

DRO = Diesel range organics.
dup = duplicate sample.
Gamma Spec* = Gamma spectroscopy short list (Americium-241, Cesium-137, Cobalt-60, and Potassium-40).
GRO = Gasoline range organics.
HE = High explosives.
NPN = Nitrate plus nitrate (reported as nitrogen).
SVOC = Semivolatile organic compound.
TAL = Target Analyte List.
TPH = Total petroleum hydrocarbons.
VOC = Volatile organic compound.

## 7.4 Field Methods and Measurements

The monitoring procedures, as conducted by ER Operations personnel, are consistent with procedures identified in the EPA technical enforcement guidance document (EPA 1986). The following sections provide an overview of the sampling and data collection procedures.

### 7.4.1 Groundwater Elevation

Throughout CY 2010, water level measurements were obtained to determine groundwater flow directions, hydraulic gradients, and changes in water table elevations. Water levels are periodically measured in BSG monitoring wells according to the instructions and requirements specified in SNL/NM Field Operating Procedure (FOP) 03-02, *Groundwater Level Data Acquisition and Management,* Rev. 02 (SNL November 2007). The water level information was used to create the potentiometric surface map presented in Figure 7-3 and the hydrographs presented in Figures 7C-1 through 7C-4 (Attachment 7C).

### 7.4.2 Well Purging and Water Quality Measurements

A portable Bennett™ groundwater sampling system was used to collect the groundwater samples from BSG wells. The wells are purged a minimum of one saturated screen volume. Field water quality measurements for turbidity, pH, temperature, specific conductance (SC), oxidation-reduction potential (ORP), and dissolved oxygen (DO) were recorded from the well, prior to the collection of groundwater samples according to SNL/NM FOP 05-01 (SNL August 2007a). Groundwater temperature, SC, ORP, DO, and pH were measured using a YSI™ Model 620 water quality meter. Turbidity was measured with a HACH™ Model 2100P portable turbidity meter.

The amount of water required to achieve stability of field parameters is fairly consistent. However, the ability of the bedrock units to produce water varies greatly from well to well. In accordance with the Mini-Sampling and Analysis Plans (SAPs) (Table 7-3), purging continued until four stable measurements for temperature, SC, pH, and turbidity were obtained.

Groundwater stability is considered acceptable when turbidity measurements are within 10 percent of 5 nephelometric turbidity units, pH is within 0.1 units, temperature is within 1.0 degrees Celsius, and SC is within 5 percent. Associated Field Measurement Logs documenting details of well purging and water quality measurements for each sampling event have been submitted to the SNL/NM Customer Funded Records Center.

### 7.4.3 Pump Decontamination

A portable Bennett™ sampling pump and tubing bundle were decontaminated prior to installation into monitoring wells according to procedures described in *Long-Term Environmental Stewardship Groundwater Sampling Equipment Decontamination,* SNL/NM FOP 05-03 (SNL August 2007b). An EB or rinsate sample was collected to verify the effectiveness of the equipment decontamination process.

### 7.4.4 Sample Collection Sampling Procedures

Groundwater samples are collected using the Bennett™ nitrogen gas-powered portable piston pump. Sample bottles are filled directly from the pump discharge line, with the VOC samples collected at the lowest achievable discharge rate. The alluvial piezometers have continued to be dry, and no groundwater samples have ever been collected from these piezometers.

### 7.4.5 Sample Handling and Shipment

The SNL/NM Sample Management Office (SMO) processes environmental samples collected by ER Operations personnel. The SMO reviews the Mini-SAPs, orders sample containers, issues sample control and tracking numbers, tracks the chain-of-custody, and reviews analytical results returned from the laboratories for laboratory contract compliance (SNL March 2003b and April 2007). All groundwater samples are analyzed by off-site laboratories using EPA-specified protocols.

QC samples are also prepared at the laboratory to determine whether contaminant chemicals are introduced in laboratory processes and procedures. These include method blanks, laboratory control samples, matrix spike, matrix spike duplicate, and surrogate spike samples. Reported laboratory analytical and QC data are reviewed against quality assurance requirements specified in the *Procedure for Completing the Contract Verification Review,* SMO-05-03, Issue 03 (SNL April 2007) and Administrative Operating Procedure (AOP) 00-03, *Data Validation Procedure for Chemical and Radiochemical Data* (SNL July 2007).

### 7.4.6 Waste Management

Purge and decontamination water generated from sampling activities were placed into 55-gallon containers and stored at the ER Operations Field Office waste accumulation area. All waste was managed in accordance with FOP 05-04 (SNL August 2007c) as nonregulated waste, based on historical sampling results and process knowledge of the monitoring well location. Results for associated environmental samples provide supplemental data for approval to discharge water to the sanitary sewer. All data were compared with COA discharge limits.

## 7.5 Analytical Methods

Groundwater samples were submitted to GEL Laboratories, Inc. (GEL) for analysis. Samples were analyzed in accordance with applicable EPA analytical methods (Tables 7-5 and 7-6), including the following:

- *The Determination of Inorganic Anions in Water by Ion Chromatography-Method 300.0* (EPA 1983).
- *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,* SW-846, 3rd ed., Rev. 1 (and updates) (EPA 1996).
- *Perchlorate in Drinking Water Using Ion Chromatography* (EPA 1999).
- *Prescribed Procedures for Measurement of Radioactivity in Drinking Water,* EPA-600/4-80-032 (EPA 1980).

**Table 7-5. Burn Site Groundwater Study Area Chemical Analytical Methods**

| Analyte | Analytical Method[a,b,c] |
|---|---|
| Anions | SW846-9056 |
| Bicarbonate/carbonates | SM 2320B |
| Cations | SW846-6020 |
| HE | SW846-8321A Mod |
| NPN | EPA 353.2 |
| Perchlorate | EPA 314.0 |
| SVOCs | SW846-8270 |
| TAL Metals, plus Total Uranium | SW846-6020/7470 |
| TPH Diesel Range Organics | SW846-8015 |
| TPH Gasoline Range Organics | SW846-8015 |
| VOCs | SW846-8260 |

**NOTES:**

[a]U.S. Environmental Protection Agency, 1996, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, 3rd ed., Rev. 1, U.S. Environmental Protection Agency, Washington, D.C.

[b]U.S. Environmental Protection Agency, 1983, *The Determination of Inorganic Anions in Water by Ion Chromatography-Method 300.0*, EPA-600/4-84-017.

[c]U.S. Environmental Protection Agency, 1999, *Perchlorate in Drinking Water Using Ion Chromatography*, EPA 815/R-00-014.

EPA = U.S. Environmental Protection Agency.
HE = High explosives.
NPN = Nitrate plus nitrite (reported as nitrogen).
SW = Solid waste.
SVOC = Semi volatile organic compound.
TAL = Target Analyte List.
TPH = Total petroleum hydrocarbons.
VOC = Volatile organic compound.

**Table 7-6. Burn Site Groundwater Study Area Radiochemical Analytical Methods**

| Analyte | Analytical Method[a] |
|---|---|
| Gamma Spectroscopy (short list) | EPA 901.0 |
| Gross Alpha/Beta | EPA 900.0 |
| Isotopic Uranium | ASTM D3972-09M |
| Tritium | EPA 906.0 |

**NOTES:**

[a]U.S. Environmental Protection Agency, 1980. *Prescribed Procedures for Measurement of Radioactivity in Drinking Water*, EPA-600/4-80-032, U.S. Environmental Protection Agency, Cincinnati, Ohio.

EPA = U.S. Environmental Protection Agency.

## 7.6 Summary of Analytical Results

This section discusses analytical results, exceedances of regulatory standards, and pertinent trends in COC concentrations. The analytical results and field measurements for the CY 2010 BSG sampling events are presented in Tables 7A-1 through 7A-10 (Attachment 7A). Data qualifiers are explained in the footnotes following Table 7A-10.

A summary of detected VOC and semivolatile organic compound (SVOC) results is presented in Table 7A-1. The MDLs for all analyzed VOCs and SVOCs are listed in Table 7A-2. The only VOC detected was carbon disulfide (Table 7A-1). Carbon disulfide was reported at concentrations of 1.58 J (where "J" is an estimated value below the laboratory practical quantitation limit) for samples from monitoring well CYN-MW1D. No HE compounds were detected. The MDLs for all analyzed HE compounds are listed in Table 7A-3.

The analytical results for nitrate plus nitrite (NPN) (reported as nitrogen) are presented in Table 7A-4. NPN results exceed the MCL of 10 mg/L in samples from CYN-MW1D, CYN-MW3, CYN-MW6, CYN-MW9, CYN-MW10, CYN-MW11, and CYN-MW12. NPN concentrations in samples from the other BSG wells are less than the MCL (Table 7A-4). For CY 2010, the NPN concentrations for wells exceeding the MCL are summarized as follows:

- CYN-MW1D had reported concentrations of 13.4 mg/L (February 2010), 12.4 mg/L (February 2010, reanalysis), and 12.2 mg/L (September 2010). The historical range of NPN concentrations for CYN-MW1 is less than 1 to 28 mg/L with highly variable fluctuations in concentrations and a slightly decreasing trend (Figure 7B-1).

- CYN-MW3 had reported concentrations of 10.4 mg/L (March 2010) and 12.0 mg/L (September 2010). The historical range of NPN concentrations for CYN-MW3 is approximately 4 to 15 mg/L with a slightly decreasing trend (Figure 7B-2).

- CYN-MW6 had reported concentrations of 35.8 mg/L (March 2010) and 29.9 mg/L (September 2010). The historical range of NPN concentrations for CYN-MW6 is approximately 23 to 40 mg/L with an overall increasing trend (Figure 7B-3).

- CYN-MW9 had reported concentrations of 30.1 mg/L (September 2010), 30.1 mg/L (September 2010, duplicate), and 36.6 mg/L (October 2010). Two sampling events are insufficient to determine a trend (Figure 7B-4).

- CYN-MW10 had reported concentrations of 11.0 mg/L (September 2010), 11.4 mg/L (November 2010), and 11.4 mg/L (November 2010, duplicate). Two sampling events are insufficient to determine a trend (Figure 7B-5).

- CYN-MW11 had reported concentrations of 10.0 mg/L (September 2010) and 10.6 mg/L (November 2010). Two sampling events are insufficient to determine a trend (Figure 7B-6).

- CYN-MW12 had reported concentrations of 12.2 mg/L (September 2010) and 14.4 mg/L (November 2010). Two sampling events are insufficient to determine a trend (Figure 7B-7).

The results for TPH are listed for TPH-DRO and TPH-GRO in Table 7A-5. No MCLs have been established for TPH-DRO or TPH-GRO. No detections of TPH-DRO were reported for any of the samples collected during the CY 2010 sampling events. Detections of TPH-GRO were reported for the February sampling event, with values ranging from 17.8 to 30.5 μg/L. However, all TPH–GRO results were rejected during data validation, which initiated an additional round of sampling for TPH–GRO in June 2010. All TPH–GRO results for the June and September 2010 sampling events were qualified as not detected during data validation. All TPH-GRO results for the October/November 2010 samples were not detected (Table 7A-5).

The analytical results for anions, cations, and alkalinity are presented in Table 7A-6. None of the analytes exceed MCLs, where established.

Perchlorate was not detected above the MDL of 4 μg/L in any of the samples collected from the new wells CYN-MW9, CYN-MW10, CYN-MW11, or CYN-MW12. Perchlorate was detected above the MDL of 4 μg/L in samples collected from CYN-MW6 (Table 7A-7). Perchlorate concentrations for the samples from CYN-MW6 are estimated values and range from 4.59 J to 6.14 J µg/L. Currently, no MCL is established for perchlorate. However, perchlorate is a COC for the BSG study area because it exceeds the NMED-specified screening level/MDL of 4 µg/L (NMED April 2004). Figure 7B-8 (Attachment 7B) shows that the perchlorate concentration in this well has historically exceeded the screening level/MDL of 4 µg/L, but exhibits a slightly decreasing trend.

Total metal results are presented in Table 7A-8. No metals exceed established MCLs.

Groundwater samples were analyzed for tritium, gross alpha/beta activity, and gamma spectroscopy. The results are presented in Table 7A-9. All radionuclide activities are below MCLs, where established. Gamma spectroscopy analysis detected no isotopes above the associated minimum detectable activity.

Field water quality parameters are measured during sample purging of each well prior to sampling and include temperature, SC, ORP, pH, turbidity, and DO. The parameter measurements obtained immediately prior to sample collection are presented in Table 7A-10.

## 7.7 Quality Control Results

Field and laboratory QC samples were prepared to determine the accuracy of the methods used and to detect inadvertent sample contamination that may have occurred during the sampling and analysis process. All chemical data were reviewed and qualified in accordance with AOP 00-03, *Data Validation Procedure for Chemical and Radiochemical Data* (SNL July 2007). Although some analytical results were qualified during the data validation process, no significant data quality problems were noted for BSG COCs. Data validation qualifiers are provided with the analytical results in Tables 7A-1 through 7A-9 (Attachment 7A). The data validation report associated with each sampling event has been submitted to the SNL/NM Customer Funded Records Center. The following sections discuss site-specific QC results for the BSG quarterly sampling events.

### 7.7.1 Field Quality Control Samples

Field QC samples included environmental duplicate, EB, and TB, and FB samples. The field QC samples were submitted for analysis along with the groundwater samples in accordance with QC procedures specified in the Mini-SAPs (SNL February 2010, May 2010, August 2010, and October 2010b).

#### 7.7.1.1 Duplicate Environmental Samples

Duplicate environmental samples were analyzed in order to estimate the overall reproducibility of the sampling and analytical process. A duplicate sample is collected immediately after the original environmental sample in order to reduce variability caused by time and/or sampling mechanics. The results of duplicate sample analyses (detected parameters only) are used to calculate relative percent difference (RPD) values. Duplicate sample results show good correlation (RPD values less than 20) for all calculated parameters.

#### 7.7.1.2 Equipment Blank Samples

A portable Bennett™ groundwater sampling system was used to collect groundwater samples in all wells. The sampling pump and tubing bundle were decontaminated prior to installation into monitoring wells according to procedures described in SNL/NM FOP 05-03 (SNL August 2007b). An EB or rinsate sample was collected to verify the effectiveness of the equipment decontamination process. The results of the EB sample analyses are as follows:

- **February/March 2010 Sampling Event at CYN-MW7**—An EB sample was collected prior to sampling and analyzed for NPN, TPH-DRO, and TPH-GRO. The results for the February 2010 sample showed detections of NPN and TPH-GRO. NPN was reported at a concentration of 0.0885 mg/L, but this result was qualified as not detected during data validation due to associated laboratory method blank contamination. The result for TPH-GRO was qualified as unusable during data validation.

- **May/June 2010 Sampling Event at CYN-MW7**—The EB sample was collected prior to sampling CYN-MW7 and analyzed for NPN, TPH-DRO, and TPH-GRO. No parameters were detected above the associated laboratory MDLs.

- **September 2010 Sampling Events at CYN-MW4 and CYN-MW9**—The EB samples were collected prior to sampling CYN-MW4 and CYN-MW9 and analyzed for all parameters. Bromodichloromethane, bromoform, carbon disulfide, chloroform, chloromethane, dibromochloromethane, and toluene were detected above the laboratory MDLs. No corrective action was necessary as these compounds were not detected in the associated environmental samples. Inorganic analytes detected in the EB samples included antimony, calcium, copper, chloride, sodium, and zinc. No corrective action was required for antimony, calcium, chloride, and sodium as the associated sampling results were greater than five times the EB result. The results for copper in CYN-MW9 samples and zinc in CYN-MW4 samples were qualified as not detected during data validation as these parameters were detected in the EB samples at concentrations less than five times the environmental sampling results.

- **October/November 2010 Sampling Events at CYN-MW10**—The EB sample was collected prior to sampling CYN-MW10 and analyzed for all parameters. Bromodichloromethane, chloroform, and dibromochloromethane were detected above the laboratory MDLs. No corrective action was necessary as these compounds were not detected in the associated environmental sample.

#### 7.7.1.3 Trip Blank Samples

TB samples are submitted whenever samples are collected for VOC analysis to assess whether contamination of the samples has occurred during shipment and storage. The TB samples consist of laboratory reagent grade water with hydrochloric acid preservative contained in 40-milliliter volatile organic analysis vials prepared by the analytical laboratory, which accompany the empty sample containers supplied by the laboratory. The TBs were brought to the field and accompanied each sample shipment.

- **May/June 2010 Sampling Event**—Due to detections of TPH-GRO in environmental samples, seven TB samples were submitted for TPH-GRO analysis during the May/June 2010 resampling event. TPH-GRO was detected above the MDL in the TB samples associated with CYN-MW4, CYN-MW6, and CYN-MW7. No corrective action was required for the CYN-MW6 TB sample result as TPH-GRO was not detected in the environmental sample. The result for the TB sample associated with CYN-MW4 was qualified as not detected during data validation due to associated laboratory method blank contamination. TPH-GRO was detected in the TB sample associat4ed with CYN-MW7 at a concentration of 30.6 µg/L; however, as this result is greater than the results for the environmental and duplicate samples, the results for both the CYN-MW7 environmental and duplicate samples were qualified as not detected during data validation.

- **September 2010 Sampling Event**—A total of 12 TB samples were submitted with the September 2010 samples. Chloromethane was detected above the MDL in the TB samples associated with CYN-MW4, CYN-MW7, and CYN-MW10. No corrective action was necessary as the compound was not detected in associated environmental samples. TPH-GRO was detected in all TB samples at concentrations ranging from 11.0 to 31.3 μg/L. Therefore, the results for environmental samples with detected TPH-GRO at concentrations less than five times the TB concentration were qualified as not detected during data validation.

- **October/November 2010 Sampling Event**—A total of five VOC and TPH-GRO TB samples were submitted with the October/November 2010 samples. Chloromethane and toluene were detected above the MDL in various TB samples. TPH-GRO was detected in the TB sample associated with CYN-MW12 at a concentration 11.0 μg/L. No corrective action was necessary as these compounds were not detected in associated environmental samples.

#### 7.7.1.4 Field Blank Samples

FB samples were collected to assess whether contamination of the samples resulted from ambient field conditions. The FB samples were prepared by pouring deionized water into sample containers at a sampling point to simulate the transfer of environmental samples from the sampling system to the sample container.

- **May/June 2010 Sampling Event**—An FB sample was collected at the CYN-MW6 sampling point. TPH-DRO was detected above the laboratory MDL, but no corrective action was necessary as TPH-DRO was not detected in the associated CYN-MW6 environmental sample.

- **September 2010 Sampling Event**—An FB sample was collected at the CYN-MW12 sampling point. The VOC compounds bromodichloromethane, chloroform, and dibromochloromethane were detected above laboratory MDLs. No corrective action was necessary as these compounds were not detected in the associated CYN-MW12 environmental sample.

- **October/November 2010 Sampling Event**—An FB sample was collected at the CYN-MW10 sampling point. The VOC compounds bromodichloromethane, chloroform, and dibromochloromethane were detected above laboratory MDLs. No corrective action was necessary as these compounds were not detected in the associated environmental sample.

### 7.7.2 Laboratory Quality Control Samples

Internal laboratory QC samples, including method blanks and duplicate laboratory control samples were analyzed concurrently with all groundwater samples. All chemical data were reviewed and qualified in accordance with AOP 00-03, *Data Validation Procedure for Chemical and Radiochemical Data* (SNL July 2007). Laboratory data qualifiers are provided with the analytical results in Tables 7A-1 through 7A-9 (Attachment 7A).

## 7.8 Variances and Nonconformances

No variances or nonconformances from field or sampling requirements specified in the BSG monitoring Mini-SAPs (SNL February 2010, May 2010, August 2010, and October 2010b) occurred during sampling activities. The following project-specific issues associated with the CY 2010 sampling events for BSG occurred:

- **February/March 2010 Sampling Event**—Monitoring well CYN-MW6 was purged dry, allowed to recover, and then sampled to collect the most representative groundwater sample possible. TPH-GRO results were qualified as unusable and the following additional tests were performed. SNL/NM personnel collected several field QC samples including FB, TB, and EB samples in May 2010. SNL/NM submitted the samples to GEL with several empty 40-milliliter vials and various laboratory-prepared TB samples for analysis. Siloxane compounds detected in various samples have been attributed to the sample containers and acid preservative.

- **September 2010 Sampling Event**—SNL/NM field team members did not include TB samples specific for TPH-GRO analysis. SNL/NM contacted GEL and requested that TPH-GRO TB analysis be performed using extra volume from the VOC TB samples. The error was not discovered until completion of several analyses, and GEL reanalyzed the samples from CYN-MW4, CYN-MW7, and CYN-MW8 outside holding time requirements. Request for data validation of the CYN-MW3 anion reanalysis was not initially performed by SNL/NM SMO personnel. Data validation for the reanalysis was completed in December 2010.

## 7.9 Summary and Conclusions

This section provides a brief summary of activities, discussion of COCs that exceed standards, trends of concentrations versus time, the current conceptual site model, and plans for studies to be completed during CY 2011 at the BSG study area.

The BSG study area is located in the vicinity of the active Lurance Canyon Burn Site facility. Groundwater investigations were initiated in 1997 at the request of the NMED after elevated nitrate levels were discovered in the nonpotable Burn Site Well. The study area currently consists of 10 monitoring wells. Wells were sampled during February/March 2010, May/June 2010, September 2010, and October/November 2010. The samples were analyzed for VOCs, SVOCs, HE, TPH-DRO, TPH-GRO, anions, NPN, Target Analyte List metals (plus uranium), anions, bicarbonate/carbonates, cations, gross alpha/beta activity, tritium, and radionuclides by gamma spectroscopy. As required by the NMED, semiannual sampling for perchlorate was conducted at CYN-MW6, and quarterly sampling for perchlorate was conducted at the four new monitoring wells CYN-MW9, CYN-MW10, CYN-MW11, and CYN-MW12.

Only NPN was detected at concentrations exceeding the MCL of 10 mg/L in samples from the following BSG study area wells: CYN-MW1D, CYN-MW3, CYN-MW6, CYN-MW9, CYN-MW10, CYN-MW11, and CYN-MW12. The maximum concentration reported was 36.6 mg/L in the sample collected from CYN-MW9 during the October 2010 sampling event. For CY 2010, the NPN concentrations for samples from wells exceeding the MCL are summarized as follows:

- CYN-MW1D had reported concentrations of NPN at 13.4, 12.4, and 12.2 mg/L. The historical range of NPN concentrations for CYN-MW1 is less than 1 to 28 mg/L with highly variable fluctuations in concentrations and a slightly decreasing trend.

- CYN-MW3 had reported concentrations of NPN at 10.4 and 12.0 mg/L. The historical range of NPN concentrations for CYN-MW3 is approximately 4 to 15 mg/L with a slightly decreasing trend.

- CYN-MW6 had reported concentrations of NPN at 35.8 and 29.9 mg/L. The historical range of NPN concentrations for CYN-MW6 is approximately 23 to 40 mg/L with an overall increasing trend.

- CYN-MW9 had reported concentrations of NPN at 30.1, 30.1, and 36.6 mg/L.

- CYN-MW10 had reported concentrations of NPN at 11.0, 11.4, and 11.4 mg/L.

- CYN-MW11 had reported concentrations of NPN at 10.0 and 10.6 mg/L.

- CYN-MW12 had reported concentrations of NPN at 12.2 and 14.4 mg/L.

The analytical results for this reporting period are consistent with historical concentrations. The current conceptual model described in Section 7.1.7 does not require modification based on the analytical results for this reporting period.

During CY 2011, semiannual groundwater sampling will continue at six of the BSG study area wells (CYN-MW1D, CYN-MW3, CYN-MW4, CYN-MW6, CYN-MW7, and CYN-MW8) during the second and fourth quarters of FY 2011. Quarterly groundwater sampling will continue at the four new BSG study area wells (CYN-MW9, CYN-MW10, CYN-MW11, and CYN-MW12) during CY 2011. In addition, the subsurface soil sampling and well installation field report will be submitted to the NMED.

## 7.10 References


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# Attachment 7A
# Burn Site Groundwater
# Analytical Results Tables

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# Attachment 7A Tables

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**Table 7A-1**
**Summary of Detected Volatile Organic, Semivolatile Organic, and High Explosive Compounds, Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Result[a] (µg/L) | MDL[b] (µg/L) | PQL[c] (µg/L) | MCL[d] (µg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CYN-MW1D** 21-Sep-10 | Carbon Disulfide | 1.58 | 1.25 | 5.00 | NE | J | | 089661-001 | SW846-8260B |

Refer to footnotes on page 7A-35.

## Table 7A-2
## Method Detection Limits for Volatile and Semivolatile Organic Compounds, Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Analyte | MDL[b] (µg/L) | Analytical Method[g] | Analyte | MDL[b] (µg/L) | Analytical Method[g] | Analyte | MDL[b] (µg/L) | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|
| 1,1,1-Trichloroethane | 0.325 | 8260B | 1,2,4-Trichlorobenzene | 1.89 - 2.41 | 8270C | Di-n-butyl phthalate | 1.89 - 2.41 | 8270C |
| 1,1,2,2-Tetrachloroethane | 0.250 | 8260B | 1,2-Dichlorobenzene | 1.89 - 2.41 | 8270C | Di-n-octyl phthalate | 2.83 - 3.61 | 8270C |
| 1,1,2-Trichloroethane | 0.250 | 8260B | 1,3-Dichlorobenzene | 1.89 - 2.41 | 8270C | Dibenz[a,h]anthracene | 0.189 - 0.241 | 8270C |
| 1,1-Dichloroethane | 0.300 | 8260B | 1,4-Dichlorobenzene | 1.89 - 2.41 | 8270C | Dibenzofuran | 1.89 - 2.41 | 8270C |
| 1,1-Dichloroethene | 0.300 | 8260B | 2,4,5-Trichlorophenol | 1.89 - 2.41 | 8270C | Diethylphthalate | 1.89 - 2.41 | 8270C |
| 1,2-Dichloroethane | 0.250 | 8260B | 2,4,6-Trichlorophenol | 1.89 - 2.41 | 8270C | Dimethylphthalate | 1.89 - 2.41 | 8270C |
| 1,2-Dichloropropane | 0.250 | 8260B | 2,4-Dichlorophenol | 1.89 - 2.41 | 8270C | Dinitro-o-cresol | 2.83 - 3.61 | 8270C |
| 2-Butanone | 1.25 | 8260B | 2,4-Dimethylphenol | 1.89 - 2.41 | 8270C | Diphenyl amine | 2.83 - 3.61 | 8270C |
| 2-Hexanone | 1.25 | 8260B | 2,4-Dinitrophenol | 4.72 - 6.02 | 8270C | Fluoranthene | 0.189 - 0.241 | 8270C |
| 4-methyl-, 2-Pentanone | 1.25 | 8260B | 2,4-Dinitrotoluene | 1.89 - 2.41 | 8270C | Fluorene | 0.189 - 0.241 | 8270C |
| Acetone | 3.50 | 8260B | 2,6-Dinitrotoluene | 1.89 - 2.41 | 8270C | Hexachlorobenzene | 1.89 - 2.41 | 8270C |
| Benzene | 0.300 | 8260B | 2-Chloronaphthalene | 0.283 - 0.361 | 8270C | Hexachlorobutadiene | 1.89 - 2.41 | 8270C |
| Bromodichloromethane | 0.250 | 8260B | 2-Chlorophenol | 1.89 - 2.41 | 8270C | Hexachlorocyclopentadiene | 2.83 - 3.61 | 8270C |
| Bromoform | 0.250 | 8260B | 2-Methylnaphthalene | 0.283 - 0.361 | 8270C | Hexachloroethane | 1.89 - 2.41 | 8270C |
| Bromomethane | 0.300 | 8260B | 2-Nitroaniline | 1.89 - 2.41 | 8270C | Indeno(1,2,3-c,d)pyrene | 0.189 - 0.241 | 8270C |
| Carbon disulfide | 1.25 | 8260B | 2-Nitrophenol | 1.89 - 2.41 | 8270C | Isophorone | 2.83 - 3.61 | 8270C |
| Carbon tetrachloride | 0.300 | 8260B | 3,3'-Dichlorobenzidine | 1.89 - 2.41 | 8270C | Naphthalene | 0.283 - 0.361 | 8270C |
| Chlorobenzene | 0.250 | 8260B | 3-Nitroaniline | 1.89 - 2.41 | 8270C | Nitro-benzene | 2.83 - 3.61 | 8270C |
| Chloroethane | 0.300 | 8260B | 4-Bromophenyl phenyl ether | 1.89 - 2.41 | 8270C | Pentachlorophenol | 1.89 - 2.41 | 8270C |
| Chloroform | 0.250 | 8260B | 4-Chloro-3-methylphenol | 1.89 - 2.41 | 8270C | Phenanthrene | 0.189 - 0.241 | 8270C |
| Chloromethane | 0.300 | 8260B | 4-Chlorobenzenamine | 1.89 - 2.41 | 8270C | Phenol | 0.943 - 1.2 | 8270C |
| Dibromochloromethane | 0.300 | 8260B | 4-Chlorophenyl phenyl ether | 1.89 - 2.41 | 8270C | Pyrene | 0.283 - 0.361 | 8270C |
| Ethyl benzene | 0.250 | 8260B | 4-Nitroaniline | 2.83 - 3.61 | 8270C | bis(2-Chloroethoxy)methane | 2.83 - 3.61 | 8270C |
| Methylene chloride | 3.00 | 8260B | 4-Nitrophenol | 1.89 - 2.41 | 8270C | bis(2-Chloroethyl)ether | 1.89 - 2.41 | 8270C |
| Styrene | 0.250 | 8260B | Acenaphthene | 0.292 - 0.373 | 8270C | bis(2-Ethylhexyl)phthalate | 1.89 - 2.41 | 8270C |
| Tetrachloroethene | 0.300 | 8260B | Acenaphthylene | 0.189 - 0.241 | 8270C | bis-Chloroisopropyl ether | 1.89 - 2.41 | 8270C |
| Toluene | 0.250 | 8260B | Anthracene | 0.189 - 0.241 | 8270C | m,p-Cresol | 2.83 - 3.61 | 8270C |
| Trichloroethene | 0.250 | 8260B | Benzo(a)anthracene | 0.189 - 0.241 | 8270C | n-Nitrosodipropylamine | 1.89 - 2.41 | 8270C |
| Vinyl acetate | 1.50 | 8260B | Benzo(a)pyrene | 0.189 - 0.241 | 8270C | o-Cresol | 1.89 - 2.41 | 8270C |
| Vinyl chloride | 0.500 | 8260B | Benzo(b)fluoranthene | 0.189 - 0.241 | 8270C | | | |
| Xylene | 0.300 | 8260B | Benzo(ghi)perylene | 0.189 - 0.241 | 8270C | | | |
| cis-1,2-Dichloroethene | 0.300 | 8260B | Benzo(k)fluoranthene | 0.189 - 0.241 | 8270C | | | |
| cis-1,3-Dichloropropene | 0.250 | 8260B | Butylbenzyl phthalate | 1.89 - 2.41 | 8270C | | | |
| trans-1,2-Dichloroethene | 0.300 | 8260B | Carbazole | 0.189 - 0.241 | 8270C | | | |
| trans-1,3-Dichloropropene | 0.250 | 8260B | Chrysene | 0.189 - 0.241 | 8270C | | | |

Refer to footnotes on page 7A-35.

## Table 7A-3
## Method Detection Limits for High Explosives Compounds (EPA Method[g] SW846-8321A), Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Analyte | MDL[b] (µg/L) |
|---|---|
| 1,3,5-Trinitrobenzene | 0.104 |
| 1,3-Dinitrobenzene | 0.104 |
| 2,4,6-Trinitrotoluene | 0.104 |
| 2,4-Dinitrotoluene | 0.104 |
| 2,6-Dinitrotoluene | 0.0779 |
| 2-Amino-4,6-dinitrotoluene | 0.104 |
| 2-Nitrotoluene | 0.104 |
| 3-Nitrotoluene | 0.104 |
| 4-Amino-2,6-dinitrotoluene | 0.104 |
| 4-Nitrotoluene | 0.104 |
| HMX | 0.104 |
| Nitro-benzene | 0.104 |
| Pentaerythritol tetranitrate | 0.130 |
| RDX | 0.104 |
| Tetryl | 0.130 |

Refer to footnotes on page 7A-35.

## Table 7A-4
## Summary of Nitrate plus Nitrite Results, Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CYN-MW1D** 25-Feb-10 | Nitrate plus nitrite as N | **13.4** | 0.500 | 2.50 | 10.0 | B | J | 088178-018 | EPA 353.2 |
| **CYN-MW1D** (Reanalysis) 25-Feb-10 | Nitrate plus nitrite as N | **12.4** | 0.250 | 1.25 | 10.0 | H | | 088178-R18 | EPA 353.2 |
| **CYN-MW3** 01-Mar-10 | Nitrate plus nitrite as N | **10.4** | 0.100 | 0.500 | 10.0 | | | 088179-018 | EPA 353.2 |
| **CYN-MW4** 22-Feb-10 | Nitrate plus nitrite as N | 0.171 | 0.050 | 0.250 | 10.0 | B, J | 0.058U | 088173-018 | EPA 353.2 |
| **CYN-MW6** 03-Mar-10 | Nitrate plus nitrite as N | **35.8** | 0.250 | 1.25 | 10.0 | | | 088180-018 | EPA 353.2 |
| **CYN-MW7** 24-Feb-10 | Nitrate plus nitrite as N | 2.04 | 0.100 | 0.500 | 10.0 | B | | 088176-018 | EPA 353.2 |
| **CYN-MW7** (Duplicate) 24-Feb-10 | Nitrate plus nitrite as N | 2.19 | 0.100 | 0.500 | 10.0 | B | | 088177-018 | EPA 353.2 |
| **CYN-MW8** 23-Feb-10 | Nitrate plus nitrite as N | 4.90 | 0.250 | 1.25 | 10.0 | B | | 088174-018 | EPA 353.2 |
| | | | | | | | | | |
| **CYN-MW1D** 21-Sep-10 | Nitrate plus nitrite as N | **12.2** | 0.250 | 1.25 | 10.0 | B | | 089661-018 | EPA 353.2 |
| **CYN-MW3** 22-Sep-10 | Nitrate plus nitrite as N | **12.0** | 0.250 | 1.25 | 10.0 | B | | 089663-018 | EPA 353.2 |
| **CYN-MW4** 16-Sep-10 | Nitrate plus nitrite as N | 0.149 | 0.050 | 0.250 | 10.0 | J | | 089656-018 | EPA 353.2 |
| **CYN-MW4** (Duplicate) 16-Sep-10 | Nitrate plus nitrite as N | 0.150 | 0.050 | 0.250 | 10.0 | J | | 089657-018 | EPA 353.2 |
| **CYN-MW6** 20-Sep-10 | Nitrate plus nitrite as N | **29.9** | 0.500 | 2.50 | 10.0 | B | | 089659-018 | EPA 353.2 |
| **CYN-MW7** 15-Sep-10 | Nitrate plus nitrite as N | 2.15 | 0.100 | 0.500 | 10.0 | | | 089652-018 | EPA 353.2 |
| **CYN-MW8** 14-Sep-10 | Nitrate plus nitrite as N | 5.08 | 0.250 | 1.25 | 10.0 | | | 089650-018 | EPA 353.2 |
| **CYN-MW9** 28-Sep-10 | Nitrate plus nitrite as N | **30.1** | 0.500 | 2.50 | 10.0 | | | 089672-018 | EPA 353.2 |
| **CYN-MW9** (Duplicate) 28-Sep-10 | Nitrate plus nitrite as N | **30.1** | 0.500 | 2.50 | 10.0 | | | 089673-018 | EPA 353.2 |

Refer to footnotes on page 7A-35.

## Table 7A-4 *(Concluded)*
## Summary of Nitrate plus Nitrite Results, Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CYN-MW10** 27-Sep-10 | Nitrate plus nitrite as N | **11.0** | 0.250 | 1.25 | 10.0 | | | 089668-018 | EPA 353.2 |
| **CYN-MW11** 29-Sep-10 | Nitrate plus nitrite as N | 10.0 | 0.250 | 1.25 | 10.0 | | | 089675-018 | EPA 353.2 |
| **CYN-MW12** 23-Sep-10 | Nitrate plus nitrite as N | **12.2** | 0.250 | 1.25 | 10.0 | B | | 089665-018 | EPA 353.2 |
| | | | | | | | | | |
| **CYN-MW9** 27-Oct-10 | Nitrate plus nitrite as N | **36.6** | 5.00 | 25.0 | 10.0 | | | 089759-018 | EPA 353.2 |
| **CYN-MW10** 02-Nov-10 | Nitrate plus nitrite as N | **11.4** | 0.250 | 1.25 | 10.0 | | | 089773-018 | EPA 353.2 |
| **CYN-MW10** (Duplicate) 02-Nov-10 | Nitrate plus nitrite as N | **11.4** | 0.250 | 1.25 | 10.0 | | | 089774-018 | EPA 353.2 |
| **CYN-MW11** 01-Nov-10 | Nitrate plus nitrite as N | **10.6** | 0.250 | 1.25 | 10.0 | | | 089765-018 | EPA 353.2 |
| **CYN-MW12** 28-Oct-10 | Nitrate plus nitrite as N | **14.4** | 0.500 | 2.50 | 10.0 | | | 089762-018 | EPA 353.2 |

Refer to footnotes on page 7A-35.

# Table 7A-5
## Summary of TPH-Diesel Range Organics and TPH-Gasoline Range Organics Results, Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Well ID | Analyte | Result[a] (µg/L) | MDL[b] (µg/L) | PQL[c] (µg/L) | MCL[d] (µg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CYN-MW1D** | Diesel Range Organics | ND | 69.1 | 213 | NE | U | | 088178-005 | SW846 8015A/B |
| 25-Feb-10 | Gasoline Range Organics | 30.5 | 10.5 | 50.0 | NE | J | R | 088178-006 | SW846 8015B |
| **CYN-MW3** | Diesel Range Organics | ND | 73.9 | 227 | NE | U | | 088179-005 | SW846 8015A/B |
| 01-Mar-10 | Gasoline Range Organics | 23.0 | 10.5 | 50.0 | NE | J | R | 088179-006 | SW846 8015B |
| **CYN-MW4** | Diesel Range Organics | ND | 67.7 | 208 | NE | U | | 088173-005 | SW846 8015A/B |
| 22-Feb-10 | Gasoline Range Organics | 17.8 | 10.5 | 50.0 | NE | J | R | 088173-006 | SW846 8015B |
| **CYN-MW6** | Diesel Range Organics | ND | 70.7 | 217 | NE | U | | 088180-005 | SW846 8015A/B |
| 03-Mar-10 | Gasoline Range Organics | 27.2 | 10.5 | 50.0 | NE | J | R | 088180-006 | SW846 8015B |
| **CYN-MW7** | Diesel Range Organics | ND | 69.1 | 213 | NE | U | | 088176-005 | SW846 8015A/B |
| 24-Feb-10 | Gasoline Range Organics | 30.1 | 10.5 | 50.0 | NE | J | R | 088176-006 | SW846 8015B |
| **CYN-MW7** (Duplicate) | Diesel Range Organics | ND | 69.1 | 213 | NE | U | | 088177-005 | SW846 8015A/B |
| 24-Feb-10 | Gasoline Range Organics | 25.6 | 10.5 | 50.0 | NE | J | R | 088177-006 | SW846 8015B |
| **CYN-MW8** | Diesel Range Organics | ND | 69.1 | 213 | NE | U | | 088174-005 | SW846 8015A/B |
| 23-Feb-10 | Gasoline Range Organics | 26.3 | 10.5 | 50.0 | NE | J | R | 088174-006 | SW846 8015B |
| | | | | | | | | | |
| **CYN-MW1D** 01-Jun-10 | Gasoline Range Organics | ND | 10.5 | 50.0 | NE | U | | 089140-006 | SW846 8015B |
| **CYN-MW3** 02-Jun-10 | Gasoline Range Organics | ND | 10.5 | 50.0 | NE | U | | 089142-006 | SW846 8015B |
| **CYN-MW4** 27-May-10 | Gasoline Range Organics | 14.1 | 10.5 | 50.0 | NE | B, J | 50U | 089138-006 | SW846 8015B |
| **CYN-MW6** 04-Jun-10 | Gasoline Range Organics | ND | 10.5 | 50.0 | NE | U | | 089144-006 | SW846 8015B |
| **CYN-MW7** 26-May-10 | Gasoline Range Organics | 29.6 | 10.5 | 50.0 | NE | J | 50U | 089135-006 | SW846 8015B |
| **CYN-MW7** (Duplicate) 26-May-10 | Gasoline Range Organics | 24.9 | 10.5 | 50.0 | NE | J | 50U | 089136-006 | SW846 8015B |
| **CYN-MW8** 25-May-10 | Gasoline Range Organics | ND | 10.5 | 50.0 | NE | U | | 089131-006 | SW846 8015B |
| | | | | | | | | | |
| **CYN-MW1D** | Diesel Range Organics | ND | 69.9 | 215 | NE | U | | 089661-005 | SW846 8015A/B |
| 21-Sep-10 | Gasoline Range Organics | 19.1 | 10.5 | 50.0 | NE | J | 50U | 089661-006 | SW846 8015B |
| **CYN-MW3** | Diesel Range Organics | ND | 67.7 | 208 | NE | U | | 089663-005 | SW846 8015A/B |
| 22-Sep-10 | Gasoline Range Organics | ND | 10.5 | 50.0 | NE | U | | 089663-006 | SW846 8015B |

Refer to footnotes on page 7A-35.

## Table 7A-5 *(Continued)*
## Summary of TPH-Diesel Range Organics and TPH-Gasoline Range Organics Results, Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Result[a] (µg/L) | MDL[b] (µg/L) | PQL[c] (µg/L) | MCL[d] (µg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CYN-MW4** | Diesel Range Organics | ND | 70.7 | 217 | NE | U | | 089656-005 | SW846 8015A/B |
| 16-Sep-10 | Gasoline Range Organics | 10.8 | 10.5 | 50.0 | NE | J | 50U | 089656-006 | SW846 8015B |
| **CYN-MW4** (Re-analysis) 16-Sep-10 | Gasoline Range Organics | 14.8 | 10.5 | 50.0 | NE | H, J | 50UJ | 089656-R06 | SW846 8015B |
| **CYN-MW4** (Duplicate) | Diesel Range Organics | ND | 70.7 | 217 | NE | U | | 089657-005 | SW846 8015A/B |
| 16-Sep-10 | Gasoline Range Organics | 11.4 | 10.5 | 50.0 | NE | J | 50U | 089657-006 | SW846 8015B |
| **CYN-MW4** (Duplicate re-analysis) 16-Sep-10 | Gasoline Range Organics | ND | 10.5 | 50.0 | NE | H, U | UJ | 089657-R06 | SW846 8015B |
| **CYN-MW6** | Diesel Range Organics | ND | 65.0 | 200 | NE | U | | 089659-005 | SW846 8015A/B |
| 20-Sep-10 | Gasoline Range Organics | ND | 10.5 | 50.0 | NE | U | | 089659-006 | SW846 8015B |
| **CYN-MW7** | Diesel Range Organics | ND | 69.1 | 213 | NE | U | | 089652-005 | SW846 8015A/B |
| 15-Sep-10 | Gasoline Range Organics | ND | 10.5 | 50.0 | NE | U | | 089652-006 | SW846 8015B |
| **CYN-MW7** (Re-analysis) 15-Sep-10 | Gasoline Range Organics | ND | 10.5 | 50.0 | NE | H, U | UJ | 089652-R06 | SW846 8015B |
| **CYN-MW8** | Diesel Range Organics | ND | 74.7 | 230 | NE | U | | 089650-005 | SW846 8015A/B |
| 14-Sep-10 | Gasoline Range Organics | ND | 10.5 | 50.0 | NE | U | | 089650-006 | SW846 8015B |
| **CYN-MW8** (Re-analysis) 14-Sep-10 | Gasoline Range Organics | 13.5 | 10.5 | 50.0 | NE | H, J | 50UJ | 089650-R06 | SW846 8015B |
| **CYN-MW9** | Diesel Range Organics | ND | 73.0 | 225 | NE | U | | 089672-005 | SW846 8015A/B |
| 28-Sep-10 | Gasoline Range Organics | 14.8 | 10.5 | 50.0 | NE | J | 50U | 089672-006 | SW846 8015B |
| **CYN-MW9** (Duplicate) | Diesel Range Organics | ND | 71.4 | 220 | NE | U | | 089673-005 | SW846 8015A/B |
| 28-Sep-10 | Gasoline Range Organics | 13.1 | 10.5 | 50.0 | NE | J | 50U | 089673-006 | SW846 8015B |
| **CYN-MW10** | Diesel Range Organics | ND | 72.2 | 222 | NE | U | | 089668-005 | SW846 8015A/B |
| 27-Sep-10 | Gasoline Range Organics | 13.5 | 10.5 | 50.0 | NE | J | 50U | 089668-006 | SW846 8015B |
| **CYN-MW11** | Diesel Range Organics | ND | 68.4 | 211 | NE | U | | 089675-005 | SW846 8015A/B |
| 29-Sep-10 | Gasoline Range Organics | 12.1 | 10.5 | 50.0 | NE | J | 50U | 089675-006 | SW846 8015B |
| **CYN-MW12** | Diesel Range Organics | ND | 71.4 | 220 | NE | U | | 089665-005 | SW846 8015A/B |
| 23-Sep-10 | Gasoline Range Organics | 14.4 | 10.5 | 50.0 | NE | J | 50U | 089665-006 | SW846 8015B |
| | | | | | | | | | |
| **CYN-MW9** | Diesel Range Organics | ND | 65.0 | 200 | NE | U | | 089759-005 | SW846 8015A/B |
| 27-Oct-10 | Gasoline Range Organics | ND | 10.5 | 50.0 | NE | U | | 089759-006 | SW846 8015B |
| **CYN-MW10** | Diesel Range Organics | ND | 65.7 | 202 | NE | U | | 089773-005 | SW846 8015A/B |
| 02-Nov-10 | Gasoline Range Organics | ND | 10.5 | 50.0 | NE | U | | 089773-006 | SW846 8015B |
| **CYN-MW10** (Duplicate) | Diesel Range Organics | ND | 66.3 | 204 | NE | U | | 089774-005 | SW846 8015A/B |
| 02-Nov-10 | Gasoline Range Organics | ND | 10.5 | 50.0 | NE | U | | 089774-006 | SW846 8015B |

Refer to footnotes on page 7A-35.

**Table 7A-5** *(Concluded)*
**Summary of TPH-Diesel Range Organics and TPH-Gasoline Range Organics Results, Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Result[a] (µg/L) | MDL[b] (µg/L) | PQL[c] (µg/L) | MCL[d] (µg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CYN-MW11** | Diesel Range Organics | ND | 64.4 | 198 | NE | U | | 089765-005 | SW846 8015A/B |
| 01-Nov-10 | Gasoline Range Organics | ND | 10.5 | 50.0 | NE | U | | 089765-006 | SW846 8015B |
| **CYN-MW12** | Diesel Range Organics | ND | 71.4 | 220 | NE | U | | 089762-005 | SW846 8015A/B |
| 28-Oct-10 | Gasoline Range Organics | ND | 10.5 | 50.0 | NE | U | | 089762-006 | SW846 8015B |

Refer to footnotes on page 7A-35.

# Table 7A-6
## Summary of Anion, Cation, and Alkalinity Results, Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CYN-MW1D** 21-Sep-10 | Bicarbonate Alkalinity | 72.9 | 0.725 | 1.00 | NE | B | | 089661-016 | SM2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 089661-016 | SM2320B |
| | Bromide | 0.429 | 0.066 | 0.200 | NE | | | 089661-016 | SW846 9056 |
| | Chloride | 27.2 | 0.660 | 2.00 | NE | | | 089661-016 | SW846 9056 |
| | Fluoride | 1.81 | 0.033 | 0.100 | 4.0 | | | 089661-016 | SW846 9056 |
| | Sulfate | 114 | 1.00 | 4.00 | NE | | | 089661-016 | SW846 9056 |
| | Calcium | 70.0 | 0.200 | 2.00 | NE | B | | 089661-017 | SW846-6020 |
| | Magnesium | 14.6 | 0.005 | 0.015 | NE | | | 089661-017 | SW846-6020 |
| | Potassium | 2.62 | 0.080 | 0.300 | NE | | | 089661-017 | SW846-6020 |
| | Sodium | 34.8 | 0.080 | 0.250 | NE | | | 089661-017 | SW846-6020 |
| **CYN-MW3** 22-Sep-10 | Bicarbonate Alkalinity | 239 | 0.725 | 1.00 | NE | B | | 089663-016 | SM2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 089663-016 | SM2320B |
| | Bromide | 0.748 | 0.066 | 0.200 | NE | | | 089663-016 | SW846 9056 |
| | Chloride | 120 | 0.660 | 2.00 | NE | | | 089663-016 | SW846 9056 |
| | Fluoride | 0.639 | 0.033 | 0.100 | 4.0 | | | 089663-016 | SW846 9056 |
| | Sulfate | 365 | 1.00 | 4.00 | NE | | | 089663-016 | SW846 9056 |
| | Calcium | 129 | 0.200 | 2.00 | NE | B | | 089663-017 | SW846-6020 |
| | Magnesium | 35.4 | 0.005 | 0.015 | NE | | | 089663-017 | SW846-6020 |
| | Potassium | 2.03 | 0.080 | 0.300 | NE | | | 089663-017 | SW846-6020 |
| | Sodium | 40.7 | 0.080 | 0.250 | NE | | | 089663-017 | SW846-6020 |
| **CYN-MW3** (Re-analysis) 22-Sep-10 | Bromide | 0.750 | 0.066 | 0.200 | NE | H | J | 089663-R16 | SW846 9056 |
| | Chloride | 55.3 | 0.660 | 2.00 | NE | H | J | 089663-R16 | SW846 9056 |
| | Fluoride | 0.675 | 0.033 | 0.100 | 4.0 | H | J | 089663-R16 | SW846 9056 |
| | Sulfate | 167 | 1.00 | 4.00 | NE | H | J | 089663-R16 | SW846 9056 |
| **CYN-MW4** 16-Sep-10 | Bicarbonate Alkalinity | 223 | 0.725 | 1.00 | NE | B | | 089656-016 | SM2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 089656-016 | SM2320B |
| | Bromide | 0.378 | 0.066 | 0.200 | NE | | | 089656-016 | SW846 9056 |
| | Chloride | 24.2 | 0.660 | 2.00 | NE | | | 089656-016 | SW846 9056 |
| | Fluoride | 0.780 | 0.033 | 0.100 | 4.0 | | | 089656-016 | SW846 9056 |
| | Sulfate | 130 | 1.00 | 4.00 | NE | | | 089656-016 | SW846 9056 |
| | Calcium | 69.7 | 0.200 | 2.00 | NE | | | 089656-017 | SW846-6020 |
| | Magnesium | 33.9 | 0.025 | 0.075 | NE | | | 089656-017 | SW846-6020 |
| | Potassium | 6.27 | 0.400 | 1.50 | NE | | | 089656-017 | SW846-6020 |
| | Sodium | 46.6 | 0.400 | 1.50 | NE | | | 089656-017 | SW846-6020 |

Refer to footnotes on page 7A-35.

**Table 7A-6** *(Continued)*
**Summary of Anion, Cation, and Alkalinity Results,**
**Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CYN-MW4** (Duplicate) 16-Sep-10 | Bicarbonate Alkalinity | 223 | 0.725 | 1.00 | NE | B | | 089657-016 | SM2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 089657-016 | SM2320B |
| | Bromide | 0.396 | 0.066 | 0.200 | NE | | | 089657-016 | SW846 9056 |
| | Chloride | 24.0 | 0.660 | 2.00 | NE | | | 089657-016 | SW846 9056 |
| | Fluoride | 0.784 | 0.033 | 0.100 | 4.0 | | | 089657-016 | SW846 9056 |
| | Sulfate | 128 | 1.00 | 4.00 | NE | | | 089657-016 | SW846 9056 |
| | Calcium | 68.4 | 0.200 | 2.00 | NE | | | 089657-017 | SW846-6020 |
| | Magnesium | 36.3 | 0.025 | 0.075 | NE | | | 089657-017 | SW846-6020 |
| | Potassium | 6.87 | 0.400 | 1.50 | NE | | | 089657-017 | SW846-6020 |
| | Sodium | 45.5 | 0.400 | 1.25 | NE | | | 089657-017 | SW846-6020 |
| **CYN-MW6** 20-Sep-10 | Bicarbonate Alkalinity | 296 | 0.725 | 1.00 | NE | B | | 089659-016 | SM2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 089659-016 | SM2320B |
| | Bromide | 0.875 | 0.066 | 0.200 | NE | | | 089659-016 | SW846 9056 |
| | Chloride | 61.1 | 0.660 | 2.00 | NE | | | 089659-016 | SW846 9056 |
| | Fluoride | 0.624 | 0.033 | 0.100 | 4.0 | | | 089659-016 | SW846 9056 |
| | Sulfate | 132 | 1.00 | 4.00 | NE | | | 089659-016 | SW846 9056 |
| | Calcium | 162 | 0.200 | 2.00 | NE | B | | 089659-017 | SW846-6020 |
| | Magnesium | 42.3 | 0.005 | 0.015 | NE | | | 089659-017 | SW846-6020 |
| | Potassium | 2.33 | 0.080 | 0.300 | NE | | | 089659-017 | SW846-6020 |
| | Sodium | 44.4 | 0.080 | 0.250 | NE | | | 089659-017 | SW846-6020 |
| **CYN-MW7** 15-Sep-10 | Bicarbonate Alkalinity | 256 | 0.725 | 1.00 | NE | B | | 089652-016 | SM2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 089652-016 | SM2320B |
| | Bromide | 0.626 | 0.066 | 0.200 | NE | | | 089652-016 | SW846 9056 |
| | Chloride | 41.3 | 0.330 | 1.00 | NE | | | 089652-016 | SW846 9056 |
| | Fluoride | 1.30 | 0.033 | 0.100 | 4.0 | | | 089652-016 | SW846 9056 |
| | Sulfate | 82.8 | 0.500 | 2.00 | NE | | | 089652-016 | SW846 9056 |
| | Calcium | 103 | 0.200 | 2.00 | NE | | | 089652-017 | SW846-6020 |
| | Magnesium | 20.4 | 0.025 | 0.075 | NE | | | 089652-017 | SW846-6020 |
| | Potassium | 2.43 | 0.400 | 1.50 | NE | | | 089652-017 | SW846-6020 |
| | Sodium | 44.1 | 0.400 | 1.25 | NE | | | 089652-017 | SW846-6020 |

Refer to footnotes on page 7A-35.

## Table 7A-6 *(Continued)*
## Summary of Anion, Cation, and Alkalinity Results, Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CYN-MW8** 14-Sep-10 | Bicarbonate Alkalinity | 237 | 0.725 | 1.00 | NE | B | | 089650-016 | SM2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 089650-016 | SM2320B |
| | Bromide | 0.752 | 0.066 | 0.200 | NE | | | 089650-016 | SW846 9056 |
| | Chloride | 56.9 | 0.660 | 2.00 | NE | | | 089650-016 | SW846 9056 |
| | Fluoride | 1.40 | 0.033 | 0.100 | 4.0 | | | 089650-016 | SW846 9056 |
| | Sulfate | 119 | 1.00 | 4.00 | NE | | | 089650-016 | SW846 9056 |
| | Calcium | 114 | 0.200 | 2.00 | NE | | | 089650-017 | SW846-6020 |
| | Magnesium | 24.3 | 0.025 | 0.075 | NE | | | 089650-017 | SW846-6020 |
| | Potassium | 2.32 | 0.400 | 1.50 | NE | | | 089650-017 | SW846-6020 |
| | Sodium | 45.9 | 0.400 | 1.25 | NE | | | 089650-017 | SW846-6020 |
| **CYN-MW9** 28-Sep-10 | Bicarbonate Alkalinity | 236 | 0.725 | 1.00 | NE | B | | 089672-016 | SM2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 089672-016 | SM2320B |
| | Bromide | 1.13 | 0.066 | 0.200 | NE | | | 089672-016 | SW846 9056 |
| | Chloride | 79.2 | 0.660 | 2.00 | NE | | | 089672-016 | SW846 9056 |
| | Fluoride | 0.609 | 0.033 | 0.100 | 4.0 | | | 089672-016 | SW846 9056 |
| | Sulfate | 173 | 1.00 | 4.00 | NE | | | 089672-016 | SW846 9056 |
| | Calcium | 169 | 0.400 | 4.00 | NE | | J | 089672-017 | SW846-6020 |
| | Magnesium | 48.6 | 0.050 | 0.150 | NE | | | 089672-017 | SW846-6020 |
| | Potassium | 2.71 | 0.080 | 0.300 | NE | | | 089672-017 | SW846-6020 |
| | Sodium | 40.3 | 0.800 | 2.50 | NE | | | 089672-017 | SW846-6020 |
| **CYN-MW9** (Duplicate) 28-Sep-10 | Bicarbonate Alkalinity | 238 | 0.725 | 1.00 | NE | B | | 089673-016 | SM2320B |
| | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 089673-016 | SM2320B |
| | Bromide | 1.15 | 0.066 | 0.200 | NE | | | 089673-016 | SW846 9056 |
| | Chloride | 80.2 | 0.660 | 2.00 | NE | | | 089673-016 | SW846 9056 |
| | Fluoride | 0.600 | 0.033 | 0.100 | 4.0 | | | 089673-016 | SW846 9056 |
| | Sulfate | 175 | 1.00 | 4.00 | NE | | | 089673-016 | SW846 9056 |
| | Calcium | 170 | 0.400 | 4.00 | NE | | J | 089673-017 | SW846-6020 |
| | Magnesium | 50.6 | 0.050 | 0.150 | NE | | | 089673-017 | SW846-6020 |
| | Potassium | 2.63 | 0.080 | 0.300 | NE | | | 089673-017 | SW846-6020 |
| | Sodium | 43.6 | 0.800 | 2.50 | NE | | | 089673-017 | SW846-6020 |

Refer to footnotes on page 7A-35.

**Table 7A-6** *(Concluded)*
**Summary of Anion, Cation, and Alkalinity Results,**
**Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CYN-MW10** | Bicarbonate Alkalinity | 236 | 0.725 | 1.00 | NE | B | | 089668-016 | SM2320B |
| 27-Sep-10 | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 089668-016 | SM2320B |
| | Bromide | 0.789 | 0.066 | 0.200 | NE | | | 089668-016 | SW846 9056 |
| | Chloride | 53.2 | 0.660 | 2.00 | NE | | | 089668-016 | SW846 9056 |
| | Fluoride | 0.626 | 0.033 | 0.100 | 4.0 | | | 089668-016 | SW846 9056 |
| | Sulfate | 172 | 1.00 | 4.00 | NE | | | 089668-016 | SW846 9056 |
| | Calcium | 128 | 0.500 | 5.00 | NE | | J | 089668-017 | SW846-6020 |
| | Magnesium | 36.4 | 0.025 | 0.075 | NE | | | 089668-017 | SW846-6020 |
| | Potassium | 1.96 | 0.080 | 0.300 | NE | | | 089668-017 | SW846-6020 |
| | Sodium | 37.6 | 0.400 | 1.25 | NE | | | 089668-017 | SW846-6020 |
| **CYN-MW11** | Bicarbonate Alkalinity | 257 | 0.725 | 1.00 | NE | B | | 089675-016 | SM2320B |
| 29-Sep-10 | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 089675-016 | SM2320B |
| | Bromide | 1.00 | 0.066 | 0.200 | NE | | | 089675-016 | SW846 9056 |
| | Chloride | 73.6 | 0.660 | 2.00 | NE | | | 089675-016 | SW846 9056 |
| | Fluoride | 0.660 | 0.033 | 0.100 | 4.0 | | | 089675-016 | SW846 9056 |
| | Sulfate | 178 | 1.00 | 4.00 | NE | | | 089675-016 | SW846 9056 |
| | Calcium | 142 | 0.400 | 4.00 | NE | | J | 089675-017 | SW846-6020 |
| | Magnesium | 44.0 | 0.050 | 0.150 | NE | | | 089675-017 | SW846-6020 |
| | Potassium | 3.33 | 0.080 | 0.300 | NE | | | 089675-017 | SW846-6020 |
| | Sodium | 45.5 | 0.800 | 2.50 | NE | | | 089675-017 | SW846-6020 |
| **CYN-MW12** | Bicarbonate Alkalinity | 250 | 0.725 | 1.00 | NE | B | | 089665-016 | SM2320B |
| 23-Sep-10 | Carbonate Alkalinity | ND | 0.725 | 1.00 | NE | U | | 089665-016 | SM2320B |
| | Bromide | 0.928 | 0.066 | 0.200 | NE | | | 089665-016 | SW846 9056 |
| | Chloride | 88.8 | 0.330 | 1.00 | NE | | | 089665-016 | SW846 9056 |
| | Fluoride | 1.04 | 0.033 | 0.100 | 4.0 | | | 089665-016 | SW846 9056 |
| | Sulfate | 208 | 1.00 | 4.00 | NE | | | 089665-016 | SW846 9056 |
| | Calcium | 164 | 0.200 | 2.00 | NE | B | | 089665-017 | SW846-6020 |
| | Magnesium | 44.2 | 0.005 | 0.015 | NE | | | 089665-017 | SW846-6020 |
| | Potassium | 5.86 | 0.080 | 0.300 | NE | | | 089665-017 | SW846-6020 |
| | Sodium | 51.4 | 0.800 | 2.50 | NE | | | 089665-017 | SW846-6020 |

Refer to footnotes on page 7A-35.

# Table 7A-7
## Summary of Perchlorate Results,
## Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Well ID | Perchlorate Result[a] (μg/L) | MDL[b] (μg/L) | PQL[c] (μg/L) | MCL[d] (μg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|
| **CYN-MW6** 03-Mar-10 | 4.59 | 4.0 | 12 | NE | J | | 088180-020 | EPA 314.0 |
| | | | | | | | | |
| **CYN-MW6** 20-Sep-10 | 6.14 | 4.0 | 12 | NE | J | | 089659-020 | EPA 314.0 |
| **CYN-MW9** 28-Sep-10 | ND | 4.0 | 12 | NE | U | | 089672-020 | EPA 314.0 |
| **CYN-MW9** (Duplicate) 28-Sep-10 | ND | 4.0 | 12 | NE | U | | 089673-020 | EPA 314.0 |
| **CYN-MW10** 27-Sep-10 | ND | 4.0 | 12 | NE | U | | 089668-020 | EPA 314.0 |
| **CYN-MW11** 29-Sep-10 | ND | 4.0 | 12 | NE | U | | 089675-020 | EPA 314.0 |
| **CYN-MW12** 23-Sep-10 | ND | 4.0 | 12 | NE | U | | 089665-020 | EPA 314.0 |
| | | | | | | | | |
| **CYN-MW9** 27-Oct-10 | ND | 4.0 | 12 | NE | U | | 089759-020 | EPA 314.0 |
| **CYN-MW10** 02-Nov-10 | ND | 4.0 | 12 | NE | U | | 089773-020 | EPA 314.0 |
| **CYN-MW10** (Duplicate) 02-Nov-10 | ND | 4.0 | 12 | NE | U | | 089774-020 | EPA 314.0 |
| **CYN-MW11** 01-Nov-10 | ND | 4.0 | 12 | NE | U | | 089765-020 | EPA 314.0 |
| **CYN-MW12** 28-Oct-10 | ND | 4.0 | 12 | NE | U | | 089762-020 | EPA 314.0 |

Refer to footnotes on page 7A-35.

# Table 7A-8
## Summary of Total Metal Results,
## Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CYN-MW1D** | Aluminum | 0.0245 | 0.010 | 0.030 | NE | J | | 089661-010 | SW846 6020 |
| 21-Sep-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 089661-010 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 089661-010 | SW846 6020 |
| | Barium | 0.0467 | 0.0005 | 0.002 | 2.00 | | | 089661-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089661-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 089661-010 | SW846 6020 |
| | Calcium | 67.3 | 0.200 | 2.00 | NE | B | | 089661-010 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 089661-010 | SW846 6020 |
| | Cobalt | 0.000325 | 0.0001 | 0.001 | NE | J | | 089661-010 | SW846 6020 |
| | Copper | 0.00245 | 0.0003 | 0.001 | NE | | | 089661-010 | SW846 6020 |
| | Iron | 8.36 | 0.010 | 0.100 | NE | | | 089661-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089661-010 | SW846 6020 |
| | Magnesium | 14.4 | 0.005 | 0.015 | NE | | | 089661-010 | SW846 6020 |
| | Manganese | 0.0675 | 0.001 | 0.005 | NE | | | 089661-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 089661-010 | SW846 7470 |
| | Nickel | 0.00168 | 0.0005 | 0.002 | NE | J | | 089661-010 | SW846 6020 |
| | Potassium | 2.52 | 0.080 | 0.300 | NE | | | 089661-010 | SW846 6020 |
| | Selenium | 0.002 | 0.001 | 0.005 | 0.050 | J | | 089661-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089661-010 | SW846 6020 |
| | Sodium | 33.4 | 0.080 | 0.250 | NE | | | 089661-010 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 089661-010 | SW846 6020 |
| | Uranium | 0.00111 | 0.00005 | 0.0002 | 0.030 | | | 089661-010 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | | 089661-010 | SW846 6020 |
| | Zinc | ND | 0.0026 | 0.010 | NE | U | | 089661-010 | SW846 6020 |

Refer to footnotes on page 7A-35.

# Table 7A-8 *(Continued)*
# Summary of Total Metal Results,
# Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CYN-MW3** | Aluminum | 0.0158 | 0.010 | 0.030 | NE | J | | 089663-010 | SW846 6020 |
| 22-Sep-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 089663-010 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 089663-010 | SW846 6020 |
| | Barium | 0.0502 | 0.0005 | 0.002 | 2.00 | | | 089663-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089663-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 089663-010 | SW846 6020 |
| | Calcium | 140 | 0.200 | 2.00 | NE | B | | 089663-010 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 089663-010 | SW846 6020 |
| | Cobalt | 0.000179 | 0.0001 | 0.001 | NE | J | J+ | 089663-010 | SW846 6020 |
| | Copper | 0.00348 | 0.0003 | 0.001 | NE | | | 089663-010 | SW846 6020 |
| | Iron | 0.233 | 0.010 | 0.100 | NE | | | 089663-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089663-010 | SW846 6020 |
| | Magnesium | 37.0 | 0.005 | 0.015 | NE | | | 089663-010 | SW846 6020 |
| | Manganese | ND | 0.001 | 0.005 | NE | U | | 089663-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 089663-010 | SW846 7470 |
| | Nickel | 0.00274 | 0.0005 | 0.002 | NE | | | 089663-010 | SW846 6020 |
| | Potassium | 2.13 | 0.080 | 0.300 | NE | | | 089663-010 | SW846 6020 |
| | Selenium | 0.00811 | 0.001 | 0.005 | 0.050 | | | 089663-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089663-010 | SW846 6020 |
| | Sodium | 41.2 | 0.080 | 0.250 | NE | | | 089663-010 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 089663-010 | SW846 6020 |
| | Uranium | 0.00624 | 0.00005 | 0.0002 | 0.030 | | | 089663-010 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | | 089663-010 | SW846 6020 |
| | Zinc | 0.00283 | 0.0026 | 0.010 | NE | J | | 089663-010 | SW846 6020 |

Refer to footnotes on page 7A-35.

**Table 7A-8** *(Continued)*
**Summary of Total Metal Results,**
**Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CYN-MW4** | Aluminum | ND | 0.050 | 0.150 | NE | U | | 089656-010 | SW846 6020 |
| 16-Sep-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 089656-010 | SW846 6020 |
| | Arsenic | 0.00185 | 0.0015 | 0.005 | 0.010 | J | | 089656-010 | SW846 6020 |
| | Barium | 0.0471 | 0.0005 | 0.002 | 2.00 | | | 089656-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089656-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 089656-010 | SW846 6020 |
| | Calcium | 69.7 | 0.200 | 2.00 | NE | | | 089656-010 | SW846 6020 |
| | Chromium | ND | 0.0125 | 0.050 | 0.100 | U | | 089656-010 | SW846 6020 |
| | Cobalt | ND | 0.0005 | 0.005 | NE | U | | 089656-010 | SW846 6020 |
| | Copper | ND | 0.0015 | 0.005 | NE | U | | 089656-010 | SW846 6020 |
| | Iron | 0.128 | 0.050 | 0.500 | NE | J | | 089656-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089656-010 | SW846 6020 |
| | Magnesium | 34.6 | 0.025 | 0.075 | NE | | | 089656-010 | SW846 6020 |
| | Manganese | ND | 0.005 | 0.025 | NE | U | | 089656-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 089656-010 | SW846 7470 |
| | Nickel | ND | 0.0025 | 0.010 | NE | U | | 089656-010 | SW846 6020 |
| | Potassium | 6.34 | 0.400 | 1.50 | NE | | | 089656-010 | SW846 6020 |
| | Selenium | 0.0148 | 0.001 | 0.005 | 0.050 | | | 089656-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089656-010 | SW846 6020 |
| | Sodium | 45.7 | 0.400 | 1.25 | NE | | | 089656-010 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 089656-010 | SW846 6020 |
| | Uranium | 0.0126 | 0.00005 | 0.0002 | 0.030 | B | | 089656-010 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | | 089656-010 | SW846 6020 |
| | Zinc | 0.00672 | 0.0026 | 0.010 | NE | J | 0.041U | 089656-010 | SW846 6020 |

Refer to footnotes on page 7A-35.

## Table 7A-8 *(Continued)*
## Summary of Total Metal Results,
## Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CYN-MW4** (Duplicate) 16-Sep-10 | Aluminum | ND | 0.050 | 0.150 | NE | U | | 089657-010 | SW846 6020 |
| | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 089657-010 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 089657-010 | SW846 6020 |
| | Barium | 0.0464 | 0.0005 | 0.002 | 2.00 | | | 089657-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089657-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 089657-010 | SW846 6020 |
| | Calcium | 69.1 | 0.200 | 2.00 | NE | | | 089657-010 | SW846 6020 |
| | Chromium | ND | 0.0125 | 0.050 | 0.100 | U | | 089657-010 | SW846 6020 |
| | Cobalt | ND | 0.0005 | 0.005 | NE | U | | 089657-010 | SW846 6020 |
| | Copper | ND | 0.0015 | 0.005 | NE | U | | 089657-010 | SW846 6020 |
| | Iron | 0.127 | 0.050 | 0.500 | NE | J | | 089657-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089657-010 | SW846 6020 |
| | Magnesium | 35.4 | 0.025 | 0.075 | NE | | | 089657-010 | SW846 6020 |
| | Manganese | ND | 0.005 | 0.025 | NE | U | | 089657-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 089657-010 | SW846 7470 |
| | Nickel | ND | 0.0025 | 0.010 | NE | U | | 089657-010 | SW846 6020 |
| | Potassium | 6.41 | 0.400 | 1.50 | NE | | | 089657-010 | SW846 6020 |
| | Selenium | 0.0146 | 0.001 | 0.005 | 0.050 | | | 089657-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089657-010 | SW846 6020 |
| | Sodium | 46.3 | 0.400 | 1.25 | NE | | | 089657-010 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 089657-010 | SW846 6020 |
| | Uranium | 0.0126 | 0.00005 | 0.0002 | 0.030 | B | | 089657-010 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | | 089657-010 | SW846 6020 |
| | Zinc | 0.00651 | 0.0026 | 0.010 | NE | J | 0.041U | 089657-010 | SW846 6020 |

Refer to footnotes on page 7A-35.

**Table 7A-8** *(Continued)*
**Summary of Total Metal Results,**
**Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CYN-MW6** | Aluminum | 0.0138 | 0.010 | 0.030 | NE | J | | 089659-010 | SW846 6020 |
| 20-Sep-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 089659-010 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 089659-010 | SW846 6020 |
| | Barium | 0.0664 | 0.0005 | 0.002 | 2.00 | | | 089659-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089659-010 | SW846 6020 |
| | Cadmium | 0.000124 | 0.00011 | 0.001 | 0.005 | J | J+ | 089659-010 | SW846 6020 |
| | Calcium | 160 | 0.200 | 2.00 | NE | B | | 089659-010 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 089659-010 | SW846 6020 |
| | Cobalt | 0.000299 | 0.0001 | 0.001 | NE | J | J+ | 089659-010 | SW846 6020 |
| | Copper | 0.00628 | 0.0003 | 0.001 | NE | | | 089659-010 | SW846 6020 |
| | Iron | 0.253 | 0.010 | 0.100 | NE | | | 089659-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089659-010 | SW846 6020 |
| | Magnesium | 46.4 | 0.005 | 0.015 | NE | | | 089659-010 | SW846 6020 |
| | Manganese | 0.00148 | 0.001 | 0.005 | NE | J | J+ | 089659-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 089659-010 | SW846 7470 |
| | Nickel | 0.00361 | 0.0005 | 0.002 | NE | | | 089659-010 | SW846 6020 |
| | Potassium | 2.37 | 0.080 | 0.300 | NE | | | 089659-010 | SW846 6020 |
| | Selenium | 0.0101 | 0.001 | 0.005 | 0.050 | | | 089659-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089659-010 | SW846 6020 |
| | Sodium | 45.2 | 0.080 | 0.250 | NE | | | 089659-010 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 089659-010 | SW846 6020 |
| | Uranium | 0.0087 | 0.00005 | 0.0002 | 0.030 | | | 089659-010 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | | 089659-010 | SW846 6020 |
| | Zinc | 0.0197 | 0.0026 | 0.010 | NE | | | 089659-010 | SW846 6020 |

Refer to footnotes on page 7A-35.

**Table 7A-8** *(Continued)*
**Summary of Total Metal Results,**
**Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CYN-MW7** | Aluminum | 0.0562 | 0.050 | 0.150 | NE | J | J+ | 089652-010 | SW846 6020 |
| 15-Sep-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 089652-010 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 089652-010 | SW846 6020 |
| | Barium | 0.106 | 0.0005 | 0.002 | 2.00 | | | 089652-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089652-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 089652-010 | SW846 6020 |
| | Calcium | 107 | 0.200 | 2.00 | NE | | | 089652-010 | SW846 6020 |
| | Chromium | ND | 0.0125 | 0.050 | 0.100 | U | | 089652-010 | SW846 6020 |
| | Cobalt | ND | 0.0005 | 0.005 | NE | U | | 089652-010 | SW846 6020 |
| | Copper | ND | 0.0015 | 0.005 | NE | U | | 089652-010 | SW846 6020 |
| | Iron | 0.203 | 0.050 | 0.500 | NE | J | | 089652-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089652-010 | SW846 6020 |
| | Magnesium | 21.2 | 0.025 | 0.075 | NE | | | 089652-010 | SW846 6020 |
| | Manganese | ND | 0.005 | 0.025 | NE | U | | 089652-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 089652-010 | SW846 7470 |
| | Nickel | 0.00322 | 0.0025 | 0.010 | NE | J | | 089652-010 | SW846 6020 |
| | Potassium | 2.52 | 0.400 | 1.50 | NE | | | 089652-010 | SW846 6020 |
| | Selenium | 0.00449 | 0.001 | 0.005 | 0.050 | J | | 089652-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089652-010 | SW846 6020 |
| | Sodium | 39.9 | 0.400 | 1.25 | NE | | | 089652-010 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 089652-010 | SW846 6020 |
| | Uranium | 0.00682 | 0.00005 | 0.0002 | 0.030 | B | | 089652-010 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | | 089652-010 | SW846 6020 |
| | Zinc | 0.004 | 0.0026 | 0.010 | NE | J | | 089652-010 | SW846 6020 |

Refer to footnotes on page 7A-35.

## Table 7A-8 *(Continued)*
## Summary of Total Metal Results,
## Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CYN-MW8** | Aluminum | ND | 0.010 | 0.030 | NE | U | | 089650-010 | SW846 6020 |
| 14-Sep-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 089650-010 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 089650-010 | SW846 6020 |
| | Barium | 0.0598 | 0.0005 | 0.002 | 2.00 | | | 089650-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089650-010 | SW846 6020 |
| | Cadmium | 0.000171 | 0.00011 | 0.001 | 0.005 | J | J+ | 089650-010 | SW846 6020 |
| | Calcium | 116 | 0.200 | 2.00 | NE | | | 089650-010 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 089650-010 | SW846 6020 |
| | Cobalt | 0.000309 | 0.0001 | 0.001 | NE | J | J+ | 089650-010 | SW846 6020 |
| | Copper | 0.000956 | 0.0003 | 0.001 | NE | B, J | 0.0019U | 089650-010 | SW846 6020 |
| | Iron | 0.188 | 0.010 | 0.100 | NE | | | 089650-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089650-010 | SW846 6020 |
| | Magnesium | 24.4 | 0.025 | 0.075 | NE | | | 089650-010 | SW846 6020 |
| | Manganese | 0.00305 | 0.001 | 0.005 | NE | J | J+ | 089650-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 089650-010 | SW846 7470 |
| | Nickel | 0.00324 | 0.0005 | 0.002 | NE | | J+ | 089650-010 | SW846 6020 |
| | Potassium | 2.62 | 0.400 | 1.50 | NE | | | 089650-010 | SW846 6020 |
| | Selenium | 0.00708 | 0.001 | 0.005 | 0.050 | | | 089650-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089650-010 | SW846 6020 |
| | Sodium | 49.2 | 0.400 | 1.25 | NE | | | 089650-010 | SW846 6020 |
| | Thallium | 0.000434 | 0.0003 | 0.001 | 0.002 | J | 0.0023U | 089650-010 | SW846 6020 |
| | Uranium | 0.00797 | 0.00005 | 0.0002 | 0.030 | B | | 089650-010 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | | 089650-010 | SW846 6020 |
| | Zinc | 0.00609 | 0.0026 | 0.010 | NE | J | | 089650-010 | SW846 6020 |

Refer to footnotes on page 7A-35.

**Table 7A-8** *(Continued)*
**Summary of Total Metal Results,**
**Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CYN-MW9** | Aluminum | ND | 0.010 | 0.030 | NE | U | | 089672-010 | SW846 6020 |
| 28-Sep-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 089672-010 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 089672-010 | SW846 6020 |
| | Barium | 0.0738 | 0.0005 | 0.002 | 2.00 | | | 089672-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089672-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 089672-010 | SW846 6020 |
| | Calcium | 166 | 0.400 | 4.00 | NE | | J | 089672-010 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 089672-010 | SW846 6020 |
| | Cobalt | 0.000365 | 0.0001 | 0.001 | NE | J | J+ | 089672-010 | SW846 6020 |
| | Copper | 0.0015 | 0.0003 | 0.001 | NE | | 0.0098UJ | 089672-010 | SW846 6020 |
| | Iron | 0.368 | 0.010 | 0.100 | NE | | | 089672-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089672-010 | SW846 6020 |
| | Magnesium | 48.1 | 0.050 | 0.150 | NE | | | 089672-010 | SW846 6020 |
| | Manganese | 0.0658 | 0.001 | 0.005 | NE | | J+ | 089672-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 089672-010 | SW846 7470 |
| | Nickel | 0.00524 | 0.0005 | 0.002 | NE | | J+ | 089672-010 | SW846 6020 |
| | Potassium | 2.68 | 0.080 | 0.300 | NE | | | 089672-010 | SW846 6020 |
| | Selenium | 0.00822 | 0.001 | 0.005 | 0.050 | | | 089672-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089672-010 | SW846 6020 |
| | Sodium | 42.0 | 0.800 | 2.50 | NE | | | 089672-010 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 089672-010 | SW846 6020 |
| | Uranium | 0.00821 | 0.00005 | 0.0002 | 0.030 | B | | 089672-010 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | | 089672-010 | SW846 6020 |
| | Zinc | 0.0359 | 0.0026 | 0.010 | NE | | J+ | 089672-010 | SW846 6020 |

Refer to footnotes on page 7A-35.

**Table 7A-8** *(Continued)*
**Summary of Total Metal Results,**
**Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CYN-MW9** (Duplicate) 28-Sep-10 | Aluminum | 0.012 | 0.010 | 0.030 | NE | J | | 089673-010 | SW846 6020 |
| | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 089673-010 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 089673-010 | SW846 6020 |
| | Barium | 0.074 | 0.0005 | 0.002 | 2.00 | | | 089673-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089673-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 089673-010 | SW846 6020 |
| | Calcium | 174 | 0.400 | 4.00 | NE | | J | 089673-010 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 089673-010 | SW846 6020 |
| | Cobalt | 0.000378 | 0.0001 | 0.001 | NE | J | J+ | 089673-010 | SW846 6020 |
| | Copper | 0.00152 | 0.0003 | 0.001 | NE | | 0.0098UJ | 089673-010 | SW846 6020 |
| | Iron | 0.388 | 0.010 | 0.100 | NE | | | 089673-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089673-010 | SW846 6020 |
| | Magnesium | 49.8 | 0.050 | 0.150 | NE | | | 089673-010 | SW846 6020 |
| | Manganese | 0.068 | 0.001 | 0.005 | NE | | J+ | 089673-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 089673-010 | SW846 7470 |
| | Nickel | 0.00547 | 0.0005 | 0.002 | NE | | J+ | 089673-010 | SW846 6020 |
| | Potassium | 2.75 | 0.080 | 0.300 | NE | | | 089673-010 | SW846 6020 |
| | Selenium | 0.00831 | 0.001 | 0.005 | 0.050 | | | 089673-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089673-010 | SW846 6020 |
| | Sodium | 40.2 | 0.800 | 2.50 | NE | | | 089673-010 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 089673-010 | SW846 6020 |
| | Uranium | 0.00827 | 0.00005 | 0.0002 | 0.030 | B | | 089673-010 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | | 089673-010 | SW846 6020 |
| | Zinc | 0.0368 | 0.0026 | 0.010 | NE | | J+ | 089673-010 | SW846 6020 |

Refer to footnotes on page 7A-35.

**Table 7A-8** *(Continued)*
**Summary of Total Metal Results,**
**Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CYN-MW10** | Aluminum | ND | 0.010 | 0.030 | NE | U | | 089668-010 | SW846 6020 |
| 27-Sep-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 089668-010 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 089668-010 | SW846 6020 |
| | Barium | 0.0644 | 0.0005 | 0.002 | 2.00 | | | 089668-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089668-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 089668-010 | SW846 6020 |
| | Calcium | 133 | 0.100 | 1.00 | NE | | | 089668-010 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 089668-010 | SW846 6020 |
| | Cobalt | 0.000197 | 0.0001 | 0.001 | NE | J | J+ | 089668-010 | SW846 6020 |
| | Copper | 0.000989 | 0.0003 | 0.001 | NE | J | | 089668-010 | SW846 6020 |
| | Iron | 0.282 | 0.010 | 0.100 | NE | | | 089668-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089668-010 | SW846 6020 |
| | Magnesium | 35.2 | 0.025 | 0.075 | NE | | | 089668-010 | SW846 6020 |
| | Manganese | 0.00296 | 0.001 | 0.005 | NE | J | J+ | 089668-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 089668-010 | SW846 7470 |
| | Nickel | 0.00399 | 0.0005 | 0.002 | NE | | J+ | 089668-010 | SW846 6020 |
| | Potassium | 1.99 | 0.080 | 0.300 | NE | | | 089668-010 | SW846 6020 |
| | Selenium | 0.00771 | 0.001 | 0.005 | 0.050 | | | 089668-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089668-010 | SW846 6020 |
| | Sodium | 37.2 | 0.400 | 1.25 | NE | | | 089668-010 | SW846 6020 |
| | Thallium | 0.000588 | 0.0003 | 0.001 | 0.002 | B, J | 0.0031U | 089668-010 | SW846 6020 |
| | Uranium | 0.0068 | 0.00005 | 0.0002 | 0.030 | B | | 089668-010 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | | 089668-010 | SW846 6020 |
| | Zinc | 0.00305 | 0.0026 | 0.010 | NE | J | J+ | 089668-010 | SW846 6020 |

Refer to footnotes on page 7A-35.

## Table 7A-8 *(Continued)*
## Summary of Total Metal Results,
## Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

## Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CYN-MW11** | Aluminum | 0.0478 | 0.010 | 0.030 | NE | | | 089675-010 | SW846 6020 |
| 29-Sep-10 | Antimony | 0.000617 | 0.0005 | 0.003 | 0.006 | J | | 089675-010 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 089675-010 | SW846 6020 |
| | Barium | 0.0868 | 0.0005 | 0.002 | 2.00 | | | 089675-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089675-010 | SW846 6020 |
| | Cadmium | ND | 0.00011 | 0.001 | 0.005 | U | | 089675-010 | SW846 6020 |
| | Calcium | 128 | 0.400 | 4.00 | NE | | J | 089675-010 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 089675-010 | SW846 6020 |
| | Cobalt | 0.00127 | 0.0001 | 0.001 | NE | | J+ | 089675-010 | SW846 6020 |
| | Copper | 0.00153 | 0.0003 | 0.001 | NE | | | 089675-010 | SW846 6020 |
| | Iron | 0.394 | 0.010 | 0.100 | NE | | | 089675-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089675-010 | SW846 6020 |
| | Magnesium | 44.2 | 0.050 | 0.150 | NE | | | 089675-010 | SW846 6020 |
| | Manganese | 0.771 | 0.001 | 0.005 | NE | | | 089675-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 089675-010 | SW846 7470 |
| | Nickel | 0.00593 | 0.0005 | 0.002 | NE | | J+ | 089675-010 | SW846 6020 |
| | Potassium | 3.62 | 0.080 | 0.300 | NE | | | 089675-010 | SW846 6020 |
| | Selenium | 0.00548 | 0.001 | 0.005 | 0.050 | | | 089675-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089675-010 | SW846 6020 |
| | Sodium | 51.8 | 0.800 | 2.50 | NE | | | 089675-010 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 089675-010 | SW846 6020 |
| | Uranium | 0.00771 | 0.00005 | 0.0002 | 0.030 | B | | 089675-010 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | | 089675-010 | SW846 6020 |
| | Zinc | 0.735 | 0.0026 | 0.010 | NE | | | 089675-010 | SW846 6020 |

Refer to footnotes on page 7A-35.

## Table 7A-8 *(Concluded)*
## Summary of Total Metal Results,
## Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Result[a] (mg/L) | MDL[b] (mg/L) | PQL[c] (mg/L) | MCL[d] (mg/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CYN-MW12** | Aluminum | 0.0105 | 0.010 | 0.030 | NE | J | | 089665-010 | SW846 6020 |
| 23-Sep-10 | Antimony | ND | 0.0005 | 0.003 | 0.006 | U | | 089665-010 | SW846 6020 |
| | Arsenic | ND | 0.0015 | 0.005 | 0.010 | U | | 089665-010 | SW846 6020 |
| | Barium | 0.0435 | 0.0005 | 0.002 | 2.00 | | | 089665-010 | SW846 6020 |
| | Beryllium | ND | 0.0001 | 0.0005 | 0.004 | U | | 089665-010 | SW846 6020 |
| | Cadmium | 0.00029 | 0.00011 | 0.001 | 0.005 | J | | 089665-010 | SW846 6020 |
| | Calcium | 157 | 0.200 | 2.00 | NE | B | | 089665-010 | SW846 6020 |
| | Chromium | ND | 0.0025 | 0.010 | 0.100 | U | | 089665-010 | SW846 6020 |
| | Cobalt | 0.00126 | 0.0001 | 0.001 | NE | | J+ | 089665-010 | SW846 6020 |
| | Copper | 0.0036 | 0.0003 | 0.001 | NE | | | 089665-010 | SW846 6020 |
| | Iron | 0.280 | 0.010 | 0.100 | NE | | | 089665-010 | SW846 6020 |
| | Lead | ND | 0.0005 | 0.002 | NE | U | | 089665-010 | SW846 6020 |
| | Magnesium | 43.6 | 0.005 | 0.015 | NE | | | 089665-010 | SW846 6020 |
| | Manganese | 0.588 | 0.001 | 0.005 | NE | | | 089665-010 | SW846 6020 |
| | Mercury | ND | 0.000066 | 0.0002 | 0.002 | U | | 089665-010 | SW846 7470 |
| | Nickel | 0.00425 | 0.0005 | 0.002 | NE | | | 089665-010 | SW846 6020 |
| | Potassium | 5.56 | 0.080 | 0.300 | NE | | | 089665-010 | SW846 6020 |
| | Selenium | 0.00668 | 0.001 | 0.005 | 0.050 | | | 089665-010 | SW846 6020 |
| | Silver | ND | 0.0002 | 0.001 | NE | U | | 089665-010 | SW846 6020 |
| | Sodium | 48.2 | 0.080 | 0.250 | NE | | | 089665-010 | SW846 6020 |
| | Thallium | ND | 0.0003 | 0.001 | 0.002 | U | | 089665-010 | SW846 6020 |
| | Uranium | 0.00877 | 0.00005 | 0.0002 | 0.030 | | | 089665-010 | SW846 6020 |
| | Vanadium | ND | 0.003 | 0.010 | NE | U | | 089665-010 | SW846 6020 |
| | Zinc | 0.231 | 0.013 | 0.050 | NE | | | 089665-010 | SW846 6020 |

Refer to footnotes on page 7A-35.

## Table 7A-9
## Summary of Tritium, Gross Alpha, Gross Beta, Gamma Spectroscopy, and Isotopic Uranium Results, Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Activity[a] (pCi/L) | MDA[b] (pCi/L) | Critical Level[c] (pCi/L) | MCL[d] (pCi/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CYN-MW1D** | Americium-241 | -7.19 ± 13.0 | 21.5 | 10.7 | NE | U | BD | 089661-033 | EPA 901.1 |
| 21-Sep-10 | Cesium-137 | 0.949 ± 2.02 | 3.45 | 1.73 | NE | U | BD | 089661-033 | EPA 901.1 |
| | Cobalt-60 | 0.0907 ± 2.20 | 3.66 | 1.83 | NE | U | BD | 089661-033 | EPA 901.1 |
| | Potassium-40 | 12.2 ± 46.9 | 33.1 | 16.5 | NE | U | BD | 089661-033 | EPA 901.1 |
| | Gross Alpha | 0.50 | NA | NA | 15 | NA | None | 089661-034 | EPA 900.0 |
| | Gross Beta | 2.53 ± 1.07 | 1.56 | 0.756 | 4mrem/yr | | J | 089661-034 | EPA 900.0 |
| | Uranium-233/234 | 2.04 ± 0.320 | 0.0513 | 0.0216 | NE | | | 089661-035 | HASL-300 |
| | Uranium-235/236 | 0.0413 ± 0.0271 | 0.0396 | 0.0147 | NE | | J | 089661-035 | HASL-300 |
| | Uranium-238 | 0.331 ± 0.0771 | 0.031 | 0.0114 | NE | | | 089661-035 | HASL-300 |
| | Tritium | 32.4 ± 86.6 | 147 | 71.6 | NE | U | BD | 089661-036 | EPA 906.0 M |
| **CYN-MW3** | Americium-241 | 4.37 ± 12.4 | 18.7 | 9.36 | NE | U | BD | 089663-033 | EPA 901.1 |
| 22-Sep-10 | Cesium-137 | 0.398 ± 1.92 | 3.26 | 1.63 | NE | U | BD | 089663-033 | EPA 901.1 |
| | Cobalt-60 | 0.879 ± 1.94 | 3.34 | 1.67 | NE | U | BD | 089663-033 | EPA 901.1 |
| | Potassium-40 | 21.1 ± 50.1 | 28.4 | 14.2 | NE | U | BD | 089663-033 | EPA 901.1 |
| | Gross Alpha | 2.00 | NA | NA | 15 | NA | None | 089663-034 | EPA 900.0 |
| | Gross Beta | 5.63 ± 1.86 | 2.43 | 1.17 | 4mrem/yr | | J | 089663-034 | EPA 900.0 |
| | Uranium-233/234 | 6.16 ± 0.899 | 0.0559 | 0.0235 | NE | | | 089663-035 | HASL-300 |
| | Uranium-235/236 | 0.213 ± 0.0659 | 0.0431 | 0.016 | NE | | J | 089663-035 | HASL-300 |
| | Uranium-238 | 1.93 ± 0.310 | 0.0338 | 0.0124 | NE | | | 089663-035 | HASL-300 |
| | Tritium | 56.6 ± 92.7 | 156 | 75.8 | NE | U | BD | 089663-036 | EPA 906.0 M |
| **CYN-MW4** | Americium-241 | 7.34 ± 7.95 | 12.5 | 6.25 | NE | U | BD | 089656-033 | EPA 901.1 |
| 16-Sep-10 | Cesium-137 | 0.416 ± 1.86 | 3.15 | 1.57 | NE | U | BD | 089656-033 | EPA 901.1 |
| | Cobalt-60 | -1.53 ± 1.89 | 2.98 | 1.49 | NE | U | BD | 089656-033 | EPA 901.1 |
| | Potassium-40 | -15.4 ± 38.4 | 41.6 | 20.8 | NE | U | BD | 089656-033 | EPA 901.1 |
| | Gross Alpha | 3.74 | NA | NA | 15 | NA | None | 089656-034 | EPA 900.0 |
| | Gross Beta | 13.3 ± 2.71 | 1.45 | 0.691 | 4mrem/yr | | | 089656-034 | EPA 900.0 |
| | Uranium-233/234 | 32.5 ± 4.76 | 0.123 | 0.0548 | NE | | | 089656-035 | HASL-300 |
| | Uranium-235/236 | 0.721 ± 0.166 | 0.0628 | 0.0232 | NE | | | 089656-035 | HASL-300 |
| | Uranium-238 | 4.34 ± 0.690 | 0.0546 | 0.0207 | NE | | | 089656-035 | HASL-300 |
| | Tritium | 8.74 ± 63.4 | 114 | 52.5 | NE | U | BD | 089656-036 | EPA 906.0 M |

Refer to footnotes on page 7A-35.

## **Table 7A-9** *(Continued)*
## Summary of Tritium, Gross Alpha, Gross Beta, Gamma Spectroscopy, and Isotopic Uranium Results, Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Activity[a] (pCi/L) | MDA[b] (pCi/L) | Critical Level[c] (pCi/L) | MCL[d] (pCi/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CYN-MW4** (Duplicate) 16-Sep-10 | Americium-241 | 0.182 ± 4.58 | 7.70 | 3.85 | NE | U | BD | 089657-033 | EPA 901.1 |
| | Cesium-137 | -0.564 ± 1.55 | 2.60 | 1.30 | NE | U | BD | 089657-033 | EPA 901.1 |
| | Cobalt-60 | 1.65 ± 1.59 | 2.90 | 1.45 | NE | U | BD | 089657-033 | EPA 901.1 |
| | Potassium-40 | -22.2 ± 34.1 | 39.2 | 19.6 | NE | U | BD | 089657-033 | EPA 901.1 |
| | Gross Alpha | -5.15 | NA | NA | 15 | NA | None | 089657-034 | EPA 900.0 |
| | Gross Beta | 4.08 ± 2.00 | 2.79 | 1.36 | 4mrem/yr | | J | 089657-034 | EPA 900.0 |
| | Uranium-233/234 | 33.9 ± 4.93 | 0.116 | 0.0515 | NE | | | 089657-035 | HASL-300 |
| | Uranium-235/236 | 0.355 ± 0.103 | 0.059 | 0.0218 | NE | | | 089657-035 | HASL-300 |
| | Uranium-238 | 4.39 ± 0.689 | 0.0514 | 0.0195 | NE | | | 089657-035 | HASL-300 |
| | Tritium | -5.95 ± 63.3 | 116 | 53.6 | NE | U | BD | 089657-036 | EPA 906.0 M |
| **CYN-MW6** 20-Sep-10 | Americium-241 | -8.49 ± 12.8 | 21.1 | 10.6 | NE | U | BD | 089659-033 | EPA 901.1 |
| | Cesium-137 | -0.25 ± 2.03 | 3.38 | 1.69 | NE | U | BD | 089659-033 | EPA 901.1 |
| | Cobalt-60 | -0.781 ± 2.21 | 3.55 | 1.78 | NE | U | BD | 089659-033 | EPA 901.1 |
| | Potassium-40 | -46.4 ± 36.7 | 42.3 | 21.2 | NE | U | BD | 089659-033 | EPA 901.1 |
| | Gross Alpha | -1.69 | NA | NA | 15 | NA | None | 089659-034 | EPA 900.0 |
| | Gross Beta | 4.25 ± 2.00 | 2.95 | 1.43 | 4mrem/yr | | J | 089659-034 | EPA 900.0 |
| | Uranium-233/234 | 10.6 ± 1.55 | 0.0889 | 0.0373 | NE | | | 089659-035 | HASL-300 |
| | Uranium-235/236 | 0.247 ± 0.0895 | 0.0685 | 0.0255 | NE | | J | 089659-035 | HASL-300 |
| | Uranium-238 | 2.84 ± 0.463 | 0.0537 | 0.0197 | NE | | | 089659-035 | HASL-300 |
| | Tritium | 83.3 ± 93.5 | 155 | 75.2 | NE | U | BD | 089659-036 | EPA 906.0 M |
| **CYN-MW7** 15-Sep-10 | Americium-241 | -2.87 ± 10.6 | 17.8 | 8.90 | NE | U | BD | 089652-033 | EPA 901.1 |
| | Cesium-137 | 0.889 ± 1.96 | 3.37 | 1.68 | NE | U | BD | 089652-033 | EPA 901.1 |
| | Cobalt-60 | -0.333 ± 2.09 | 3.43 | 1.71 | NE | U | BD | 089652-033 | EPA 901.1 |
| | Potassium-40 | 40.8 ± 24.8 | 45.2 | 22.6 | NE | U | BD | 089652-033 | EPA 901.1 |
| | Gross Alpha | -1.94 | NA | NA | 15 | NA | None | 089652-034 | EPA 900.0 |
| | Gross Beta | 4.99 ± 1.48 | 1.60 | 0.761 | 4mrem/yr | | | 089652-034 | EPA 900.0 |
| | Uranium-233/234 | 19.3 ± 2.80 | 0.107 | 0.0479 | NE | | | 089652-035 | HASL-300 |
| | Uranium-235/236 | 0.127 ± 0.054 | 0.0549 | 0.0203 | NE | | J | 089652-035 | HASL-300 |
| | Uranium-238 | 2.41 ± 0.397 | 0.0478 | 0.0181 | NE | | | 089652-035 | HASL-300 |
| | Tritium | 0.00 ± 63.0 | 115 | 52.9 | NE | U | BD | 089652-036 | EPA 906.0 M |

Refer to footnotes on page 7A-35.

**Table 7A-9** *(Continued)*
**Summary of Tritium, Gross Alpha, Gross Beta, Gamma Spectroscopy, and Isotopic Uranium Results, Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico**

**Calendar Year 2010**

| Well ID | Analyte | Activity[a] (pCi/L) | MDA[b] (pCi/L) | Critical Level[c] (pCi/L) | MCL[d] (pCi/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CYN-MW8** | Americium-241 | -2.01 ± 12.0 | 20.4 | 10.2 | NE | U | BD | 089650-033 | EPA 901.1 |
| 14-Sep-10 | Cesium-137 | -5.26 ± 3.74 | 4.14 | 2.07 | NE | U | BD | 089650-033 | EPA 901.1 |
| | Cobalt-60 | -1.19 ± 1.88 | 3.01 | 1.50 | NE | U | BD | 089650-033 | EPA 901.1 |
| | Potassium-40 | 40.3 ± 26.9 | 31.8 | 15.9 | NE | | J | 089650-033 | EPA 901.1 |
| | Gross Alpha | -5.59 | NA | NA | 15 | NA | None | 089650-034 | EPA 900.0 |
| | Gross Beta | 5.96 ± 1.78 | 2.08 | 1.00 | 4mrem/yr | | J | 089650-034 | EPA 900.0 |
| | Uranium-233/234 | 24.9 ± 3.62 | 0.157 | 0.0702 | NE | | | 089650-035 | HASL-300 |
| | Uranium-235/236 | 0.326 ± 0.109 | 0.0804 | 0.0297 | NE | | | 089650-035 | HASL-300 |
| | Uranium-238 | 2.96 ± 0.499 | 0.070 | 0.0265 | NE | | | 089650-035 | HASL-300 |
| | Tritium | -48.3 ± 58.3 | 114 | 52.7 | NE | U | BD | 089650-036 | EPA 906.0 M |
| **CYN-MW9** | Americium-241 | 2.16 ± 12.5 | 18.8 | 9.41 | NE | U | BD | 089672-033 | EPA 901.1 |
| 28-Sep-10 | Cesium-137 | 1.92 ± 1.83 | 3.23 | 1.62 | NE | U | BD | 089672-033 | EPA 901.1 |
| | Cobalt-60 | 1.30 ± 1.92 | 3.37 | 1.69 | NE | U | BD | 089672-033 | EPA 901.1 |
| | Potassium-40 | -6.03 ± 43.5 | 45.6 | 22.8 | NE | U | BD | 089672-033 | EPA 901.1 |
| | Gross Alpha | -0.49 | NA | NA | 15 | NA | None | 089672-034 | EPA 900.0 |
| | Gross Beta | 3.93 ± 1.57 | 2.18 | 1.05 | 4mrem/yr | | J | 089672-034 | EPA 900.0 |
| | Uranium-233/234 | 8.21 ± 1.18 | 0.0533 | 0.0224 | NE | | | 089672-035 | HASL-300 |
| | Uranium-235/236 | 0.218 ± 0.0646 | 0.0411 | 0.0153 | NE | | J | 089672-035 | HASL-300 |
| | Uranium-238 | 2.46 ± 0.381 | 0.0322 | 0.0118 | NE | | | 089672-035 | HASL-300 |
| | Tritium | 58.0 ± 67.2 | 111 | 50.8 | NE | U | BD | 089672-036 | EPA 906.0 M |
| **CYN-MW9** (Duplicate) | Americium-241 | -8.95 ± 13.1 | 21.8 | 10.9 | NE | U | BD | 089673-033 | EPA 901.1 |
| 28-Sep-10 | Cesium-137 | -0.77 ± 1.85 | 3.04 | 1.52 | NE | U | BD | 089673-033 | EPA 901.1 |
| | Cobalt-60 | 0.220 ± 2.04 | 3.43 | 1.72 | NE | U | BD | 089673-033 | EPA 901.1 |
| | Potassium-40 | 3.29 ± 45.0 | 51.5 | 25.8 | NE | U | BD | 089673-033 | EPA 901.1 |
| | Gross Alpha | 3.00 | NA | NA | 15 | NA | None | 089673-034 | EPA 900.0 |
| | Gross Beta | 4.19 ± 1.84 | 2.66 | 1.29 | 4mrem/yr | | J | 089673-034 | EPA 900.0 |
| | Uranium-233/234 | 9.03 ± 1.31 | 0.0585 | 0.0246 | NE | | | 089673-035 | HASL-300 |
| | Uranium-235/236 | 0.158 ± 0.0568 | 0.0451 | 0.0167 | NE | | J | 089673-035 | HASL-300 |
| | Uranium-238 | 2.51 ± 0.395 | 0.0354 | 0.013 | NE | | | 089673-035 | HASL-300 |
| | Tritium | 76.9 ± 68.0 | 108 | 49.5 | NE | U | BD | 089673-036 | EPA 906.0 M |

Refer to footnotes on page 7A-35.

## Table 7A-9 *(Concluded)*
## Summary of Tritium, Gross Alpha, Gross Beta, Gamma Spectroscopy, and Isotopic Uranium Results, Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Analyte | Activity[a] (pCi/L) | MDA[b] (pCi/L) | Critical Level[c] (pCi/L) | MCL[d] (pCi/L) | Laboratory Qualifier[e] | Validation Qualifier[f] | Sample No. | Analytical Method[g] |
|---|---|---|---|---|---|---|---|---|---|
| **CYN-MW10** | Americium-241 | -6.54 ± 11.8 | 17.2 | 8.61 | NE | U | BD | 089668-033 | EPA 901.1 |
| 27-Sep-10 | Cesium-137 | 0.0486 ± 1.92 | 3.28 | 1.64 | NE | U | BD | 089668-033 | EPA 901.1 |
| | Cobalt-60 | -0.572 ± 2.04 | 3.42 | 1.71 | NE | U | BD | 089668-033 | EPA 901.1 |
| | Potassium-40 | -25.4 ± 36.9 | 45.4 | 22.7 | NE | U | BD | 089668-033 | EPA 901.1 |
| | Gross Alpha | -0.99 | NA | NA | 15 | NA | None | 089668-034 | EPA 900.0 |
| | Gross Beta | 2.82 ± 1.32 | 1.91 | 0.921 | 4mrem/yr | | J | 089668-034 | EPA 900.0 |
| | Uranium-233/234 | 6.21 ± 0.916 | 0.0601 | 0.0253 | NE | | | 089668-035 | HASL-300 |
| | Uranium-235/236 | 0.132 ± 0.0507 | 0.0463 | 0.0172 | NE | | J | 089668-035 | HASL-300 |
| | Uranium-238 | 2.19 ± 0.352 | 0.0363 | 0.0134 | NE | | | 089668-035 | HASL-300 |
| | Tritium | 31.6 ± 62.9 | 109 | 49.9 | NE | U | BD | 089668-036 | EPA 906.0 M |
| **CYN-MW11** | Americium-241 | 11.0 ± 7.72 | 11.9 | 5.96 | NE | U | BD | 089675-033 | EPA 901.1 |
| 29-Sep-10 | Cesium-137 | 0.980 ± 1.90 | 3.23 | 1.61 | NE | U | BD | 089675-033 | EPA 901.1 |
| | Cobalt-60 | 2.25 ± 2.02 | 3.63 | 1.82 | NE | U | BD | 089675-033 | EPA 901.1 |
| | Potassium-40 | 4.29 ± 40.8 | 28.4 | 14.2 | NE | U | BD | 089675-033 | EPA 901.1 |
| | Gross Alpha | 0.88 | NA | NA | 15 | NA | None | 089675-034 | EPA 900.0 |
| | Gross Beta | 9.26 ± 3.64 | 5.19 | 2.53 | 4mrem/yr | | J | 089675-034 | EPA 900.0 |
| | Uranium-233/234 | 6.28 ± 0.911 | 0.053 | 0.0223 | NE | | | 089675-035 | HASL-300 |
| | Uranium-235/236 | 0.143 ± 0.0525 | 0.0409 | 0.0152 | NE | | J | 089675-035 | HASL-300 |
| | Uranium-238 | 2.22 ± 0.348 | 0.032 | 0.0118 | NE | | | 089675-035 | HASL-300 |
| | Tritium | 34.3 ± 62.4 | 108 | 49.2 | NE | U | BD | 089675-036 | EPA 906.0 M |
| **CYN-MW12** | Americium-241 | -8.69 ± 13.3 | 22.1 | 11.1 | NE | U | BD | 089665-033 | EPA 901.1 |
| 23-Sep-10 | Cesium-137 | 0.466 ± 1.90 | 3.24 | 1.62 | NE | U | BD | 089665-033 | EPA 901.1 |
| | Cobalt-60 | -0.594 ± 2.03 | 3.31 | 1.65 | NE | U | BD | 089665-033 | EPA 901.1 |
| | Potassium-40 | 13.1 ± 47.0 | 33.7 | 16.9 | NE | U | BD | 089665-033 | EPA 901.1 |
| | Gross Alpha | 0.521 | NA | NA | 15 | NA | None | 089665-034 | EPA 900.0 |
| | Gross Beta | 7.33 ± 2.61 | 3.59 | 1.75 | 4mrem/yr | | J | 089665-034 | EPA 900.0 |
| | Uranium-233/234 | 11.1 ± 1.60 | 0.0583 | 0.0245 | NE | | | 089665-035 | HASL-300 |
| | Uranium-235/236 | 0.239 ± 0.0708 | 0.0449 | 0.0167 | NE | | J | 089665-035 | HASL-300 |
| | Uranium-238 | 2.84 ± 0.440 | 0.0352 | 0.0129 | NE | | | 089665-035 | HASL-300 |
| | Tritium | 61.7 ± 92.8 | 156 | 75.7 | NE | U | BD | 089665-036 | EPA 906.0 M |

Refer to footnotes on page 7A-35.

## Table 7A-10
## Summary of Field Water Quality Measurements[h],
## Burn Site Groundwater Monitoring, Sandia National Laboratories/New Mexico

### Calendar Year 2010

| Well ID | Sample Date | Temperature ($^0$C) | Specific Conductivity (μmho/cm) | Oxidation Reduction Potential (mV) | pH | Turbidity (NTU) | Dissolved Oxygen (% Sat) | Dissolved Oxygen (mg/L) |
|---|---|---|---|---|---|---|---|---|
| **CYN-MW1D** | 25-Feb-10 | 13.89 | 517 | 27.5 | 7.74 | 132 | 11.7 | 1.20 |
| **CYN-MW3** | 01-Mar-10 | 13.10 | 927 | 266.3 | 7.19 | 0.33 | 62.1 | 6.56 |
| **CYN-MW4** | 22-Feb-10 | 12.98 | 702 | 224.8 | 7.17 | 0.26 | 44.3 | 4.66 |
| **CYN-MW6** | 03-Mar-10 | 16.27 | 1302 | 231.2 | 6.92 | 1.74 | 18.0 | 1.76 |
| **CYN-MW7** | 24-Feb-10 | 15.73 | 736 | 229.9 | 7.03 | 15.6 | 33.0 | 3.24 |
| **CYN-MW8** | 23-Feb-10 | 14.97 | 849 | 223.5 | 7.06 | 0.36 | 29.9 | 3.08 |
| | | | | | | | | |
| **CYN-MW1D** | 01-Jun-10 | 19.71 | 445 | -109.8 | 8.98 | 92.0 | 6.3 | 0.59 |
| **CYN-MW3** | 02-Jun-10 | 16.70 | 912 | 260.5 | 8.31 | 1.39 | 64.5 | 6.26 |
| **CYN-MW4** | 27-May-10 | 19.74 | 685 | 96.0 | 7.84 | 0.18 | 37.4 | 3.42 |
| **CYN-MW6** | 04-Jun-10 | 18.28 | 1090 | 284.4 | 8.18 | 0.34 | 20.4 | 1.91 |
| **CYN-MW7** | 26-May-10 | 19.17 | 719 | 140.0 | 7.35 | 4.90 | 34.7 | 3.20 |
| **CYN-MW8** | 25-May-10 | 18.53 | 824 | 149.9 | 7.14 | 0.61 | 40.8 | 3.81 |
| | | | | | | | | |
| **CYN-MW1D** | 21-Sep-10 | 20.31 | 495 | -20.6 | 7.75 | 105.0 | 9.6 | 0.88 |
| **CYN-MW3** | 22-Sep-10 | 18.35 | 900 | 142.5 | 7.29 | 0.33 | 66.5 | 6.19 |
| **CYN-MW4** | 16-Sep-10 | 20.50 | 672 | 180.5 | 7.29 | 0.12 | 34.8 | 3.12 |
| **CYN-MW6** | 20-Sep-10 | 18.53 | 1059 | 103.8 | 7.04 | 0.37 | 20.6 | 1.92 |
| **CYN-MW7** | 15-Sep-10 | 21.62 | 707 | 166.1 | 7.09 | 1.11 | 39.1 | 3.44 |
| **CYN-MW8** | 14-Sep-10 | 21.46 | 811 | 158.1 | 7.13 | 0.19 | 48.1 | 4.24 |
| **CYN-MW9** | 28-Sep-10 | 18.93 | 1089 | 197.3 | 7.03 | 0.45 | 48.6 | 4.50 |
| **CYN-MW10** | 27-Sep-10 | 19.86 | 905 | 145.5 | 7.33 | 0.40 | 71.3 | 6.49 |
| **CYN-MW11** | 29-Sep-10 | 21.51 | 992 | 58.9 | 7.27 | 3.73 | 5.5 | 0.51 |
| **CYN-MW12** | 23-Sep-10 | 18.47 | 1045 | 50.8 | 7.10 | 0.90 | 5.4 | 0.51 |
| | | | | | | | | |
| **CYN-MW9** | 27-Oct-10 | 16.07 | 1081 | 210.7 | 7.08 | 0.28 | 48.5 | 475 |
| **CYN-MW10** | 02-Nov-10 | 16.40 | 899 | 259.3 | 7.37 | 0.39 | 66.8 | 6.52 |
| **CYN-MW11** | 01-Nov-10 | 16.98 | 975 | 81.3 | 7.34 | 0.57 | 5.4 | 0.55 |
| **CYN-MW12** | 28-Oct-10 | 17.59 | 1035 | 173.4 | 7.16 | 0.26 | 6.6 | 0.63 |

Refer to footnotes on page 7A-35.

## *Footnotes for Burn Site Groundwater Monitoring Tables*

**[a]Result**

- Values in bold exceed the established MCL.
- ND = not detected (at method detection limit).
- Activities of zero or less are considered to be not detected.
- Gross alpha activity measurements were corrected by subtracting out the total uranium activity (40 CFR Parts 9, 141, and 142, Table 1-4)
- μg/L = micrograms per liter.
- mg/L = milligrams per liter.
- pCi/L = picocuries per liter.

**[b]MDL or MDA**

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.

The 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.

NA = not applicable for gross alpha activities. The MDA could not be calculated as the gross alpha activity was corrected by subtracting out the total uranium activity.

**[c]PQL or Critical Level**

Practical quantitation limit. The lowest concentration of analytes in a sample that can be reliably determined within specified limits of precision and accuracy by that indicated method under routine laboratory operating conditions.

The minimum activity that can be measured and reported with 99% confidence that the analyte is greater than zero; analyte is matrix specific.

NA = not applicable for gross alpha activities. The critical level could not be calculated as the gross alpha activity was corrected by subtracting out the total uranium activity.

**[d]MCL**

- Maximum contaminant level. Established by the U.S. Environmental Protection Agency Primary Water Regulations (40 CFR 141.11(b)), National Primary Drinking Water Standards, EPA, July 2002.
- NE = not established.
- The following are the MCLs for gross alpha particles and beta particles in community water systems:
  15 pCi/L = Gross alpha particle activity, excluding total uranium (40 CFR Parts 9, 141, and 142, Table 1-4).
  4 mrem/yr = any combination of beta and/or gamma emitting radionuclides (as dose rate).

**[e]Laboratory Qualifier**

B = Analyte is detected in associated laboratory method blank.
H = Analytical holding time was exceeded.
J = Amount detected is below the practical quantitation limit (PQL).
NA = Not applicable for gross alpha activities.
U = Analyte is absent or below the method detection limit.

**[f]Validation Qualifier**

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.
BD = Below detection limit as used in radiochemistry to identify results that are not statistically different from zero.
J = The associated value is an estimated quantity.
J+ = The associated numerical value is an estimated quantity with suspected positive bias.

## *Footnotes for Burn Site Groundwater Monitoring Tables (Concluded)*

**[f]Validation Qualifier (continued)**

| | | |
|---|---|---|
| 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. |
| R | = | The data are unusable. Resampling and reanalysis are necessary for verification. |

**[g]Analytical Method**

- U.S. Environmental Protection Agency, 1996, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, 3rd ed., Rev. 1
- U.S. Environmental Protection Agency, Washington, D.C.; or Clesceri, Greenburg, and Eaton, 1998, *Standard Methods for the Examination of Water and Wastewater*, 20$^{th}$ ed., Method 2320B.
- U.S. Environmental Protection Agency, 1983, *The Determination of Inorganic Anions in Water by Ion Chromatography-Method 300.0*, EPA-600/4-84-017.
- U.S. Environmental Protection Agency, 1980, *Prescribed Procedures for Measurement of Radioactivity in Drinking Water*, EPA-600/4-80-032.
- U.S. Environmental Protection Agency, 1999, *Perchlorate in Drinking Water Using Ion Chromatography*, EPA 815/R-00-014.
- U.S. Department of Energy, Environmental Measurements Laboratory, 1990, *EML Procedures Manual,* 27th ed., Vol. 1, Rev. 1992, HASL-300.

**[h]Field Water Quality Measurements**

- Field measurements collected prior to sampling.

| | |
|---|---|
| °C | = degrees Celsius. |
| % Sat | = present saturation. |
| μmho/cm | = micromhos per centimeter. |
| mg/L | = milligrams per liter. |
| mV | = millivolts. |
| NTU | = nephelometric turbidity units. |
| pH | = potential of hydrogen (negative logarithm of the hydrogen ion concentration). |

# Attachment 7B
# Burn Site Groundwater
# Plots

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# Attachment 7B Plots

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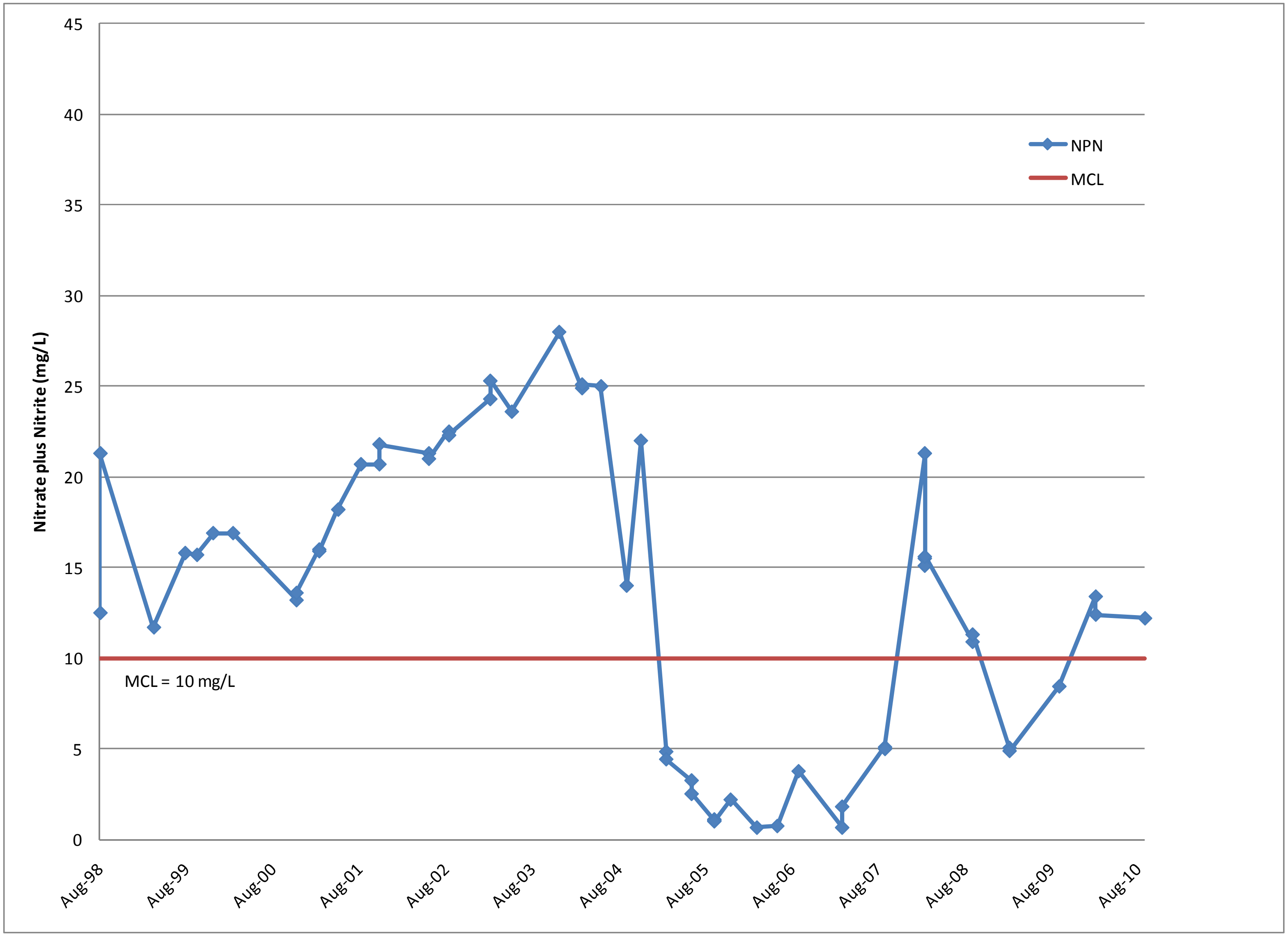


**Figure 7B-1. Nitrate plus Nitrite Concentrations, CYN-MW1D**

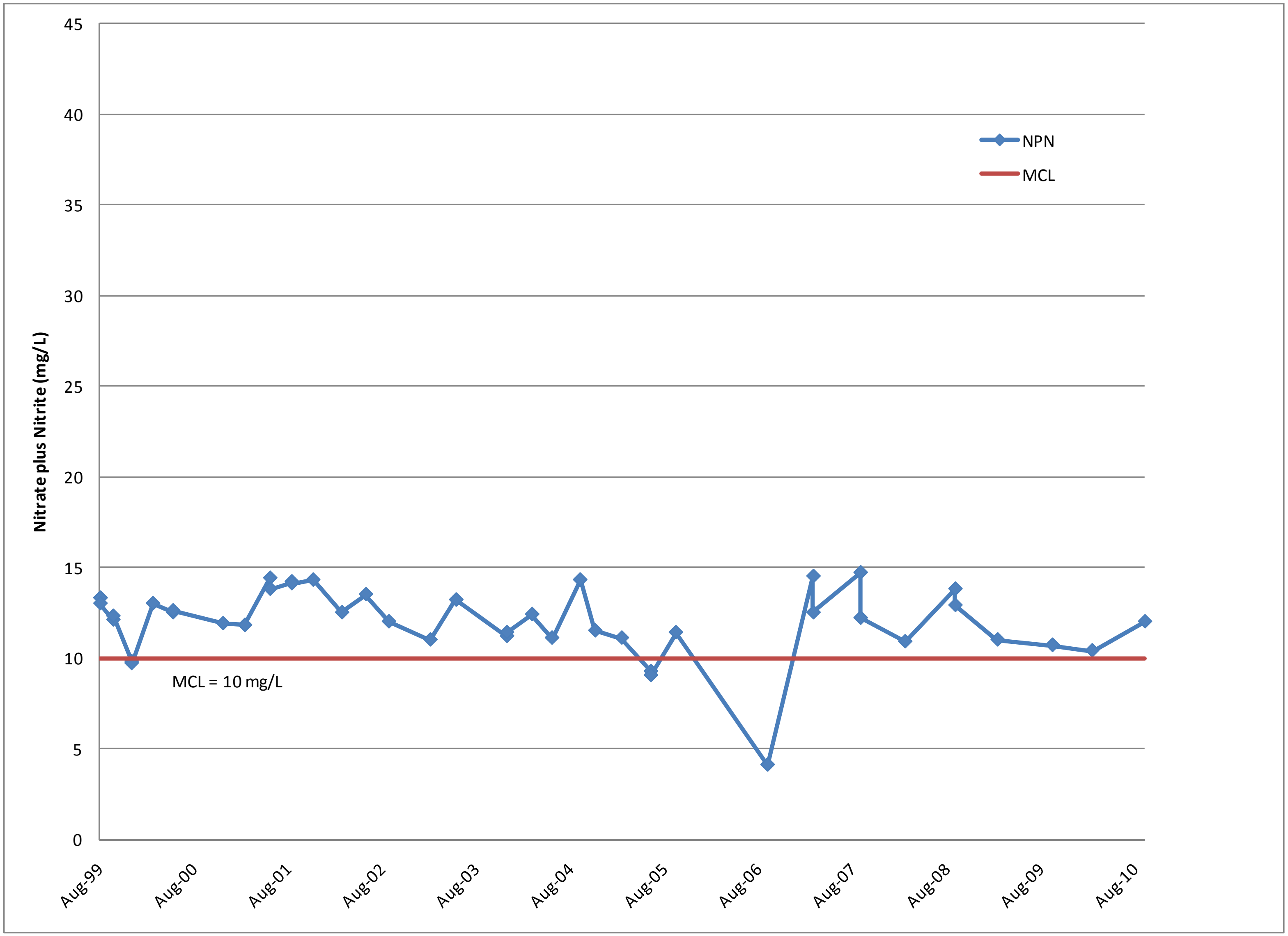


**Figure 7B-2. Nitrate plus Nitrite Concentrations, CYN-MW3**

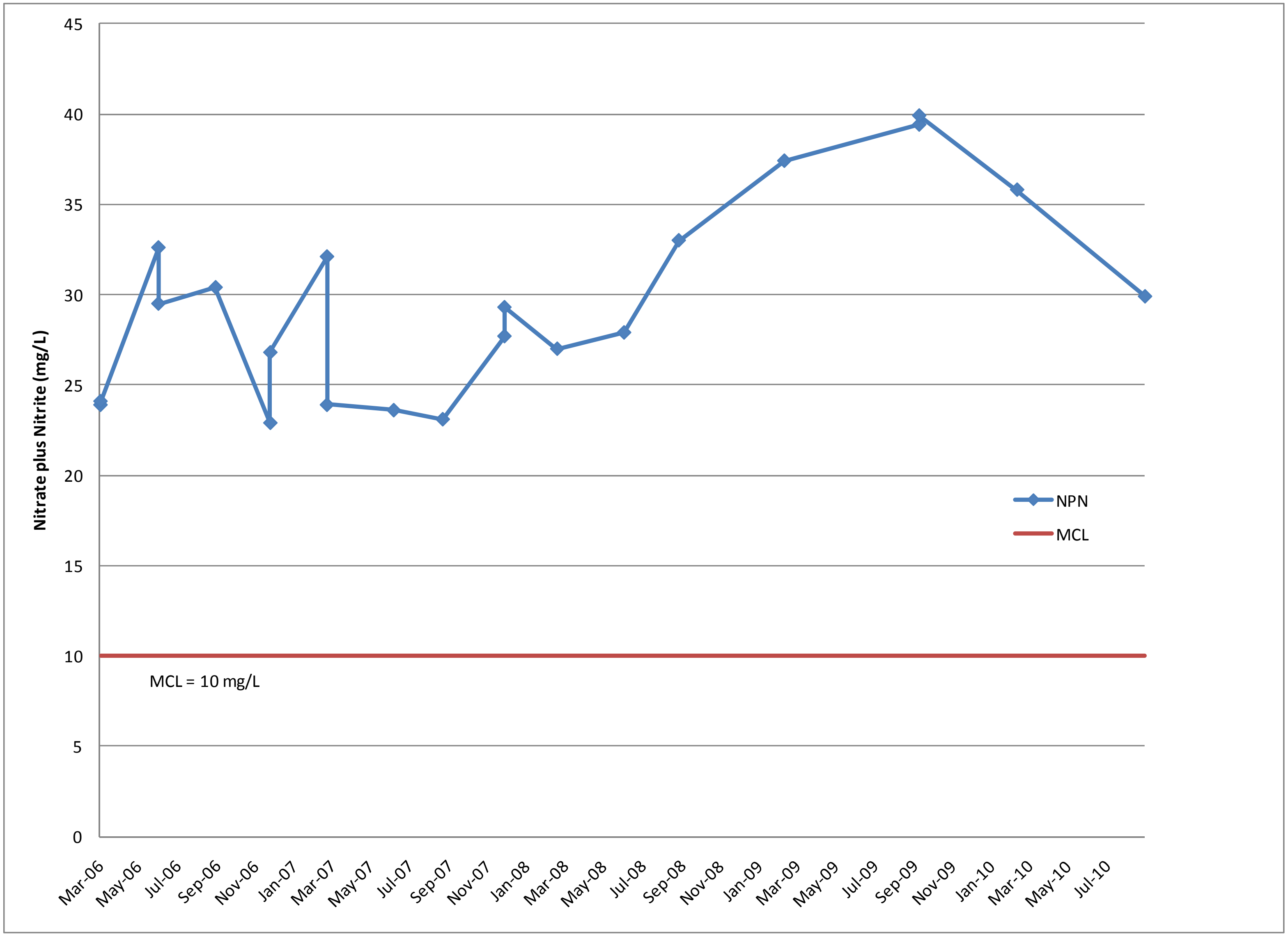


**Figure 7B-3. Nitrate plus Nitrite Concentrations, CYN-MW6**

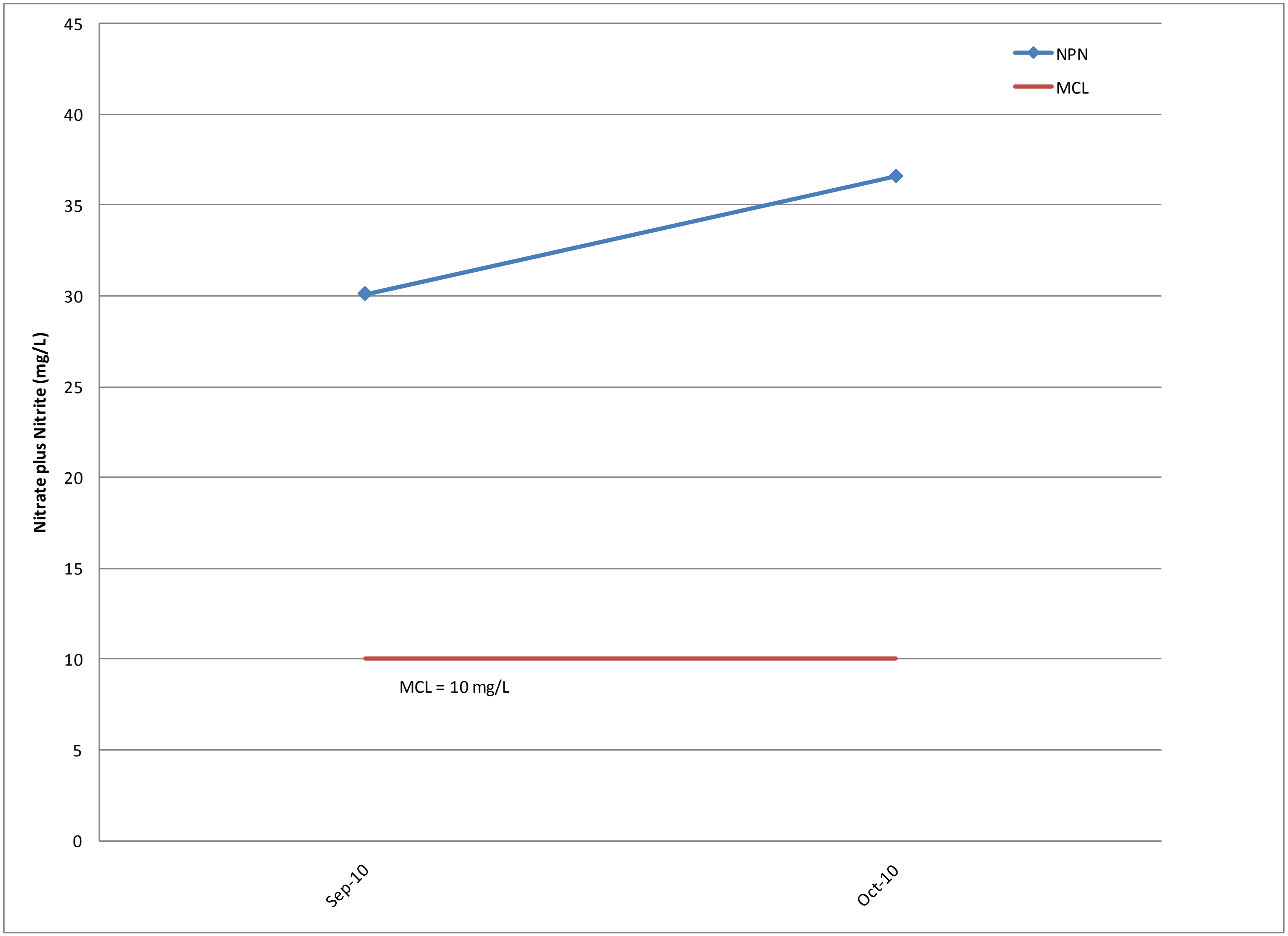


**Figure 7B-4. Nitrate plus Nitrite Concentrations, CYN-MW9**

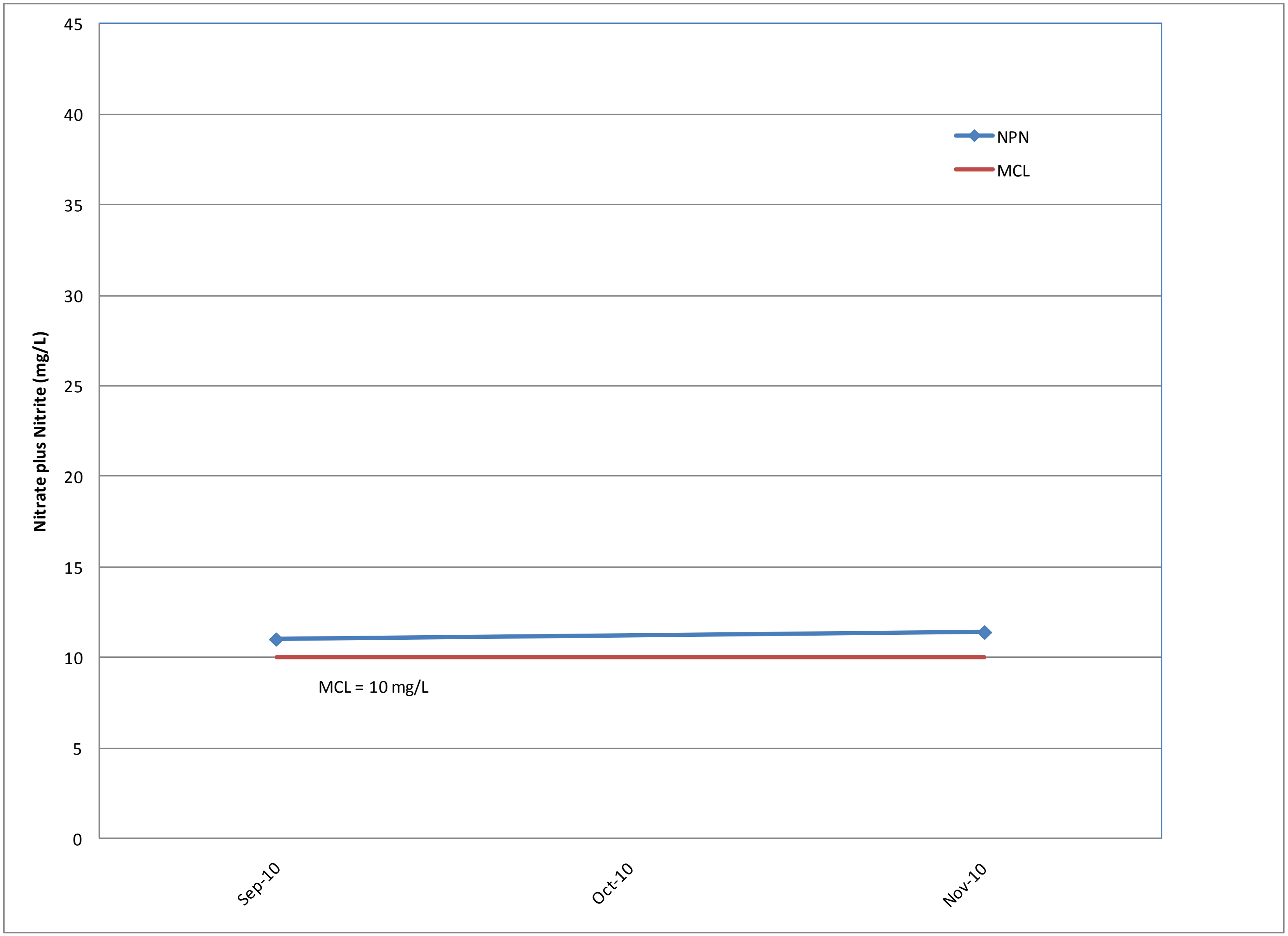


**Figure 7B-5. Nitrate plus Nitrite Concentrations, CYN-MW10**

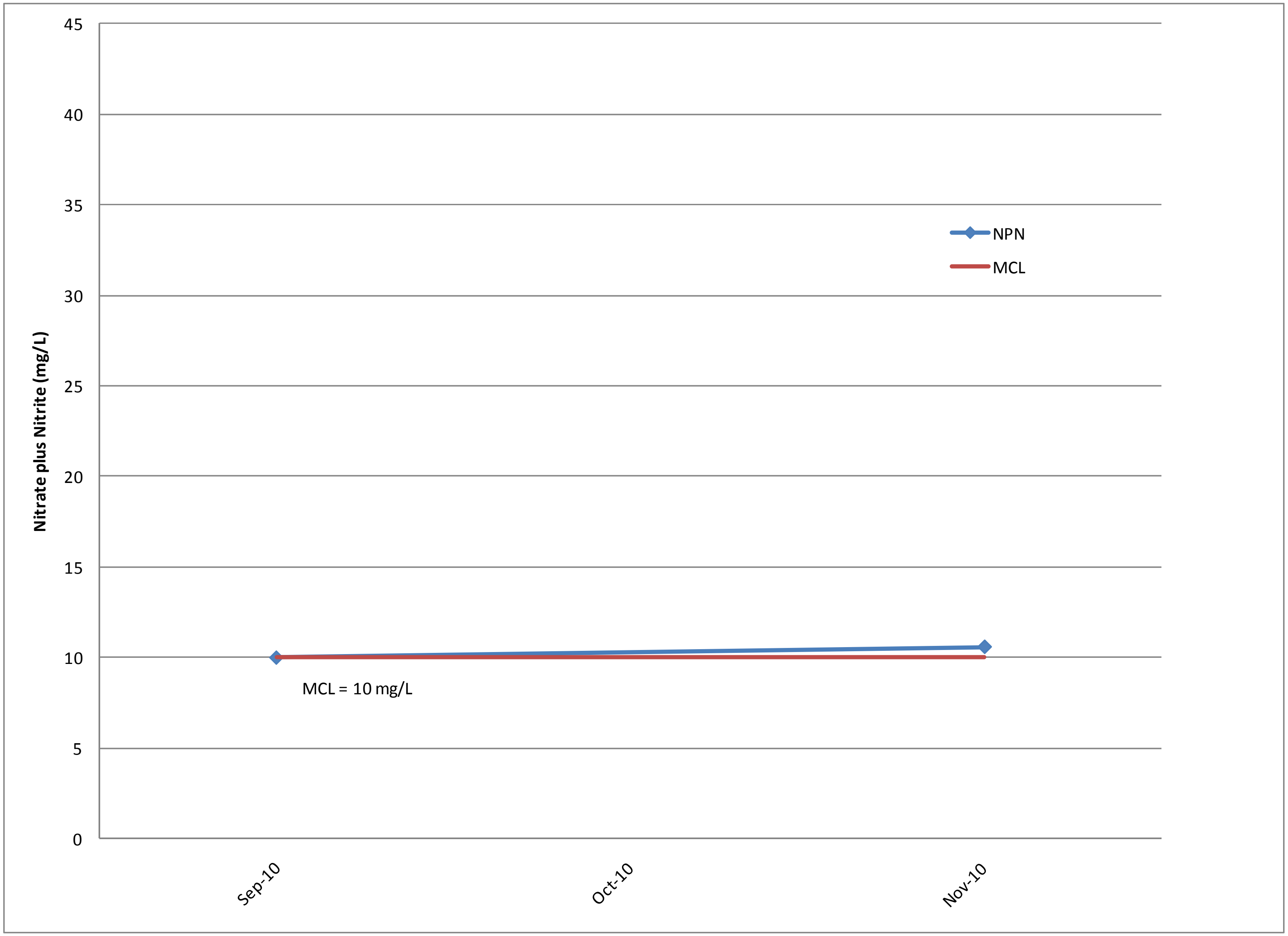


**Figure 7B-6. Nitrate plus Nitrite Concentrations, CYN-MW11**

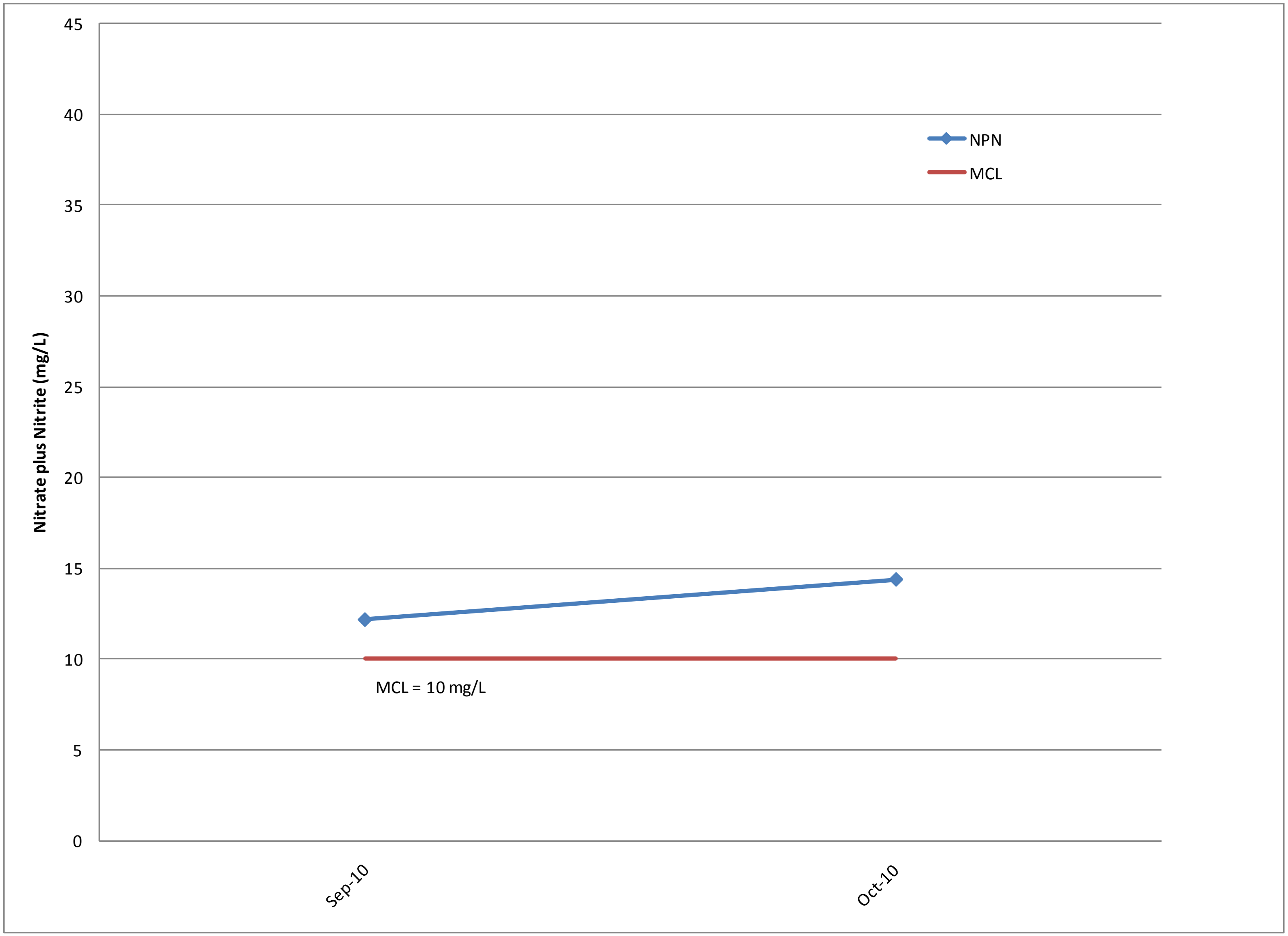


**Figure 7B-7. Nitrate plus Nitrite Concentrations, CYN-MW12**

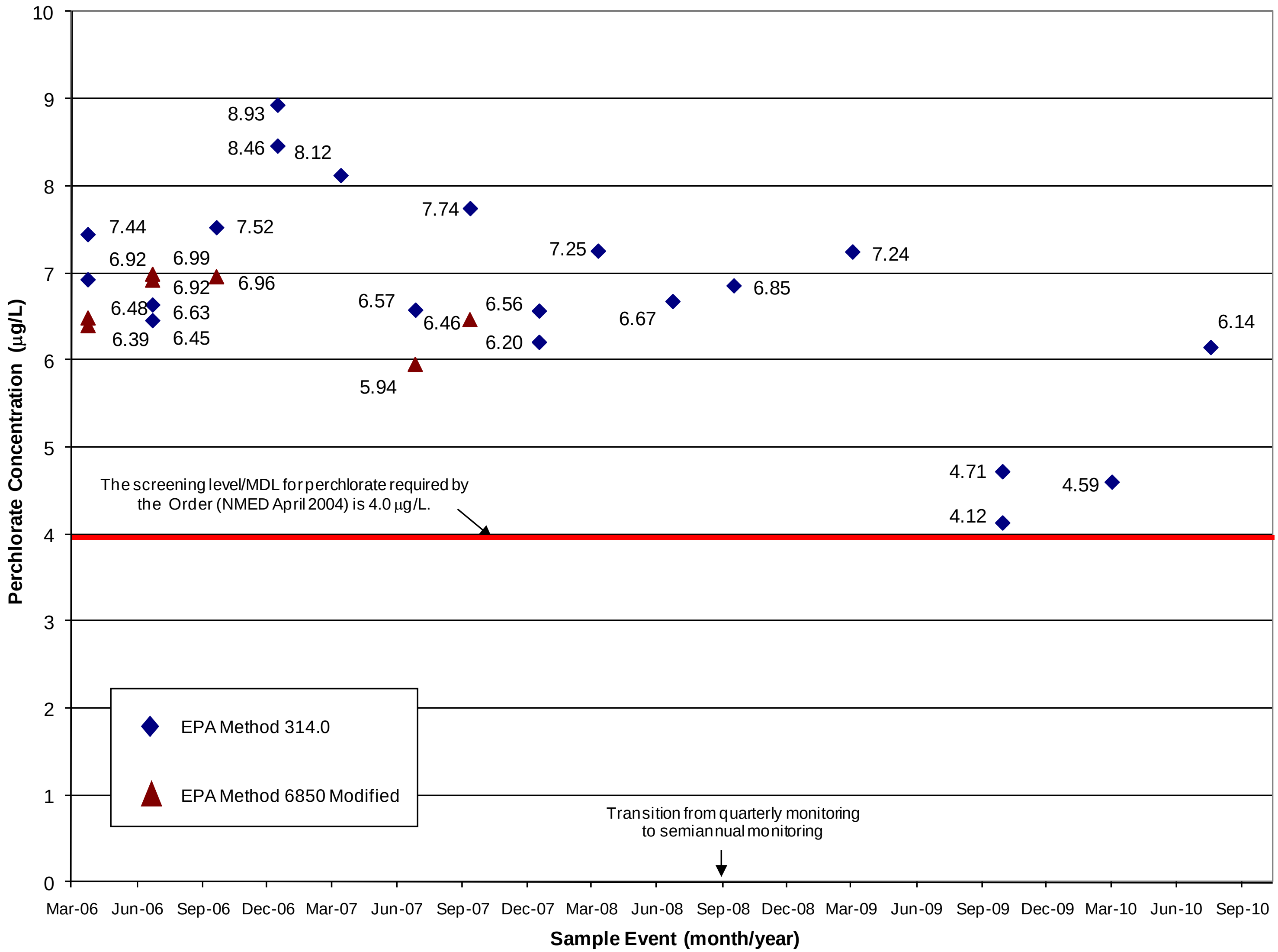


**Figure 7B-8. Perchlorate Concentrations, CYN-MW6**

# Attachment 7C
# Burn Site Groundwater Hydrographs

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# Attachment 7C Hydrographs

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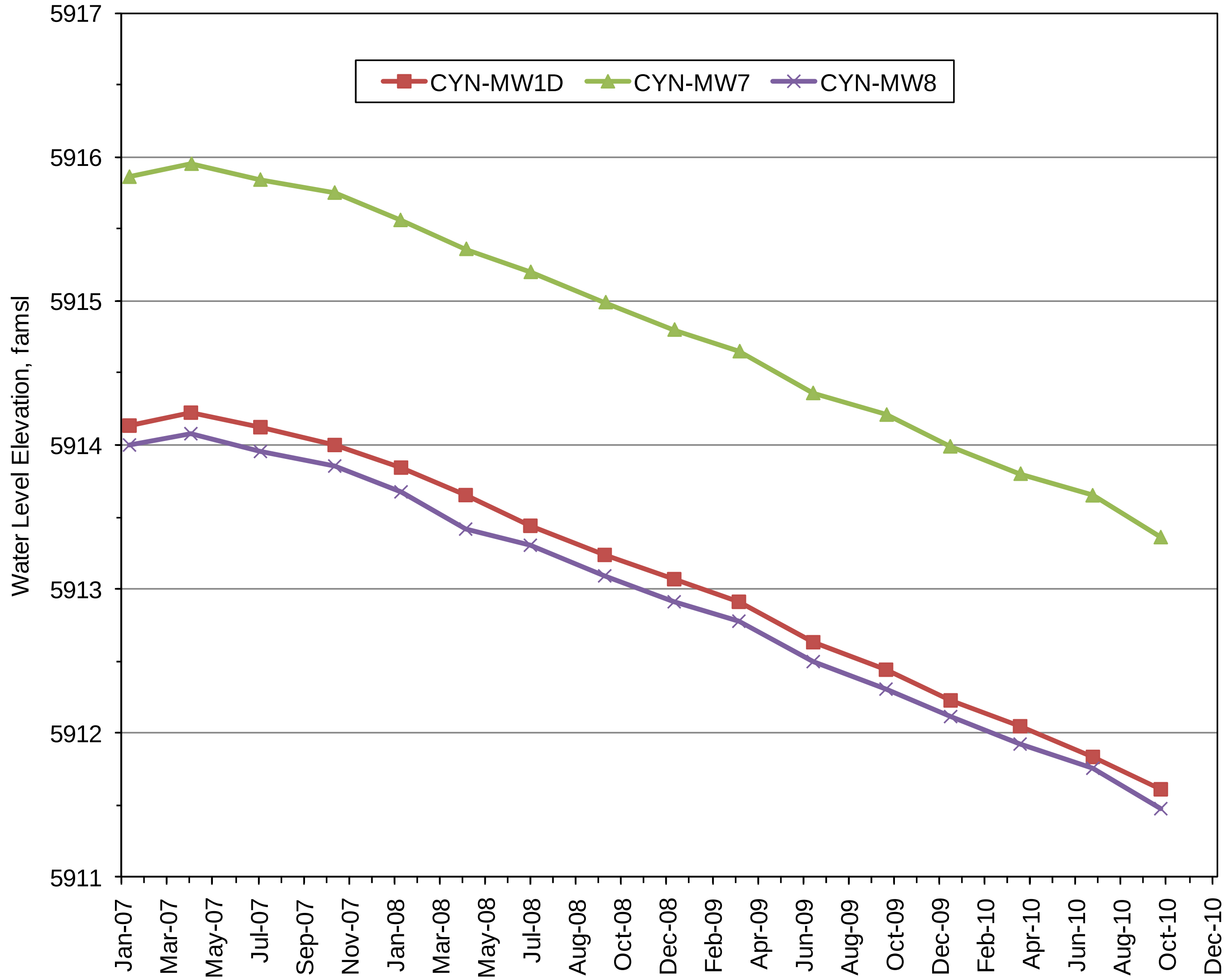


**Figure 7C-1. Burn Site Groundwater Wells (1 of 4)**

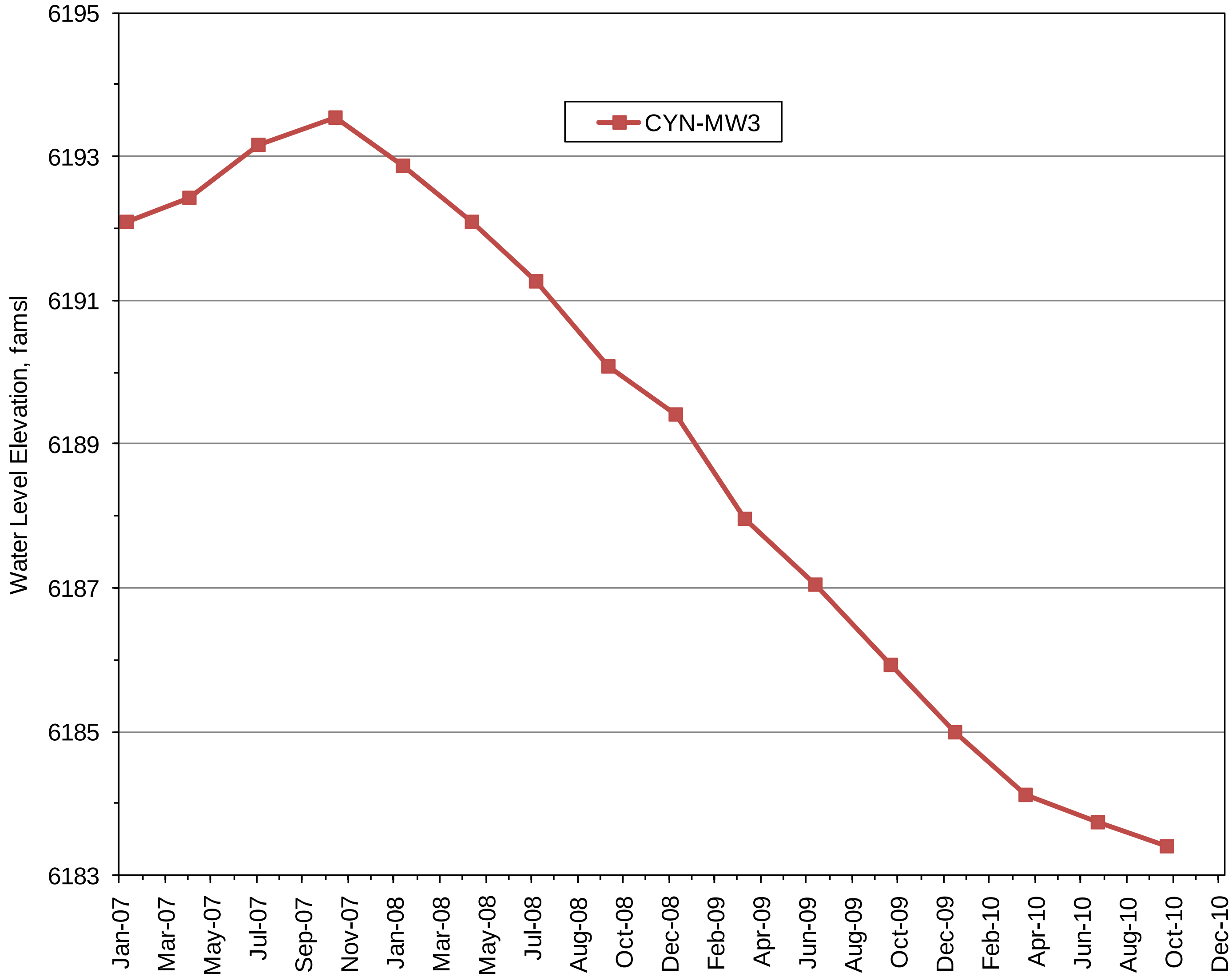


**Figure 7C-2. Burn Site Groundwater Wells (2 of 4)**

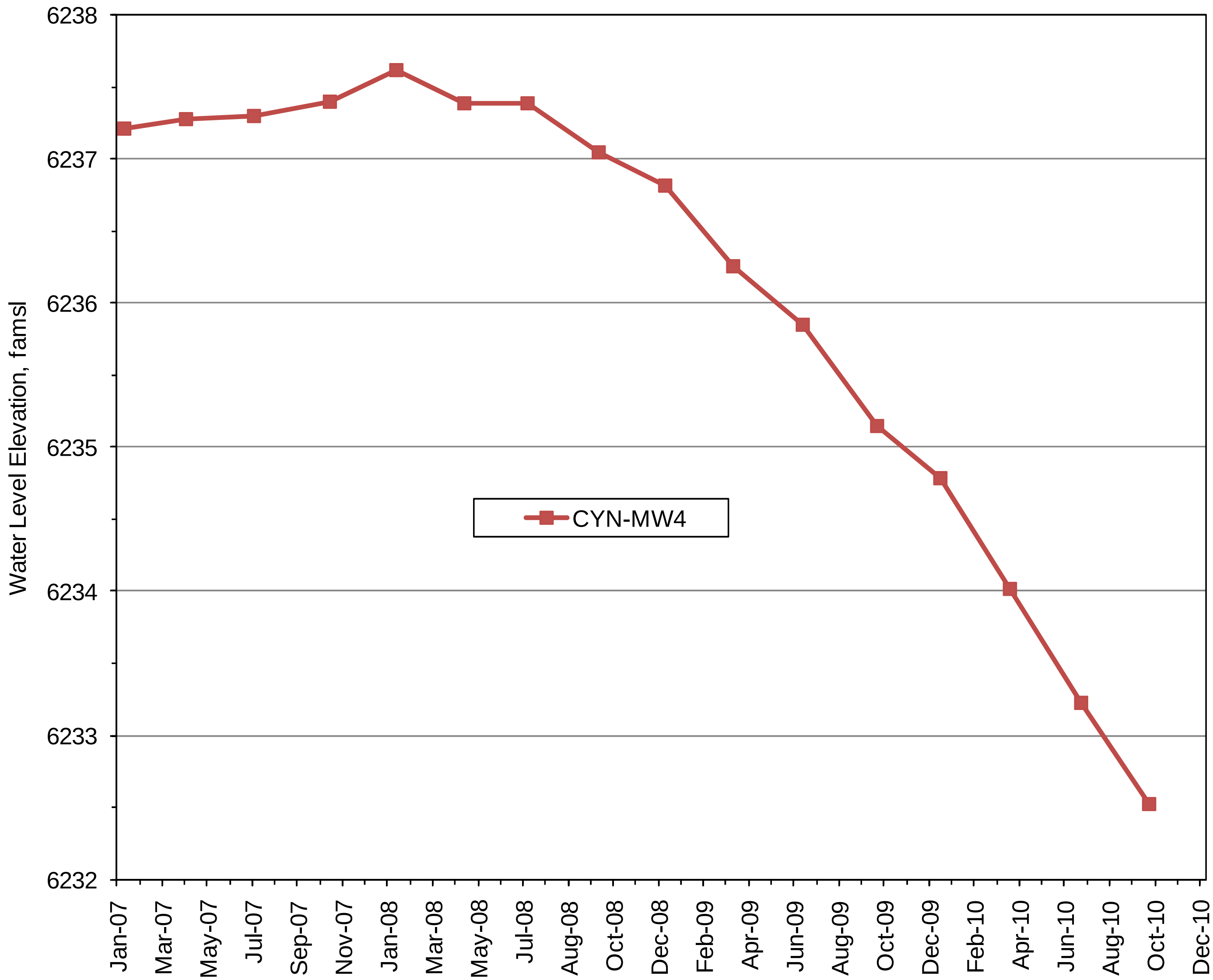


**Figure 7C-3. Burn Site Groundwater Wells (3 of 4)**

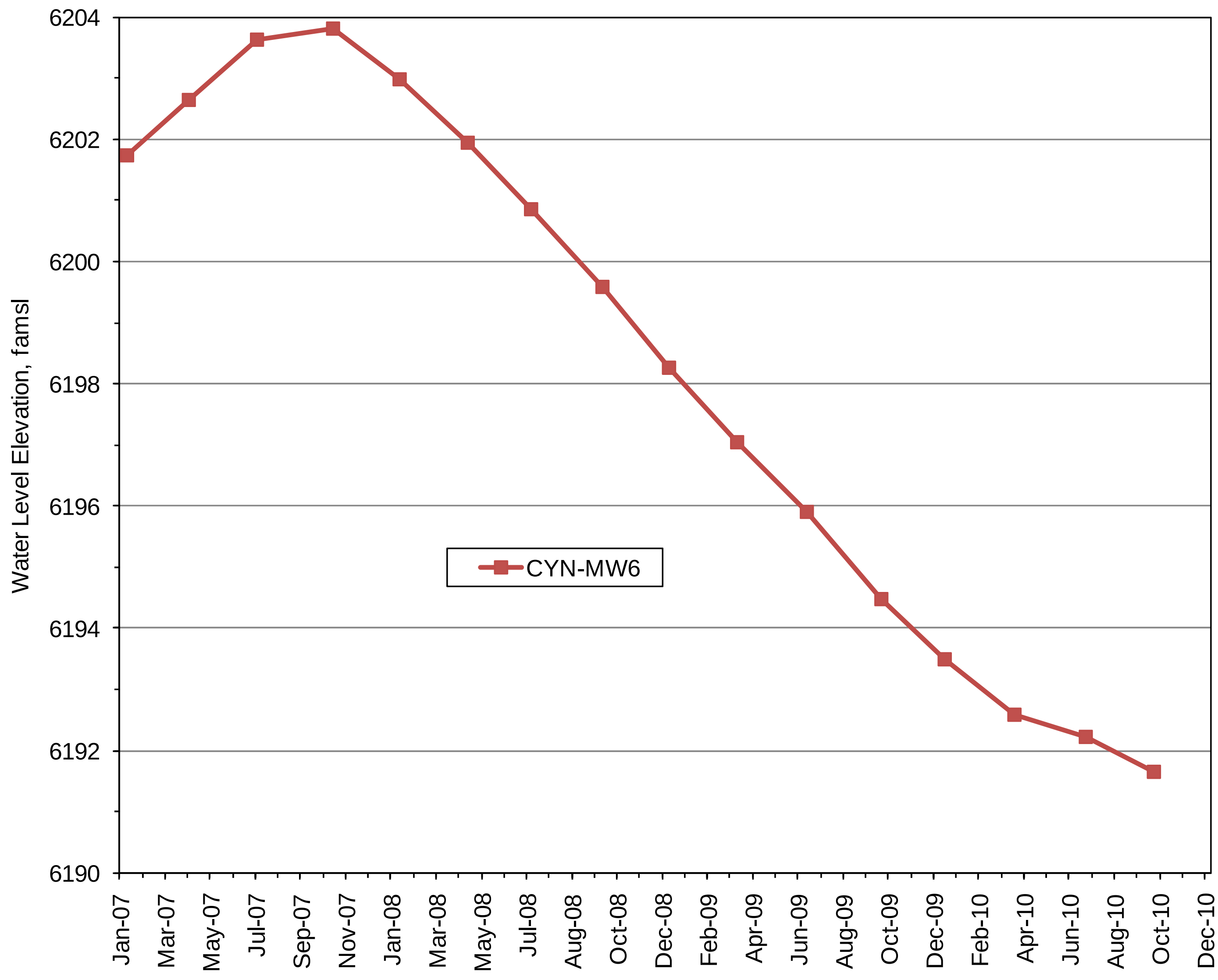


**Figure 7C-4. Burn Site Groundwater Wells (4 of 4)**

# APPENDIX C

## 2010 TERRESTRIAL SURVEILLANCE RESULTS

## TABLE C-1. Radiological Results Sorted by Location for Calendar Year 2010, Soil

| Location Type | Analyte | Location | Units | Activity and/or Concentration | Two Sigma Error | Lab Data Qualifiers | Decision Level | MDA |
|---|---|---|---|---|---|---|---|---|
| Community | Americium-241 | 9 | pCi/g | 0.0332 | 0.0176 | U | 0.0151 | 0.0332 |
| Community | Americium-241 | 10 | pCi/g | -0.00954 | 0.0466 | U | 0.0381 | 0.0762 |
| Community | Americium-241 | 25 | pCi/g | 0.0339 | 0.0618 | U | 0.0509 | 0.102 |
| Community | Americium-241 | 62 | pCi/g | 0.0974 | 0.059 | U | 0.0475 | 0.0974 |
| Community | Cesium-137 | 9 | pCi/g | 0.303 | 0.0389 | | 0.0113 | 0.0226 |
| Community | Cesium-137 | 10 | pCi/g | 0.215 | 0.0305 | | 0.0116 | 0.0231 |
| Community | Cesium-137 | 25 | pCi/g | 0.00527 | 0.0157 | U | 0.0133 | 0.0265 |
| Community | Cesium-137 | 62 | pCi/g | 0.379 | 0.0432 | | 0.0135 | 0.027 |
| Community | Tritium | 9 | pCi/L | 192 | 111 | | 86.3 | 177 |
| Community | Tritium | 10 | pCi/L | 141 | 106 | U | 84.5 | 173 |
| Community | Tritium | 25 | pCi/L | 106 | 127 | U | 103 | 212 |
| Community | Tritium | 62 | pCi/L | 54.1 | 106 | U | 86.7 | 180 |
| Community | Uranium | 9 | mg/kg | 0.539 | | | 0.0129 | 0.039 |
| Community | Uranium | 10 | mg/kg | 0.481 | | | 0.013 | 0.0394 |
| Community | Uranium | 25 | mg/kg | 0.573 | | | 0.0122 | 0.037 |
| Community | Uranium | 62 | mg/kg | 0.526 | | | 0.0128 | 0.0389 |
| On-Site | Americium-241 | 1 | pCi/g | -0.059 | 0.0602 | U | 0.0545 | 0.109 |
| On-Site | Americium-241 | 02NE | pCi/g | -0.117 | 0.0782 | U | 0.0646 | 0.129 |
| On-Site | Americium-241 | 02NW | pCi/g | 0.00972 | 0.0434 | U | 0.0405 | 0.0809 |
| On-Site | Americium-241 | 02SE | pCi/g | 0.028 | 0.0655 | U | 0.0557 | 0.111 |
| On-Site | Americium-241 | 02SW | pCi/g | 0.0362 | 0.0558 | U | 0.045 | 0.0899 |
| On-Site | Americium-241 | 3 | pCi/g | 0.0526 | 0.0321 | U | 0.0272 | 0.0544 |
| On-Site | Americium-241 | 6 | pCi/g | 0.0749 | 0.0327 | U | 0.0281 | 0.075 |
| On-Site | Americium-241 | 7 | pCi/g | 0.013 | 0.0148 | U | 0.013 | 0.026 |
| On-Site | Americium-241 | 33 | pCi/g | 0.0193 | 0.0682 | U | 0.0633 | 0.127 |
| On-Site | Americium-241 | 34 | pCi/g | 0.00506 | 0.0466 | U | 0.0371 | 0.0742 |
| On-Site | Americium-241 | 35 | pCi/g | 0.0589 | 0.0398 | U | 0.031 | 0.062 |
| On-Site | Americium-241 | 41 | pCi/g | 0.0329 | 0.0878 | U | 0.0732 | 0.146 |
| On-Site | Americium-241 | 42 | pCi/g | -0.127 | 0.0538 | U | 0.0381 | 0.0762 |
| On-Site | Americium-241 | 43 | pCi/g | -0.092 | 0.0695 | U | 0.0627 | 0.125 |
| On-Site | Americium-241 | 45 | pCi/g | -0.0407 | 0.104 | U | 0.0937 | 0.187 |
| On-Site | Americium-241 | 46 | pCi/g | 0.0105 | 0.0388 | U | 0.0329 | 0.0658 |

## TABLE C-1. Radiological Results Sorted by Location for Calendar Year 2010, Soil

| Location Type | Analyte | Location | Units | Activity and/or Concentration | Two Sigma Error | Lab Data Qualifiers | Decision Level | MDA |
|---|---|---|---|---|---|---|---|---|
| On-Site | Americium-241 | 49 | pCi/g | 0.0151 | 0.0525 | U | 0.0487 | 0.0974 |
| On-Site | Americium-241 | 51 | pCi/g | 0.0448 | 0.0386 | U | 0.0328 | 0.0655 |
| On-Site | Americium-241 | 52 | pCi/g | -0.0113 | 0.0238 | U | 0.0212 | 0.0424 |
| On-Site | Americium-241 | 53 | pCi/g | -0.0486 | 0.0459 | U | 0.0428 | 0.0855 |
| On-Site | Americium-241 | 54 | pCi/g | 0.0317 | 0.0517 | U | 0.0458 | 0.0915 |
| On-Site | Americium-241 | 55 | pCi/g | -0.0543 | 0.0647 | U | 0.0582 | 0.116 |
| On-Site | Americium-241 | 56 | pCi/g | -0.0127 | 0.0528 | U | 0.0496 | 0.0991 |
| On-Site | Americium-241 | 57 | pCi/g | -0.00116 | 0.0344 | U | 0.0281 | 0.0561 |
| On-Site | Americium-241 | 66 | pCi/g | 0.00456 | 0.0325 | U | 0.0304 | 0.0609 |
| On-Site | Americium-241 | 76 | pCi/g | -0.0272 | 0.0696 | U | 0.055 | 0.11 |
| On-Site | Americium-241 | 77 | pCi/g | 0.0144 | 0.0243 | U | 0.0197 | 0.0393 |
| On-Site | Americium-241 | 78 | pCi/g | -0.103 | 0.0565 | U | 0.0421 | 0.0842 |
| On-Site | Americium-241 | 86 | pCi/g | -0.0152 | 0.0548 | U | 0.0506 | 0.101 |
| On-Site | Americium-241 | 92 | pCi/g | 0.0349 | 0.0727 | U | 0.0703 | 0.14 |
| On-Site | Cesium-137 | 1 | pCi/g | 0.207 | 0.0263 | | 0.0105 | 0.0211 |
| On-Site | Cesium-137 | 02NE | pCi/g | 0.149 | 0.0304 | | 0.0144 | 0.0287 |
| On-Site | Cesium-137 | 02NW | pCi/g | 0.0785 | 0.0263 | | 0.0158 | 0.0316 |
| On-Site | Cesium-137 | 02SE | pCi/g | 0.171 | 0.0332 | | 0.0151 | 0.0302 |
| On-Site | Cesium-137 | 02SW | pCi/g | 0.0826 | 0.0316 | | 0.0134 | 0.0268 |
| On-Site | Cesium-137 | 3 | pCi/g | 0.0777 | 0.0148 | | 0.00713 | 0.0143 |
| On-Site | Cesium-137 | 6 | pCi/g | 0.16 | 0.0218 | | 0.00727 | 0.0145 |
| On-Site | Cesium-137 | 7 | pCi/g | 0.0959 | 0.0203 | | 0.00991 | 0.0198 |
| On-Site | Cesium-137 | 33 | pCi/g | 0.0991 | 0.0209 | | 0.00961 | 0.0192 |
| On-Site | Cesium-137 | 34 | pCi/g | 0.149 | 0.0228 | | 0.00906 | 0.0181 |
| On-Site | Cesium-137 | 35 | pCi/g | 0.139 | 0.0248 | | 0.00905 | 0.0181 |
| On-Site | Cesium-137 | 41 | pCi/g | 0.123 | 0.0211 | | 0.0107 | 0.0215 |
| On-Site | Cesium-137 | 42 | pCi/g | 0.097 | 0.0168 | | 0.00841 | 0.0168 |
| On-Site | Cesium-137 | 43 | pCi/g | 0.0519 | 0.0167 | | 0.00931 | 0.0186 |
| On-Site | Cesium-137 | 45 | pCi/g | 0.0365 | 0.0237 | | 0.0165 | 0.0331 |
| On-Site | Cesium-137 | 46 | pCi/g | 0.199 | 0.0241 | | 0.00855 | 0.0171 |
| On-Site | Cesium-137 | 49 | pCi/g | 0.498 | 0.0474 | | 0.00898 | 0.018 |
| On-Site | Cesium-137 | 51 | pCi/g | 0.0697 | 0.0152 | | 0.00853 | 0.0171 |

## TABLE C-1.  Radiological Results Sorted by Location for Calendar Year 2010, Soil

| Location Type | Analyte | Location | Units | Activity and/or Concentration | Two Sigma Error | Lab Data Qualifiers | Decision Level | MDA |
|---|---|---|---|---|---|---|---|---|
| On-Site | Cesium-137 | 52 | pCi/g | 0.0188 | 0.0117 | | 0.00681 | 0.0136 |
| On-Site | Cesium-137 | 53 | pCi/g | 0.04 | 0.0126 | | 0.00719 | 0.0144 |
| On-Site | Cesium-137 | 54 | pCi/g | 0.17 | 0.0255 | | 0.0104 | 0.0207 |
| On-Site | Cesium-137 | 55 | pCi/g | 0.491 | 0.0489 | | 0.0107 | 0.0213 |
| On-Site | Cesium-137 | 56 | pCi/g | 0.0203 | 0.0126 | | 0.0081 | 0.0162 |
| On-Site | Cesium-137 | 57 | pCi/g | 0.0408 | 0.0107 | | 0.00695 | 0.0139 |
| On-Site | Cesium-137 | 66 | pCi/g | 0.0569 | 0.0143 | | 0.00781 | 0.0156 |
| On-Site | Cesium-137 | 76 | pCi/g | 0.146 | 0.0329 | | 0.0138 | 0.0275 |
| On-Site | Cesium-137 | 77 | pCi/g | 0.408 | 0.0612 | | 0.0183 | 0.0365 |
| On-Site | Cesium-137 | 78 | pCi/g | 0.475 | 0.0435 | | 0.0092 | 0.0184 |
| On-Site | Cesium-137 | 86 | pCi/g | 0.0125 | 0.0131 | U | 0.00894 | 0.0179 |
| On-Site | Cesium-137 | 92 | pCi/g | 0.489 | 0.0671 | | 0.0177 | 0.0354 |
| On-Site | Tritium | 1 | pCi/L | -12.2 | 166 | U | 139 | 289 |
| On-Site | Tritium | 02NE | pCi/L | 617 | 153 | | 90.3 | 187 |
| On-Site | Tritium | 02NW | pCi/L | 430 | 149 | | 104 | 215 |
| On-Site | Tritium | 02SE | pCi/L | 437 | 149 | | 105 | 215 |
| On-Site | Tritium | 02SW | pCi/L | 224 | 134 | | 104 | 214 |
| On-Site | Tritium | 3 | pCi/L | 160 | 89.3 | | 61.3 | 133 |
| On-Site | Tritium | 6 | pCi/L | 158 | 89.8 | | 61.8 | 134 |
| On-Site | Tritium | 7 | pCi/L | 246 | 105 | | 75.9 | 157 |
| On-Site | Tritium | 33 | pCi/L | 152 | 111 | U | 86.5 | 179 |
| On-Site | Tritium | 34 | pCi/L | 59.1 | 112 | U | 92.3 | 191 |
| On-Site | Tritium | 35 | pCi/L | 268 | 107 | | 76.6 | 158 |
| On-Site | Tritium | 41 | pCi/L | 113 | 60.3 | | 41.8 | 89.9 |
| On-Site | Tritium | 42 | pCi/L | 85.4 | 93.7 | U | 75.6 | 156 |
| On-Site | Tritium | 43 | pCi/L | 202 | 101 | | 76 | 157 |
| On-Site | Tritium | 45 | pCi/L | 142 | 96.9 | U | 75 | 156 |
| On-Site | Tritium | 46 | pCi/L | 148 | 58.5 | | 39.1 | 82.7 |
| On-Site | Tritium | 49 | pCi/L | 202 | 93.4 | | 60.7 | 132 |
| On-Site | Tritium | 51 | pCi/L | 134 | 80.7 | | 56.3 | 122 |
| On-Site | Tritium | 52 | pCi/L | 148 | 84.2 | | 58 | 126 |
| On-Site | Tritium | 53 | pCi/L | 134 | 84 | | 59.1 | 129 |

**TABLE C-1.  Radiological Results Sorted by Location for Calendar Year 2010, Soil**

| Location Type | Analyte | Location | Units | Activity and/or Concentration | Two Sigma Error | Lab Data Qualifiers | Decision Level | MDA |
|---|---|---|---|---|---|---|---|---|
| On-Site | Tritium | 54 | pCi/L | 127 | 57.3 | | 39.8 | 84 |
| On-Site | Tritium | 55 | pCi/L | 46.4 | 107 | U | 88.3 | 183 |
| On-Site | Tritium | 56 | pCi/L | 121 | 62 | | 42.6 | 91.7 |
| On-Site | Tritium | 57 | pCi/L | 200 | 94.3 | | 61.7 | 134 |
| On-Site | Tritium | 66 | pCi/L | 23.2 | 125 | U | 104 | 214 |
| On-Site | Tritium | 76 | pCi/L | 191 | 100 | | 75 | 156 |
| On-Site | Tritium | 77 | pCi/L | 38 | 90.4 | U | 74.5 | 155 |
| On-Site | Tritium | 78 | pCi/L | 130 | 81.6 | | 57.4 | 125 |
| On-Site | Tritium | 86 | pCi/L | 33 | 136 | U | 113 | 233 |
| On-Site | Tritium | 92 | pCi/g | -0.125 | 0.714 | U | 0.605 | 1.27 |
| On-Site | Uranium | 1 | mg/kg | 0.645 | | | 0.0124 | 0.0377 |
| On-Site | Uranium | 02NE | mg/kg | 0.264 | | | 0.0129 | 0.039 |
| On-Site | Uranium | 02NW | mg/kg | 0.607 | | | 0.0129 | 0.0391 |
| On-Site | Uranium | 02SE | mg/kg | 0.415 | | | 0.0114 | 0.0346 |
| On-Site | Uranium | 02SW | mg/kg | 0.321 | | | 0.0131 | 0.0398 |
| On-Site | Uranium | 3 | mg/kg | 0.485 | | | 0.0129 | 0.0392 |
| On-Site | Uranium | 6 | mg/kg | 0.404 | | | 0.0129 | 0.0392 |
| On-Site | Uranium | 7 | mg/kg | 0.347 | | | 0.0125 | 0.038 |
| On-Site | Uranium | 33 | mg/kg | 0.702 | | | 0.0118 | 0.0359 |
| On-Site | Uranium | 34 | mg/kg | 0.507 | | | 0.0131 | 0.0398 |
| On-Site | Uranium | 41 | mg/kg | 0.34 | | | 0.0122 | 0.037 |
| On-Site | Uranium | 42 | mg/kg | 0.383 | | | 0.013 | 0.0393 |
| On-Site | Uranium | 43 | mg/kg | 0.313 | | | 0.0122 | 0.0368 |
| On-Site | Uranium | 45 | mg/kg | 0.322 | | | 0.0128 | 0.0387 |
| On-Site | Uranium | 46 | mg/kg | 0.665 | | | 0.0123 | 0.0373 |
| On-Site | Uranium | 49 | mg/kg | 0.52 | | | 0.0128 | 0.0389 |
| On-Site | Uranium | 51 | mg/kg | 0.616 | | | 0.0124 | 0.0377 |
| On-Site | Uranium | 52 | mg/kg | 0.397 | | | 0.0125 | 0.0379 |
| On-Site | Uranium | 53 | mg/kg | 0.314 | | | 0.0117 | 0.0355 |
| On-Site | Uranium | 54 | mg/kg | 0.357 | | | 0.013 | 0.0394 |
| On-Site | Uranium | 55 | mg/kg | 0.557 | | | 0.0127 | 0.0385 |
| On-Site | Uranium | 56 | mg/kg | 0.401 | | | 0.0125 | 0.0378 |

## TABLE C-1. Radiological Results Sorted by Location for Calendar Year 2010, Soil

| Location Type | Analyte | Location | Units | Activity and/or Concentration | Two Sigma Error | Lab Data Qualifiers | Decision Level | MDA |
|---|---|---|---|---|---|---|---|---|
| On-Site | Uranium | 57 | mg/kg | 0.846 | | | 0.0131 | 0.0398 |
| On-Site | Uranium | 76 | mg/kg | 0.268 | | | 0.0132 | 0.04 |
| On-Site | Uranium | 77 | mg/kg | 0.393 | | | 0.0123 | 0.0372 |
| On-Site | Uranium | 78 | mg/kg | 0.435 | | | 0.0122 | 0.0371 |
| On-Site | Uranium | 86 | mg/kg | 0.905 | | | 0.0124 | 0.0375 |
| On-Site | Uranium | 90 | mg/kg | 0.356 | | | 0.0115 | 0.035 |
| On-Site | Uranium | 91 | mg/kg | 0.199 | | | 0.0111 | 0.0335 |
| On-Site | Uranium | 92 | mg/kg | 0.383 | | | 0.0124 | 0.0377 |
| Perimeter | Americium-241 | 4 | pCi/g | 0.0144 | 0.0357 | U | 0.0338 | 0.0677 |
| Perimeter | Americium-241 | 5 | pCi/g | 0.00147 | 0.0415 | U | 0.0394 | 0.0788 |
| Perimeter | Americium-241 | 12 | pCi/g | 0.0137 | 0.0155 | U | 0.0129 | 0.0259 |
| Perimeter | Americium-241 | 16 | pCi/g | -0.039 | 0.0857 | U | 0.0798 | 0.159 |
| Perimeter | Americium-241 | 19 | pCi/g | -0.122 | 0.0794 | U | 0.072 | 0.144 |
| Perimeter | Americium-241 | 58 | pCi/g | 0.0742 | 0.0486 | U | 0.0408 | 0.0815 |
| Perimeter | Americium-241 | 59 | pCi/g | 0.00509 | 0.0254 | U | 0.0215 | 0.0429 |
| Perimeter | Americium-241 | 60 | pCi/g | 0.0122 | 0.0498 | U | 0.0406 | 0.0811 |
| Perimeter | Americium-241 | 61 | pCi/g | -0.0228 | 0.0353 | U | 0.0283 | 0.0565 |
| Perimeter | Americium-241 | 63 | pCi/g | 0.0509 | 0.0656 | U | 0.0557 | 0.111 |
| Perimeter | Americium-241 | 64 | pCi/g | -0.0109 | 0.0568 | U | 0.0494 | 0.0986 |
| Perimeter | Americium-241 | 80 | pCi/g | 0.00778 | 0.0288 | U | 0.0236 | 0.0472 |
| Perimeter | Americium-241 | 81 | pCi/g | 0.0146 | 0.0684 | U | 0.0644 | 0.129 |
| Perimeter | Americium-241 | 82 | pCi/g | -0.00685 | 0.0487 | U | 0.0419 | 0.0838 |
| Perimeter | Americium-241 | 87 | pCi/g | 0.025 | 0.0261 | U | 0.0221 | 0.0442 |
| Perimeter | Americium-241 | 88 | pCi/g | -0.00956 | 0.0221 | U | 0.0208 | 0.0416 |
| Perimeter | Americium-241 | 89 | pCi/g | 0.0855 | 0.0668 | U | 0.0582 | 0.116 |
| Perimeter | Cesium-137 | 4 | pCi/g | 0.468 | 0.046 | | 0.00831 | 0.0166 |
| Perimeter | Cesium-137 | 5 | pCi/g | 0.127 | 0.0191 | | 0.0066 | 0.0132 |
| Perimeter | Cesium-137 | 12 | pCi/g | 0.833 | 0.0976 | | 0.011 | 0.022 |
| Perimeter | Cesium-137 | 16 | pCi/g | 0.0676 | 0.0185 | U | 0.0174 | 0.0676 |
| Perimeter | Cesium-137 | 19 | pCi/g | 0.362 | 0.0366 | | 0.0103 | 0.0207 |
| Perimeter | Cesium-137 | 58 | pCi/g | 0.0548 | 0.0136 | | 0.00938 | 0.0188 |
| Perimeter | Cesium-137 | 59 | pCi/g | 0.25 | 0.0282 | | 0.00714 | 0.0143 |

**TABLE C-1. Radiological Results Sorted by Location for Calendar Year 2010, Soil**

| Location Type | Analyte | Location | Units | Activity and/or Concentration | Two Sigma Error | Lab Data Qualifiers | Decision Level | MDA |
|---|---|---|---|---|---|---|---|---|
| Perimeter | Cesium-137 | 60 | pCi/g | 0.0176 | 0.0177 | U | 0.00966 | 0.0193 |
| Perimeter | Cesium-137 | 61 | pCi/g | -0.00741 | 0.013 | U | 0.00965 | 0.0193 |
| Perimeter | Cesium-137 | 63 | pCi/g | 0.403 | 0.0416 | | 0.00887 | 0.0177 |
| Perimeter | Cesium-137 | 64 | pCi/g | 0.176 | 0.0363 | | 0.0165 | 0.033 |
| Perimeter | Cesium-137 | 80 | pCi/g | 0.0947 | 0.0185 | | 0.00845 | 0.0169 |
| Perimeter | Cesium-137 | 81 | pCi/g | 0.334 | 0.0418 | | 0.00992 | 0.0198 |
| Perimeter | Cesium-137 | 82 | pCi/g | 0.0196 | 0.0142 | | 0.0094 | 0.0188 |
| Perimeter | Cesium-137 | 87 | pCi/g | 0.264 | 0.0323 | | 0.00706 | 0.0141 |
| Perimeter | Cesium-137 | 88 | pCi/g | 0.141 | 0.0223 | | 0.00768 | 0.0154 |
| Perimeter | Cesium-137 | 89 | pCi/g | 0.0635 | 0.0184 | | 0.0106 | 0.0211 |
| Perimeter | Tritium | 4 | pCi/L | 243 | 103 | | 74.3 | 154 |
| Perimeter | Tritium | 5 | pCi/L | 201 | 151 | U | 120 | 246 |
| Perimeter | Tritium | 12 | pCi/g | 0.0249 | 0.721 | U | 0.604 | 1.27 |
| Perimeter | Tritium | 16 | pCi/L | 141 | 104 | U | 81.9 | 169 |
| Perimeter | Tritium | 16 | pCi/g | 0.5 | 0.759 | U | 0.607 | 1.28 |
| Perimeter | Tritium | 19 | pCi/L | 140 | 84.2 | | 58.7 | 128 |
| Perimeter | Tritium | 58 | pCi/L | 212 | 94.2 | | 60.4 | 131 |
| Perimeter | Tritium | 59 | pCi/L | 240 | 102 | | 64.2 | 140 |
| Perimeter | Tritium | 60 | pCi/L | 109 | 132 | U | 107 | 221 |
| Perimeter | Tritium | 61 | pCi/L | 117 | 90.3 | U | 71.1 | 147 |
| Perimeter | Tritium | 63 | pCi/L | 134 | 57.5 | | 39.5 | 83.4 |
| Perimeter | Tritium | 64 | pCi/g | 0.228 | 0.748 | U | 0.615 | 1.29 |
| Perimeter | Tritium | 64 | pCi/g | 0.545 | 0.71 | U | 0.562 | 1.18 |
| Perimeter | Tritium | 64 | pCi/g | 0.672 | 0.799 | U | 0.627 | 1.32 |
| Perimeter | Tritium | 80 | pCi/L | 94.1 | 58.8 | | 42.2 | 90.7 |
| Perimeter | Tritium | 81 | pCi/L | 122 | 132 | U | 107 | 220 |
| Perimeter | Tritium | 82 | pCi/L | 115 | 56.1 | | 39.7 | 84 |
| Perimeter | Tritium | 87 | pCi/L | 190 | 101 | | 75.6 | 157 |
| Perimeter | Tritium | 88 | pCi/L | 186 | 112 | | 86.5 | 179 |
| Perimeter | Tritium | 89 | pCi/L | 230 | 130 | | 98.9 | 205 |
| Perimeter | Uranium | 4 | mg/kg | 0.48 | | | 0.013 | 0.0395 |
| Perimeter | Uranium | 5 | mg/kg | 0.339 | | | 0.0124 | 0.0376 |

## TABLE C-1. Radiological Results Sorted by Location for Calendar Year 2010, Soil

| Location Type | Analyte | Location | Units | Activity and/or Concentration | Two Sigma Error | Lab Data Qualifiers | Decision Level | MDA |
|---|---|---|---|---|---|---|---|---|
| Perimeter | Uranium | 12 | mg/kg | 0.364 | | | 0.013 | 0.0394 |
| Perimeter | Uranium | 16 | mg/kg | 0.764 | | | 0.0115 | 0.0348 |
| Perimeter | Uranium | 19 | mg/kg | 0.46 | | | 0.0126 | 0.0381 |
| Perimeter | Uranium | 58 | mg/kg | 0.617 | | | 0.013 | 0.0393 |
| Perimeter | Uranium | 59 | mg/kg | 0.487 | | | 0.0126 | 0.0383 |
| Perimeter | Uranium | 60 | mg/kg | 0.556 | | | 0.013 | 0.0394 |
| Perimeter | Uranium | 61 | mg/kg | 0.458 | | | 0.0125 | 0.038 |
| Perimeter | Uranium | 63 | mg/kg | 0.516 | | | 0.0131 | 0.0398 |
| Perimeter | Uranium | 64 | mg/kg | 0.832 | | | 0.0126 | 0.0383 |
| Perimeter | Uranium | 80 | mg/kg | 0.673 | | | 0.0127 | 0.0385 |
| Perimeter | Uranium | 81 | mg/kg | 0.463 | | | 0.0131 | 0.0398 |
| Perimeter | Uranium | 82 | mg/kg | 0.727 | | | 0.0125 | 0.038 |
| Perimeter | Uranium | 87 | mg/kg | 0.232 | | | 0.0124 | 0.0375 |
| Perimeter | Uranium | 88 | mg/kg | 0.178 | | | 0.0129 | 0.0391 |
| Perimeter | Uranium | 89 | mg/kg | 0.367 | | | 0.0126 | 0.0383 |

**NOTES:**

**MDA = minimum detectable amount**
**mg/kg = milligram per kilogram**
**n/a = not applicable**
**pCi/g = picocurie per gram**
**pCi/L = picocurie per liter**
**U = The analyte was analyzed for, but not detected above the MDA.**

# TABLE C-2. Radiological Results by Location for Calendar Year 2010, Sediment

| Location Type | Analyte | Location | Units | Activity and/or Concentration | Two Sigma Error | Lab Data Qualifiers | Decision Level | MDA |
|---|---|---|---|---|---|---|---|---|
| Community | Americium-241 | 8 | pCi/g | 0.0758 | 0.0516 | U | 0.0422 | 0.0844 |
| Community | Americium-241 | 68 | pCi/g | 0.00672 | 0.0748 | U | 0.0612 | 0.122 |
| Community | Cesium-137 | 8 | pCi/g | 0.0955 | 0.0251 | | 0.0109 | 0.0218 |
| Community | Cesium-137 | 68 | pCi/g | 0.1 | 0.0367 | | 0.014 | 0.0281 |
| Community | Tritium | 8 | pCi/L | 18 | 104 | U | 86.6 | 180 |
| Community | Tritium | 68 | pCi/L | 97.6 | 104 | U | 84.5 | 173 |
| Community | Uranium | 68 | mg/kg | 0.651 | | | 0.0127 | 0.0384 |
| On-Site | Americium-241 | 72 | pCi/g | 0.0502 | 0.0619 | U | 0.0517 | 0.103 |
| On-Site | Americium-241 | 74N | pCi/g | 0.0327 | 0.0537 | U | 0.0479 | 0.0957 |
| On-Site | Americium-241 | 75 | pCi/g | 0.0758 | 0.0616 | U | 0.0524 | 0.105 |
| On-Site | Americium-241 | 79 | pCi/g | 0.0628 | 0.0684 | U | 0.0491 | 0.098 |
| On-Site | Americium-241 | 83 | pCi/g | 0.00923 | 0.0164 | U | 0.0134 | 0.0268 |
| On-Site | Americium-241 | 84 | pCi/g | -0.00963 | 0.0501 | U | 0.0402 | 0.0803 |
| On-Site | Americium-241 | 85 | pCi/g | 0.0611 | 0.0526 | U | 0.0433 | 0.0865 |
| On-Site | Cesium-137 | 72 | pCi/g | 0.0356 | 0.0153 | | 0.00999 | 0.02 |
| On-Site | Cesium-137 | 74N | pCi/g | 0.00694 | 0.0133 | U | 0.0106 | 0.0211 |
| On-Site | Cesium-137 | 75 | pCi/g | 0.0185 | 0.0167 | U | 0.0115 | 0.023 |
| On-Site | Cesium-137 | 79 | pCi/g | 0.138 | 0.0226 | | 0.0106 | 0.0212 |
| On-Site | Cesium-137 | 83 | pCi/g | 0.173 | 0.0342 | | 0.0129 | 0.0258 |
| On-Site | Cesium-137 | 84 | pCi/g | 0.124 | 0.019 | | 0.00907 | 0.0181 |
| On-Site | Cesium-137 | 85 | pCi/g | 0.22 | 0.031 | | 0.0105 | 0.021 |
| On-Site | Tritium | 72 | pCi/L | 154 | 98 | U | 75.9 | 157 |
| On-Site | Tritium | 74N | pCi/L | 596 | 210 | | 145 | 300 |
| On-Site | Tritium | 75 | pCi/L | 434 | 148 | | 100 | 208 |
| On-Site | Tritium | 79 | pCi/L | 31.8 | 111 | U | 91.8 | 190 |
| On-Site | Tritium | 83 | pCi/L | 176 | 229 | U | 186 | 384 |
| On-Site | Tritium | 84 | pCi/L | 195 | 100 | | 75.6 | 156 |
| On-Site | Tritium | 85 | pCi/L | 144 | 96.6 | U | 75.2 | 155 |
| On-Site | Uranium | 72 | mg/kg | 0.55 | | | 0.0116 | 0.0352 |
| On-Site | Uranium | 74N | mg/kg | 0.593 | | | 0.0122 | 0.0368 |
| On-Site | Uranium | 75 | mg/kg | 0.824 | | | 0.0125 | 0.038 |
| On-Site | Uranium | 79 | mg/kg | 1.51 | | | 0.0124 | 0.0375 |

## TABLE C-2. Radiological Results by Location for Calendar Year 2010, Sediment

| Location Type | Analyte | Location | Units | Activity and/or Concentration | Two Sigma Error | Lab Data Qualifiers | Decision Level | MDA |
|---|---|---|---|---|---|---|---|---|
| On-Site | Uranium | 83 | mg/kg | 0.706 | | | 0.012 | 0.0363 |
| On-Site | Uranium | 84 | mg/kg | 0.644 | | | 0.012 | 0.0364 |
| On-Site | Uranium | 85 | mg/kg | 0.774 | | | 0.0131 | 0.0398 |
| Perimeter | Americium-241 | 60 | pCi/g | -0.000239 | 0.0363 | U | 0.0307 | 0.0615 |
| Perimeter | Americium-241 | 73 | pCi/g | -0.0000844 | 0.0205 | U | 0.0165 | 0.033 |
| Perimeter | Cesium-137 | 60 | pCi/g | 0.00219 | 0.0122 | U | 0.0108 | 0.0217 |
| Perimeter | Cesium-137 | 73 | pCi/g | 0.0239 | 0.015 | U | 0.0134 | 0.0268 |
| Perimeter | Tritium | 60 | pCi/L | 69.3 | 180 | U | 149 | 309 |
| Perimeter | Tritium | 73 | pCi/L | 378 | 138 | | 96.3 | 199 |
| Perimeter | Uranium | 60 | mg/kg | 0.653 | | | 0.0118 | 0.0357 |
| Perimeter | Uranium | 65 | mg/kg | 1.44 | | | 0.0122 | 0.0368 |
| Perimeter | Uranium | 73 | mg/kg | 0.39 | | | 0.0122 | 0.037 |

**NOTES:**

**MDA = minimum detectable amount**
**mg/kg = milligram per kilogram**
**n/a = not applicable**
**pCi/g = picocurie per gram**
**pCi/L = picocurie per liter**
**U = The analyte was analyzed for, but not detected above the MDA.**

## TABLE C-3. Radiological Replicate Results Sorted by Location for Calendar Year 2010, Soil

| Location Type | Analyte | Location | Sample ID | Units | Activity and/or Concentration | Two Sigma Error | Qualifier | Decision Level | MDA |
|---|---|---|---|---|---|---|---|---|---|
| On-Site | Americium-241 | 02NE | 088761-001 | pCi/g | -0.12 | 0.08 | U | 0.06 | 0.13 |
| On-Site | Americium-241 | 02NE | 088761-002 | pCi/g | -0.06 | 0.08 | U | 0.07 | 0.14 |
| On-Site | Americium-241 | 02NE | 088761-003 | pCi/g | 0.00 | 0.08 | U | 0.08 | 0.16 |
| | | | **Average** | | **-0.06** | | | | |
| | | | **Std Dev** | | **0.06** | | | | |
| | | | **CV (%)** | | **-98.15** | | | | |
| On-Site | Americium-241 | 33 | 088796-001 | pCi/g | 0.02 | 0.07 | U | 0.06 | 0.13 |
| On-Site | Americium-241 | 33 | 088796-002 | pCi/g | 0.00 | 0.11 | U | 0.09 | 0.18 |
| On-Site | Americium-241 | 33 | 088796-003 | pCi/g | 0.02 | 0.02 | U | 0.02 | 0.03 |
| | | | **Average** | | **0.01** | | | | |
| | | | **Std Dev** | | **0.01** | | | | |
| | | | **CV (%)** | | **109.54** | | | | |
| On-Site | Americium-241 | 53 | 088756-001 | pCi/g | -0.05 | 0.05 | U | 0.04 | 0.09 |
| On-Site | Americium-241 | 53 | 088756-002 | pCi/g | 0.02 | 0.03 | U | 0.03 | 0.07 |
| On-Site | Americium-241 | 53 | 088756-003 | pCi/g | 0.02 | 0.04 | U | 0.03 | 0.07 |
| | | | **Average** | | **0.00** | | | | |
| | | | **Std Dev** | | **0.04** | | | | |
| | | | **CV (%)** | | **-2548.74** | | | | |
| On-Site | Cesium-137 | 02NE | 088761-001 | pCi/g | 0.15 | 0.03 | | 0.01 | 0.03 |
| On-Site | Cesium-137 | 02NE | 088761-002 | pCi/g | 0.14 | 0.03 | | 0.02 | 0.03 |
| On-Site | Cesium-137 | 02NE | 088761-003 | pCi/g | 0.17 | 0.03 | | 0.01 | 0.03 |
| | | | **Average** | | **0.15** | | | | |
| | | | **Std Dev** | | **0.01** | | | | |
| | | | **CV (%)** | | **7.19** | | | | |
| On-Site | Cesium-137 | 33 | 088796-001 | pCi/g | 0.10 | 0.02 | | 0.01 | 0.02 |
| On-Site | Cesium-137 | 33 | 088796-002 | pCi/g | 0.12 | 0.03 | | 0.01 | 0.02 |
| On-Site | Cesium-137 | 33 | 088796-003 | pCi/g | 0.10 | 0.02 | | 0.01 | 0.02 |
| | | | **Average** | | **0.11** | | | | |
| | | | **Std Dev** | | **0.01** | | | | |
| | | | **CV (%)** | | **11.85** | | | | |
| On-Site | Cesium-137 | 53 | 088756-001 | pCi/g | 0.04 | 0.01 | | 0.01 | 0.01 |
| On-Site | Cesium-137 | 53 | 088756-002 | pCi/g | 0.05 | 0.01 | | 0.01 | 0.01 |
| On-Site | Cesium-137 | 53 | 088756-003 | pCi/g | 0.05 | 0.01 | | 0.01 | 0.02 |
| | | | **Average** | | **0.04** | | | | |
| | | | **Std Dev** | | **0.00** | | | | |
| | | | **CV (%)** | | **9.70** | | | | |

## TABLE C-3. Radiological Replicate Results Sorted by Location for Calendar Year 2010, Soil

| Location Type | Analyte | Location | Sample ID | Units | Activity and/or Concentration | Two Sigma Error | Qualifier | Decision Level | MDA |
|---|---|---|---|---|---|---|---|---|---|
| On-Site | Tritium | 02NE | 088761-001 | pCi/L | 617.00 | 153.00 | | 90.30 | 187.00 |
| On-Site | Tritium | 02NE | 088761-002 | pCi/L | 615.00 | 158.00 | | 94.60 | 196.00 |
| On-Site | Tritium | 02NE | 088761-003 | pCi/L | 777.00 | 174.00 | | 94.50 | 195.00 |
| | | | **Average** | | **669.67** | | | | |
| | | | **Std Dev** | | **92.96** | | | | |
| | | | **CV (%)** | | **13.88** | | | | |
| On-Site | Tritium | 33 | 088796-001 | pCi/L | 152.00 | 111.00 | U | 86.50 | 179.00 |
| On-Site | Tritium | 33 | 088796-002 | pCi/L | 198.00 | 121.00 | | 92.70 | 192.00 |
| On-Site | Tritium | 33 | 088796-003 | pCi/L | 137.00 | 94.20 | U | 73.40 | 152.00 |
| | | | **Average** | | **162.33** | | | | |
| | | | **Std Dev** | | **31.79** | | | | |
| | | | **CV (%)** | | **19.58** | | | | |
| On-Site | Tritium | 53 | 088756-001 | pCi/L | 134.00 | 84.00 | | 59.10 | 129.00 |
| On-Site | Tritium | 53 | 088756-002 | pCi/L | 239.00 | 92.20 | | 56.10 | 122.00 |
| On-Site | Tritium | 53 | 088756-003 | pCi/L | 269.00 | 104.00 | | 63.20 | 137.00 |
| | | | **Average** | | **214.00** | | | | |
| | | | **Std Dev** | | **70.89** | | | | |
| | | | **CV (%)** | | **33.12** | | | | |
| On-Site | Uranium | 02NE | 088761-001 | mg/kg | 0.26 | | | 0.01 | 0.04 |
| On-Site | Uranium | 02NE | 088761-002 | mg/kg | 0.46 | | | 0.01 | 0.04 |
| On-Site | Uranium | 02NE | 088761-003 | mg/kg | 0.27 | | | 0.01 | 0.04 |
| | | | **Average** | | **0.33** | | | | |
| | | | **Std Dev** | | **0.11** | | | | |
| | | | **CV (%)** | | **33.10** | | | | |
| On-Site | Uranium | 33 | 088796-001 | mg/kg | 0.70 | | | 0.01 | 0.04 |
| On-Site | Uranium | 33 | 088796-002 | mg/kg | 0.99 | | | 0.01 | 0.04 |
| On-Site | Uranium | 33 | 088796-003 | mg/kg | 0.92 | | | 0.01 | 0.04 |
| | | | **Average** | | **0.87** | | | | |
| | | | **Std Dev** | | **0.15** | | | | |
| | | | **CV (%)** | | **17.40** | | | | |
| On-Site | Uranium | 53 | 088756-001 | mg/kg | 0.31 | | | 0.01 | 0.04 |
| On-Site | Uranium | 53 | 088756-002 | mg/kg | 0.27 | | | 0.01 | 0.04 |
| On-Site | Uranium | 53 | 088756-003 | mg/kg | 0.25 | | | 0.01 | 0.04 |
| | | | **Average** | | **0.28** | | | | |
| | | | **Std Dev** | | **0.03** | | | | |
| | | | **CV (%)** | | **10.88** | | | | |

## TABLE C-3. Radiological Replicate Results Sorted by Location for Calendar Year 2010, Soil

| Location Type | Analyte | Location | Sample ID | Units | Activity and/or Concentration | Two Sigma Error | Qualifier | Decision Level | MDA |
|---|---|---|---|---|---|---|---|---|---|
| Perimeter | Americium-241 | 64 | 088807-001 | pCi/g | -0.01 | 0.06 | U | 0.05 | 0.10 |
| Perimeter | Americium-241 | 64 | 088807-002 | pCi/g | 0.05 | 0.07 | U | 0.06 | 0.12 |
| Perimeter | Americium-241 | 64 | 088807-003 | pCi/g | 0.11 | 0.07 | U | 0.06 | 0.11 |
| | | | **Average** | | **0.05** | | | | |
| | | | **Std Dev** | | **0.06** | | | | |
| | | | **CV (%)** | | **124.21** | | | | |
| Perimeter | Cesium-137 | 64 | 088807-001 | pCi/g | 0.18 | 0.04 | | 0.02 | 0.03 |
| Perimeter | Cesium-137 | 64 | 088807-002 | pCi/g | 0.60 | 0.07 | | 0.02 | 0.04 |
| Perimeter | Cesium-137 | 64 | 088807-003 | pCi/g | 0.00 | 0.01 | U | 0.01 | 0.02 |
| | | | **Average** | | **0.26** | | | | |
| | | | **Std Dev** | | **0.31** | | | | |
| | | | **CV (%)** | | **119.24** | | | | |
| Perimeter | Tritium | 64 | 088807-R01 | pCi/g | 0.55 | 0.71 | U | 0.56 | 1.18 |
| Perimeter | Tritium | 64 | 088807-R02 | pCi/g | 0.23 | 0.75 | U | 0.62 | 1.29 |
| Perimeter | Tritium | 64 | 088807-R03 | pCi/g | 0.67 | 0.80 | U | 0.63 | 1.32 |
| | | | **Average** | | **0.48** | | | | |
| | | | **Std Dev** | | **0.23** | | | | |
| | | | **CV (%)** | | **47.48** | | | | |
| Perimeter | Uranium | 64 | 088807-001 | mg/kg | 0.83 | | | 0.01 | 0.04 |
| Perimeter | Uranium | 64 | 088807-002 | mg/kg | 0.94 | | | 0.01 | 0.04 |
| Perimeter | Uranium | 64 | 088807-003 | mg/kg | 1.28 | | | 0.01 | 0.04 |
| | | | **Average** | | **1.02** | | | | |
| | | | **Std Dev** | | **0.23** | | | | |
| | | | **CV (%)** | | **23.08** | | | | |

**NOTES:**

**CV = coefficient of variation. Only meaningful if data contains non-zero values.**
**mg/kg = milligram per kilogram**
**n/a = not applicable**
**MDA = minimum detectable amount.**
**pCi/g = picocurie per gram**
**pCi/L = picocurie per liter**
**Std Dev = standard deviation**
**U = The analyte was analyzed for, but not detected. For organic and inorganic analytes the result is less than the method detection limit.**

## TABLE C-3.  Radiological Replicate Results Sorted by Location for Calendar Year 2010, Soil

| Location Type | Analyte | Location | Sample ID | Units | Activity and/or Concentration | Two Sigma Error | Qualifier | Decision Level | MDA |
|---|---|---|---|---|---|---|---|---|---|
| For radiochemical analytes the result is less than the MDA. | | | | | | | | | |

## TABLE C-4. Radiological Replicate Results Sorted by Location for Calendar Year 2010, Sediment

| Location Type | Analyte | Location | Sample ID | Units | Activity and/or Concentration | Two Sigma Error | Qualifier | Decision Level | Detection Limit |
|---|---|---|---|---|---|---|---|---|---|
| On-Site | Americium-241 | 74N | 088811-001 | pCi/g | 0.03 | 0.05 | U | 0.05 | 0.10 |
| On-Site | Americium-241 | 74N | 088811-002 | pCi/g | -0.02 | 0.04 | U | 0.03 | 0.07 |
| On-Site | Americium-241 | 74N | 088811-003 | pCi/g | 0.03 | 0.02 | U | 0.02 | 0.03 |
| | | | **Average** | | **0.02** | | | | |
| | | | **Std Dev** | | **0.03** | | | | |
| | | | **CV (%)** | | **180.42** | | | | |
| On-Site | Cesium-137 | 74N | 088811-001 | pCi/g | 0.01 | 0.01 | U | 0.01 | 0.02 |
| On-Site | Cesium-137 | 74N | 088811-002 | pCi/g | 0.00 | 0.01 | U | 0.01 | 0.02 |
| On-Site | Cesium-137 | 74N | 088811-003 | pCi/g | 0.02 | 0.01 | U | 0.01 | 0.02 |
| | | | **Average** | | **0.01** | | | | |
| | | | **Std Dev** | | **0.01** | | | | |
| | | | **CV (%)** | | **149.83** | | | | |
| On-Site | Tritium | 74N | 088811-001 | pCi/L | 596.00 | 210.00 | | 145.00 | 300.00 |
| On-Site | Tritium | 74N | 088811-002 | pCi/L | 1110.00 | 214.00 | | 97.30 | 201.00 |
| On-Site | Tritium | 74N | 088811-003 | pCi/L | 564.00 | 163.00 | | 104.00 | 216.00 |
| | | | **Average** | | **756.67** | | | | |
| | | | **Std Dev** | | **306.41** | | | | |
| | | | **CV (%)** | | **40.50** | | | | |
| On-Site | Uranium | 74N | 088811-001 | mg/kg | 0.59 | | | 0.01 | 0.04 |
| On-Site | Uranium | 74N | 088811-002 | mg/kg | 0.46 | | | 0.01 | 0.04 |
| On-Site | Uranium | 74N | 088811-003 | mg/kg | 0.85 | | | 0.01 | 0.04 |
| | | | **Average** | | **0.63** | | | | |
| | | | **Std Dev** | | **0.20** | | | | |
| | | | **CV (%)** | | **31.17** | | | | |

**NOTES:**

**CV = coefficient of variation. Only meaningful if data contains non-zero values.**
**mg/kg = milligram per kilogram**
**n/a = not applicable**
**MDA = minimum detectable amount.**
**pCi/g = picocurie per gram**
**pCi/L = picocurie per liter**
**Std Dev = standard deviation**
**U = The analyte was analyzed for, but not detected. For organic and inorganic analytes the result is less than the method detection limit.**

## TABLE C-4. Radiological Replicate Results Sorted by Location for Calendar Year 2010, Sediment

| Location Type | Analyte | Location | Sample ID | Units | Activity and/or Concentration | Two Sigma Error | Qualifier | Decision Level | Detection Limit |
|---|---|---|---|---|---|---|---|---|---|
| For radiochemical analytes the result is less than the MDA. | | | | | | | | | |

**TABLE C-5. TLD Measurements by Quarter and Location Class for Calendar Year 2010**

| Location Class | Location Number | 1st Quarter (90 Days) | | 2nd Quarter (93 Days) | | 3rd Quarter (98 Days) | | 4th Quarter (90 Days) | |
|---|---|---|---|---|---|---|---|---|---|
| | | Exposure (mR) | Error | Exposure (mR) | Error | Exposure (mR) | Error | Exposure (mR) | Error |
| Community | 10 | 25.3 | 1.7 | 32.4 | 1.5 | 32.4 | 3.2 | 32.2 | 0.4 |
| Community | 11 | 25.3 | 2.1 | 25.4 | 1.4 | 23.7 | 2.3 | 25.9 | 1.1 |
| Community | 21 | 25.2 | 1.5 | 28.2 | 1.8 | 26.3 | 2.3 | 28.1 | 0.5 |
| Community | 22 | n/a | n/a | 27.2 | 1.4 | 27.8 | 2.9 | 27.1 | 0.5 |
| Community | 23 | 26 | 1.9 | 26.4 | 1.2 | 25.4 | 2.6 | 30.9 | 5.6 |
| Community | 24 | 22.9 | 1.5 | 24.6 | 0.9 | 21.5 | 2.5 | 24.2 | 0.6 |
| Community | 25 | 24 | 1.5 | 26.3 | 0.9 | 25.4 | 2.3 | 25.5 | 0.5 |
| Community | 26 | 29.3 | 1.5 | 29.6 | 0.8 | 32.7 | 2.6 | 32.3 | 2.4 |
| Community | 27 | 26.9 | 2 | 26.6 | 1 | 28 | 2.4 | 26.3 | 0.4 |
| Community | 28 | 25.5 | 1.5 | 24.7 | 1 | 25.5 | 2.1 | 28.8 | 0.4 |
| Community | 29 | 22.6 | 1.6 | 23.7 | 0.9 | 23.9 | 4.6 | 22.8 | 0.5 |
| Community | 30 | 27.1 | 1.7 | 28.9 | 1.1 | 29.2 | 2.6 | 25.2 | 1.3 |
| On-Site | 1 | 27.5 | 0.9 | 27 | 1.1 | 26 | 1.5 | 27.9 | 0.6 |
| On-Site | 2NW | 25.9 | 0.8 | 25.3 | 1.7 | 25.9 | 2.7 | 25.6 | 1.4 |
| On-Site | 3 | 27.5 | 0.7 | 26.5 | 1.3 | 30.1 | 1.2 | 27.3 | 0.6 |
| On-Site | 6 | 25.8 | 0.7 | 26.4 | 2.5 | 23.9 | 1.3 | 26.5 | 0.8 |
| On-Site | 7 | 26.7 | 0.7 | 25.7 | 1.3 | 27.7 | 4.3 | 26.9 | 0.7 |
| On-Site | 20 | 28.4 | 0.8 | 27.6 | 1.8 | 25.7 | 1.6 | 27.2 | 0.7 |
| On-Site | 31 | 27.9 | 0.7 | 28.2 | 1.4 | 26 | 1.4 | 29.8 | 2.8 |
| On-Site | 41 | 29.6 | 3.1 | 26.7 | 2 | 26.8 | 1.5 | 25.8 | 0.6 |
| On-Site | 42 | 26.6 | 0.8 | 24.3 | 1.3 | 25.8 | 3.1 | 26.4 | 1 |
| On-Site | 43 | 26.4 | 1.3 | 25.2 | 1.9 | 25.3 | 1.3 | 26 | 0.6 |
| On-Site | 45 | 26.4 | 0.7 | 27.1 | 1.2 | 26.3 | 2.7 | 27.3 | 1.1 |
| On-Site | 45E | 29.1 | 2 | 26.9 | 1.2 | 26.1 | 1.3 | 28.1 | 0.7 |
| On-Site | 46 | 27.5 | 1.6 | 28.4 | 2.1 | 26.9 | 1.5 | 27 | 0.8 |
| On-Site | 47 | 25.8 | 0.7 | 24.7 | 1.3 | 28.5 | 1.8 | 29.6 | 2.7 |
| On-Site | 48 | 28.5 | 1.1 | 33.2 | 5.8 | 28.3 | 5.4 | 27 | 0.6 |
| On-Site | 66 | 30.2 | 5.5 | 25.4 | 1.1 | 26.2 | 2.3 | 26.1 | 0.8 |
| On-Site | E1003 | 24.6 | 1.6 | 24.7 | 1.5 | 26.7 | 1.2 | 24.2 | 0.7 |
| On-Site | E1004 | 24.6 | 1.5 | 26.3 | 1.9 | 28.5 | 1.9 | 23 | 0.7 |

**TABLE C-5. TLD Measurements by Quarter and Location Class for Calendar Year 2010**

| Location Class | Location Number | 1st Quarter (90 Days) | | 2nd Quarter (93 Days) | | 3rd Quarter (98 Days) | | 4th Quarter (90 Days) | |
|---|---|---|---|---|---|---|---|---|---|
| | | Exposure (mR) | Error | Exposure (mR) | Error | Exposure (mR) | Error | Exposure (mR) | Error |
| Perimeter | 4 | 26.2 | 0.7 | 32.5 | 5.8 | 30.7 | 5.6 | 26.1 | 1.1 |
| Perimeter | 5 | 25.7 | 1.9 | 24.3 | 1.2 | 24.4 | 1.2 | 24.2 | 0.8 |
| Perimeter | 16 | 31.8 | 0.8 | 31.3 | 1.8 | 30.7 | 1.5 | 31.5 | 0.7 |
| Perimeter | 18 | 27 | 0.7 | 32.4 | 5.8 | 29 | 5.5 | 26.4 | 0.6 |
| Perimeter | 19 | 27.2 | 0.9 | 28.3 | 1.1 | 27.3 | 1.7 | 27.6 | 1.4 |
| Perimeter | 39 | 25.7 | 0.9 | 24.7 | 1.7 | 26.8 | 1.2 | 26.1 | 0.9 |
| Perimeter | 40 | 25.9 | 0.9 | 25 | 1.5 | 26.5 | 1.3 | 25.5 | 1 |
| Perimeter | 81 | 26.6 | 0.7 | 27.3 | 1.3 | 27.6 | 1.2 | 27.2 | 0.8 |

NOTES:

mR = Milliroentgen (10E-3 roentgen)

n/a = Dosimeter was not returned to dosimetry lab.

## TABLE C-6. Non-radiological Results by Location for Calendar Year 2010, Soil

| Location Type | Location | Analyte | Units | Result | Lab Data Qualifiers | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|
| Community | 09 | Aluminum | mg/kg | 15800 | | 14.6 | 48.7 |
| Community | 09 | Antimony | mg/kg | 0.314 | U | 0.314 | 0.952 |
| Community | 09 | Arsenic | mg/kg | 4.91 | | 0.195 | 0.975 |
| Community | 09 | Barium | mg/kg | 192 | | 0.487 | 1.95 |
| Community | 09 | Beryllium | mg/kg | 0.747 | | 0.0195 | 0.0975 |
| Community | 09 | Cadmium | mg/kg | 0.352 | | 0.0195 | 0.195 |
| Community | 09 | Calcium | mg/kg | 42900 | | 32.2 | 97.5 |
| Community | 09 | Chromium | mg/kg | 16.7 | | 0.195 | 0.585 |
| Community | 09 | Cobalt | mg/kg | 6.15 | | 0.0585 | 0.195 |
| Community | 09 | Copper | mg/kg | 11.6 | | 0.0643 | 0.195 |
| Community | 09 | Iron | mg/kg | 16300 | | 24.4 | 97.5 |
| Community | 09 | Lead | mg/kg | 17.9 | | 0.0975 | 0.39 |
| Community | 09 | Magnesium | mg/kg | 5140 | | 1.46 | 4.87 |
| Community | 09 | Manganese | mg/kg | 327 | | 0.975 | 4.87 |
| Community | 09 | Nickel | mg/kg | 13 | | 0.0975 | 0.39 |
| Community | 09 | Potassium | mg/kg | 2370 | | 78 | 292 |
| Community | 09 | Selenium | mg/kg | 0.487 | U | 0.487 | 0.975 |
| Community | 09 | Silver | mg/kg | 0.0952 | U | 0.0952 | 0.476 |
| Community | 09 | Sodium | mg/kg | 60 | | 15.6 | 48.7 |
| Community | 09 | Thallium | mg/kg | 0.132 | J | 0.0585 | 0.195 |
| Community | 09 | Vanadium | mg/kg | 32.6 | | 1.95 | 9.75 |
| Community | 09 | Zinc | mg/kg | 47.6 | | 0.39 | 1.95 |
| Community | 10 | Aluminum | mg/kg | 16400 | | 14.8 | 49.2 |
| Community | 10 | Antimony | mg/kg | 0.311 | U | 0.311 | 0.943 |
| Community | 10 | Arsenic | mg/kg | 2.49 | | 0.197 | 0.984 |
| Community | 10 | Barium | mg/kg | 115 | | 0.0984 | 0.394 |
| Community | 10 | Beryllium | mg/kg | 0.67 | | 0.0197 | 0.0984 |
| Community | 10 | Cadmium | mg/kg | 0.289 | | 0.0197 | 0.197 |
| Community | 10 | Calcium | mg/kg | 7750 | | 6.5 | 19.7 |
| Community | 10 | Chromium | mg/kg | 15 | | 0.197 | 0.591 |
| Community | 10 | Cobalt | mg/kg | 5.4 | | 0.0591 | 0.197 |
| Community | 10 | Copper | mg/kg | 8.26 | | 0.065 | 0.197 |
| Community | 10 | Iron | mg/kg | 13900 | | 24.6 | 98.4 |

## TABLE C-6.  Non-radiological Results by Location for Calendar Year 2010, Soil

| Location Type | Location | Analyte | Units | Result | Lab Data Qualifiers | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|
| Community | 10 | Lead | mg/kg | 11 | | 0.0984 | 0.394 |
| Community | 10 | Magnesium | mg/kg | 3520 | | 1.48 | 4.92 |
| Community | 10 | Manganese | mg/kg | 438 | | 0.984 | 4.92 |
| Community | 10 | Nickel | mg/kg | 11.2 | | 0.0984 | 0.394 |
| Community | 10 | Potassium | mg/kg | 2640 | | 78.7 | 295 |
| Community | 10 | Selenium | mg/kg | 0.492 | U | 0.492 | 0.984 |
| Community | 10 | Silver | mg/kg | 0.101 | J | 0.0943 | 0.472 |
| Community | 10 | Sodium | mg/kg | 47.2 | J | 15.7 | 49.2 |
| Community | 10 | Thallium | mg/kg | 0.133 | J | 0.0591 | 0.197 |
| Community | 10 | Vanadium | mg/kg | 24.1 | | 1.97 | 9.84 |
| Community | 10 | Zinc | mg/kg | 36.3 | | 0.394 | 1.97 |
| Community | 25 | Aluminum | mg/kg | 6690 | | 13.9 | 46.3 |
| Community | 25 | Antimony | mg/kg | 1.63 | U | 1.63 | 4.95 |
| Community | 25 | Arsenic | mg/kg | 2.18 | | 0.185 | 0.926 |
| Community | 25 | Barium | mg/kg | 101 | | 0.0926 | 0.37 |
| Community | 25 | Beryllium | mg/kg | 0.259 | | 0.0185 | 0.0926 |
| Community | 25 | Cadmium | mg/kg | 0.291 | | 0.0185 | 0.185 |
| Community | 25 | Calcium | mg/kg | 87000 | | 61.1 | 185 |
| Community | 25 | Chromium | mg/kg | 7.2 | | 0.185 | 0.556 |
| Community | 25 | Cobalt | mg/kg | 2.21 | | 0.0556 | 0.185 |
| Community | 25 | Copper | mg/kg | 5.08 | | 0.0611 | 0.185 |
| Community | 25 | Iron | mg/kg | 5730 | | 4.63 | 18.5 |
| Community | 25 | Lead | mg/kg | 10.6 | | 0.0926 | 0.37 |
| Community | 25 | Magnesium | mg/kg | 9450 | | 6.94 | 23.1 |
| Community | 25 | Manganese | mg/kg | 152 | | 0.185 | 0.926 |
| Community | 25 | Nickel | mg/kg | 11.3 | | 0.0926 | 0.37 |
| Community | 25 | Potassium | mg/kg | 1200 | | 74.1 | 278 |
| Community | 25 | Selenium | mg/kg | 0.463 | U | 0.463 | 0.926 |
| Community | 25 | Silver | mg/kg | 0.099 | U | 0.099 | 0.495 |
| Community | 25 | Sodium | mg/kg | 317 | | 14.8 | 46.3 |
| Community | 25 | Thallium | mg/kg | 0.0643 | J | 0.0556 | 0.185 |
| Community | 25 | Vanadium | mg/kg | 29.5 | | 1.85 | 9.26 |
| Community | 25 | Zinc | mg/kg | 29.3 | | 0.37 | 1.85 |

## TABLE C-6. Non-radiological Results by Location for Calendar Year 2010, Soil

| Location Type | Location | Analyte | Units | Result | Lab Data Qualifiers | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|
| Community | 62 | Aluminum | mg/kg | 14900 | | 14.6 | 48.6 |
| Community | 62 | Antimony | mg/kg | 0.322 | U | 0.322 | 0.975 |
| Community | 62 | Arsenic | mg/kg | 2.18 | | 0.195 | 0.973 |
| Community | 62 | Barium | mg/kg | 115 | | 0.0973 | 0.389 |
| Community | 62 | Beryllium | mg/kg | 0.625 | | 0.0195 | 0.0973 |
| Community | 62 | Cadmium | mg/kg | 0.297 | | 0.0195 | 0.195 |
| Community | 62 | Calcium | mg/kg | 20700 | | 32.1 | 97.3 |
| Community | 62 | Chromium | mg/kg | 14.4 | | 0.195 | 0.584 |
| Community | 62 | Cobalt | mg/kg | 5.34 | | 0.0584 | 0.195 |
| Community | 62 | Copper | mg/kg | 7.78 | | 0.0642 | 0.195 |
| Community | 62 | Iron | mg/kg | 14200 | | 24.3 | 97.3 |
| Community | 62 | Lead | mg/kg | 10.8 | | 0.0973 | 0.389 |
| Community | 62 | Magnesium | mg/kg | 3280 | | 1.46 | 4.86 |
| Community | 62 | Manganese | mg/kg | 480 | | 0.973 | 4.86 |
| Community | 62 | Nickel | mg/kg | 10.8 | | 0.0973 | 0.389 |
| Community | 62 | Potassium | mg/kg | 2650 | | 77.8 | 292 |
| Community | 62 | Selenium | mg/kg | 0.486 | U | 0.486 | 0.973 |
| Community | 62 | Silver | mg/kg | 0.0975 | U | 0.0975 | 0.487 |
| Community | 62 | Sodium | mg/kg | 49.7 | | 15.6 | 48.6 |
| Community | 62 | Thallium | mg/kg | 0.132 | J | 0.0584 | 0.195 |
| Community | 62 | Vanadium | mg/kg | 24.9 | | 1.95 | 9.73 |
| Community | 62 | Zinc | mg/kg | 34.1 | | 0.389 | 1.95 |
| On-Site | 01 | Aluminum | mg/kg | 14200 | | 14.1 | 47.1 |
| On-Site | 01 | Antimony | mg/kg | 0.329 | U | 0.329 | 0.998 |
| On-Site | 01 | Arsenic | mg/kg | 2.44 | | 0.188 | 0.942 |
| On-Site | 01 | Barium | mg/kg | 142 | | 0.0942 | 0.377 |
| On-Site | 01 | Beryllium | mg/kg | 0.631 | | 0.0942 | 0.471 |
| On-Site | 01 | Cadmium | mg/kg | 0.312 | | 0.0188 | 0.188 |
| On-Site | 01 | Calcium | mg/kg | 25500 | | 31.1 | 94.2 |
| On-Site | 01 | Chromium | mg/kg | 11.1 | | 0.942 | 2.82 |
| On-Site | 01 | Cobalt | mg/kg | 6.36 | | 0.282 | 0.942 |
| On-Site | 01 | Copper | mg/kg | 12.8 | | 0.311 | 0.942 |
| On-Site | 01 | Iron | mg/kg | 14400 | | 23.5 | 94.2 |

## TABLE C-6. Non-radiological Results by Location for Calendar Year 2010, Soil

| Location Type | Location | Analyte | Units | Result | Lab Data Qualifiers | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|
| On-Site | 01 | Lead | mg/kg | 11.9 | | 0.0942 | 0.377 |
| On-Site | 01 | Magnesium | mg/kg | 5650 | | 7.06 | 23.5 |
| On-Site | 01 | Manganese | mg/kg | 376 | | 0.942 | 4.71 |
| On-Site | 01 | Nickel | mg/kg | 11.9 | | 0.471 | 1.88 |
| On-Site | 01 | Potassium | mg/kg | 5340 | | 75.3 | 282 |
| On-Site | 01 | Selenium | mg/kg | 0.471 | U | 0.471 | 0.942 |
| On-Site | 01 | Silver | mg/kg | 0.348 | J | 0.0998 | 0.499 |
| On-Site | 01 | Sodium | mg/kg | 75.3 | U | 75.3 | 235 |
| On-Site | 01 | Thallium | mg/kg | 0.212 | | 0.0565 | 0.188 |
| On-Site | 01 | Vanadium | mg/kg | 26.3 | | 1.88 | 9.42 |
| On-Site | 01 | Zinc | mg/kg | 50.2 | | 0.377 | 1.88 |
| On-Site | 02NE | Aluminum | mg/kg | 6630 | | 2.92 | 9.75 |
| On-Site | 02NE | Antimony | mg/kg | 1.4 | U | 1.4 | 4.25 |
| On-Site | 02NE | Arsenic | mg/kg | 1.51 | | 0.195 | 0.975 |
| On-Site | 02NE | Barium | mg/kg | 66.6 | | 0.0975 | 0.39 |
| On-Site | 02NE | Beryllium | mg/kg | 0.341 | | 0.0195 | 0.0975 |
| On-Site | 02NE | Cadmium | mg/kg | 0.287 | | 0.0195 | 0.195 |
| On-Site | 02NE | Calcium | mg/kg | 5100 | | 6.43 | 19.5 |
| On-Site | 02NE | Chromium | mg/kg | 5.76 | | 0.195 | 0.585 |
| On-Site | 02NE | Cobalt | mg/kg | 2.34 | | 0.0585 | 0.195 |
| On-Site | 02NE | Copper | mg/kg | 4.91 | | 0.0643 | 0.195 |
| On-Site | 02NE | Iron | mg/kg | 6290 | | 4.87 | 19.5 |
| On-Site | 02NE | Lead | mg/kg | 42.9 | | 0.0975 | 0.39 |
| On-Site | 02NE | Magnesium | mg/kg | 1790 | | 1.46 | 4.87 |
| On-Site | 02NE | Manganese | mg/kg | 112 | | 0.195 | 0.975 |
| On-Site | 02NE | Nickel | mg/kg | 4.9 | | 0.0975 | 0.39 |
| On-Site | 02NE | Potassium | mg/kg | 1650 | | 15.6 | 58.5 |
| On-Site | 02NE | Selenium | mg/kg | 0.487 | U | 0.487 | 0.975 |
| On-Site | 02NE | Silver | mg/kg | 0.179 | J | 0.085 | 0.425 |
| On-Site | 02NE | Sodium | mg/kg | 22.6 | J | 15.6 | 48.7 |
| On-Site | 02NE | Thallium | mg/kg | 0.0825 | J | 0.0585 | 0.195 |
| On-Site | 02NE | Vanadium | mg/kg | 10.7 | | 0.39 | 1.95 |
| On-Site | 02NE | Zinc | mg/kg | 22.3 | | 0.39 | 1.95 |

## TABLE C-6. Non-radiological Results by Location for Calendar Year 2010, Soil

| Location Type | Location | Analyte | Units | Result | Lab Data Qualifiers | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|
| On-Site | 02NW | Aluminum | mg/kg | 7730 | | 2.94 | 9.78 |
| On-Site | 02NW | Antimony | mg/kg | 0.329 | U | 0.329 | 0.998 |
| On-Site | 02NW | Arsenic | mg/kg | 2.1 | | 0.196 | 0.978 |
| On-Site | 02NW | Barium | mg/kg | 109 | | 0.0978 | 0.391 |
| On-Site | 02NW | Beryllium | mg/kg | 0.515 | | 0.0196 | 0.0978 |
| On-Site | 02NW | Cadmium | mg/kg | 0.243 | | 0.0196 | 0.196 |
| On-Site | 02NW | Calcium | mg/kg | 25900 | | 32.3 | 97.8 |
| On-Site | 02NW | Chromium | mg/kg | 7.07 | | 0.196 | 0.587 |
| On-Site | 02NW | Cobalt | mg/kg | 3.4 | | 0.0587 | 0.196 |
| On-Site | 02NW | Copper | mg/kg | 6.28 | | 0.0646 | 0.196 |
| On-Site | 02NW | Iron | mg/kg | 7680 | | 4.89 | 19.6 |
| On-Site | 02NW | Lead | mg/kg | 8.16 | | 0.0978 | 0.391 |
| On-Site | 02NW | Magnesium | mg/kg | 3110 | | 1.47 | 4.89 |
| On-Site | 02NW | Manganese | mg/kg | 174 | | 0.196 | 0.978 |
| On-Site | 02NW | Nickel | mg/kg | 7.01 | | 0.0978 | 0.391 |
| On-Site | 02NW | Potassium | mg/kg | 2340 | | 15.7 | 58.7 |
| On-Site | 02NW | Selenium | mg/kg | 0.489 | U | 0.489 | 0.978 |
| On-Site | 02NW | Silver | mg/kg | 0.0998 | U | 0.0998 | 0.499 |
| On-Site | 02NW | Sodium | mg/kg | 69 | | 15.7 | 48.9 |
| On-Site | 02NW | Thallium | mg/kg | 0.107 | J | 0.0587 | 0.196 |
| On-Site | 02NW | Vanadium | mg/kg | 12.6 | | 0.391 | 1.96 |
| On-Site | 02NW | Zinc | mg/kg | 29.6 | | 0.391 | 1.96 |
| On-Site | 02SE | Aluminum | mg/kg | 7520 | | 2.6 | 8.65 |
| On-Site | 02SE | Antimony | mg/kg | 1.5 | U | 1.5 | 4.54 |
| On-Site | 02SE | Arsenic | mg/kg | 1.95 | | 0.173 | 0.865 |
| On-Site | 02SE | Barium | mg/kg | 86.6 | | 0.0865 | 0.346 |
| On-Site | 02SE | Beryllium | mg/kg | 0.408 | | 0.0173 | 0.0865 |
| On-Site | 02SE | Cadmium | mg/kg | 0.44 | | 0.0173 | 0.173 |
| On-Site | 02SE | Calcium | mg/kg | 13900 | | 57.1 | 173 |
| On-Site | 02SE | Chromium | mg/kg | 6.1 | | 0.173 | 0.519 |
| On-Site | 02SE | Cobalt | mg/kg | 2.69 | | 0.0519 | 0.173 |
| On-Site | 02SE | Copper | mg/kg | 5.79 | | 0.0571 | 0.173 |
| On-Site | 02SE | Iron | mg/kg | 6830 | | 4.33 | 17.3 |

TABLE C-6. Non-radiological Results by Location for Calendar Year 2010, Soil

| Location Type | Location | Analyte | Units | Result | Lab Data Qualifiers | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|
| On-Site | 02SE | Lead | mg/kg | 7.55 | | 0.0865 | 0.346 |
| On-Site | 02SE | Magnesium | mg/kg | 2260 | | 1.3 | 4.33 |
| On-Site | 02SE | Manganese | mg/kg | 119 | | 0.173 | 0.865 |
| On-Site | 02SE | Nickel | mg/kg | 6.18 | | 0.0865 | 0.346 |
| On-Site | 02SE | Potassium | mg/kg | 1950 | | 13.8 | 51.9 |
| On-Site | 02SE | Selenium | mg/kg | 0.433 | U | 0.433 | 0.865 |
| On-Site | 02SE | Silver | mg/kg | 0.257 | J | 0.0907 | 0.454 |
| On-Site | 02SE | Sodium | mg/kg | 24.7 | J | 13.8 | 43.3 |
| On-Site | 02SE | Thallium | mg/kg | 0.103 | J | 0.0519 | 0.173 |
| On-Site | 02SE | Vanadium | mg/kg | 11.6 | | 0.346 | 1.73 |
| On-Site | 02SE | Zinc | mg/kg | 24.6 | | 0.346 | 1.73 |
| On-Site | 02SW | Aluminum | mg/kg | 5910 | | 2.98 | 9.94 |
| On-Site | 02SW | Antimony | mg/kg | 0.33 | U | 0.33 | 1 |
| On-Site | 02SW | Arsenic | mg/kg | 1.6 | | 0.199 | 0.994 |
| On-Site | 02SW | Barium | mg/kg | 63.5 | | 0.0994 | 0.398 |
| On-Site | 02SW | Beryllium | mg/kg | 0.297 | | 0.0199 | 0.0994 |
| On-Site | 02SW | Cadmium | mg/kg | 0.154 | J | 0.0199 | 0.199 |
| On-Site | 02SW | Calcium | mg/kg | 6810 | | 6.56 | 19.9 |
| On-Site | 02SW | Chromium | mg/kg | 6.8 | | 0.199 | 0.596 |
| On-Site | 02SW | Cobalt | mg/kg | 2.42 | | 0.0596 | 0.199 |
| On-Site | 02SW | Copper | mg/kg | 5.41 | | 0.0656 | 0.199 |
| On-Site | 02SW | Iron | mg/kg | 5890 | | 4.97 | 19.9 |
| On-Site | 02SW | Lead | mg/kg | 5.53 | | 0.0994 | 0.398 |
| On-Site | 02SW | Magnesium | mg/kg | 1800 | | 1.49 | 4.97 |
| On-Site | 02SW | Manganese | mg/kg | 122 | | 0.199 | 0.994 |
| On-Site | 02SW | Nickel | mg/kg | 4.87 | | 0.0994 | 0.398 |
| On-Site | 02SW | Potassium | mg/kg | 1390 | | 15.9 | 59.6 |
| On-Site | 02SW | Selenium | mg/kg | 0.497 | U | 0.497 | 0.994 |
| On-Site | 02SW | Silver | mg/kg | 0.1 | U | 0.1 | 0.5 |
| On-Site | 02SW | Sodium | mg/kg | 46.4 | J | 15.9 | 49.7 |
| On-Site | 02SW | Thallium | mg/kg | 0.0805 | J | 0.0596 | 0.199 |
| On-Site | 02SW | Vanadium | mg/kg | 10.2 | | 0.398 | 1.99 |
| On-Site | 02SW | Zinc | mg/kg | 31.1 | | 0.398 | 1.99 |

## TABLE C-6. Non-radiological Results by Location for Calendar Year 2010, Soil

| Location Type | Location | Analyte | Units | Result | Lab Data Qualifiers | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|
| On-Site | 03 | Aluminum | mg/kg | 9320 | | 2.94 | 9.8 |
| On-Site | 03 | Antimony | mg/kg | 1.56 | U | 1.56 | 4.73 |
| On-Site | 03 | Arsenic | mg/kg | 4.47 | | 0.196 | 0.98 |
| On-Site | 03 | Barium | mg/kg | 308 | | 0.98 | 3.92 |
| On-Site | 03 | Beryllium | mg/kg | 0.352 | | 0.0196 | 0.098 |
| On-Site | 03 | Cadmium | mg/kg | 0.232 | | 0.0196 | 0.196 |
| On-Site | 03 | Calcium | mg/kg | 74600 | | 64.7 | 196 |
| On-Site | 03 | Chromium | mg/kg | 7.42 | | 0.196 | 0.588 |
| On-Site | 03 | Cobalt | mg/kg | 3.07 | | 0.0588 | 0.196 |
| On-Site | 03 | Copper | mg/kg | 5.14 | | 0.0647 | 0.196 |
| On-Site | 03 | Iron | mg/kg | 7380 | | 4.9 | 19.6 |
| On-Site | 03 | Lead | mg/kg | 7.81 | | 0.098 | 0.392 |
| On-Site | 03 | Magnesium | mg/kg | 5300 | | 1.47 | 4.9 |
| On-Site | 03 | Manganese | mg/kg | 101 | | 0.196 | 0.98 |
| On-Site | 03 | Nickel | mg/kg | 8.05 | | 0.098 | 0.392 |
| On-Site | 03 | Potassium | mg/kg | 1960 | | 15.7 | 58.8 |
| On-Site | 03 | Selenium | mg/kg | 0.49 | U | 0.49 | 0.98 |
| On-Site | 03 | Silver | mg/kg | 0.0947 | U | 0.0947 | 0.473 |
| On-Site | 03 | Sodium | mg/kg | 86.8 | | 15.7 | 49 |
| On-Site | 03 | Thallium | mg/kg | 0.128 | J | 0.0588 | 0.196 |
| On-Site | 03 | Vanadium | mg/kg | 25.6 | | 3.92 | 19.6 |
| On-Site | 03 | Zinc | mg/kg | 23.8 | | 0.396 | 1.98 |
| On-Site | 06 | Aluminum | mg/kg | 21400 | | 14.7 | 49 |
| On-Site | 06 | Antimony | mg/kg | 0.325 | U | 0.325 | 0.986 |
| On-Site | 06 | Arsenic | mg/kg | 3.28 | | 0.196 | 0.98 |
| On-Site | 06 | Barium | mg/kg | 108 | | 0.098 | 0.392 |
| On-Site | 06 | Beryllium | mg/kg | 0.82 | | 0.098 | 0.49 |
| On-Site | 06 | Cadmium | mg/kg | 0.261 | | 0.0196 | 0.196 |
| On-Site | 06 | Calcium | mg/kg | 2970 | | 6.47 | 19.6 |
| On-Site | 06 | Chromium | mg/kg | 11.8 | | 0.196 | 0.588 |
| On-Site | 06 | Cobalt | mg/kg | 4.01 | | 0.0588 | 0.196 |
| On-Site | 06 | Copper | mg/kg | 30.6 | | 0.0647 | 0.196 |
| On-Site | 06 | Iron | mg/kg | 14500 | | 24.5 | 98 |

TABLE C-6.  Non-radiological Results by Location for Calendar Year 2010, Soil

| Location Type | Location | Analyte | Units | Result | Lab Data Qualifiers | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|
| On-Site | 06 | Lead | mg/kg | 11.4 | | 0.098 | 0.392 |
| On-Site | 06 | Magnesium | mg/kg | 3840 | | 7.35 | 24.5 |
| On-Site | 06 | Manganese | mg/kg | 163 | | 0.196 | 0.98 |
| On-Site | 06 | Nickel | mg/kg | 11.6 | | 0.098 | 0.392 |
| On-Site | 06 | Potassium | mg/kg | 3190 | | 15.7 | 58.8 |
| On-Site | 06 | Selenium | mg/kg | 0.49 | U | 0.49 | 0.98 |
| On-Site | 06 | Silver | mg/kg | 0.261 | J | 0.0986 | 0.493 |
| On-Site | 06 | Sodium | mg/kg | 78.4 | U | 78.4 | 245 |
| On-Site | 06 | Thallium | mg/kg | 0.175 | J | 0.0588 | 0.196 |
| On-Site | 06 | Vanadium | mg/kg | 26.4 | | 1.96 | 9.8 |
| On-Site | 06 | Zinc | mg/kg | 50.8 | | 0.364 | 1.82 |
| On-Site | 07 | Aluminum | mg/kg | 6790 | | 2.85 | 9.49 |
| On-Site | 07 | Antimony | mg/kg | 0.301 | U | 0.301 | 0.912 |
| On-Site | 07 | Arsenic | mg/kg | 1.69 | | 0.19 | 0.949 |
| On-Site | 07 | Barium | mg/kg | 72.2 | | 0.0949 | 0.38 |
| On-Site | 07 | Beryllium | mg/kg | 0.379 | | 0.019 | 0.0949 |
| On-Site | 07 | Cadmium | mg/kg | 0.156 | J | 0.019 | 0.19 |
| On-Site | 07 | Calcium | mg/kg | 7900 | | 6.26 | 19 |
| On-Site | 07 | Chromium | mg/kg | 6.35 | | 0.19 | 0.569 |
| On-Site | 07 | Cobalt | mg/kg | 3 | | 0.0569 | 0.19 |
| On-Site | 07 | Copper | mg/kg | 5.59 | | 0.0626 | 0.19 |
| On-Site | 07 | Iron | mg/kg | 6960 | | 4.74 | 19 |
| On-Site | 07 | Lead | mg/kg | 6.46 | | 0.0949 | 0.38 |
| On-Site | 07 | Magnesium | mg/kg | 2060 | | 1.42 | 4.74 |
| On-Site | 07 | Manganese | mg/kg | 170 | | 0.19 | 0.949 |
| On-Site | 07 | Nickel | mg/kg | 5.83 | | 0.0949 | 0.38 |
| On-Site | 07 | Potassium | mg/kg | 2240 | | 15.2 | 56.9 |
| On-Site | 07 | Selenium | mg/kg | 0.474 | U | 0.474 | 0.949 |
| On-Site | 07 | Silver | mg/kg | 0.128 | J | 0.0912 | 0.456 |
| On-Site | 07 | Sodium | mg/kg | 30.4 | J | 15.2 | 47.4 |
| On-Site | 07 | Thallium | mg/kg | 0.0922 | J | 0.0569 | 0.19 |
| On-Site | 07 | Vanadium | mg/kg | 11.2 | | 0.38 | 1.9 |
| On-Site | 07 | Zinc | mg/kg | 24.5 | | 0.38 | 1.9 |

## TABLE C-6. Non-radiological Results by Location for Calendar Year 2010, Soil

| Location Type | Location | Analyte | Units | Result | Lab Data Qualifiers | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|
| On-Site | 33 | Aluminum | mg/kg | 14100 | | 26.9 | 89.8 |
| On-Site | 33 | Antimony | mg/kg | 0.327 | U | 0.327 | 0.992 |
| On-Site | 33 | Arsenic | mg/kg | 6.11 | | 0.18 | 0.898 |
| On-Site | 33 | Barium | mg/kg | 120 | | 0.0898 | 0.359 |
| On-Site | 33 | Beryllium | mg/kg | 0.807 | | 0.018 | 0.0898 |
| On-Site | 33 | Cadmium | mg/kg | 0.392 | | 0.018 | 0.18 |
| On-Site | 33 | Calcium | mg/kg | 49000 | | 59.2 | 180 |
| On-Site | 33 | Chromium | mg/kg | 11.2 | | 0.18 | 0.539 |
| On-Site | 33 | Cobalt | mg/kg | 4.63 | | 0.0539 | 0.18 |
| On-Site | 33 | Copper | mg/kg | 8.57 | | 0.0592 | 0.18 |
| On-Site | 33 | Iron | mg/kg | 11800 | | 44.9 | 180 |
| On-Site | 33 | Lead | mg/kg | 12.2 | | 0.0898 | 0.359 |
| On-Site | 33 | Magnesium | mg/kg | 5520 | | 13.5 | 44.9 |
| On-Site | 33 | Manganese | mg/kg | 310 | | 1.8 | 8.98 |
| On-Site | 33 | Nickel | mg/kg | 10.5 | | 0.0898 | 0.359 |
| On-Site | 33 | Potassium | mg/kg | 3890 | | 144 | 539 |
| On-Site | 33 | Selenium | mg/kg | 0.449 | U | 0.449 | 0.898 |
| On-Site | 33 | Silver | mg/kg | 0.0992 | U | 0.0992 | 0.496 |
| On-Site | 33 | Sodium | mg/kg | 141 | | 14.4 | 44.9 |
| On-Site | 33 | Thallium | mg/kg | 0.241 | | 0.0539 | 0.18 |
| On-Site | 33 | Vanadium | mg/kg | 23.7 | | 3.59 | 18 |
| On-Site | 33 | Zinc | mg/kg | 53.2 | | 0.359 | 1.8 |
| On-Site | 34 | Aluminum | mg/kg | 12300 | | 29.9 | 99.6 |
| On-Site | 34 | Antimony | mg/kg | 0.319 | U | 0.319 | 0.965 |
| On-Site | 34 | Arsenic | mg/kg | 4.19 | | 0.199 | 0.996 |
| On-Site | 34 | Barium | mg/kg | 145 | | 0.0996 | 0.398 |
| On-Site | 34 | Beryllium | mg/kg | 0.61 | | 0.0199 | 0.0996 |
| On-Site | 34 | Cadmium | mg/kg | 0.259 | | 0.0199 | 0.199 |
| On-Site | 34 | Calcium | mg/kg | 21000 | | 65.7 | 199 |
| On-Site | 34 | Chromium | mg/kg | 10.5 | | 0.199 | 0.598 |
| On-Site | 34 | Cobalt | mg/kg | 5.42 | | 0.0598 | 0.199 |
| On-Site | 34 | Copper | mg/kg | 7.69 | | 0.0657 | 0.199 |
| On-Site | 34 | Iron | mg/kg | 12100 | | 49.8 | 199 |

## TABLE C-6. Non-radiological Results by Location for Calendar Year 2010, Soil

| Location Type | Location | Analyte | Units | Result | Lab Data Qualifiers | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|
| On-Site | 34 | Lead | mg/kg | 10.9 | | 0.0996 | 0.398 |
| On-Site | 34 | Magnesium | mg/kg | 2940 | | 1.49 | 4.98 |
| On-Site | 34 | Manganese | mg/kg | 292 | | 1.99 | 9.96 |
| On-Site | 34 | Nickel | mg/kg | 10.4 | | 0.0996 | 0.398 |
| On-Site | 34 | Potassium | mg/kg | 2390 | | 15.9 | 59.8 |
| On-Site | 34 | Selenium | mg/kg | 0.498 | U | 0.498 | 0.996 |
| On-Site | 34 | Silver | mg/kg | 0.0965 | U | 0.0965 | 0.483 |
| On-Site | 34 | Sodium | mg/kg | 34.2 | J | 15.9 | 49.8 |
| On-Site | 34 | Thallium | mg/kg | 0.124 | J | 0.0598 | 0.199 |
| On-Site | 34 | Vanadium | mg/kg | 19.5 | | 0.398 | 1.99 |
| On-Site | 34 | Zinc | mg/kg | 39 | | 0.398 | 1.99 |
| On-Site | 41 | Aluminum | mg/kg | 11000 | | 13.9 | 46.3 |
| On-Site | 41 | Antimony | mg/kg | 0.315 | U | 0.315 | 0.954 |
| On-Site | 41 | Arsenic | mg/kg | 2.05 | | 0.185 | 0.926 |
| On-Site | 41 | Barium | mg/kg | 65.1 | | 0.0926 | 0.37 |
| On-Site | 41 | Beryllium | mg/kg | 0.42 | | 0.0185 | 0.0926 |
| On-Site | 41 | Cadmium | mg/kg | 0.178 | J | 0.0185 | 0.185 |
| On-Site | 41 | Calcium | mg/kg | 10600 | | 30.6 | 92.6 |
| On-Site | 41 | Chromium | mg/kg | 8.28 | | 0.185 | 0.556 |
| On-Site | 41 | Cobalt | mg/kg | 3.91 | | 0.0556 | 0.185 |
| On-Site | 41 | Copper | mg/kg | 6.56 | | 0.0611 | 0.185 |
| On-Site | 41 | Iron | mg/kg | 8970 | | 4.63 | 18.5 |
| On-Site | 41 | Lead | mg/kg | 10.8 | | 0.0926 | 0.37 |
| On-Site | 41 | Magnesium | mg/kg | 2460 | | 1.39 | 4.63 |
| On-Site | 41 | Manganese | mg/kg | 127 | | 0.185 | 0.926 |
| On-Site | 41 | Nickel | mg/kg | 6.54 | | 0.0926 | 0.37 |
| On-Site | 41 | Potassium | mg/kg | 2720 | | 14.8 | 55.6 |
| On-Site | 41 | Selenium | mg/kg | 0.463 | U | 0.463 | 0.926 |
| On-Site | 41 | Silver | mg/kg | 0.123 | J | 0.0954 | 0.477 |
| On-Site | 41 | Sodium | mg/kg | 42.1 | J | 14.8 | 46.3 |
| On-Site | 41 | Thallium | mg/kg | 0.0887 | J | 0.0556 | 0.185 |
| On-Site | 41 | Vanadium | mg/kg | 16.1 | | 0.37 | 1.85 |
| On-Site | 41 | Zinc | mg/kg | 30.1 | | 0.397 | 1.98 |

## TABLE C-6. Non-radiological Results by Location for Calendar Year 2010, Soil

| Location Type | Location | Analyte | Units | Result | Lab Data Qualifiers | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|
| On-Site | 42 | Aluminum | mg/kg | 9350 | | 2.95 | 9.82 |
| On-Site | 42 | Antimony | mg/kg | 0.325 | U | 0.325 | 0.986 |
| On-Site | 42 | Arsenic | mg/kg | 2.29 | | 0.196 | 0.982 |
| On-Site | 42 | Barium | mg/kg | 80.2 | | 0.0982 | 0.393 |
| On-Site | 42 | Beryllium | mg/kg | 0.502 | | 0.0196 | 0.0982 |
| On-Site | 42 | Cadmium | mg/kg | 0.174 | J | 0.0196 | 0.196 |
| On-Site | 42 | Calcium | mg/kg | 25200 | | 64.8 | 196 |
| On-Site | 42 | Chromium | mg/kg | 9.2 | | 0.196 | 0.589 |
| On-Site | 42 | Cobalt | mg/kg | 3.64 | | 0.0589 | 0.196 |
| On-Site | 42 | Copper | mg/kg | 7.28 | | 0.0648 | 0.196 |
| On-Site | 42 | Iron | mg/kg | 9030 | | 4.91 | 19.6 |
| On-Site | 42 | Lead | mg/kg | 6.8 | | 0.0996 | 0.398 |
| On-Site | 42 | Magnesium | mg/kg | 3100 | | 1.47 | 4.91 |
| On-Site | 42 | Manganese | mg/kg | 164 | | 0.196 | 0.982 |
| On-Site | 42 | Nickel | mg/kg | 8.18 | | 0.0982 | 0.393 |
| On-Site | 42 | Potassium | mg/kg | 2810 | | 15.7 | 58.9 |
| On-Site | 42 | Selenium | mg/kg | 0.491 | U | 0.491 | 0.982 |
| On-Site | 42 | Silver | mg/kg | 0.0986 | U | 0.0986 | 0.493 |
| On-Site | 42 | Sodium | mg/kg | 41 | J | 15.7 | 49.1 |
| On-Site | 42 | Thallium | mg/kg | 0.147 | J | 0.0589 | 0.196 |
| On-Site | 42 | Vanadium | mg/kg | 17.1 | | 0.393 | 1.96 |
| On-Site | 42 | Zinc | mg/kg | 26.3 | | 0.393 | 1.96 |
| On-Site | 43 | Aluminum | mg/kg | 8430 | | 2.76 | 9.21 |
| On-Site | 43 | Antimony | mg/kg | 0.326 | U | 0.326 | 0.988 |
| On-Site | 43 | Arsenic | mg/kg | 1.91 | | 0.184 | 0.921 |
| On-Site | 43 | Barium | mg/kg | 56.1 | | 0.0921 | 0.368 |
| On-Site | 43 | Beryllium | mg/kg | 0.337 | | 0.0184 | 0.0921 |
| On-Site | 43 | Cadmium | mg/kg | 0.114 | J | 0.0184 | 0.184 |
| On-Site | 43 | Calcium | mg/kg | 6550 | | 6.08 | 18.4 |
| On-Site | 43 | Chromium | mg/kg | 6.96 | | 0.184 | 0.552 |
| On-Site | 43 | Cobalt | mg/kg | 2.78 | | 0.0552 | 0.184 |
| On-Site | 43 | Copper | mg/kg | 5.49 | | 0.0608 | 0.184 |
| On-Site | 43 | Iron | mg/kg | 7430 | | 4.6 | 18.4 |

TABLE C-6.  Non-radiological Results by Location for Calendar Year 2010, Soil

| Location Type | Location | Analyte | Units | Result | Lab Data Qualifiers | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|
| On-Site | 43 | Magnesium | mg/kg | 2340 | | 1.38 | 4.6 |
| On-Site | 43 | Manganese | mg/kg | 113 | | 0.184 | 0.921 |
| On-Site | 43 | Nickel | mg/kg | 5.73 | | 0.0921 | 0.368 |
| On-Site | 43 | Potassium | mg/kg | 2040 | | 14.7 | 55.2 |
| On-Site | 43 | Selenium | mg/kg | 0.46 | U | 0.46 | 0.921 |
| On-Site | 43 | Silver | mg/kg | 0.0988 | U | 0.0988 | 0.494 |
| On-Site | 43 | Sodium | mg/kg | 28.3 | J | 14.7 | 46 |
| On-Site | 43 | Thallium | mg/kg | 0.0917 | J | 0.0552 | 0.184 |
| On-Site | 43 | Vanadium | mg/kg | 14.7 | | 0.368 | 1.84 |
| On-Site | 43 | Zinc | mg/kg | 22.3 | | 0.368 | 1.84 |
| On-Site | 45 | Aluminum | mg/kg | 7410 | | 2.9 | 9.67 |
| On-Site | 45 | Antimony | mg/kg | 0.304 | U | 0.304 | 0.923 |
| On-Site | 45 | Arsenic | mg/kg | 2.83 | | 0.193 | 0.967 |
| On-Site | 45 | Barium | mg/kg | 70.5 | | 0.0967 | 0.387 |
| On-Site | 45 | Beryllium | mg/kg | 0.386 | | 0.0193 | 0.0967 |
| On-Site | 45 | Cadmium | mg/kg | 0.152 | J | 0.0193 | 0.193 |
| On-Site | 45 | Calcium | mg/kg | 12000 | | 63.8 | 193 |
| On-Site | 45 | Chromium | mg/kg | 6.65 | | 0.193 | 0.58 |
| On-Site | 45 | Cobalt | mg/kg | 2.52 | | 0.058 | 0.193 |
| On-Site | 45 | Copper | mg/kg | 5.38 | | 0.0638 | 0.193 |
| On-Site | 45 | Iron | mg/kg | 6860 | | 4.84 | 19.3 |
| On-Site | 45 | Lead | mg/kg | 6.73 | | 0.0967 | 0.387 |
| On-Site | 45 | Magnesium | mg/kg | 2470 | | 1.45 | 4.84 |
| On-Site | 45 | Manganese | mg/kg | 121 | | 0.193 | 0.967 |
| On-Site | 45 | Nickel | mg/kg | 5.64 | | 0.0967 | 0.387 |
| On-Site | 45 | Potassium | mg/kg | 2150 | | 15.5 | 58 |
| On-Site | 45 | Selenium | mg/kg | 0.484 | U | 0.484 | 0.967 |
| On-Site | 45 | Silver | mg/kg | 0.0923 | U | 0.0923 | 0.461 |
| On-Site | 45 | Sodium | mg/kg | 34.6 | J | 15.5 | 48.4 |
| On-Site | 45 | Thallium | mg/kg | 0.0979 | J | 0.058 | 0.193 |
| On-Site | 45 | Vanadium | mg/kg | 12.5 | | 0.387 | 1.93 |
| On-Site | 45 | Zinc | mg/kg | 24.8 | | 0.387 | 1.93 |

## TABLE C-6. Non-radiological Results by Location for Calendar Year 2010, Soil

| Location Type | Location | Analyte | Units | Result | Lab Data Qualifiers | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|
| On-Site | 46 | Aluminum | mg/kg | 8940 | | 2.8 | 9.33 |
| On-Site | 46 | Antimony | mg/kg | 0.302 | U | 0.302 | 0.916 |
| On-Site | 46 | Arsenic | mg/kg | 2.07 | | 0.187 | 0.933 |
| On-Site | 46 | Barium | mg/kg | 97 | | 0.0933 | 0.373 |
| On-Site | 46 | Beryllium | mg/kg | 0.422 | | 0.0187 | 0.0933 |
| On-Site | 46 | Cadmium | mg/kg | 0.248 | | 0.0187 | 0.187 |
| On-Site | 46 | Calcium | mg/kg | 21200 | | 30.8 | 93.3 |
| On-Site | 46 | Chromium | mg/kg | 8.48 | | 0.187 | 0.56 |
| On-Site | 46 | Cobalt | mg/kg | 4.07 | | 0.056 | 0.187 |
| On-Site | 46 | Copper | mg/kg | 8.56 | | 0.0616 | 0.187 |
| On-Site | 46 | Iron | mg/kg | 10800 | | 23.3 | 93.3 |
| On-Site | 46 | Lead | mg/kg | 9.89 | | 0.0933 | 0.373 |
| On-Site | 46 | Magnesium | mg/kg | 3590 | | 1.4 | 4.66 |
| On-Site | 46 | Manganese | mg/kg | 224 | | 0.933 | 4.66 |
| On-Site | 46 | Nickel | mg/kg | 7.59 | | 0.0933 | 0.373 |
| On-Site | 46 | Potassium | mg/kg | 2730 | | 14.9 | 56 |
| On-Site | 46 | Selenium | mg/kg | 0.466 | U | 0.466 | 0.933 |
| On-Site | 46 | Silver | mg/kg | 0.0916 | U | 0.0916 | 0.458 |
| On-Site | 46 | Sodium | mg/kg | 54.9 | | 14.9 | 46.6 |
| On-Site | 46 | Thallium | mg/kg | 0.104 | J | 0.056 | 0.187 |
| On-Site | 46 | Vanadium | mg/kg | 21.4 | | 1.87 | 9.33 |
| On-Site | 46 | Zinc | mg/kg | 74.5 | | 0.396 | 1.98 |
| On-Site | 49 | Aluminum | mg/kg | 9170 | | 2.92 | 9.73 |
| On-Site | 49 | Antimony | mg/kg | 0.302 | U | 0.302 | 0.916 |
| On-Site | 49 | Arsenic | mg/kg | 2 | | 0.195 | 0.973 |
| On-Site | 49 | Barium | mg/kg | 97.8 | | 0.0973 | 0.389 |
| On-Site | 49 | Beryllium | mg/kg | 0.408 | | 0.0195 | 0.0973 |
| On-Site | 49 | Cadmium | mg/kg | 0.314 | | 0.0195 | 0.195 |
| On-Site | 49 | Calcium | mg/kg | 15800 | | 32.1 | 97.3 |
| On-Site | 49 | Chromium | mg/kg | 8.63 | | 0.195 | 0.584 |
| On-Site | 49 | Cobalt | mg/kg | 4.38 | | 0.0584 | 0.195 |
| On-Site | 49 | Copper | mg/kg | 8.8 | | 0.0642 | 0.195 |
| On-Site | 49 | Iron | mg/kg | 11400 | | 24.3 | 97.3 |

TABLE C-6.  Non-radiological Results by Location for Calendar Year 2010, Soil

| Location Type | Location | Analyte | Units | Result | Lab Data Qualifiers | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|
| On-Site | 49 | Lead | mg/kg | 13.5 | | 0.0973 | 0.389 |
| On-Site | 49 | Magnesium | mg/kg | 4030 | | 1.46 | 4.86 |
| On-Site | 49 | Manganese | mg/kg | 257 | | 0.973 | 4.86 |
| On-Site | 49 | Nickel | mg/kg | 8.19 | | 0.0973 | 0.389 |
| On-Site | 49 | Potassium | mg/kg | 2710 | | 15.6 | 58.4 |
| On-Site | 49 | Selenium | mg/kg | 0.486 | U | 0.486 | 0.973 |
| On-Site | 49 | Silver | mg/kg | 0.113 | J | 0.0916 | 0.458 |
| On-Site | 49 | Sodium | mg/kg | 49.6 | | 15.6 | 48.6 |
| On-Site | 49 | Thallium | mg/kg | 0.123 | J | 0.0584 | 0.195 |
| On-Site | 49 | Vanadium | mg/kg | 21.3 | | 1.95 | 9.73 |
| On-Site | 49 | Zinc | mg/kg | 40.5 | | 0.375 | 1.87 |
| On-Site | 51 | Aluminum | mg/kg | 14200 | | 14.1 | 47.1 |
| On-Site | 51 | Antimony | mg/kg | 0.314 | U | 0.314 | 0.951 |
| On-Site | 51 | Arsenic | mg/kg | 2.68 | | 0.188 | 0.942 |
| On-Site | 51 | Barium | mg/kg | 99.6 | | 0.0942 | 0.377 |
| On-Site | 51 | Beryllium | mg/kg | 0.732 | | 0.0942 | 0.471 |
| On-Site | 51 | Cadmium | mg/kg | 0.217 | | 0.0188 | 0.188 |
| On-Site | 51 | Calcium | mg/kg | 18500 | | 31.1 | 94.2 |
| On-Site | 51 | Chromium | mg/kg | 51.8 | | 0.188 | 0.565 |
| On-Site | 51 | Cobalt | mg/kg | 3.44 | | 0.0565 | 0.188 |
| On-Site | 51 | Copper | mg/kg | 10.1 | | 0.0621 | 0.188 |
| On-Site | 51 | Iron | mg/kg | 11300 | | 23.5 | 94.2 |
| On-Site | 51 | Lead | mg/kg | 11.3 | | 0.0942 | 0.377 |
| On-Site | 51 | Magnesium | mg/kg | 3670 | | 7.06 | 23.5 |
| On-Site | 51 | Manganese | mg/kg | 138 | | 0.188 | 0.942 |
| On-Site | 51 | Nickel | mg/kg | 8.26 | | 0.0942 | 0.377 |
| On-Site | 51 | Potassium | mg/kg | 2540 | | 15.1 | 56.5 |
| On-Site | 51 | Selenium | mg/kg | 0.471 | U | 0.471 | 0.942 |
| On-Site | 51 | Silver | mg/kg | 0.0951 | U | 0.0951 | 0.475 |
| On-Site | 51 | Sodium | mg/kg | 75.3 | U | 75.3 | 235 |
| On-Site | 51 | Thallium | mg/kg | 0.112 | J | 0.0565 | 0.188 |
| On-Site | 51 | Vanadium | mg/kg | 14.6 | | 0.377 | 1.88 |
| On-Site | 51 | Zinc | mg/kg | 101 | | 0.39 | 1.95 |

## TABLE C-6. Non-radiological Results by Location for Calendar Year 2010, Soil

| Location Type | Location | Analyte | Units | Result | Lab Data Qualifiers | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|
| On-Site | 52 | Aluminum | mg/kg | 8780 | | 2.84 | 9.47 |
| On-Site | 52 | Antimony | mg/kg | 0.32 | U | 0.32 | 0.969 |
| On-Site | 52 | Arsenic | mg/kg | 2.74 | | 0.189 | 0.947 |
| On-Site | 52 | Barium | mg/kg | 98 | | 0.0947 | 0.379 |
| On-Site | 52 | Beryllium | mg/kg | 0.434 | | 0.0189 | 0.0947 |
| On-Site | 52 | Cadmium | mg/kg | 0.132 | J | 0.0189 | 0.189 |
| On-Site | 52 | Calcium | mg/kg | 28500 | | 31.3 | 94.7 |
| On-Site | 52 | Chromium | mg/kg | 7.3 | | 0.189 | 0.568 |
| On-Site | 52 | Cobalt | mg/kg | 3.05 | | 0.0568 | 0.189 |
| On-Site | 52 | Copper | mg/kg | 5.1 | | 0.0625 | 0.189 |
| On-Site | 52 | Iron | mg/kg | 7880 | | 4.73 | 18.9 |
| On-Site | 52 | Lead | mg/kg | 5.41 | | 0.0947 | 0.379 |
| On-Site | 52 | Magnesium | mg/kg | 2950 | | 1.42 | 4.73 |
| On-Site | 52 | Manganese | mg/kg | 129 | | 0.189 | 0.947 |
| On-Site | 52 | Nickel | mg/kg | 7.12 | | 0.0947 | 0.379 |
| On-Site | 52 | Potassium | mg/kg | 1720 | | 15.2 | 56.8 |
| On-Site | 52 | Selenium | mg/kg | 0.473 | U | 0.473 | 0.947 |
| On-Site | 52 | Silver | mg/kg | 0.0969 | U | 0.0969 | 0.484 |
| On-Site | 52 | Sodium | mg/kg | 44.5 | J | 15.2 | 47.3 |
| On-Site | 52 | Thallium | mg/kg | 0.0913 | J | 0.0568 | 0.189 |
| On-Site | 52 | Vanadium | mg/kg | 16.6 | | 0.379 | 1.89 |
| On-Site | 52 | Zinc | mg/kg | 27.8 | | 0.365 | 1.82 |
| On-Site | 53 | Aluminum | mg/kg | 11800 | | 13.3 | 44.3 |
| On-Site | 53 | Antimony | mg/kg | 0.322 | U | 0.322 | 0.975 |
| On-Site | 53 | Arsenic | mg/kg | 1.97 | | 0.177 | 0.887 |
| On-Site | 53 | Barium | mg/kg | 70.6 | | 0.0887 | 0.355 |
| On-Site | 53 | Beryllium | mg/kg | 0.422 | | 0.0177 | 0.0887 |
| On-Site | 53 | Cadmium | mg/kg | 0.154 | J | 0.0177 | 0.177 |
| On-Site | 53 | Calcium | mg/kg | 3650 | | 5.85 | 17.7 |
| On-Site | 53 | Chromium | mg/kg | 9.45 | | 0.177 | 0.532 |
| On-Site | 53 | Cobalt | mg/kg | 3.01 | | 0.0532 | 0.177 |
| On-Site | 53 | Copper | mg/kg | 5.42 | | 0.0585 | 0.177 |
| On-Site | 53 | Iron | mg/kg | 8360 | | 4.43 | 17.7 |

## TABLE C-6.  Non-radiological Results by Location for Calendar Year 2010, Soil

| Location Type | Location | Analyte | Units | Result | Lab Data Qualifiers | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|
| On-Site | 53 | Lead | mg/kg | 12.9 | | 0.0887 | 0.355 |
| On-Site | 53 | Magnesium | mg/kg | 2290 | | 1.33 | 4.43 |
| On-Site | 53 | Manganese | mg/kg | 135 | | 0.177 | 0.887 |
| On-Site | 53 | Nickel | mg/kg | 5.84 | | 0.0887 | 0.355 |
| On-Site | 53 | Potassium | mg/kg | 2050 | | 14.2 | 53.2 |
| On-Site | 53 | Selenium | mg/kg | 0.443 | U | 0.443 | 0.887 |
| On-Site | 53 | Silver | mg/kg | 0.115 | J | 0.0975 | 0.487 |
| On-Site | 53 | Sodium | mg/kg | 39.6 | J | 14.2 | 44.3 |
| On-Site | 53 | Thallium | mg/kg | 0.0979 | J | 0.0532 | 0.177 |
| On-Site | 53 | Vanadium | mg/kg | 16.2 | | 0.355 | 1.77 |
| On-Site | 53 | Zinc | mg/kg | 20.1 | | 0.376 | 1.88 |
| On-Site | 54 | Aluminum | mg/kg | 13200 | | 29.5 | 98.4 |
| On-Site | 54 | Antimony | mg/kg | 0.326 | U | 0.326 | 0.988 |
| On-Site | 54 | Arsenic | mg/kg | 2.24 | | 0.197 | 0.984 |
| On-Site | 54 | Barium | mg/kg | 92 | | 0.0984 | 0.394 |
| On-Site | 54 | Beryllium | mg/kg | 0.373 | | 0.0197 | 0.0984 |
| On-Site | 54 | Cadmium | mg/kg | 1.06 | | 0.0197 | 0.197 |
| On-Site | 54 | Calcium | mg/kg | 27800 | | 32.5 | 98.4 |
| On-Site | 54 | Chromium | mg/kg | 7.69 | | 0.197 | 0.591 |
| On-Site | 54 | Cobalt | mg/kg | 2.95 | | 0.0591 | 0.197 |
| On-Site | 54 | Copper | mg/kg | 6.7 | | 0.065 | 0.197 |
| On-Site | 54 | Iron | mg/kg | 8400 | | 4.92 | 19.7 |
| On-Site | 54 | Lead | mg/kg | 7.32 | | 0.0984 | 0.394 |
| On-Site | 54 | Magnesium | mg/kg | 2770 | | 1.48 | 4.92 |
| On-Site | 54 | Manganese | mg/kg | 109 | | 0.197 | 0.984 |
| On-Site | 54 | Nickel | mg/kg | 9.29 | | 0.0984 | 0.394 |
| On-Site | 54 | Potassium | mg/kg | 2160 | | 15.7 | 59.1 |
| On-Site | 54 | Selenium | mg/kg | 0.492 | U | 0.492 | 0.984 |
| On-Site | 54 | Silver | mg/kg | 0.0988 | U | 0.0988 | 0.494 |
| On-Site | 54 | Sodium | mg/kg | 112 | | 15.7 | 49.2 |
| On-Site | 54 | Thallium | mg/kg | 0.0856 | J | 0.0591 | 0.197 |
| On-Site | 54 | Vanadium | mg/kg | 16.9 | | 0.394 | 1.97 |
| On-Site | 54 | Zinc | mg/kg | 24 | | 0.387 | 1.93 |

TABLE C-6. Non-radiological Results by Location for Calendar Year 2010, Soil

| Location Type | Location | Analyte | Units | Result | Lab Data Qualifiers | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|
| On-Site | 55 | Aluminum | mg/kg | 12000 | | 14.5 | 48.2 |
| On-Site | 55 | Antimony | mg/kg | 0.324 | U | 0.324 | 0.98 |
| On-Site | 55 | Arsenic | mg/kg | 2.12 | | 0.193 | 0.963 |
| On-Site | 55 | Barium | mg/kg | 90.4 | | 0.0963 | 0.385 |
| On-Site | 55 | Beryllium | mg/kg | 0.409 | | 0.0193 | 0.0963 |
| On-Site | 55 | Cadmium | mg/kg | 0.261 | | 0.0193 | 0.193 |
| On-Site | 55 | Calcium | mg/kg | 6750 | | 6.36 | 19.3 |
| On-Site | 55 | Chromium | mg/kg | 8.75 | | 0.193 | 0.578 |
| On-Site | 55 | Cobalt | mg/kg | 3.1 | | 0.0578 | 0.193 |
| On-Site | 55 | Copper | mg/kg | 6.65 | | 0.0636 | 0.193 |
| On-Site | 55 | Iron | mg/kg | 8940 | | 4.82 | 19.3 |
| On-Site | 55 | Lead | mg/kg | 10 | | 0.0963 | 0.385 |
| On-Site | 55 | Magnesium | mg/kg | 3960 | | 7.23 | 24.1 |
| On-Site | 55 | Manganese | mg/kg | 191 | | 0.193 | 0.963 |
| On-Site | 55 | Nickel | mg/kg | 7.05 | | 0.0963 | 0.385 |
| On-Site | 55 | Potassium | mg/kg | 3210 | | 77.1 | 289 |
| On-Site | 55 | Selenium | mg/kg | 0.482 | U | 0.482 | 0.963 |
| On-Site | 55 | Silver | mg/kg | 0.098 | U | 0.098 | 0.49 |
| On-Site | 55 | Sodium | mg/kg | 31.7 | J | 15.4 | 48.2 |
| On-Site | 55 | Thallium | mg/kg | 0.112 | J | 0.0578 | 0.193 |
| On-Site | 55 | Vanadium | mg/kg | 16 | | 0.385 | 1.93 |
| On-Site | 55 | Zinc | mg/kg | 32.2 | | 0.385 | 1.93 |
| On-Site | 56 | Aluminum | mg/kg | 5580 | | 2.84 | 9.45 |
| On-Site | 56 | Antimony | mg/kg | 0.288 | U | 0.288 | 0.874 |
| On-Site | 56 | Arsenic | mg/kg | 2.36 | | 0.189 | 0.945 |
| On-Site | 56 | Barium | mg/kg | 66.3 | | 0.0945 | 0.378 |
| On-Site | 56 | Beryllium | mg/kg | 0.242 | | 0.0189 | 0.0945 |
| On-Site | 56 | Cadmium | mg/kg | 0.254 | | 0.0189 | 0.189 |
| On-Site | 56 | Calcium | mg/kg | 17900 | | 31.2 | 94.5 |
| On-Site | 56 | Chromium | mg/kg | 5.78 | | 0.189 | 0.567 |
| On-Site | 56 | Cobalt | mg/kg | 2.34 | | 0.0567 | 0.189 |
| On-Site | 56 | Copper | mg/kg | 9.46 | | 0.0624 | 0.189 |
| On-Site | 56 | Iron | mg/kg | 6090 | | 4.73 | 18.9 |

## TABLE C-6.  Non-radiological Results by Location for Calendar Year 2010, Soil

| Location Type | Location | Analyte | Units | Result | Lab Data Qualifiers | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|
| On-Site | 56 | Lead | mg/kg | 6.98 | | 0.0945 | 0.378 |
| On-Site | 56 | Magnesium | mg/kg | 1750 | | 1.42 | 4.73 |
| On-Site | 56 | Manganese | mg/kg | 97.3 | | 0.189 | 0.945 |
| On-Site | 56 | Nickel | mg/kg | 5.37 | | 0.0945 | 0.378 |
| On-Site | 56 | Potassium | mg/kg | 1030 | | 15.1 | 56.7 |
| On-Site | 56 | Selenium | mg/kg | 0.473 | U | 0.473 | 0.945 |
| On-Site | 56 | Silver | mg/kg | 0.108 | J | 0.0874 | 0.437 |
| On-Site | 56 | Sodium | mg/kg | 46.2 | J | 15.1 | 47.3 |
| On-Site | 56 | Thallium | mg/kg | 0.0567 | U | 0.0567 | 0.189 |
| On-Site | 56 | Vanadium | mg/kg | 12.5 | | 0.378 | 1.89 |
| On-Site | 56 | Zinc | mg/kg | 126 | | 0.388 | 1.94 |
| On-Site | 57 | Aluminum | mg/kg | 7700 | | 2.98 | 9.94 |
| On-Site | 57 | Antimony | mg/kg | 0.312 | U | 0.312 | 0.945 |
| On-Site | 57 | Arsenic | mg/kg | 3.04 | | 0.199 | 0.994 |
| On-Site | 57 | Barium | mg/kg | 173 | | 0.0994 | 0.398 |
| On-Site | 57 | Beryllium | mg/kg | 0.372 | | 0.0199 | 0.0994 |
| On-Site | 57 | Cadmium | mg/kg | 0.214 | | 0.0199 | 0.199 |
| On-Site | 57 | Calcium | mg/kg | 44300 | | 32.8 | 99.4 |
| On-Site | 57 | Chromium | mg/kg | 7.44 | | 0.199 | 0.596 |
| On-Site | 57 | Cobalt | mg/kg | 4.36 | | 0.0596 | 0.199 |
| On-Site | 57 | Copper | mg/kg | 12.5 | | 0.0656 | 0.199 |
| On-Site | 57 | Iron | mg/kg | 9930 | | 24.9 | 99.4 |
| On-Site | 57 | Lead | mg/kg | 8.87 | | 0.0994 | 0.398 |
| On-Site | 57 | Magnesium | mg/kg | 4530 | | 1.49 | 4.97 |
| On-Site | 57 | Manganese | mg/kg | 189 | | 0.199 | 0.994 |
| On-Site | 57 | Nickel | mg/kg | 7.67 | | 0.0994 | 0.398 |
| On-Site | 57 | Potassium | mg/kg | 2260 | | 15.9 | 59.6 |
| On-Site | 57 | Selenium | mg/kg | 0.497 | U | 0.497 | 0.994 |
| On-Site | 57 | Silver | mg/kg | 0.0945 | U | 0.0945 | 0.473 |
| On-Site | 57 | Sodium | mg/kg | 74.9 | | 15.9 | 49.7 |
| On-Site | 57 | Thallium | mg/kg | 0.0905 | J | 0.0596 | 0.199 |
| On-Site | 57 | Vanadium | mg/kg | 27.5 | | 1.99 | 9.94 |
| On-Site | 57 | Zinc | mg/kg | 70.1 | | 0.357 | 1.78 |

## TABLE C-6. Non-radiological Results by Location for Calendar Year 2010, Soil

| Location Type | Location | Analyte | Units | Result | Lab Data Qualifiers | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|
| On-Site | 76 | Aluminum | mg/kg | 7440 | | 3 | 10 |
| On-Site | 76 | Antimony | mg/kg | 0.329 | U | 0.329 | 0.998 |
| On-Site | 76 | Arsenic | mg/kg | 1.88 | | 0.2 | 1 |
| On-Site | 76 | Barium | mg/kg | 59.4 | | 0.1 | 0.4 |
| On-Site | 76 | Beryllium | mg/kg | 0.394 | | 0.02 | 0.1 |
| On-Site | 76 | Cadmium | mg/kg | 0.143 | J | 0.02 | 0.2 |
| On-Site | 76 | Calcium | mg/kg | 2220 | | 6.6 | 20 |
| On-Site | 76 | Chromium | mg/kg | 6.67 | | 0.2 | 0.6 |
| On-Site | 76 | Cobalt | mg/kg | 2.75 | | 0.06 | 0.2 |
| On-Site | 76 | Copper | mg/kg | 5.74 | | 0.066 | 0.2 |
| On-Site | 76 | Iron | mg/kg | 6890 | | 5 | 20 |
| On-Site | 76 | Lead | mg/kg | 7.04 | | 0.1 | 0.4 |
| On-Site | 76 | Magnesium | mg/kg | 2010 | | 1.5 | 5 |
| On-Site | 76 | Manganese | mg/kg | 128 | | 0.2 | 1 |
| On-Site | 76 | Nickel | mg/kg | 5.87 | | 0.1 | 0.4 |
| On-Site | 76 | Potassium | mg/kg | 2490 | | 16 | 60 |
| On-Site | 76 | Selenium | mg/kg | 0.5 | U | 0.5 | 1 |
| On-Site | 76 | Silver | mg/kg | 0.169 | J | 0.0998 | 0.499 |
| On-Site | 76 | Sodium | mg/kg | 28.1 | J | 16 | 50 |
| On-Site | 76 | Thallium | mg/kg | 0.0986 | J | 0.06 | 0.2 |
| On-Site | 76 | Vanadium | mg/kg | 11.3 | | 0.4 | 2 |
| On-Site | 76 | Zinc | mg/kg | 24.1 | | 0.4 | 2 |
| On-Site | 77 | Aluminum | mg/kg | 11800 | | 27.9 | 92.9 |
| On-Site | 77 | Antimony | mg/kg | 0.306 | U | 0.306 | 0.926 |
| On-Site | 77 | Arsenic | mg/kg | 2.73 | | 0.186 | 0.929 |
| On-Site | 77 | Barium | mg/kg | 137 | | 0.0929 | 0.372 |
| On-Site | 77 | Beryllium | mg/kg | 0.512 | | 0.0186 | 0.0929 |
| On-Site | 77 | Cadmium | mg/kg | 0.315 | | 0.0186 | 0.186 |
| On-Site | 77 | Calcium | mg/kg | 27000 | | 61.3 | 186 |
| On-Site | 77 | Chromium | mg/kg | 8.58 | | 0.186 | 0.558 |
| On-Site | 77 | Cobalt | mg/kg | 3.83 | | 0.0558 | 0.186 |
| On-Site | 77 | Copper | mg/kg | 8.48 | | 0.0613 | 0.186 |
| On-Site | 77 | Iron | mg/kg | 9700 | | 46.5 | 186 |

## TABLE C-6. Non-radiological Results by Location for Calendar Year 2010, Soil

| Location Type | Location | Analyte | Units | Result | Lab Data Qualifiers | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|
| On-Site | 77 | Lead | mg/kg | 13 | | 0.0929 | 0.372 |
| On-Site | 77 | Magnesium | mg/kg | 3600 | | 1.39 | 4.65 |
| On-Site | 77 | Manganese | mg/kg | 208 | | 1.86 | 9.29 |
| On-Site | 77 | Nickel | mg/kg | 8.26 | | 0.0929 | 0.372 |
| On-Site | 77 | Potassium | mg/kg | 2930 | | 14.9 | 55.8 |
| On-Site | 77 | Selenium | mg/kg | 0.465 | U | 0.465 | 0.929 |
| On-Site | 77 | Silver | mg/kg | 0.0926 | U | 0.0926 | 0.463 |
| On-Site | 77 | Sodium | mg/kg | 57.4 | | 14.9 | 46.5 |
| On-Site | 77 | Thallium | mg/kg | 0.131 | J | 0.0558 | 0.186 |
| On-Site | 77 | Vanadium | mg/kg | 15.7 | | 0.372 | 1.86 |
| On-Site | 77 | Zinc | mg/kg | 37 | | 0.372 | 1.86 |
| On-Site | 78 | Aluminum | mg/kg | 11400 | | 13.9 | 46.4 |
| On-Site | 78 | Antimony | mg/kg | 0.325 | U | 0.325 | 0.986 |
| On-Site | 78 | Arsenic | mg/kg | 2.25 | | 0.186 | 0.928 |
| On-Site | 78 | Barium | mg/kg | 79.4 | | 0.0928 | 0.371 |
| On-Site | 78 | Beryllium | mg/kg | 0.398 | | 0.0186 | 0.0928 |
| On-Site | 78 | Cadmium | mg/kg | 0.233 | | 0.0186 | 0.186 |
| On-Site | 78 | Calcium | mg/kg | 2520 | | 6.12 | 18.6 |
| On-Site | 78 | Chromium | mg/kg | 11.2 | | 0.186 | 0.557 |
| On-Site | 78 | Cobalt | mg/kg | 4.32 | | 0.0557 | 0.186 |
| On-Site | 78 | Copper | mg/kg | 7.91 | | 0.0612 | 0.186 |
| On-Site | 78 | Iron | mg/kg | 12700 | | 23.2 | 92.8 |
| On-Site | 78 | Lead | mg/kg | 11.5 | | 0.0928 | 0.371 |
| On-Site | 78 | Magnesium | mg/kg | 3840 | | 1.39 | 4.64 |
| On-Site | 78 | Manganese | mg/kg | 258 | | 0.928 | 4.64 |
| On-Site | 78 | Nickel | mg/kg | 9.28 | | 0.0928 | 0.371 |
| On-Site | 78 | Potassium | mg/kg | 2350 | | 14.8 | 55.7 |
| On-Site | 78 | Selenium | mg/kg | 0.464 | U | 0.464 | 0.928 |
| On-Site | 78 | Silver | mg/kg | 0.136 | J | 0.0986 | 0.493 |
| On-Site | 78 | Sodium | mg/kg | 56.5 | | 14.8 | 46.4 |
| On-Site | 78 | Thallium | mg/kg | 0.124 | J | 0.0557 | 0.186 |
| On-Site | 78 | Vanadium | mg/kg | 21.8 | | 1.86 | 9.28 |
| On-Site | 78 | Zinc | mg/kg | 30 | | 0.399 | 2 |

## TABLE C-6. Non-radiological Results by Location for Calendar Year 2010, Soil

| Location Type | Location | Analyte | Units | Result | Lab Data Qualifiers | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|
| On-Site | 86 | Aluminum | mg/kg | 10800 | | 14.1 | 46.9 |
| On-Site | 86 | Antimony | mg/kg | 0.327 | U | 0.327 | 0.992 |
| On-Site | 86 | Arsenic | mg/kg | 3.54 | | 0.188 | 0.938 |
| On-Site | 86 | Barium | mg/kg | 187 | | 0.469 | 1.88 |
| On-Site | 86 | Beryllium | mg/kg | 0.503 | | 0.0188 | 0.0938 |
| On-Site | 86 | Cadmium | mg/kg | 0.178 | J | 0.0188 | 0.188 |
| On-Site | 86 | Calcium | mg/kg | 52200 | | 61.9 | 188 |
| On-Site | 86 | Chromium | mg/kg | 9.32 | | 0.188 | 0.563 |
| On-Site | 86 | Cobalt | mg/kg | 4.04 | | 0.0563 | 0.188 |
| On-Site | 86 | Copper | mg/kg | 7.61 | | 0.0619 | 0.188 |
| On-Site | 86 | Iron | mg/kg | 12300 | | 23.5 | 93.8 |
| On-Site | 86 | Lead | mg/kg | 7.37 | | 0.0938 | 0.375 |
| On-Site | 86 | Magnesium | mg/kg | 4420 | | 1.41 | 4.69 |
| On-Site | 86 | Manganese | mg/kg | 205 | | 0.938 | 4.69 |
| On-Site | 86 | Nickel | mg/kg | 8.25 | | 0.0938 | 0.375 |
| On-Site | 86 | Potassium | mg/kg | 2590 | | 75 | 281 |
| On-Site | 86 | Selenium | mg/kg | 0.469 | U | 0.469 | 0.938 |
| On-Site | 86 | Silver | mg/kg | 0.0992 | U | 0.0992 | 0.496 |
| On-Site | 86 | Sodium | mg/kg | 113 | | 15 | 46.9 |
| On-Site | 86 | Thallium | mg/kg | 0.118 | J | 0.0563 | 0.188 |
| On-Site | 86 | Vanadium | mg/kg | 27.1 | | 1.88 | 9.38 |
| On-Site | 86 | Zinc | mg/kg | 30.8 | | 1.88 | 9.38 |
| On-Site | 90 | Aluminum | mg/kg | 7060 | | 13.1 | 43.7 |
| On-Site | 90 | Antimony | mg/kg | 0.306 | U | 0.306 | 0.926 |
| On-Site | 90 | Arsenic | mg/kg | 1.54 | | 0.175 | 0.874 |
| On-Site | 90 | Barium | mg/kg | 60.1 | | 0.0874 | 0.35 |
| On-Site | 90 | Beryllium | mg/kg | 0.302 | | 0.0175 | 0.0874 |
| On-Site | 90 | Cadmium | mg/kg | 0.203 | | 0.0175 | 0.175 |
| On-Site | 90 | Calcium | mg/kg | 2460 | | 5.77 | 17.5 |
| On-Site | 90 | Chromium | mg/kg | 7.13 | | 0.175 | 0.524 |
| On-Site | 90 | Cobalt | mg/kg | 2.37 | | 0.0524 | 0.175 |
| On-Site | 90 | Copper | mg/kg | 5.71 | | 0.0577 | 0.175 |
| On-Site | 90 | Iron | mg/kg | 7240 | | 4.37 | 17.5 |

## TABLE C-6. Non-radiological Results by Location for Calendar Year 2010, Soil

| Location Type | Location | Analyte | Units | Result | Lab Data Qualifiers | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|
| On-Site | 90 | Lead | mg/kg | 11.1 | | 0.0874 | 0.35 |
| On-Site | 90 | Magnesium | mg/kg | 1840 | | 1.31 | 4.37 |
| On-Site | 90 | Manganese | mg/kg | 143 | | 0.175 | 0.874 |
| On-Site | 90 | Nickel | mg/kg | 4.91 | | 0.0874 | 0.35 |
| On-Site | 90 | Potassium | mg/kg | 1870 | | 69.9 | 262 |
| On-Site | 90 | Selenium | mg/kg | 0.437 | U | 0.437 | 0.874 |
| On-Site | 90 | Silver | mg/kg | 0.0998 | J | 0.0926 | 0.463 |
| On-Site | 90 | Sodium | mg/kg | 39.2 | J | 14 | 43.7 |
| On-Site | 90 | Thallium | mg/kg | 0.0874 | J | 0.0524 | 0.175 |
| On-Site | 90 | Vanadium | mg/kg | 12.4 | | 0.35 | 1.75 |
| On-Site | 90 | Zinc | mg/kg | 36.2 | | 0.35 | 1.75 |
| On-Site | 91 | Aluminum | mg/kg | 2630 | | 2.51 | 8.38 |
| On-Site | 91 | Antimony | mg/kg | 0.322 | U | 0.322 | 0.977 |
| On-Site | 91 | Arsenic | mg/kg | 1.1 | | 0.168 | 0.838 |
| On-Site | 91 | Barium | mg/kg | 31.9 | | 0.0838 | 0.335 |
| On-Site | 91 | Beryllium | mg/kg | 0.181 | | 0.0168 | 0.0838 |
| On-Site | 91 | Cadmium | mg/kg | 0.105 | J | 0.0168 | 0.168 |
| On-Site | 91 | Calcium | mg/kg | 14800 | | 27.6 | 83.8 |
| On-Site | 91 | Chromium | mg/kg | 2.49 | | 0.168 | 0.503 |
| On-Site | 91 | Cobalt | mg/kg | 1.47 | | 0.0503 | 0.168 |
| On-Site | 91 | Copper | mg/kg | 2.22 | | 0.0553 | 0.168 |
| On-Site | 91 | Iron | mg/kg | 4910 | | 4.19 | 16.8 |
| On-Site | 91 | Lead | mg/kg | 3.45 | | 0.0838 | 0.335 |
| On-Site | 91 | Magnesium | mg/kg | 1010 | | 1.26 | 4.19 |
| On-Site | 91 | Manganese | mg/kg | 101 | | 0.168 | 0.838 |
| On-Site | 91 | Nickel | mg/kg | 3.05 | | 0.0838 | 0.335 |
| On-Site | 91 | Potassium | mg/kg | 643 | | 13.4 | 50.3 |
| On-Site | 91 | Selenium | mg/kg | 0.419 | U | 0.419 | 0.838 |
| On-Site | 91 | Silver | mg/kg | 0.0977 | U | 0.0977 | 0.488 |
| On-Site | 91 | Sodium | mg/kg | 16.2 | J | 13.4 | 41.9 |
| On-Site | 91 | Thallium | mg/kg | 0.0611 | J | 0.0503 | 0.168 |
| On-Site | 91 | Vanadium | mg/kg | 9.01 | | 0.335 | 1.68 |
| On-Site | 91 | Zinc | mg/kg | 12.5 | | 0.335 | 1.68 |

## TABLE C-6.  Non-radiological Results by Location for Calendar Year 2010, Soil

| Location Type | Location | Analyte | Units | Result | Lab Data Qualifiers | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|
| On-Site | 92 | Aluminum | mg/kg | 7700 | | 2.82 | 9.42 |
| On-Site | 92 | Antimony | mg/kg | 0.314 | U | 0.314 | 0.952 |
| On-Site | 92 | Arsenic | mg/kg | 1.26 | | 0.188 | 0.942 |
| On-Site | 92 | Barium | mg/kg | 62.9 | | 0.0942 | 0.377 |
| On-Site | 92 | Beryllium | mg/kg | 0.298 | | 0.0188 | 0.0942 |
| On-Site | 92 | Cadmium | mg/kg | 0.221 | | 0.0188 | 0.188 |
| On-Site | 92 | Calcium | mg/kg | 1210 | | 6.21 | 18.8 |
| On-Site | 92 | Chromium | mg/kg | 6.97 | | 0.188 | 0.565 |
| On-Site | 92 | Cobalt | mg/kg | 2.85 | | 0.0565 | 0.188 |
| On-Site | 92 | Copper | mg/kg | 5.29 | | 0.0621 | 0.188 |
| On-Site | 92 | Iron | mg/kg | 6550 | | 4.71 | 18.8 |
| On-Site | 92 | Lead | mg/kg | 8.53 | | 0.0942 | 0.377 |
| On-Site | 92 | Magnesium | mg/kg | 2030 | | 7.06 | 23.5 |
| On-Site | 92 | Manganese | mg/kg | 143 | | 0.188 | 0.942 |
| On-Site | 92 | Nickel | mg/kg | 5.17 | | 0.0942 | 0.377 |
| On-Site | 92 | Potassium | mg/kg | 1720 | | 15.1 | 56.5 |
| On-Site | 92 | Selenium | mg/kg | 0.471 | U | 0.471 | 0.942 |
| On-Site | 92 | Silver | mg/kg | 0.0952 | U | 0.0952 | 0.476 |
| On-Site | 92 | Sodium | mg/kg | 42.8 | J | 15.1 | 47.1 |
| On-Site | 92 | Thallium | mg/kg | 0.0976 | J | 0.0565 | 0.188 |
| On-Site | 92 | Vanadium | mg/kg | 14.9 | | 0.377 | 1.88 |
| On-Site | 92 | Zinc | mg/kg | 27.7 | | 0.377 | 1.88 |
| Perimeter | 04 | Aluminum | mg/kg | 6830 | | 2.96 | 9.88 |
| Perimeter | 04 | Antimony | mg/kg | 0.292 | U | 0.292 | 0.885 |
| Perimeter | 04 | Arsenic | mg/kg | 1.79 | | 0.198 | 0.988 |
| Perimeter | 04 | Barium | mg/kg | 73.5 | | 0.0988 | 0.395 |
| Perimeter | 04 | Beryllium | mg/kg | 0.318 | | 0.0198 | 0.0988 |
| Perimeter | 04 | Cadmium | mg/kg | 0.179 | J | 0.0198 | 0.198 |
| Perimeter | 04 | Calcium | mg/kg | 6840 | | 6.52 | 19.8 |
| Perimeter | 04 | Chromium | mg/kg | 6.28 | | 0.198 | 0.593 |
| Perimeter | 04 | Cobalt | mg/kg | 2.59 | | 0.0593 | 0.198 |
| Perimeter | 04 | Copper | mg/kg | 5.07 | | 0.0652 | 0.198 |
| Perimeter | 04 | Iron | mg/kg | 6510 | | 4.94 | 19.8 |

## TABLE C-6. Non-radiological Results by Location for Calendar Year 2010, Soil

| Location Type | Location | Analyte | Units | Result | Lab Data Qualifiers | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|
| Perimeter | 04 | Lead | mg/kg | 8.32 | | 0.0988 | 0.395 |
| Perimeter | 04 | Magnesium | mg/kg | 2290 | | 1.48 | 4.94 |
| Perimeter | 04 | Manganese | mg/kg | 140 | | 0.198 | 0.988 |
| Perimeter | 04 | Nickel | mg/kg | 5.54 | | 0.0988 | 0.395 |
| Perimeter | 04 | Potassium | mg/kg | 1890 | | 15.8 | 59.3 |
| Perimeter | 04 | Selenium | mg/kg | 0.494 | U | 0.494 | 0.988 |
| Perimeter | 04 | Silver | mg/kg | 0.147 | J | 0.0885 | 0.442 |
| Perimeter | 04 | Sodium | mg/kg | 28.6 | J | 15.8 | 49.4 |
| Perimeter | 04 | Thallium | mg/kg | 0.0814 | J | 0.0593 | 0.198 |
| Perimeter | 04 | Vanadium | mg/kg | 11.4 | | 0.395 | 1.98 |
| Perimeter | 04 | Zinc | mg/kg | 23.7 | | 0.395 | 1.98 |
| Perimeter | 05 | Aluminum | mg/kg | 6130 | | 14.1 | 47 |
| Perimeter | 05 | Antimony | mg/kg | 0.297 | U | 0.297 | 0.901 |
| Perimeter | 05 | Arsenic | mg/kg | 1.29 | | 0.188 | 0.94 |
| Perimeter | 05 | Barium | mg/kg | 52.1 | | 0.094 | 0.376 |
| Perimeter | 05 | Beryllium | mg/kg | 0.289 | | 0.0188 | 0.094 |
| Perimeter | 05 | Cadmium | mg/kg | 0.121 | J | 0.0188 | 0.188 |
| Perimeter | 05 | Calcium | mg/kg | 1030 | | 6.2 | 18.8 |
| Perimeter | 05 | Chromium | mg/kg | 6.21 | | 0.188 | 0.564 |
| Perimeter | 05 | Cobalt | mg/kg | 2.03 | | 0.0564 | 0.188 |
| Perimeter | 05 | Copper | mg/kg | 4.11 | | 0.062 | 0.188 |
| Perimeter | 05 | Iron | mg/kg | 6040 | | 4.7 | 18.8 |
| Perimeter | 05 | Lead | mg/kg | 6.04 | | 0.094 | 0.376 |
| Perimeter | 05 | Magnesium | mg/kg | 1830 | | 1.41 | 4.7 |
| Perimeter | 05 | Manganese | mg/kg | 115 | | 0.188 | 0.94 |
| Perimeter | 05 | Nickel | mg/kg | 4.08 | | 0.094 | 0.376 |
| Perimeter | 05 | Potassium | mg/kg | 1850 | | 75.2 | 282 |
| Perimeter | 05 | Selenium | mg/kg | 0.47 | U | 0.47 | 0.94 |
| Perimeter | 05 | Silver | mg/kg | 0.0901 | U | 0.0901 | 0.45 |
| Perimeter | 05 | Sodium | mg/kg | 29.9 | J | 15 | 47 |
| Perimeter | 05 | Thallium | mg/kg | 0.0741 | J | 0.0564 | 0.188 |
| Perimeter | 05 | Vanadium | mg/kg | 10.7 | | 0.376 | 1.88 |
| Perimeter | 05 | Zinc | mg/kg | 19.7 | | 0.376 | 1.88 |

## TABLE C-6. Non-radiological Results by Location for Calendar Year 2010, Soil

| Location Type | Location | Analyte | Units | Result | Lab Data Qualifiers | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|
| Perimeter | 12 | Aluminum | mg/kg | 7720 | | 14.8 | 49.3 |
| Perimeter | 12 | Antimony | mg/kg | 0.323 | U | 0.323 | 0.978 |
| Perimeter | 12 | Arsenic | mg/kg | 1.12 | | 0.197 | 0.986 |
| Perimeter | 12 | Barium | mg/kg | 52.8 | | 0.0986 | 0.394 |
| Perimeter | 12 | Beryllium | mg/kg | 0.219 | J | 0.0986 | 0.493 |
| Perimeter | 12 | Cadmium | mg/kg | 0.196 | J | 0.0197 | 0.197 |
| Perimeter | 12 | Calcium | mg/kg | 1620 | | 32.5 | 98.6 |
| Perimeter | 12 | Chromium | mg/kg | 7.8 | | 0.986 | 2.96 |
| Perimeter | 12 | Cobalt | mg/kg | 5.02 | | 0.296 | 0.986 |
| Perimeter | 12 | Copper | mg/kg | 7.27 | | 0.325 | 0.986 |
| Perimeter | 12 | Iron | mg/kg | 8700 | | 24.7 | 98.6 |
| Perimeter | 12 | Lead | mg/kg | 8.28 | | 0.0986 | 0.394 |
| Perimeter | 12 | Magnesium | mg/kg | 2910 | | 7.4 | 24.7 |
| Perimeter | 12 | Manganese | mg/kg | 202 | | 0.986 | 4.93 |
| Perimeter | 12 | Nickel | mg/kg | 6.32 | | 0.493 | 1.97 |
| Perimeter | 12 | Potassium | mg/kg | 1240 | | 78.9 | 296 |
| Perimeter | 12 | Selenium | mg/kg | 0.493 | U | 0.493 | 0.986 |
| Perimeter | 12 | Silver | mg/kg | 0.0978 | U | 0.0978 | 0.489 |
| Perimeter | 12 | Sodium | mg/kg | 78.9 | U | 78.9 | 247 |
| Perimeter | 12 | Thallium | mg/kg | 0.0884 | J | 0.0592 | 0.197 |
| Perimeter | 12 | Vanadium | mg/kg | 8.53 | J | 1.97 | 9.86 |
| Perimeter | 12 | Zinc | mg/kg | 27.1 | | 0.394 | 1.97 |
| Perimeter | 16 | Aluminum | mg/kg | 13400 | | 13.1 | 43.6 |
| Perimeter | 16 | Antimony | mg/kg | 0.327 | U | 0.327 | 0.992 |
| Perimeter | 16 | Arsenic | mg/kg | 1.92 | | 0.174 | 0.871 |
| Perimeter | 16 | Barium | mg/kg | 98.1 | | 0.0871 | 0.348 |
| Perimeter | 16 | Beryllium | mg/kg | 0.559 | | 0.0871 | 0.436 |
| Perimeter | 16 | Cadmium | mg/kg | 0.275 | | 0.0174 | 0.174 |
| Perimeter | 16 | Calcium | mg/kg | 8780 | | 28.7 | 87.1 |
| Perimeter | 16 | Chromium | mg/kg | 9.25 | | 0.871 | 2.61 |
| Perimeter | 16 | Cobalt | mg/kg | 6.57 | | 0.261 | 0.871 |
| Perimeter | 16 | Copper | mg/kg | 12.9 | | 0.287 | 0.871 |
| Perimeter | 16 | Iron | mg/kg | 15500 | | 21.8 | 87.1 |

**TABLE C-6. Non-radiological Results by Location for Calendar Year 2010, Soil**

| Location Type | Location | Analyte | Units | Result | Lab Data Qualifiers | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|
| Perimeter | 16 | Lead | mg/kg | 8.1 | | 0.0871 | 0.348 |
| Perimeter | 16 | Magnesium | mg/kg | 4850 | | 6.53 | 21.8 |
| Perimeter | 16 | Manganese | mg/kg | 345 | | 0.871 | 4.36 |
| Perimeter | 16 | Nickel | mg/kg | 9.78 | | 0.436 | 1.74 |
| Perimeter | 16 | Potassium | mg/kg | 3250 | | 69.7 | 261 |
| Perimeter | 16 | Selenium | mg/kg | 0.436 | U | 0.436 | 0.871 |
| Perimeter | 16 | Silver | mg/kg | 0.496 | U | 0.496 | 2.48 |
| Perimeter | 16 | Sodium | mg/kg | 69.7 | U | 69.7 | 218 |
| Perimeter | 16 | Thallium | mg/kg | 0.156 | J | 0.0523 | 0.174 |
| Perimeter | 16 | Vanadium | mg/kg | 28.1 | | 1.74 | 8.71 |
| Perimeter | 16 | Zinc | mg/kg | 47.7 | | 0.348 | 1.74 |
| Perimeter | 19 | Aluminum | mg/kg | 12700 | | 14.3 | 47.6 |
| Perimeter | 19 | Antimony | mg/kg | 0.317 | U | 0.317 | 0.96 |
| Perimeter | 19 | Arsenic | mg/kg | 2.78 | | 0.19 | 0.952 |
| Perimeter | 19 | Barium | mg/kg | 94 | | 0.0952 | 0.381 |
| Perimeter | 19 | Beryllium | mg/kg | 0.439 | | 0.019 | 0.0952 |
| Perimeter | 19 | Cadmium | mg/kg | 0.316 | | 0.019 | 0.19 |
| Perimeter | 19 | Calcium | mg/kg | 4220 | | 6.29 | 19 |
| Perimeter | 19 | Chromium | mg/kg | 15.5 | | 0.19 | 0.571 |
| Perimeter | 19 | Cobalt | mg/kg | 6.49 | | 0.0571 | 0.19 |
| Perimeter | 19 | Copper | mg/kg | 15 | | 0.0629 | 0.19 |
| Perimeter | 19 | Iron | mg/kg | 13600 | | 23.8 | 95.2 |
| Perimeter | 19 | Lead | mg/kg | 17.7 | | 0.0952 | 0.381 |
| Perimeter | 19 | Magnesium | mg/kg | 4060 | | 1.43 | 4.76 |
| Perimeter | 19 | Manganese | mg/kg | 296 | | 0.952 | 4.76 |
| Perimeter | 19 | Nickel | mg/kg | 12 | | 0.0952 | 0.381 |
| Perimeter | 19 | Potassium | mg/kg | 2790 | | 15.2 | 57.1 |
| Perimeter | 19 | Selenium | mg/kg | 0.476 | U | 0.476 | 0.952 |
| Perimeter | 19 | Silver | mg/kg | 0.192 | J | 0.096 | 0.48 |
| Perimeter | 19 | Sodium | mg/kg | 73.6 | | 15.2 | 47.6 |
| Perimeter | 19 | Thallium | mg/kg | 0.132 | J | 0.0571 | 0.19 |
| Perimeter | 19 | Vanadium | mg/kg | 26.3 | | 1.9 | 9.52 |
| Perimeter | 19 | Zinc | mg/kg | 45.4 | | 0.357 | 1.79 |

## TABLE C-6. Non-radiological Results by Location for Calendar Year 2010, Soil

| Location Type | Location | Analyte | Units | Result | Lab Data Qualifiers | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|
| Perimeter | 58 | Aluminum | mg/kg | 16000 | | 14.7 | 49.1 |
| Perimeter | 58 | Antimony | mg/kg | 0.313 | U | 0.313 | 0.949 |
| Perimeter | 58 | Arsenic | mg/kg | 3.48 | | 0.196 | 0.982 |
| Perimeter | 58 | Barium | mg/kg | 183 | | 0.0982 | 0.393 |
| Perimeter | 58 | Beryllium | mg/kg | 0.54 | | 0.0196 | 0.0982 |
| Perimeter | 58 | Cadmium | mg/kg | 0.551 | | 0.0196 | 0.196 |
| Perimeter | 58 | Calcium | mg/kg | 43100 | | 32.4 | 98.2 |
| Perimeter | 58 | Chromium | mg/kg | 10.1 | | 0.196 | 0.589 |
| Perimeter | 58 | Cobalt | mg/kg | 5.03 | | 0.0589 | 0.196 |
| Perimeter | 58 | Copper | mg/kg | 11.5 | | 0.0648 | 0.196 |
| Perimeter | 58 | Iron | mg/kg | 13800 | | 24.6 | 98.2 |
| Perimeter | 58 | Lead | mg/kg | 14.1 | | 0.0982 | 0.393 |
| Perimeter | 58 | Magnesium | mg/kg | 4650 | | 1.47 | 4.91 |
| Perimeter | 58 | Manganese | mg/kg | 229 | | 0.982 | 4.91 |
| Perimeter | 58 | Nickel | mg/kg | 9.86 | | 0.0982 | 0.393 |
| Perimeter | 58 | Potassium | mg/kg | 3100 | | 15.7 | 58.9 |
| Perimeter | 58 | Selenium | mg/kg | 0.491 | U | 0.491 | 0.982 |
| Perimeter | 58 | Silver | mg/kg | 0.0949 | U | 0.0949 | 0.474 |
| Perimeter | 58 | Sodium | mg/kg | 59 | | 15.7 | 49.1 |
| Perimeter | 58 | Thallium | mg/kg | 0.14 | J | 0.0589 | 0.196 |
| Perimeter | 58 | Vanadium | mg/kg | 30.6 | | 1.96 | 9.82 |
| Perimeter | 58 | Zinc | mg/kg | 41.6 | | 0.4 | 2 |
| Perimeter | 59 | Aluminum | mg/kg | 7540 | | 2.87 | 9.58 |
| Perimeter | 59 | Antimony | mg/kg | 0.327 | U | 0.327 | 0.992 |
| Perimeter | 59 | Arsenic | mg/kg | 1.93 | | 0.192 | 0.958 |
| Perimeter | 59 | Barium | mg/kg | 100 | | 0.0958 | 0.383 |
| Perimeter | 59 | Beryllium | mg/kg | 0.367 | | 0.0192 | 0.0958 |
| Perimeter | 59 | Cadmium | mg/kg | 0.308 | | 0.0192 | 0.192 |
| Perimeter | 59 | Calcium | mg/kg | 23700 | | 31.6 | 95.8 |
| Perimeter | 59 | Chromium | mg/kg | 7.52 | | 0.192 | 0.575 |
| Perimeter | 59 | Cobalt | mg/kg | 3.29 | | 0.0575 | 0.192 |
| Perimeter | 59 | Copper | mg/kg | 9.78 | | 0.0632 | 0.192 |
| Perimeter | 59 | Iron | mg/kg | 8280 | | 4.79 | 19.2 |

## TABLE C-6. Non-radiological Results by Location for Calendar Year 2010, Soil

| Location Type | Location | Analyte | Units | Result | Lab Data Qualifiers | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|
| Perimeter | 59 | Lead | mg/kg | 25.5 | | 0.0958 | 0.383 |
| Perimeter | 59 | Magnesium | mg/kg | 3020 | | 1.44 | 4.79 |
| Perimeter | 59 | Manganese | mg/kg | 163 | | 0.192 | 0.958 |
| Perimeter | 59 | Nickel | mg/kg | 6.49 | | 0.0958 | 0.383 |
| Perimeter | 59 | Potassium | mg/kg | 1890 | | 15.3 | 57.5 |
| Perimeter | 59 | Selenium | mg/kg | 0.479 | U | 0.479 | 0.958 |
| Perimeter | 59 | Silver | mg/kg | 0.102 | J | 0.0992 | 0.496 |
| Perimeter | 59 | Sodium | mg/kg | 50.5 | | 15.3 | 47.9 |
| Perimeter | 59 | Thallium | mg/kg | 0.0703 | J | 0.0575 | 0.192 |
| Perimeter | 59 | Vanadium | mg/kg | 17 | | 0.383 | 1.92 |
| Perimeter | 59 | Zinc | mg/kg | 33.2 | | 0.374 | 1.87 |
| Perimeter | 60 | Aluminum | mg/kg | 13000 | | 14.8 | 49.3 |
| Perimeter | 60 | Antimony | mg/kg | 1.63 | U | 1.63 | 4.93 |
| Perimeter | 60 | Arsenic | mg/kg | 2.1 | | 0.197 | 0.986 |
| Perimeter | 60 | Barium | mg/kg | 138 | | 0.0986 | 0.394 |
| Perimeter | 60 | Beryllium | mg/kg | 0.534 | | 0.0986 | 0.493 |
| Perimeter | 60 | Cadmium | mg/kg | 0.251 | | 0.0197 | 0.197 |
| Perimeter | 60 | Calcium | mg/kg | 27400 | | 32.5 | 98.6 |
| Perimeter | 60 | Chromium | mg/kg | 11.6 | | 0.986 | 2.96 |
| Perimeter | 60 | Cobalt | mg/kg | 6.01 | | 0.296 | 0.986 |
| Perimeter | 60 | Copper | mg/kg | 12.3 | | 0.325 | 0.986 |
| Perimeter | 60 | Iron | mg/kg | 13000 | | 24.7 | 98.6 |
| Perimeter | 60 | Lead | mg/kg | 9.6 | | 0.0986 | 0.394 |
| Perimeter | 60 | Magnesium | mg/kg | 5520 | | 7.4 | 24.7 |
| Perimeter | 60 | Manganese | mg/kg | 350 | | 0.986 | 4.93 |
| Perimeter | 60 | Nickel | mg/kg | 11.7 | | 0.493 | 1.97 |
| Perimeter | 60 | Potassium | mg/kg | 4330 | | 78.9 | 296 |
| Perimeter | 60 | Selenium | mg/kg | 0.493 | U | 0.493 | 0.986 |
| Perimeter | 60 | Silver | mg/kg | 0.0986 | U | 0.0986 | 0.493 |
| Perimeter | 60 | Sodium | mg/kg | 78.9 | U | 78.9 | 247 |
| Perimeter | 60 | Thallium | mg/kg | 0.132 | J | 0.0592 | 0.197 |
| Perimeter | 60 | Vanadium | mg/kg | 24.4 | | 1.97 | 9.86 |
| Perimeter | 60 | Zinc | mg/kg | 44 | | 0.394 | 1.97 |

## TABLE C-6. Non-radiological Results by Location for Calendar Year 2010, Soil

| Location Type | Location | Analyte | Units | Result | Lab Data Qualifiers | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|
| Perimeter | 61 | Aluminum | mg/kg | 8350 | | 14.3 | 47.5 |
| Perimeter | 61 | Antimony | mg/kg | 1.64 | U | 1.64 | 4.96 |
| Perimeter | 61 | Arsenic | mg/kg | 2.63 | | 0.19 | 0.951 |
| Perimeter | 61 | Barium | mg/kg | 153 | | 0.0951 | 0.38 |
| Perimeter | 61 | Beryllium | mg/kg | 0.296 | | 0.019 | 0.0951 |
| Perimeter | 61 | Cadmium | mg/kg | 0.179 | J | 0.019 | 0.19 |
| Perimeter | 61 | Calcium | mg/kg | 37600 | | 31.4 | 95.1 |
| Perimeter | 61 | Chromium | mg/kg | 5.56 | | 0.19 | 0.57 |
| Perimeter | 61 | Cobalt | mg/kg | 2.69 | | 0.057 | 0.19 |
| Perimeter | 61 | Copper | mg/kg | 6.81 | | 0.0627 | 0.19 |
| Perimeter | 61 | Iron | mg/kg | 6660 | | 4.75 | 19 |
| Perimeter | 61 | Lead | mg/kg | 7.19 | | 0.0951 | 0.38 |
| Perimeter | 61 | Magnesium | mg/kg | 3340 | | 7.13 | 23.8 |
| Perimeter | 61 | Manganese | mg/kg | 110 | | 0.19 | 0.951 |
| Perimeter | 61 | Nickel | mg/kg | 5.63 | | 0.0951 | 0.38 |
| Perimeter | 61 | Potassium | mg/kg | 1760 | | 76 | 285 |
| Perimeter | 61 | Selenium | mg/kg | 0.475 | U | 0.475 | 0.951 |
| Perimeter | 61 | Silver | mg/kg | 0.0992 | U | 0.0992 | 0.496 |
| Perimeter | 61 | Sodium | mg/kg | 68.6 | | 15.2 | 47.5 |
| Perimeter | 61 | Thallium | mg/kg | 0.0618 | J | 0.057 | 0.19 |
| Perimeter | 61 | Vanadium | mg/kg | 18.2 | | 0.38 | 1.9 |
| Perimeter | 61 | Zinc | mg/kg | 24.1 | | 0.38 | 1.9 |
| Perimeter | 63 | Aluminum | mg/kg | 14000 | | 14.9 | 49.8 |
| Perimeter | 63 | Antimony | mg/kg | 0.323 | U | 0.323 | 0.978 |
| Perimeter | 63 | Arsenic | mg/kg | 2.72 | | 0.199 | 0.996 |
| Perimeter | 63 | Barium | mg/kg | 135 | | 0.0996 | 0.398 |
| Perimeter | 63 | Beryllium | mg/kg | 0.56 | | 0.0199 | 0.0996 |
| Perimeter | 63 | Cadmium | mg/kg | 0.333 | | 0.0199 | 0.199 |
| Perimeter | 63 | Calcium | mg/kg | 22800 | | 32.9 | 99.6 |
| Perimeter | 63 | Chromium | mg/kg | 12 | | 0.199 | 0.598 |
| Perimeter | 63 | Cobalt | mg/kg | 4.68 | | 0.0598 | 0.199 |
| Perimeter | 63 | Copper | mg/kg | 8.13 | | 0.0657 | 0.199 |
| Perimeter | 63 | Iron | mg/kg | 13400 | | 24.9 | 99.6 |

## TABLE C-6. Non-radiological Results by Location for Calendar Year 2010, Soil

| Location Type | Location | Analyte | Units | Result | Lab Data Qualifiers | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|
| Perimeter | 63 | Lead | mg/kg | 11.7 | | 0.0996 | 0.398 |
| Perimeter | 63 | Magnesium | mg/kg | 3720 | | 1.49 | 4.98 |
| Perimeter | 63 | Manganese | mg/kg | 306 | | 0.996 | 4.98 |
| Perimeter | 63 | Nickel | mg/kg | 10 | | 0.0996 | 0.398 |
| Perimeter | 63 | Potassium | mg/kg | 2460 | | 15.9 | 59.8 |
| Perimeter | 63 | Selenium | mg/kg | 0.498 | U | 0.498 | 0.996 |
| Perimeter | 63 | Silver | mg/kg | 0.0978 | U | 0.0978 | 0.489 |
| Perimeter | 63 | Sodium | mg/kg | 58.3 | | 15.9 | 49.8 |
| Perimeter | 63 | Thallium | mg/kg | 0.122 | J | 0.0598 | 0.199 |
| Perimeter | 63 | Vanadium | mg/kg | 25.7 | | 1.99 | 9.96 |
| Perimeter | 63 | Zinc | mg/kg | 39.7 | | 0.398 | 1.99 |
| Perimeter | 64 | Aluminum | mg/kg | 13400 | | 14.4 | 47.9 |
| Perimeter | 64 | Antimony | mg/kg | 1.64 | U | 1.64 | 4.96 |
| Perimeter | 64 | Arsenic | mg/kg | 1.75 | | 0.192 | 0.958 |
| Perimeter | 64 | Barium | mg/kg | 137 | | 0.958 | 3.83 |
| Perimeter | 64 | Beryllium | mg/kg | 0.607 | | 0.0958 | 0.479 |
| Perimeter | 64 | Cadmium | mg/kg | 0.413 | | 0.0192 | 0.192 |
| Perimeter | 64 | Calcium | mg/kg | 22800 | | 31.6 | 95.8 |
| Perimeter | 64 | Chromium | mg/kg | 8.98 | | 0.958 | 2.87 |
| Perimeter | 64 | Cobalt | mg/kg | 9.39 | | 0.287 | 0.958 |
| Perimeter | 64 | Copper | mg/kg | 14.7 | | 0.316 | 0.958 |
| Perimeter | 64 | Iron | mg/kg | 21100 | | 23.9 | 95.8 |
| Perimeter | 64 | Lead | mg/kg | 8.91 | | 0.0958 | 0.383 |
| Perimeter | 64 | Magnesium | mg/kg | 8180 | | 7.18 | 23.9 |
| Perimeter | 64 | Manganese | mg/kg | 622 | | 0.958 | 4.79 |
| Perimeter | 64 | Nickel | mg/kg | 11.3 | | 0.479 | 1.92 |
| Perimeter | 64 | Potassium | mg/kg | 3480 | | 76.6 | 287 |
| Perimeter | 64 | Selenium | mg/kg | 0.479 | U | 0.479 | 0.958 |
| Perimeter | 64 | Silver | mg/kg | 0.496 | U | 0.496 | 2.48 |
| Perimeter | 64 | Sodium | mg/kg | 77 | J | 76.6 | 239 |
| Perimeter | 64 | Thallium | mg/kg | 0.135 | J | 0.0575 | 0.192 |
| Perimeter | 64 | Vanadium | mg/kg | 31.9 | | 1.92 | 9.58 |
| Perimeter | 64 | Zinc | mg/kg | 67.8 | | 0.383 | 1.92 |

## TABLE C-6. Non-radiological Results by Location for Calendar Year 2010, Soil

| Location Type | Location | Analyte | Units | Result | Lab Data Qualifiers | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|
| Perimeter | 80 | Aluminum | mg/kg | 14600 | | 14.4 | 48.1 |
| Perimeter | 80 | Antimony | mg/kg | 1.6 | U | 1.6 | 4.85 |
| Perimeter | 80 | Arsenic | mg/kg | 3.33 | | 0.192 | 0.962 |
| Perimeter | 80 | Barium | mg/kg | 168 | | 0.0962 | 0.385 |
| Perimeter | 80 | Beryllium | mg/kg | 0.633 | | 0.0192 | 0.0962 |
| Perimeter | 80 | Cadmium | mg/kg | 0.366 | | 0.0192 | 0.192 |
| Perimeter | 80 | Calcium | mg/kg | 89600 | | 63.5 | 192 |
| Perimeter | 80 | Chromium | mg/kg | 13.8 | | 0.192 | 0.577 |
| Perimeter | 80 | Cobalt | mg/kg | 4.96 | | 0.0577 | 0.192 |
| Perimeter | 80 | Copper | mg/kg | 8.3 | | 0.0635 | 0.192 |
| Perimeter | 80 | Iron | mg/kg | 13600 | | 24 | 96.2 |
| Perimeter | 80 | Lead | mg/kg | 9.83 | | 0.0962 | 0.385 |
| Perimeter | 80 | Magnesium | mg/kg | 5250 | | 1.44 | 4.81 |
| Perimeter | 80 | Manganese | mg/kg | 327 | | 0.962 | 4.81 |
| Perimeter | 80 | Nickel | mg/kg | 13.6 | | 0.0962 | 0.385 |
| Perimeter | 80 | Potassium | mg/kg | 2950 | | 15.4 | 57.7 |
| Perimeter | 80 | Selenium | mg/kg | 0.481 | U | 0.481 | 0.962 |
| Perimeter | 80 | Silver | mg/kg | 0.0971 | U | 0.0971 | 0.485 |
| Perimeter | 80 | Sodium | mg/kg | 69.3 | | 15.4 | 48.1 |
| Perimeter | 80 | Thallium | mg/kg | 0.123 | J | 0.0577 | 0.192 |
| Perimeter | 80 | Vanadium | mg/kg | 25.9 | | 1.92 | 9.62 |
| Perimeter | 80 | Zinc | mg/kg | 38.5 | | 0.377 | 1.89 |
| Perimeter | 81 | Aluminum | mg/kg | 9530 | | 14.9 | 49.7 |
| Perimeter | 81 | Antimony | mg/kg | 0.327 | U | 0.327 | 0.99 |
| Perimeter | 81 | Arsenic | mg/kg | 1.94 | | 0.199 | 0.994 |
| Perimeter | 81 | Barium | mg/kg | 69.2 | | 0.0994 | 0.398 |
| Perimeter | 81 | Beryllium | mg/kg | 0.415 | | 0.0199 | 0.0994 |
| Perimeter | 81 | Cadmium | mg/kg | 0.21 | | 0.0199 | 0.199 |
| Perimeter | 81 | Calcium | mg/kg | 1620 | | 6.56 | 19.9 |
| Perimeter | 81 | Chromium | mg/kg | 8.98 | | 0.199 | 0.596 |
| Perimeter | 81 | Cobalt | mg/kg | 3.14 | | 0.0596 | 0.199 |
| Perimeter | 81 | Copper | mg/kg | 6.99 | | 0.0656 | 0.199 |
| Perimeter | 81 | Iron | mg/kg | 8890 | | 4.97 | 19.9 |

## TABLE C-6.  Non-radiological Results by Location for Calendar Year 2010, Soil

| Location Type | Location | Analyte | Units | Result | Lab Data Qualifiers | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|
| Perimeter | 81 | Lead | mg/kg | 10.1 | | 0.0994 | 0.398 |
| Perimeter | 81 | Magnesium | mg/kg | 2610 | | 1.49 | 4.97 |
| Perimeter | 81 | Manganese | mg/kg | 174 | | 0.199 | 0.994 |
| Perimeter | 81 | Nickel | mg/kg | 6.49 | | 0.0994 | 0.398 |
| Perimeter | 81 | Potassium | mg/kg | 2370 | | 79.5 | 298 |
| Perimeter | 81 | Selenium | mg/kg | 0.497 | U | 0.497 | 0.994 |
| Perimeter | 81 | Silver | mg/kg | 0.104 | J | 0.099 | 0.495 |
| Perimeter | 81 | Sodium | mg/kg | 47.5 | J | 15.9 | 49.7 |
| Perimeter | 81 | Thallium | mg/kg | 0.107 | J | 0.0596 | 0.199 |
| Perimeter | 81 | Vanadium | mg/kg | 15.6 | | 0.398 | 1.99 |
| Perimeter | 81 | Zinc | mg/kg | 28.9 | | 0.398 | 1.99 |
| Perimeter | 82 | Aluminum | mg/kg | 12700 | | 14.3 | 47.5 |
| Perimeter | 82 | Antimony | mg/kg | 1.61 | U | 1.61 | 4.88 |
| Perimeter | 82 | Arsenic | mg/kg | 3.49 | | 0.19 | 0.951 |
| Perimeter | 82 | Barium | mg/kg | 199 | | 0.475 | 1.9 |
| Perimeter | 82 | Beryllium | mg/kg | 0.464 | | 0.019 | 0.0951 |
| Perimeter | 82 | Cadmium | mg/kg | 0.18 | J | 0.019 | 0.19 |
| Perimeter | 82 | Calcium | mg/kg | 49300 | | 62.7 | 190 |
| Perimeter | 82 | Chromium | mg/kg | 8.99 | | 0.19 | 0.57 |
| Perimeter | 82 | Cobalt | mg/kg | 5.06 | | 0.057 | 0.19 |
| Perimeter | 82 | Copper | mg/kg | 9 | | 0.0627 | 0.19 |
| Perimeter | 82 | Iron | mg/kg | 12200 | | 23.8 | 95.1 |
| Perimeter | 82 | Lead | mg/kg | 7.79 | | 0.0951 | 0.38 |
| Perimeter | 82 | Magnesium | mg/kg | 4300 | | 1.43 | 4.75 |
| Perimeter | 82 | Manganese | mg/kg | 178 | | 0.19 | 0.951 |
| Perimeter | 82 | Nickel | mg/kg | 9.2 | | 0.0951 | 0.38 |
| Perimeter | 82 | Potassium | mg/kg | 2610 | | 15.2 | 57 |
| Perimeter | 82 | Selenium | mg/kg | 0.475 | U | 0.475 | 0.951 |
| Perimeter | 82 | Silver | mg/kg | 0.0977 | U | 0.0977 | 0.488 |
| Perimeter | 82 | Sodium | mg/kg | 80.8 | | 15.2 | 47.5 |
| Perimeter | 82 | Thallium | mg/kg | 0.121 | J | 0.057 | 0.19 |
| Perimeter | 82 | Vanadium | mg/kg | 28 | | 1.9 | 9.51 |
| Perimeter | 82 | Zinc | mg/kg | 35.5 | | 0.342 | 1.71 |

## TABLE C-6. Non-radiological Results by Location for Calendar Year 2010, Soil

| Location Type | Location | Analyte | Units | Result | Lab Data Qualifiers | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|
| Perimeter | 87 | Aluminum | mg/kg | 5170 | | 2.81 | 9.36 |
| Perimeter | 87 | Antimony | mg/kg | 0.301 | U | 0.301 | 0.911 |
| Perimeter | 87 | Arsenic | mg/kg | 1 | | 0.187 | 0.936 |
| Perimeter | 87 | Barium | mg/kg | 47 | | 0.0936 | 0.375 |
| Perimeter | 87 | Beryllium | mg/kg | 0.254 | | 0.0187 | 0.0936 |
| Perimeter | 87 | Cadmium | mg/kg | 0.132 | J | 0.0187 | 0.187 |
| Perimeter | 87 | Calcium | mg/kg | 1260 | | 6.18 | 18.7 |
| Perimeter | 87 | Chromium | mg/kg | 4.95 | | 0.187 | 0.562 |
| Perimeter | 87 | Cobalt | mg/kg | 2.01 | | 0.0562 | 0.187 |
| Perimeter | 87 | Copper | mg/kg | 3.82 | | 0.0618 | 0.187 |
| Perimeter | 87 | Iron | mg/kg | 5020 | | 4.68 | 18.7 |
| Perimeter | 87 | Lead | mg/kg | 6.26 | | 0.0936 | 0.375 |
| Perimeter | 87 | Magnesium | mg/kg | 1590 | | 1.4 | 4.68 |
| Perimeter | 87 | Manganese | mg/kg | 106 | | 0.187 | 0.936 |
| Perimeter | 87 | Nickel | mg/kg | 4 | | 0.0936 | 0.375 |
| Perimeter | 87 | Potassium | mg/kg | 1460 | | 15 | 56.2 |
| Perimeter | 87 | Selenium | mg/kg | 0.468 | U | 0.468 | 0.936 |
| Perimeter | 87 | Silver | mg/kg | 0.112 | J | 0.0911 | 0.455 |
| Perimeter | 87 | Sodium | mg/kg | 26.7 | J | 15 | 46.8 |
| Perimeter | 87 | Thallium | mg/kg | 0.0607 | J | 0.0562 | 0.187 |
| Perimeter | 87 | Vanadium | mg/kg | 8.67 | | 0.375 | 1.87 |
| Perimeter | 87 | Zinc | mg/kg | 17.7 | | 0.375 | 1.87 |
| Perimeter | 88 | Aluminum | mg/kg | 3300 | | 2.94 | 9.78 |
| Perimeter | 88 | Antimony | mg/kg | 0.327 | U | 0.327 | 0.99 |
| Perimeter | 88 | Arsenic | mg/kg | 0.741 | J | 0.196 | 0.978 |
| Perimeter | 88 | Barium | mg/kg | 30.6 | | 0.0978 | 0.391 |
| Perimeter | 88 | Beryllium | mg/kg | 0.156 | | 0.0196 | 0.0978 |
| Perimeter | 88 | Cadmium | mg/kg | 0.084 | J | 0.0196 | 0.196 |
| Perimeter | 88 | Calcium | mg/kg | 549 | | 6.46 | 19.6 |
| Perimeter | 88 | Chromium | mg/kg | 3.4 | | 0.196 | 0.587 |
| Perimeter | 88 | Cobalt | mg/kg | 1.32 | | 0.0587 | 0.196 |
| Perimeter | 88 | Copper | mg/kg | 2.37 | | 0.0646 | 0.196 |
| Perimeter | 88 | Iron | mg/kg | 3500 | | 4.89 | 19.6 |

## TABLE C-6. Non-radiological Results by Location for Calendar Year 2010, Soil

| Location Type | Location | Analyte | Units | Result | Lab Data Qualifiers | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|
| Perimeter | 88 | Lead | mg/kg | 4.06 | | 0.0978 | 0.391 |
| Perimeter | 88 | Magnesium | mg/kg | 755 | | 1.47 | 4.89 |
| Perimeter | 88 | Manganese | mg/kg | 75.6 | | 0.196 | 0.978 |
| Perimeter | 88 | Nickel | mg/kg | 2.42 | | 0.0978 | 0.391 |
| Perimeter | 88 | Potassium | mg/kg | 767 | | 15.7 | 58.7 |
| Perimeter | 88 | Selenium | mg/kg | 0.489 | U | 0.489 | 0.978 |
| Perimeter | 88 | Silver | mg/kg | 0.112 | J | 0.099 | 0.495 |
| Perimeter | 88 | Sodium | mg/kg | 15.7 | U | 15.7 | 48.9 |
| Perimeter | 88 | Thallium | mg/kg | 0.0587 | U | 0.0587 | 0.196 |
| Perimeter | 88 | Vanadium | mg/kg | 6.13 | | 0.391 | 1.96 |
| Perimeter | 88 | Zinc | mg/kg | 10.8 | | 0.391 | 1.96 |
| Perimeter | 89 | Aluminum | mg/kg | 5880 | | 14.4 | 47.9 |
| Perimeter | 89 | Antimony | mg/kg | 0.328 | U | 0.328 | 0.994 |
| Perimeter | 89 | Arsenic | mg/kg | 1.5 | | 0.192 | 0.958 |
| Perimeter | 89 | Barium | mg/kg | 105 | | 0.0958 | 0.383 |
| Perimeter | 89 | Beryllium | mg/kg | 0.218 | | 0.0192 | 0.0958 |
| Perimeter | 89 | Cadmium | mg/kg | 0.0881 | J | 0.0192 | 0.192 |
| Perimeter | 89 | Calcium | mg/kg | 19300 | | 31.6 | 95.8 |
| Perimeter | 89 | Chromium | mg/kg | 4.32 | | 0.192 | 0.575 |
| Perimeter | 89 | Cobalt | mg/kg | 1.93 | | 0.0575 | 0.192 |
| Perimeter | 89 | Copper | mg/kg | 3.33 | | 0.0632 | 0.192 |
| Perimeter | 89 | Iron | mg/kg | 4810 | | 4.79 | 19.2 |
| Perimeter | 89 | Lead | mg/kg | 4.02 | | 0.0958 | 0.383 |
| Perimeter | 89 | Magnesium | mg/kg | 2550 | | 7.18 | 23.9 |
| Perimeter | 89 | Manganese | mg/kg | 91.6 | | 0.192 | 0.958 |
| Perimeter | 89 | Nickel | mg/kg | 3.94 | | 0.0958 | 0.383 |
| Perimeter | 89 | Potassium | mg/kg | 1280 | | 76.6 | 287 |
| Perimeter | 89 | Selenium | mg/kg | 0.479 | U | 0.479 | 0.958 |
| Perimeter | 89 | Silver | mg/kg | 0.0994 | U | 0.0994 | 0.497 |
| Perimeter | 89 | Sodium | mg/kg | 46.1 | J | 15.3 | 47.9 |
| Perimeter | 89 | Thallium | mg/kg | 0.0575 | U | 0.0575 | 0.192 |

**TABLE C-6. Non-radiological Results by Location for Calendar Year 2010, Soil**

| Location Type | Location | Analyte | Units | Result | Lab Data Qualifiers | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|
| Perimeter | 89 | Vanadium | mg/kg | 12.9 | | 0.383 | 1.92 |
| Perimeter | 89 | Zinc | mg/kg | 44.4 | | 0.383 | 1.92 |

**NOTES:**

**J = Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL.**
**MDL = Method detection limit.**
**mg/kg = milligram per kilogram**
**PQL = Practical quantitation limit.**
**U = The analyte was analyzed for, but not detected. For organic and inorganic analytes the result is less than the effective MDL concentration.**

## TABLE C-7. Non-radiological Results by Location for Calendar Year 2010, Sediment

| Location Type | Location | Analyte | Units | Result | Lab Data Qualifiers | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|
| Community | 68 | Aluminum | mg/kg | 4020 | | 14.4 | 48 |
| Community | 68 | Antimony | mg/kg | 1.41 | U | 1.41 | 4.28 |
| Community | 68 | Arsenic | mg/kg | 4.61 | | 0.192 | 0.96 |
| Community | 68 | Barium | mg/kg | 132 | | 0.096 | 0.384 |
| Community | 68 | Beryllium | mg/kg | 0.269 | | 0.0192 | 0.096 |
| Community | 68 | Cadmium | mg/kg | 0.301 | | 0.0192 | 0.192 |
| Community | 68 | Calcium | mg/kg | 115000 | | 633 | 1920 |
| Community | 68 | Chromium | mg/kg | 5.68 | | 0.192 | 0.576 |
| Community | 68 | Cobalt | mg/kg | 2.11 | | 0.0576 | 0.192 |
| Community | 68 | Copper | mg/kg | 3.8 | | 0.0633 | 0.192 |
| Community | 68 | Iron | mg/kg | 5660 | | 4.8 | 19.2 |
| Community | 68 | Lead | mg/kg | 8.31 | | 0.096 | 0.384 |
| Community | 68 | Magnesium | mg/kg | 1980 | | 1.44 | 4.8 |
| Community | 68 | Manganese | mg/kg | 151 | | 0.192 | 0.96 |
| Community | 68 | Nickel | mg/kg | 6.8 | | 0.096 | 0.384 |
| Community | 68 | Potassium | mg/kg | 1070 | | 76.8 | 288 |
| Community | 68 | Selenium | mg/kg | 0.48 | U | 0.48 | 0.96 |
| Community | 68 | Silver | mg/kg | 0.0856 | U | 0.0856 | 0.428 |
| Community | 68 | Sodium | mg/kg | 71.3 | | 15.4 | 48 |
| Community | 68 | Thallium | mg/kg | 0.0808 | J | 0.0576 | 0.192 |
| Community | 68 | Vanadium | mg/kg | 9.78 | | 0.384 | 1.92 |
| Community | 68 | Zinc | mg/kg | 23.8 | | 0.384 | 1.92 |
| On-Site | 72 | Aluminum | mg/kg | 10800 | | 26.4 | 88 |
| On-Site | 72 | Antimony | mg/kg | 0.307 | U | 0.307 | 0.929 |
| On-Site | 72 | Arsenic | mg/kg | 3.69 | | 0.176 | 0.88 |
| On-Site | 72 | Barium | mg/kg | 105 | | 0.088 | 0.352 |
| On-Site | 72 | Beryllium | mg/kg | 0.548 | | 0.0176 | 0.088 |
| On-Site | 72 | Cadmium | mg/kg | 0.183 | | 0.0176 | 0.176 |
| On-Site | 72 | Calcium | mg/kg | 34500 | | 58.1 | 176 |
| On-Site | 72 | Chromium | mg/kg | 8.52 | | 0.176 | 0.528 |
| On-Site | 72 | Cobalt | mg/kg | 3.98 | | 0.0528 | 0.176 |
| On-Site | 72 | Copper | mg/kg | 8.44 | | 0.0581 | 0.176 |
| On-Site | 72 | Iron | mg/kg | 10400 | | 44 | 176 |

TABLE C-7.  Non-radiological Results by Location for Calendar Year 2010, Sediment

| Location Type | Location | Analyte | Units | Result | Lab Data Qualifiers | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|
| On-Site | 72 | Lead | mg/kg | 8.68 | | 0.088 | 0.352 |
| On-Site | 72 | Magnesium | mg/kg | 3900 | | 1.32 | 4.4 |
| On-Site | 72 | Manganese | mg/kg | 235 | | 1.76 | 8.8 |
| On-Site | 72 | Nickel | mg/kg | 8.18 | | 0.088 | 0.352 |
| On-Site | 72 | Potassium | mg/kg | 1840 | | 14.1 | 52.8 |
| On-Site | 72 | Selenium | mg/kg | 0.44 | U | 0.44 | 0.88 |
| On-Site | 72 | Silver | mg/kg | 0.0929 | U | 0.0929 | 0.465 |
| On-Site | 72 | Sodium | mg/kg | 75.9 | | 14.1 | 44 |
| On-Site | 72 | Thallium | mg/kg | 0.111 | J | 0.0528 | 0.176 |
| On-Site | 72 | Vanadium | mg/kg | 17.2 | | 0.352 | 1.76 |
| On-Site | 72 | Zinc | mg/kg | 32.9 | | 0.352 | 1.76 |
| On-Site | 74N | Aluminum | mg/kg | 3400 | | 13.8 | 46 |
| On-Site | 74N | Antimony | mg/kg | 0.317 | U | 0.317 | 0.96 |
| On-Site | 74N | Arsenic | mg/kg | 0.955 | | 0.184 | 0.921 |
| On-Site | 74N | Barium | mg/kg | 38 | | 0.0921 | 0.368 |
| On-Site | 74N | Beryllium | mg/kg | 0.202 | | 0.0184 | 0.0921 |
| On-Site | 74N | Cadmium | mg/kg | 0.102 | J | 0.0184 | 0.184 |
| On-Site | 74N | Calcium | mg/kg | 14600 | | 30.4 | 92.1 |
| On-Site | 74N | Chromium | mg/kg | 2.51 | | 0.184 | 0.552 |
| On-Site | 74N | Cobalt | mg/kg | 2.26 | | 0.0552 | 0.184 |
| On-Site | 74N | Copper | mg/kg | 5.29 | | 0.0608 | 0.184 |
| On-Site | 74N | Iron | mg/kg | 5290 | | 4.6 | 18.4 |
| On-Site | 74N | Lead | mg/kg | 2.75 | | 0.0921 | 0.368 |
| On-Site | 74N | Magnesium | mg/kg | 2010 | | 6.91 | 23 |
| On-Site | 74N | Manganese | mg/kg | 147 | | 0.184 | 0.921 |
| On-Site | 74N | Nickel | mg/kg | 3.62 | | 0.0921 | 0.368 |
| On-Site | 74N | Potassium | mg/kg | 818 | | 73.7 | 276 |
| On-Site | 74N | Selenium | mg/kg | 0.46 | U | 0.46 | 0.921 |
| On-Site | 74N | Silver | mg/kg | 0.096 | U | 0.096 | 0.48 |
| On-Site | 74N | Sodium | mg/kg | 45.8 | J | 14.7 | 46 |
| On-Site | 74N | Thallium | mg/kg | 0.0552 | U | 0.0552 | 0.184 |
| On-Site | 74N | Vanadium | mg/kg | 11.4 | | 0.368 | 1.84 |
| On-Site | 74N | Zinc | mg/kg | 20.5 | | 0.368 | 1.84 |

## TABLE C-7. Non-radiological Results by Location for Calendar Year 2010, Sediment

| Location Type | Location | Analyte | Units | Result | Lab Data Qualifiers | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|
| On-Site | 75 | Aluminum | mg/kg | 5420 | | 14.3 | 47.5 |
| On-Site | 75 | Antimony | mg/kg | 0.314 | U | 0.314 | 0.952 |
| On-Site | 75 | Arsenic | mg/kg | 1.16 | | 0.19 | 0.951 |
| On-Site | 75 | Barium | mg/kg | 34 | | 0.0951 | 0.38 |
| On-Site | 75 | Beryllium | mg/kg | 0.269 | | 0.019 | 0.0951 |
| On-Site | 75 | Cadmium | mg/kg | 0.137 | J | 0.019 | 0.19 |
| On-Site | 75 | Calcium | mg/kg | 31200 | | 31.4 | 95.1 |
| On-Site | 75 | Chromium | mg/kg | 6.47 | | 0.19 | 0.57 |
| On-Site | 75 | Cobalt | mg/kg | 4.82 | | 0.057 | 0.19 |
| On-Site | 75 | Copper | mg/kg | 9.49 | | 0.0627 | 0.19 |
| On-Site | 75 | Iron | mg/kg | 9080 | | 4.75 | 19 |
| On-Site | 75 | Lead | mg/kg | 7.94 | | 0.0951 | 0.38 |
| On-Site | 75 | Magnesium | mg/kg | 3180 | | 7.13 | 23.8 |
| On-Site | 75 | Manganese | mg/kg | 202 | | 0.951 | 4.75 |
| On-Site | 75 | Nickel | mg/kg | 7.22 | | 0.0951 | 0.38 |
| On-Site | 75 | Potassium | mg/kg | 714 | | 76 | 285 |
| On-Site | 75 | Selenium | mg/kg | 0.475 | U | 0.475 | 0.951 |
| On-Site | 75 | Silver | mg/kg | 0.0952 | U | 0.0952 | 0.476 |
| On-Site | 75 | Sodium | mg/kg | 55.3 | | 15.2 | 47.5 |
| On-Site | 75 | Thallium | mg/kg | 0.057 | U | 0.057 | 0.19 |
| On-Site | 75 | Vanadium | mg/kg | 18.6 | | 0.38 | 1.9 |
| On-Site | 75 | Zinc | mg/kg | 23.2 | | 0.38 | 1.9 |
| On-Site | 79 | Aluminum | mg/kg | 13000 | | 28.1 | 93.8 |
| On-Site | 79 | Antimony | mg/kg | 1.56 | U | 1.56 | 4.72 |
| On-Site | 79 | Arsenic | mg/kg | 3.56 | | 0.188 | 0.938 |
| On-Site | 79 | Barium | mg/kg | 179 | | 0.0938 | 0.375 |
| On-Site | 79 | Beryllium | mg/kg | 0.583 | | 0.0188 | 0.0938 |
| On-Site | 79 | Cadmium | mg/kg | 0.612 | | 0.0188 | 0.188 |
| On-Site | 79 | Calcium | mg/kg | 85600 | | 61.9 | 188 |
| On-Site | 79 | Chromium | mg/kg | 12.2 | | 0.188 | 0.563 |
| On-Site | 79 | Cobalt | mg/kg | 4.99 | | 0.0563 | 0.188 |
| On-Site | 79 | Copper | mg/kg | 9.5 | | 0.0619 | 0.188 |
| On-Site | 79 | Iron | mg/kg | 13000 | | 46.9 | 188 |

TABLE C-7.  Non-radiological Results by Location for Calendar Year 2010, Sediment

| Location Type | Location | Analyte | Units | Result | Lab Data Qualifiers | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|
| On-Site | 79 | Lead | mg/kg | 11.4 | | 0.0938 | 0.375 |
| On-Site | 79 | Magnesium | mg/kg | 4260 | | 1.41 | 4.69 |
| On-Site | 79 | Manganese | mg/kg | 305 | | 1.88 | 9.38 |
| On-Site | 79 | Nickel | mg/kg | 11.9 | | 0.0938 | 0.375 |
| On-Site | 79 | Potassium | mg/kg | 2260 | | 15 | 56.3 |
| On-Site | 79 | Selenium | mg/kg | 0.469 | U | 0.469 | 0.938 |
| On-Site | 79 | Silver | mg/kg | 0.0943 | U | 0.0943 | 0.472 |
| On-Site | 79 | Sodium | mg/kg | 56.6 | | 15 | 46.9 |
| On-Site | 79 | Thallium | mg/kg | 0.133 | J | 0.0563 | 0.188 |
| On-Site | 79 | Vanadium | mg/kg | 18.2 | | 0.375 | 1.88 |
| On-Site | 79 | Zinc | mg/kg | 46.6 | | 0.375 | 1.88 |
| On-Site | 83 | Aluminum | mg/kg | 16700 | | 27.2 | 90.7 |
| On-Site | 83 | Antimony | mg/kg | 1.64 | U | 1.64 | 4.96 |
| On-Site | 83 | Arsenic | mg/kg | 3.03 | | 0.181 | 0.907 |
| On-Site | 83 | Barium | mg/kg | 201 | | 0.907 | 3.63 |
| On-Site | 83 | Beryllium | mg/kg | 0.595 | J | 0.181 | 0.907 |
| On-Site | 83 | Cadmium | mg/kg | 0.408 | | 0.0181 | 0.181 |
| On-Site | 83 | Calcium | mg/kg | 47700 | | 59.9 | 181 |
| On-Site | 83 | Chromium | mg/kg | 12.4 | | 1.81 | 5.44 |
| On-Site | 83 | Cobalt | mg/kg | 6.89 | | 0.544 | 1.81 |
| On-Site | 83 | Copper | mg/kg | 18.7 | | 0.599 | 1.81 |
| On-Site | 83 | Iron | mg/kg | 15300 | | 45.4 | 181 |
| On-Site | 83 | Lead | mg/kg | 14.2 | | 0.0907 | 0.363 |
| On-Site | 83 | Magnesium | mg/kg | 7200 | | 13.6 | 45.4 |
| On-Site | 83 | Manganese | mg/kg | 398 | | 1.81 | 9.07 |
| On-Site | 83 | Nickel | mg/kg | 14.3 | | 0.907 | 3.63 |
| On-Site | 83 | Potassium | mg/kg | 6060 | | 145 | 544 |
| On-Site | 83 | Selenium | mg/kg | 0.454 | U | 0.454 | 0.907 |
| On-Site | 83 | Silver | mg/kg | 0.0992 | U | 0.0992 | 0.496 |
| On-Site | 83 | Sodium | mg/kg | 145 | U | 145 | 454 |
| On-Site | 83 | Thallium | mg/kg | 0.18 | J | 0.0544 | 0.181 |
| On-Site | 83 | Vanadium | mg/kg | 28.8 | | 3.63 | 18.1 |
| On-Site | 83 | Zinc | mg/kg | 59.7 | | 0.363 | 1.81 |

## TABLE C-7.  Non-radiological Results by Location for Calendar Year 2010, Sediment

| Location Type | Location | Analyte | Units | Result | Lab Data Qualifiers | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|
| On-Site | 84 | Aluminum | mg/kg | 8090 | | 13.7 | 45.5 |
| On-Site | 84 | Antimony | mg/kg | 0.33 | U | 0.33 | 1 |
| On-Site | 84 | Arsenic | mg/kg | 2.18 | | 0.182 | 0.911 |
| On-Site | 84 | Barium | mg/kg | 87.6 | | 0.0911 | 0.364 |
| On-Site | 84 | Beryllium | mg/kg | 0.468 | | 0.0182 | 0.0911 |
| On-Site | 84 | Cadmium | mg/kg | 0.168 | J | 0.0182 | 0.182 |
| On-Site | 84 | Calcium | mg/kg | 25800 | | 30.1 | 91.1 |
| On-Site | 84 | Chromium | mg/kg | 9.34 | | 0.182 | 0.546 |
| On-Site | 84 | Cobalt | mg/kg | 5.72 | | 0.0546 | 0.182 |
| On-Site | 84 | Copper | mg/kg | 9.81 | | 0.0601 | 0.182 |
| On-Site | 84 | Iron | mg/kg | 11000 | | 22.8 | 91.1 |
| On-Site | 84 | Lead | mg/kg | 8.25 | | 0.0911 | 0.364 |
| On-Site | 84 | Magnesium | mg/kg | 4020 | | 1.37 | 4.55 |
| On-Site | 84 | Manganese | mg/kg | 241 | | 0.911 | 4.55 |
| On-Site | 84 | Nickel | mg/kg | 8.91 | | 0.0911 | 0.364 |
| On-Site | 84 | Potassium | mg/kg | 2040 | | 72.9 | 273 |
| On-Site | 84 | Selenium | mg/kg | 0.455 | U | 0.455 | 0.911 |
| On-Site | 84 | Silver | mg/kg | 0.1 | U | 0.1 | 0.5 |
| On-Site | 84 | Sodium | mg/kg | 82.4 | | 14.6 | 45.5 |
| On-Site | 84 | Thallium | mg/kg | 0.09 | J | 0.0546 | 0.182 |
| On-Site | 84 | Vanadium | mg/kg | 10.7 | | 1.82 | 9.11 |
| On-Site | 84 | Zinc | mg/kg | 35 | | 0.364 | 1.82 |
| On-Site | 85 | Aluminum | mg/kg | 8850 | | 2.98 | 9.94 |
| On-Site | 85 | Antimony | mg/kg | 1.55 | U | 1.55 | 4.69 |
| On-Site | 85 | Arsenic | mg/kg | 2.99 | | 0.199 | 0.994 |
| On-Site | 85 | Barium | mg/kg | 141 | | 0.0994 | 0.398 |
| On-Site | 85 | Beryllium | mg/kg | 0.505 | | 0.0199 | 0.0994 |
| On-Site | 85 | Cadmium | mg/kg | 0.304 | | 0.0199 | 0.199 |
| On-Site | 85 | Calcium | mg/kg | 50700 | | 65.6 | 199 |
| On-Site | 85 | Chromium | mg/kg | 10.7 | | 0.199 | 0.596 |
| On-Site | 85 | Cobalt | mg/kg | 4.59 | | 0.0596 | 0.199 |
| On-Site | 85 | Copper | mg/kg | 8.36 | | 0.0656 | 0.199 |
| On-Site | 85 | Iron | mg/kg | 11200 | | 49.7 | 199 |

TABLE C-7. Non-radiological Results by Location for Calendar Year 2010, Sediment

| Location Type | Location | Analyte | Units | Result | Lab Data Qualifiers | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|
| On-Site | 85 | Lead | mg/kg | 11.5 | | 0.0994 | 0.398 |
| On-Site | 85 | Magnesium | mg/kg | 3500 | | 1.49 | 4.97 |
| On-Site | 85 | Manganese | mg/kg | 262 | | 1.99 | 9.94 |
| On-Site | 85 | Nickel | mg/kg | 10.7 | | 0.0994 | 0.398 |
| On-Site | 85 | Potassium | mg/kg | 1790 | | 15.9 | 59.6 |
| On-Site | 85 | Selenium | mg/kg | 0.497 | U | 0.497 | 0.994 |
| On-Site | 85 | Silver | mg/kg | 0.0938 | U | 0.0938 | 0.469 |
| On-Site | 85 | Sodium | mg/kg | 50.6 | | 15.9 | 49.7 |
| On-Site | 85 | Thallium | mg/kg | 0.116 | J | 0.0596 | 0.199 |
| On-Site | 85 | Vanadium | mg/kg | 17.5 | | 0.398 | 1.99 |
| On-Site | 85 | Zinc | mg/kg | 38 | | 0.398 | 1.99 |
| Perimeter | 60 | Aluminum | mg/kg | 5910 | | 13.4 | 44.6 |
| Perimeter | 60 | Antimony | mg/kg | 1.64 | U | 1.64 | 4.96 |
| Perimeter | 60 | Arsenic | mg/kg | 1.19 | | 0.178 | 0.891 |
| Perimeter | 60 | Barium | mg/kg | 84.4 | | 0.0891 | 0.357 |
| Perimeter | 60 | Beryllium | mg/kg | 0.288 | | 0.0178 | 0.0891 |
| Perimeter | 60 | Cadmium | mg/kg | 0.122 | J | 0.0178 | 0.178 |
| Perimeter | 60 | Calcium | mg/kg | 17900 | | 29.4 | 89.1 |
| Perimeter | 60 | Chromium | mg/kg | 4.98 | | 0.178 | 0.535 |
| Perimeter | 60 | Cobalt | mg/kg | 3.14 | | 0.0535 | 0.178 |
| Perimeter | 60 | Copper | mg/kg | 5.35 | | 0.0588 | 0.178 |
| Perimeter | 60 | Iron | mg/kg | 7920 | | 4.46 | 17.8 |
| Perimeter | 60 | Lead | mg/kg | 4.34 | | 0.0891 | 0.357 |
| Perimeter | 60 | Magnesium | mg/kg | 2750 | | 6.68 | 22.3 |
| Perimeter | 60 | Manganese | mg/kg | 207 | | 0.891 | 4.46 |
| Perimeter | 60 | Nickel | mg/kg | 5.5 | | 0.0891 | 0.357 |
| Perimeter | 60 | Potassium | mg/kg | 1590 | | 71.3 | 267 |
| Perimeter | 60 | Selenium | mg/kg | 0.446 | U | 0.446 | 0.891 |
| Perimeter | 60 | Silver | mg/kg | 0.0992 | U | 0.0992 | 0.496 |
| Perimeter | 60 | Sodium | mg/kg | 29.7 | J | 14.3 | 44.6 |
| Perimeter | 60 | Thallium | mg/kg | 0.0777 | J | 0.0535 | 0.178 |
| Perimeter | 60 | Vanadium | mg/kg | 15.1 | | 0.357 | 1.78 |
| Perimeter | 60 | Zinc | mg/kg | 24.2 | | 0.357 | 1.78 |

## TABLE C-7. Non-radiological Results by Location for Calendar Year 2010, Sediment

| Location Type | Location | Analyte | Units | Result | Lab Data Qualifiers | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|
| Perimeter | 65 | Aluminum | mg/kg | 2840 | | 2.76 | 9.21 |
| Perimeter | 65 | Antimony | mg/kg | 0.294 | U | 0.294 | 0.89 |
| Perimeter | 65 | Arsenic | mg/kg | 0.85 | J | 0.184 | 0.921 |
| Perimeter | 65 | Barium | mg/kg | 95.2 | | 0.921 | 3.68 |
| Perimeter | 65 | Beryllium | mg/kg | 0.202 | | 0.0184 | 0.0921 |
| Perimeter | 65 | Cadmium | mg/kg | 0.316 | | 0.0184 | 0.184 |
| Perimeter | 65 | Calcium | mg/kg | 37000 | | 30.4 | 92.1 |
| Perimeter | 65 | Chromium | mg/kg | 2.48 | | 0.184 | 0.552 |
| Perimeter | 65 | Cobalt | mg/kg | 1.92 | | 0.0552 | 0.184 |
| Perimeter | 65 | Copper | mg/kg | 4.17 | | 0.0608 | 0.184 |
| Perimeter | 65 | Iron | mg/kg | 4630 | | 4.6 | 18.4 |
| Perimeter | 65 | Lead | mg/kg | 3.53 | | 0.0921 | 0.368 |
| Perimeter | 65 | Magnesium | mg/kg | 2230 | | 6.91 | 23 |
| Perimeter | 65 | Manganese | mg/kg | 158 | | 0.184 | 0.921 |
| Perimeter | 65 | Nickel | mg/kg | 2.71 | | 0.0921 | 0.368 |
| Perimeter | 65 | Potassium | mg/kg | 721 | | 14.7 | 55.2 |
| Perimeter | 65 | Selenium | mg/kg | 0.46 | U | 0.46 | 0.921 |
| Perimeter | 65 | Silver | mg/kg | 0.089 | U | 0.089 | 0.445 |
| Perimeter | 65 | Sodium | mg/kg | 75.8 | | 14.7 | 46 |
| Perimeter | 65 | Thallium | mg/kg | 0.0552 | U | 0.0552 | 0.184 |
| Perimeter | 65 | Vanadium | mg/kg | 14.9 | | 0.368 | 1.84 |
| Perimeter | 65 | Zinc | mg/kg | 21.4 | | 0.368 | 1.84 |
| Perimeter | 73 | Aluminum | mg/kg | 2860 | | 13.9 | 46.3 |
| Perimeter | 73 | Antimony | mg/kg | 1.6 | U | 1.6 | 4.84 |
| Perimeter | 73 | Arsenic | mg/kg | 0.447 | J | 0.185 | 0.926 |
| Perimeter | 73 | Barium | mg/kg | 25.4 | | 0.0926 | 0.37 |
| Perimeter | 73 | Beryllium | mg/kg | 0.128 | | 0.0185 | 0.0926 |
| Perimeter | 73 | Cadmium | mg/kg | 0.083 | J | 0.0185 | 0.185 |
| Perimeter | 73 | Calcium | mg/kg | 30100 | | 30.6 | 92.6 |
| Perimeter | 73 | Chromium | mg/kg | 2.08 | | 0.185 | 0.556 |
| Perimeter | 73 | Cobalt | mg/kg | 1.75 | | 0.0556 | 0.185 |
| Perimeter | 73 | Copper | mg/kg | 3.31 | | 0.0611 | 0.185 |

## TABLE C-7. Non-radiological Results by Location for Calendar Year 2010, Sediment

| Location Type | Location | Analyte | Units | Result | Lab Data Qualifiers | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|
| Perimeter | 73 | Iron | mg/kg | 3810 | | 4.63 | 18.5 |
| Perimeter | 73 | Lead | mg/kg | 2.2 | | 0.0926 | 0.37 |
| Perimeter | 73 | Magnesium | mg/kg | 1630 | | 6.94 | 23.1 |
| Perimeter | 73 | Manganese | mg/kg | 123 | | 0.185 | 0.926 |
| Perimeter | 73 | Nickel | mg/kg | 3.43 | | 0.0926 | 0.37 |
| Perimeter | 73 | Potassium | mg/kg | 772 | | 74.1 | 278 |
| Perimeter | 73 | Selenium | mg/kg | 0.463 | U | 0.463 | 0.926 |
| Perimeter | 73 | Silver | mg/kg | 0.0967 | U | 0.0967 | 0.484 |
| Perimeter | 73 | Sodium | mg/kg | 34.4 | J | 14.8 | 46.3 |
| Perimeter | 73 | Thallium | mg/kg | 0.0556 | U | 0.0556 | 0.185 |
| Perimeter | 73 | Vanadium | mg/kg | 7.4 | | 0.37 | 1.85 |
| Perimeter | 73 | Zinc | mg/kg | 15.4 | | 0.37 | 1.85 |

**NOTES:**

**J = Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL.**
**MDL = Method detection limit.**
**mg/kg = milligram per kilogram**
**PQL = Practical quantitation limit.**
**U = The analyte was analyzed for, but not detected. For organic and inorganic analytes the result is less than the effective MDL concentration.**

## TABLE C-8. Non-radiological Replicate Results for Calendar Year 2010, Soil

| Location Type | Location | Analyte | Sample ID | Units | Result | Qualifier | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|---|
| On-Site | 02NE | Aluminum | 088761-001 | mg/kg | 6630.00 | | 2.92 | 9.75 |
| On-Site | 02NE | Aluminum | 088761-002 | mg/kg | 6450.00 | | 2.81 | 9.38 |
| On-Site | 02NE | Aluminum | 088761-003 | mg/kg | 6460.00 | | 2.88 | 9.62 |
| | | **Aluminum Average** | | | 6513.33 | | | |
| | | **Aluminum StdDev** | | | 101.16 | | | |
| | | **CV (%)** | | | 1.55 | | | |
| On-Site | 02NE | Antimony | 088761-001 | mg/kg | 1.40 | U | 1.40 | 4.25 |
| On-Site | 02NE | Antimony | 088761-002 | mg/kg | 1.60 | U | 1.60 | 4.84 |
| On-Site | 02NE | Antimony | 088761-003 | mg/kg | 1.62 | U | 1.62 | 4.91 |
| | | **Antimony Average** | | | 1.54 | | | |
| | | **Antimony StdDev** | | | 0.12 | | | |
| | | **CV (%)** | | | 7.90 | | | |
| On-Site | 02NE | Arsenic | 088761-001 | mg/kg | 1.51 | | 0.20 | 0.98 |
| On-Site | 02NE | Arsenic | 088761-002 | mg/kg | 1.42 | | 0.19 | 0.94 |
| On-Site | 02NE | Arsenic | 088761-003 | mg/kg | 1.46 | | 0.19 | 0.96 |
| | | **Arsenic Average** | | | 1.46 | | | |
| | | **Arsenic StdDev** | | | 0.05 | | | |
| | | **CV (%)** | | | 3.08 | | | |
| On-Site | 02NE | Barium | 088761-001 | mg/kg | 66.60 | | 0.10 | 0.39 |
| On-Site | 02NE | Barium | 088761-002 | mg/kg | 66.40 | | 0.09 | 0.38 |
| On-Site | 02NE | Barium | 088761-003 | mg/kg | 67.00 | | 0.10 | 0.39 |
| | | **Barium Average** | | | 66.67 | | | |
| | | **Barium StdDev** | | | 0.31 | | | |
| | | **CV (%)** | | | 0.46 | | | |
| On-Site | 02NE | Beryllium | 088761-001 | mg/kg | 0.34 | | 0.02 | 0.10 |
| On-Site | 02NE | Beryllium | 088761-002 | mg/kg | 0.34 | | 0.02 | 0.09 |
| On-Site | 02NE | Beryllium | 088761-003 | mg/kg | 0.34 | | 0.02 | 0.10 |
| | | **Beryllium Average** | | | 0.34 | | | |
| | | **Beryllium StdDev** | | | 0.00 | | | |
| | | **CV (%)** | | | 0.78 | | | |
| On-Site | 02NE | Cadmium | 088761-001 | mg/kg | 0.29 | | 0.02 | 0.20 |
| On-Site | 02NE | Cadmium | 088761-002 | mg/kg | 0.28 | | 0.02 | 0.19 |
| On-Site | 02NE | Cadmium | 088761-003 | mg/kg | 0.22 | | 0.02 | 0.19 |
| | | **Cadmium Average** | | | 0.26 | | | |
| | | **Cadmium StdDev** | | | 0.04 | | | |
| | | **CV (%)** | | | 14.67 | | | |

## TABLE C-8. Non-radiological Replicate Results for Calendar Year 2010, Soil

| Location Type | Location | Analyte | Sample ID | Units | Result | Qualifier | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|---|
| On-Site | 02NE | Calcium | 088761-001 | mg/kg | 5100.00 | | 6.43 | 19.50 |
| On-Site | 02NE | Calcium | 088761-002 | mg/kg | 4920.00 | | 6.19 | 18.80 |
| On-Site | 02NE | Calcium | 088761-003 | mg/kg | 4650.00 | | 6.35 | 19.20 |
| | | **Calcium Average** | | | 4890.00 | | | |
| | | **Calcium StdDev** | | | 226.50 | | | |
| | | **CV (%)** | | | 4.63 | | | |
| On-Site | 02NE | Chromium | 088761-001 | mg/kg | 5.76 | | 0.20 | 0.59 |
| On-Site | 02NE | Chromium | 088761-002 | mg/kg | 5.68 | | 0.19 | 0.56 |
| On-Site | 02NE | Chromium | 088761-003 | mg/kg | 5.71 | | 0.19 | 0.58 |
| | | **Chromium Average** | | | 5.72 | | | |
| | | **Chromium StdDev** | | | 0.04 | | | |
| | | **CV (%)** | | | 0.71 | | | |
| On-Site | 02NE | Cobalt | 088761-001 | mg/kg | 2.34 | | 0.06 | 0.20 |
| On-Site | 02NE | Cobalt | 088761-002 | mg/kg | 2.30 | | 0.06 | 0.19 |
| On-Site | 02NE | Cobalt | 088761-003 | mg/kg | 2.34 | | 0.06 | 0.19 |
| | | **Cobalt Average** | | | 2.33 | | | |
| | | **Cobalt StdDev** | | | 0.02 | | | |
| | | **CV (%)** | | | 0.99 | | | |
| On-Site | 02NE | Copper | 088761-001 | mg/kg | 4.91 | | 0.06 | 0.20 |
| On-Site | 02NE | Copper | 088761-002 | mg/kg | 4.56 | | 0.06 | 0.19 |
| On-Site | 02NE | Copper | 088761-003 | mg/kg | 4.72 | | 0.06 | 0.19 |
| | | **Copper Average** | | | 4.73 | | | |
| | | **Copper StdDev** | | | 0.18 | | | |
| | | **CV (%)** | | | 3.70 | | | |
| On-Site | 02NE | Iron | 088761-001 | mg/kg | 6290.00 | | 4.87 | 19.50 |
| On-Site | 02NE | Iron | 088761-002 | mg/kg | 6040.00 | | 4.69 | 18.80 |
| On-Site | 02NE | Iron | 088761-003 | mg/kg | 6110.00 | | 4.81 | 19.20 |
| | | **Iron Average** | | | 6146.67 | | | |
| | | **Iron StdDev** | | | 128.97 | | | |
| | | **CV (%)** | | | 2.10 | | | |
| On-Site | 02NE | Lead | 088761-001 | mg/kg | 42.90 | | 0.10 | 0.39 |
| On-Site | 02NE | Lead | 088761-002 | mg/kg | 8.95 | | 0.09 | 0.38 |
| On-Site | 02NE | Lead | 088761-003 | mg/kg | 6.67 | | 0.10 | 0.39 |
| | | **Lead Average** | | | 19.51 | | | |
| | | **Lead StdDev** | | | 20.29 | | | |
| | | **CV (%)** | | | 104.02 | | | |

## TABLE C-8.  Non-radiological Replicate Results for Calendar Year 2010, Soil

| Location Type | Location | Analyte | Sample ID | Units | Result | Qualifier | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|---|
| On-Site | 02NE | Magnesium | 088761-001 | mg/kg | 1790.00 | | 1.46 | 4.87 |
| On-Site | 02NE | Magnesium | 088761-002 | mg/kg | 1760.00 | | 1.41 | 4.69 |
| On-Site | 02NE | Magnesium | 088761-003 | mg/kg | 1750.00 | | 1.44 | 4.81 |
| | | **Magnesium Average** | | | 1766.67 | | | |
| | | **Magnesium StdDev** | | | 20.82 | | | |
| | | **CV (%)** | | | 1.18 | | | |
| On-Site | 02NE | Manganese | 088761-001 | mg/kg | 112.00 | | 0.20 | 0.98 |
| On-Site | 02NE | Manganese | 088761-002 | mg/kg | 110.00 | | 0.19 | 0.94 |
| On-Site | 02NE | Manganese | 088761-003 | mg/kg | 110.00 | | 0.19 | 0.96 |
| | | **Manganese Average** | | | 110.67 | | | |
| | | **Manganese StdDev** | | | 1.15 | | | |
| | | **CV (%)** | | | 1.04 | | | |
| On-Site | 02NE | Nickel | 088761-001 | mg/kg | 4.90 | | 0.10 | 0.39 |
| On-Site | 02NE | Nickel | 088761-002 | mg/kg | 4.92 | | 0.09 | 0.38 |
| On-Site | 02NE | Nickel | 088761-003 | mg/kg | 4.90 | | 0.10 | 0.39 |
| | | **Nickel Average** | | | 4.91 | | | |
| | | **Nickel StdDev** | | | 0.01 | | | |
| | | **CV (%)** | | | 0.24 | | | |
| On-Site | 02NE | Potassium | 088761-001 | mg/kg | 1650.00 | | 15.60 | 58.50 |
| On-Site | 02NE | Potassium | 088761-002 | mg/kg | 1650.00 | | 15.00 | 56.30 |
| On-Site | 02NE | Potassium | 088761-003 | mg/kg | 1550.00 | | 15.40 | 57.70 |
| | | **Potassium Average** | | | 1616.67 | | | |
| | | **Potassium StdDev** | | | 57.74 | | | |
| | | **CV (%)** | | | 3.57 | | | |
| On-Site | 02NE | Selenium | 088761-001 | mg/kg | 0.49 | U | 0.49 | 0.98 |
| On-Site | 02NE | Selenium | 088761-002 | mg/kg | 0.47 | U | 0.47 | 0.94 |
| On-Site | 02NE | Selenium | 088761-003 | mg/kg | 0.48 | U | 0.48 | 0.96 |
| | | **Selenium Average** | | | 0.48 | | | |
| | | **Selenium StdDev** | | | 0.01 | | | |
| | | **CV (%)** | | | 1.91 | | | |
| On-Site | 02NE | Silver | 088761-001 | mg/kg | 0.18 | J | 0.09 | 0.43 |
| On-Site | 02NE | Silver | 088761-002 | mg/kg | 0.20 | J | 0.10 | 0.48 |
| On-Site | 02NE | Silver | 088761-003 | mg/kg | 0.25 | J | 0.10 | 0.49 |
| | | **Silver Average** | | | 0.21 | | | |
| | | **Silver StdDev** | | | 0.04 | | | |
| | | **CV (%)** | | | 17.69 | | | |

## TABLE C-8. Non-radiological Replicate Results for Calendar Year 2010, Soil

| Location Type | Location | Analyte | Sample ID | Units | Result | Qualifier | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|---|
| On-Site | 02NE | Sodium | 088761-001 | mg/kg | 22.60 | J | 15.60 | 48.70 |
| On-Site | 02NE | Sodium | 088761-002 | mg/kg | 21.50 | J | 15.00 | 46.90 |
| On-Site | 02NE | Sodium | 088761-003 | mg/kg | 24.10 | J | 15.40 | 48.10 |
| | | **Sodium Average** | | | 22.73 | | | |
| | | **Sodium StdDev** | | | 1.31 | | | |
| | | **CV (%)** | | | 5.74 | | | |
| On-Site | 02NE | Thallium | 088761-001 | mg/kg | 0.08 | J | 0.06 | 0.20 |
| On-Site | 02NE | Thallium | 088761-002 | mg/kg | 0.08 | J | 0.06 | 0.19 |
| On-Site | 02NE | Thallium | 088761-003 | mg/kg | 0.07 | J | 0.06 | 0.19 |
| | | **Thallium Average** | | | 0.08 | | | |
| | | **Thallium StdDev** | | | 0.00 | | | |
| | | **CV (%)** | | | 5.43 | | | |
| On-Site | 02NE | Vanadium | 088761-001 | mg/kg | 10.70 | | 0.39 | 1.95 |
| On-Site | 02NE | Vanadium | 088761-002 | mg/kg | 10.20 | | 0.38 | 1.88 |
| On-Site | 02NE | Vanadium | 088761-003 | mg/kg | 10.60 | | 0.39 | 1.92 |
| | | **Vanadium Average** | | | 10.50 | | | |
| | | **Vanadium StdDev** | | | 0.26 | | | |
| | | **CV (%)** | | | 2.52 | | | |
| On-Site | 02NE | Zinc | 088761-001 | mg/kg | 22.30 | | 0.39 | 1.95 |
| On-Site | 02NE | Zinc | 088761-002 | mg/kg | 22.40 | | 0.38 | 1.88 |
| On-Site | 02NE | Zinc | 088761-003 | mg/kg | 20.30 | | 0.39 | 1.92 |
| | | **Zinc Average** | | | 21.67 | | | |
| | | **Zinc StdDev** | | | 1.18 | | | |
| | | **CV (%)** | | | 5.47 | | | |
| On-Site | 33 | Aluminum | 088796-001 | mg/kg | 14100.00 | | 26.90 | 89.80 |
| On-Site | 33 | Aluminum | 088796-002 | mg/kg | 12900.00 | | 29.10 | 97.10 |
| On-Site | 33 | Aluminum | 088796-003 | mg/kg | 12100.00 | | 30.00 | 100.00 |
| | | **Aluminum Average** | | | 13033.33 | | | |
| | | **Aluminum StdDev** | | | 1006.64 | | | |
| | | **CV (%)** | | | 7.72 | | | |
| On-Site | 33 | Antimony | 088796-001 | mg/kg | 0.33 | U | 0.33 | 0.99 |
| On-Site | 33 | Antimony | 088796-002 | mg/kg | 1.57 | U | 1.57 | 4.74 |
| On-Site | 33 | Antimony | 088796-003 | mg/kg | 1.65 | U | 1.65 | 5.00 |
| | | **Antimony Average** | | | 1.18 | | | |
| | | **Antimony StdDev** | | | 0.74 | | | |
| | | **CV (%)** | | | 62.74 | | | |

## TABLE C-8. Non-radiological Replicate Results for Calendar Year 2010, Soil

| Location Type | Location | Analyte | Sample ID | Units | Result | Qualifier | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|---|
| On-Site | 33 | Arsenic | 088796-001 | mg/kg | 6.11 | | 0.18 | 0.90 |
| On-Site | 33 | Arsenic | 088796-002 | mg/kg | 9.97 | | 0.19 | 0.97 |
| On-Site | 33 | Arsenic | 088796-003 | mg/kg | 23.00 | | 0.20 | 1.00 |
| | | **Arsenic Average** | | | 13.03 | | | |
| | | **Arsenic StdDev** | | | 8.85 | | | |
| | | **CV (%)** | | | 67.94 | | | |
| On-Site | 33 | Barium | 088796-001 | mg/kg | 120.00 | | 0.09 | 0.36 |
| On-Site | 33 | Barium | 088796-002 | mg/kg | 151.00 | | 0.10 | 0.39 |
| On-Site | 33 | Barium | 088796-003 | mg/kg | 120.00 | | 0.10 | 0.40 |
| | | **Barium Average** | | | 130.33 | | | |
| | | **Barium StdDev** | | | 17.90 | | | |
| | | **CV (%)** | | | 13.73 | | | |
| On-Site | 33 | Beryllium | 088796-001 | mg/kg | 0.81 | | 0.02 | 0.09 |
| On-Site | 33 | Beryllium | 088796-002 | mg/kg | 1.00 | | 0.02 | 0.10 |
| On-Site | 33 | Beryllium | 088796-003 | mg/kg | 1.95 | | 0.02 | 0.10 |
| | | **Beryllium Average** | | | 1.25 | | | |
| | | **Beryllium StdDev** | | | 0.61 | | | |
| | | **CV (%)** | | | 49.01 | | | |
| On-Site | 33 | Cadmium | 088796-001 | mg/kg | 0.39 | | 0.02 | 0.18 |
| On-Site | 33 | Cadmium | 088796-002 | mg/kg | 0.38 | | 0.02 | 0.19 |
| On-Site | 33 | Cadmium | 088796-003 | mg/kg | 0.34 | | 0.02 | 0.20 |
| | | **Cadmium Average** | | | 0.37 | | | |
| | | **Cadmium StdDev** | | | 0.03 | | | |
| | | **CV (%)** | | | 7.55 | | | |
| On-Site | 33 | Calcium | 088796-001 | mg/kg | 49000.00 | | 59.20 | 180.00 |
| On-Site | 33 | Calcium | 088796-002 | mg/kg | 59000.00 | | 64.10 | 194.00 |
| On-Site | 33 | Calcium | 088796-003 | mg/kg | 49500.00 | | 66.00 | 200.00 |
| | | **Calcium Average** | | | 52500.00 | | | |
| | | **Calcium StdDev** | | | 5634.71 | | | |
| | | **CV (%)** | | | 10.73 | | | |
| On-Site | 33 | Chromium | 088796-001 | mg/kg | 11.20 | | 0.18 | 0.54 |
| On-Site | 33 | Chromium | 088796-002 | mg/kg | 11.50 | | 0.19 | 0.58 |
| On-Site | 33 | Chromium | 088796-003 | mg/kg | 10.40 | | 0.20 | 0.60 |
| | | **Chromium Average** | | | 11.03 | | | |
| | | **Chromium StdDev** | | | 0.57 | | | |
| | | **CV (%)** | | | 5.15 | | | |

TABLE C-8. Non-radiological Replicate Results for Calendar Year 2010, Soil

| Location Type | Location | Analyte | Sample ID | Units | Result | Qualifier | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|---|
| On-Site | 33 | Cobalt | 088796-001 | mg/kg | 4.63 | | 0.05 | 0.18 |
| On-Site | 33 | Cobalt | 088796-002 | mg/kg | 6.60 | | 0.06 | 0.19 |
| On-Site | 33 | Cobalt | 088796-003 | mg/kg | 8.26 | | 0.06 | 0.20 |
| | | **Cobalt Average** | | | 6.50 | | | |
| | | **Cobalt StdDev** | | | 1.82 | | | |
| | | **CV (%)** | | | 27.97 | | | |
| On-Site | 33 | Copper | 088796-001 | mg/kg | 8.57 | | 0.06 | 0.18 |
| On-Site | 33 | Copper | 088796-002 | mg/kg | 9.22 | | 0.06 | 0.19 |
| On-Site | 33 | Copper | 088796-003 | mg/kg | 8.87 | | 0.07 | 0.20 |
| | | **Copper Average** | | | 8.89 | | | |
| | | **Copper StdDev** | | | 0.33 | | | |
| | | **CV (%)** | | | 3.66 | | | |
| On-Site | 33 | Iron | 088796-001 | mg/kg | 11800.00 | | 44.90 | 180.00 |
| On-Site | 33 | Iron | 088796-002 | mg/kg | 13600.00 | | 48.50 | 194.00 |
| On-Site | 33 | Iron | 088796-003 | mg/kg | 13700.00 | | 50.00 | 200.00 |
| | | **Iron Average** | | | 13033.33 | | | |
| | | **Iron StdDev** | | | 1069.27 | | | |
| | | **CV (%)** | | | 8.20 | | | |
| On-Site | 33 | Lead | 088796-001 | mg/kg | 12.20 | | 0.09 | 0.36 |
| On-Site | 33 | Lead | 088796-002 | mg/kg | 11.80 | | 0.10 | 0.39 |
| On-Site | 33 | Lead | 088796-003 | mg/kg | 12.70 | | 0.10 | 0.40 |
| | | **Lead Average** | | | 12.23 | | | |
| | | **Lead StdDev** | | | 0.45 | | | |
| | | **CV (%)** | | | 3.69 | | | |
| On-Site | 33 | Magnesium | 088796-001 | mg/kg | 5520.00 | | 13.50 | 44.90 |
| On-Site | 33 | Magnesium | 088796-002 | mg/kg | 5570.00 | | 14.60 | 48.50 |
| On-Site | 33 | Magnesium | 088796-003 | mg/kg | 5840.00 | | 15.00 | 50.00 |
| | | **Magnesium Average** | | | 5643.33 | | | |
| | | **Magnesium StdDev** | | | 172.14 | | | |
| | | **CV (%)** | | | 3.05 | | | |
| On-Site | 33 | Manganese | 088796-001 | mg/kg | 310.00 | | 1.80 | 8.98 |
| On-Site | 33 | Manganese | 088796-002 | mg/kg | 445.00 | | 1.94 | 9.71 |
| On-Site | 33 | Manganese | 088796-003 | mg/kg | 506.00 | | 2.00 | 10.00 |
| | | **Manganese Average** | | | 420.33 | | | |
| | | **Manganese StdDev** | | | 100.30 | | | |
| | | **CV (%)** | | | 23.86 | | | |

## TABLE C-8. Non-radiological Replicate Results for Calendar Year 2010, Soil

| Location Type | Location | Analyte | Sample ID | Units | Result | Qualifier | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|---|
| On-Site | 33 | Nickel | 088796-001 | mg/kg | 10.50 | | 0.09 | 0.36 |
| On-Site | 33 | Nickel | 088796-002 | mg/kg | 14.00 | | 0.10 | 0.39 |
| On-Site | 33 | Nickel | 088796-003 | mg/kg | 15.20 | | 0.10 | 0.40 |
| | | **Nickel Average** | | | 13.23 | | | |
| | | **Nickel StdDev** | | | 2.44 | | | |
| | | **CV (%)** | | | 18.45 | | | |
| On-Site | 33 | Potassium | 088796-001 | mg/kg | 3890.00 | | 144.00 | 539.00 |
| On-Site | 33 | Potassium | 088796-002 | mg/kg | 3410.00 | | 155.00 | 583.00 |
| On-Site | 33 | Potassium | 088796-003 | mg/kg | 3470.00 | | 160.00 | 600.00 |
| | | **Potassium Average** | | | 3590.00 | | | |
| | | **Potassium StdDev** | | | 261.53 | | | |
| | | **CV (%)** | | | 7.29 | | | |
| On-Site | 33 | Selenium | 088796-001 | mg/kg | 0.45 | U | 0.45 | 0.90 |
| On-Site | 33 | Selenium | 088796-002 | mg/kg | 0.49 | U | 0.49 | 0.97 |
| On-Site | 33 | Selenium | 088796-003 | mg/kg | 0.50 | U | 0.50 | 1.00 |
| | | **Selenium Average** | | | 0.48 | | | |
| | | **Selenium StdDev** | | | 0.03 | | | |
| | | **CV (%)** | | | 5.48 | | | |
| On-Site | 33 | Silver | 088796-001 | mg/kg | 0.10 | U | 0.10 | 0.50 |
| On-Site | 33 | Silver | 088796-002 | mg/kg | 0.09 | U | 0.09 | 0.47 |
| On-Site | 33 | Silver | 088796-003 | mg/kg | 0.10 | U | 0.10 | 0.50 |
| | | **Silver Average** | | | 0.10 | | | |
| | | **Silver StdDev** | | | 0.00 | | | |
| | | **CV (%)** | | | 2.80 | | | |
| On-Site | 33 | Sodium | 088796-001 | mg/kg | 141.00 | | 14.40 | 44.90 |
| On-Site | 33 | Sodium | 088796-002 | mg/kg | 249.00 | | 15.50 | 48.50 |
| On-Site | 33 | Sodium | 088796-003 | mg/kg | 130.00 | | 16.00 | 50.00 |
| | | **Sodium Average** | | | 173.33 | | | |
| | | **Sodium StdDev** | | | 65.76 | | | |
| | | **CV (%)** | | | 37.94 | | | |
| On-Site | 33 | Thallium | 088796-001 | mg/kg | 0.24 | | 0.05 | 0.18 |
| On-Site | 33 | Thallium | 088796-002 | mg/kg | 0.16 | J | 0.06 | 0.19 |
| On-Site | 33 | Thallium | 088796-003 | mg/kg | 0.18 | J | 0.06 | 0.20 |
| | | **Thallium Average** | | | 0.20 | | | |
| | | **Thallium StdDev** | | | 0.04 | | | |
| | | **CV (%)** | | | 20.84 | | | |

## TABLE C-8. Non-radiological Replicate Results for Calendar Year 2010, Soil

| Location Type | Location | Analyte | Sample ID | Units | Result | Qualifier | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|---|
| On-Site | 33 | Vanadium | 088796-001 | mg/kg | 23.70 | | 3.59 | 18.00 |
| On-Site | 33 | Vanadium | 088796-002 | mg/kg | 25.00 | | 3.88 | 19.40 |
| On-Site | 33 | Vanadium | 088796-003 | mg/kg | 26.50 | | 4.00 | 20.00 |
| | | **Vanadium Average** | | | 25.07 | | | |
| | | **Vanadium StdDev** | | | 1.40 | | | |
| | | **CV (%)** | | | 5.59 | | | |
| On-Site | 33 | Zinc | 088796-001 | mg/kg | 53.20 | | 0.36 | 1.80 |
| On-Site | 33 | Zinc | 088796-002 | mg/kg | 49.00 | | 0.39 | 1.94 |
| On-Site | 33 | Zinc | 088796-003 | mg/kg | 60.80 | | 0.40 | 2.00 |
| | | **Zinc Average** | | | 54.33 | | | |
| | | **Zinc StdDev** | | | 5.98 | | | |
| | | **CV (%)** | | | 11.01 | | | |
| On-Site | 53 | Aluminum | 088756-001 | mg/kg | 11800.00 | | 13.30 | 44.30 |
| On-Site | 53 | Aluminum | 088756-002 | mg/kg | 10600.00 | | 27.00 | 90.10 |
| On-Site | 53 | Aluminum | 088756-003 | mg/kg | 8200.00 | | 2.70 | 8.99 |
| | | **Aluminum Average** | | | 10200.00 | | | |
| | | **Aluminum StdDev** | | | 1833.03 | | | |
| | | **CV (%)** | | | 17.97 | | | |
| On-Site | 53 | Antimony | 088756-001 | mg/kg | 0.32 | U | 0.32 | 0.98 |
| On-Site | 53 | Antimony | 088756-002 | mg/kg | 0.32 | U | 0.32 | 0.96 |
| On-Site | 53 | Antimony | 088756-003 | mg/kg | 0.32 | U | 0.32 | 0.98 |
| | | **Antimony Average** | | | 0.32 | | | |
| | | **Antimony StdDev** | | | 0.00 | | | |
| | | **CV (%)** | | | 1.26 | | | |
| On-Site | 53 | Arsenic | 088756-001 | mg/kg | 1.97 | | 0.18 | 0.89 |
| On-Site | 53 | Arsenic | 088756-002 | mg/kg | 1.69 | | 0.18 | 0.90 |
| On-Site | 53 | Arsenic | 088756-003 | mg/kg | 1.87 | | 0.18 | 0.90 |
| | | **Arsenic Average** | | | 1.84 | | | |
| | | **Arsenic StdDev** | | | 0.14 | | | |
| | | **CV (%)** | | | 7.70 | | | |
| On-Site | 53 | Barium | 088756-001 | mg/kg | 70.60 | | 0.09 | 0.36 |
| On-Site | 53 | Barium | 088756-002 | mg/kg | 58.60 | | 0.09 | 0.36 |
| On-Site | 53 | Barium | 088756-003 | mg/kg | 51.20 | | 0.09 | 0.36 |
| | | **Barium Average** | | | 60.13 | | | |
| | | **Barium StdDev** | | | 9.79 | | | |
| | | **CV (%)** | | | 16.28 | | | |

## TABLE C-8. Non-radiological Replicate Results for Calendar Year 2010, Soil

| Location Type | Location | Analyte | Sample ID | Units | Result | Qualifier | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|---|
| On-Site | 53 | Beryllium | 088756-001 | mg/kg | 0.42 | | 0.02 | 0.09 |
| On-Site | 53 | Beryllium | 088756-002 | mg/kg | 0.35 | | 0.02 | 0.09 |
| On-Site | 53 | Beryllium | 088756-003 | mg/kg | 0.31 | | 0.02 | 0.09 |
| | | **Beryllium Average** | | | 0.36 | | | |
| | | **Beryllium StdDev** | | | 0.06 | | | |
| | | **CV (%)** | | | 15.34 | | | |
| On-Site | 53 | Cadmium | 088756-001 | mg/kg | 0.15 | J | 0.02 | 0.18 |
| On-Site | 53 | Cadmium | 088756-002 | mg/kg | 0.17 | J | 0.02 | 0.18 |
| On-Site | 53 | Cadmium | 088756-003 | mg/kg | 0.14 | J | 0.02 | 0.18 |
| | | **Cadmium Average** | | | 0.16 | | | |
| | | **Cadmium StdDev** | | | 0.02 | | | |
| | | **CV (%)** | | | 11.95 | | | |
| On-Site | 53 | Calcium | 088756-001 | mg/kg | 3650.00 | | 5.85 | 17.70 |
| On-Site | 53 | Calcium | 088756-002 | mg/kg | 3890.00 | | 5.95 | 18.00 |
| On-Site | 53 | Calcium | 088756-003 | mg/kg | 1780.00 | | 5.94 | 18.00 |
| | | **Calcium Average** | | | 3106.67 | | | |
| | | **Calcium StdDev** | | | 1155.18 | | | |
| | | **CV (%)** | | | 37.18 | | | |
| On-Site | 53 | Chromium | 088756-001 | mg/kg | 9.45 | | 0.18 | 0.53 |
| On-Site | 53 | Chromium | 088756-002 | mg/kg | 6.73 | | 0.18 | 0.54 |
| On-Site | 53 | Chromium | 088756-003 | mg/kg | 6.55 | | 0.18 | 0.54 |
| | | **Chromium Average** | | | 7.58 | | | |
| | | **Chromium StdDev** | | | 1.62 | | | |
| | | **CV (%)** | | | 21.45 | | | |
| On-Site | 53 | Cobalt | 088756-001 | mg/kg | 3.01 | | 0.05 | 0.18 |
| On-Site | 53 | Cobalt | 088756-002 | mg/kg | 2.77 | | 0.05 | 0.18 |
| On-Site | 53 | Cobalt | 088756-003 | mg/kg | 2.46 | | 0.05 | 0.18 |
| | | **Cobalt Average** | | | 2.75 | | | |
| | | **Cobalt StdDev** | | | 0.28 | | | |
| | | **CV (%)** | | | 10.04 | | | |
| On-Site | 53 | Copper | 088756-001 | mg/kg | 5.42 | | 0.06 | 0.18 |
| On-Site | 53 | Copper | 088756-002 | mg/kg | 5.73 | | 0.06 | 0.18 |
| On-Site | 53 | Copper | 088756-003 | mg/kg | 4.74 | | 0.06 | 0.18 |
| | | **Copper Average** | | | 5.30 | | | |
| | | **Copper StdDev** | | | 0.51 | | | |
| | | **CV (%)** | | | 9.56 | | | |

## TABLE C-8. Non-radiological Replicate Results for Calendar Year 2010, Soil

| Location Type | Location | Analyte | Sample ID | Units | Result | Qualifier | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|---|
| On-Site | 53 | Iron | 088756-001 | mg/kg | 8360.00 | B | 4.43 | 17.70 |
| On-Site | 53 | Iron | 088756-002 | mg/kg | 7110.00 | B | 4.50 | 18.00 |
| On-Site | 53 | Iron | 088756-003 | mg/kg | 6590.00 | B | 4.50 | 18.00 |
| | | **Iron Average** | | | 7353.33 | | | |
| | | **Iron StdDev** | | | 909.74 | | | |
| | | **CV (%)** | | | 12.37 | | | |
| On-Site | 53 | Lead | 088756-001 | mg/kg | 12.90 | | 0.09 | 0.36 |
| On-Site | 53 | Lead | 088756-002 | mg/kg | 7.80 | | 0.09 | 0.36 |
| On-Site | 53 | Lead | 088756-003 | mg/kg | 9.80 | | 0.09 | 0.36 |
| | | **Lead Average** | | | 10.17 | | | |
| | | **Lead StdDev** | | | 2.57 | | | |
| | | **CV (%)** | | | 25.28 | | | |
| On-Site | 53 | Magnesium | 088756-001 | mg/kg | 2290.00 | | 1.33 | 4.43 |
| On-Site | 53 | Magnesium | 088756-002 | mg/kg | 1980.00 | | 1.35 | 4.50 |
| On-Site | 53 | Magnesium | 088756-003 | mg/kg | 1590.00 | | 1.35 | 4.50 |
| | | **Magnesium Average** | | | 1953.33 | | | |
| | | **Magnesium StdDev** | | | 350.76 | | | |
| | | **CV (%)** | | | 17.96 | | | |
| On-Site | 53 | Manganese | 088756-001 | mg/kg | 135.00 | | 0.18 | 0.89 |
| On-Site | 53 | Manganese | 088756-002 | mg/kg | 108.00 | | 0.18 | 0.90 |
| On-Site | 53 | Manganese | 088756-003 | mg/kg | 105.00 | | 0.18 | 0.90 |
| | | **Manganese Average** | | | 116.00 | | | |
| | | **Manganese StdDev** | | | 16.52 | | | |
| | | **CV (%)** | | | 14.24 | | | |
| On-Site | 53 | Nickel | 088756-001 | mg/kg | 5.84 | | 0.09 | 0.36 |
| On-Site | 53 | Nickel | 088756-002 | mg/kg | 5.02 | | 0.09 | 0.36 |
| On-Site | 53 | Nickel | 088756-003 | mg/kg | 4.67 | | 0.09 | 0.36 |
| | | **Nickel Average** | | | 5.18 | | | |
| | | **Nickel StdDev** | | | 0.60 | | | |
| | | **CV (%)** | | | 11.60 | | | |
| On-Site | 53 | Potassium | 088756-001 | mg/kg | 2050.00 | | 14.20 | 53.20 |
| On-Site | 53 | Potassium | 088756-002 | mg/kg | 1830.00 | | 14.40 | 54.10 |
| On-Site | 53 | Potassium | 088756-003 | mg/kg | 1540.00 | | 14.40 | 54.00 |
| | | **Potassium Average** | | | 1806.67 | | | |
| | | **Potassium StdDev** | | | 255.80 | | | |
| | | **CV (%)** | | | 14.16 | | | |

## TABLE C-8. Non-radiological Replicate Results for Calendar Year 2010, Soil

| Location Type | Location | Analyte | Sample ID | Units | Result | Qualifier | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|---|
| On-Site | 53 | Selenium | 088756-001 | mg/kg | 0.44 | U | 0.44 | 0.89 |
| On-Site | 53 | Selenium | 088756-002 | mg/kg | 0.45 | U | 0.45 | 0.90 |
| On-Site | 53 | Selenium | 088756-003 | mg/kg | 0.45 | U | 0.45 | 0.90 |
| | | **Selenium Average** | | | 0.45 | | | |
| | | **Selenium StdDev** | | | 0.00 | | | |
| | | **CV (%)** | | | 0.90 | | | |
| On-Site | 53 | Silver | 088756-001 | mg/kg | 0.12 | J | 0.10 | 0.49 |
| On-Site | 53 | Silver | 088756-002 | mg/kg | 0.11 | J | 0.10 | 0.48 |
| On-Site | 53 | Silver | 088756-003 | mg/kg | 0.12 | J | 0.10 | 0.49 |
| | | **Silver Average** | | | 0.12 | | | |
| | | **Silver StdDev** | | | 0.01 | | | |
| | | **CV (%)** | | | 7.37 | | | |
| On-Site | 53 | Sodium | 088756-001 | mg/kg | 39.60 | J | 14.20 | 44.30 |
| On-Site | 53 | Sodium | 088756-002 | mg/kg | 41.30 | J | 14.40 | 45.00 |
| On-Site | 53 | Sodium | 088756-003 | mg/kg | 39.20 | J | 14.40 | 45.00 |
| | | **Sodium Average** | | | 40.03 | | | |
| | | **Sodium StdDev** | | | 1.12 | | | |
| | | **CV (%)** | | | 2.79 | | | |
| On-Site | 53 | Thallium | 088756-001 | mg/kg | 0.10 | J | 0.05 | 0.18 |
| On-Site | 53 | Thallium | 088756-002 | mg/kg | 0.09 | J | 0.05 | 0.18 |
| On-Site | 53 | Thallium | 088756-003 | mg/kg | 0.07 | J | 0.05 | 0.18 |
| | | **Thallium Average** | | | 0.09 | | | |
| | | **Thallium StdDev** | | | 0.01 | | | |
| | | **CV (%)** | | | 14.65 | | | |
| On-Site | 53 | Vanadium | 088756-001 | mg/kg | 16.20 | | 0.36 | 1.77 |
| On-Site | 53 | Vanadium | 088756-002 | mg/kg | 14.30 | | 0.36 | 1.80 |
| On-Site | 53 | Vanadium | 088756-003 | mg/kg | 13.60 | | 0.36 | 1.80 |
| | | **Vanadium Average** | | | 14.70 | | | |
| | | **Vanadium StdDev** | | | 1.35 | | | |
| | | **CV (%)** | | | 9.15 | | | |
| On-Site | 53 | Zinc | 088756-001 | mg/kg | 20.10 | | 0.38 | 1.88 |
| On-Site | 53 | Zinc | 088756-002 | mg/kg | 21.30 | | 0.36 | 1.78 |
| On-Site | 53 | Zinc | 088756-003 | mg/kg | 22.50 | | 0.37 | 1.82 |
| | | **Zinc Average** | | | 21.30 | | | |
| | | **Zinc StdDev** | | | 1.20 | | | |
| | | **CV (%)** | | | 5.63 | | | |

## TABLE C-8. Non-radiological Replicate Results for Calendar Year 2010, Soil

| Location Type | Location | Analyte | Sample ID | Units | Result | Qualifier | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|---|
| Perimeter | 64 | Aluminum | 088807-001 | mg/kg | 13400.00 | | 14.40 | 47.90 |
| Perimeter | 64 | Aluminum | 088807-002 | mg/kg | 15900.00 | | 14.40 | 48.00 |
| Perimeter | 64 | Aluminum | 088807-003 | mg/kg | 14800.00 | | 13.50 | 45.00 |
| | | **Aluminum Average** | | | 14700.00 | | | |
| | | **Aluminum StdDev** | | | 1253.00 | | | |
| | | **CV (%)** | | | 8.52 | | | |
| Perimeter | 64 | Antimony | 088807-001 | mg/kg | 1.64 | U | 1.64 | 4.96 |
| Perimeter | 64 | Antimony | 088807-002 | mg/kg | 0.40 | J | 0.33 | 0.99 |
| Perimeter | 64 | Antimony | 088807-003 | mg/kg | 1.50 | U | 1.50 | 4.55 |
| | | **Antimony Average** | | | 1.18 | | | |
| | | **Antimony StdDev** | | | 0.68 | | | |
| | | **CV (%)** | | | 57.36 | | | |
| Perimeter | 64 | Arsenic | 088807-001 | mg/kg | 1.75 | | 0.19 | 0.96 |
| Perimeter | 64 | Arsenic | 088807-002 | mg/kg | 1.89 | | 0.19 | 0.96 |
| Perimeter | 64 | Arsenic | 088807-003 | mg/kg | 1.73 | | 0.18 | 0.90 |
| | | **Arsenic Average** | | | 1.79 | | | |
| | | **Arsenic StdDev** | | | 0.09 | | | |
| | | **CV (%)** | | | 4.87 | | | |
| Perimeter | 64 | Barium | 088807-001 | mg/kg | 137.00 | | 0.96 | 3.83 |
| Perimeter | 64 | Barium | 088807-002 | mg/kg | 112.00 | | 0.10 | 0.38 |
| Perimeter | 64 | Barium | 088807-003 | mg/kg | 99.30 | | 0.09 | 0.36 |
| | | **Barium Average** | | | 116.10 | | | |
| | | **Barium StdDev** | | | 19.18 | | | |
| | | **CV (%)** | | | 16.52 | | | |
| Perimeter | 64 | Beryllium | 088807-001 | mg/kg | 0.61 | | 0.10 | 0.48 |
| Perimeter | 64 | Beryllium | 088807-002 | mg/kg | 0.67 | | 0.10 | 0.48 |
| Perimeter | 64 | Beryllium | 088807-003 | mg/kg | 0.52 | | 0.09 | 0.45 |
| | | **Beryllium Average** | | | 0.60 | | | |
| | | **Beryllium StdDev** | | | 0.08 | | | |
| | | **CV (%)** | | | 12.79 | | | |
| Perimeter | 64 | Cadmium | 088807-001 | mg/kg | 0.41 | | 0.02 | 0.19 |
| Perimeter | 64 | Cadmium | 088807-002 | mg/kg | 0.46 | | 0.02 | 0.19 |
| Perimeter | 64 | Cadmium | 088807-003 | mg/kg | 0.32 | | 0.02 | 0.18 |
| | | **Cadmium Average** | | | 0.40 | | | |
| | | **Cadmium StdDev** | | | 0.07 | | | |
| | | **CV (%)** | | | 17.39 | | | |

## TABLE C-8. Non-radiological Replicate Results for Calendar Year 2010, Soil

| Location Type | Location | Analyte | Sample ID | Units | Result | Qualifier | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|---|
| Perimeter | 64 | Calcium | 088807-001 | mg/kg | 22800.00 | | 31.60 | 95.80 |
| Perimeter | 64 | Calcium | 088807-002 | mg/kg | 21300.00 | | 31.70 | 96.00 |
| Perimeter | 64 | Calcium | 088807-003 | mg/kg | 34000.00 | | 29.70 | 89.90 |
| | | **Calcium Average** | | | 26033.33 | | | |
| | | **Calcium StdDev** | | | 6939.98 | | | |
| | | **CV (%)** | | | 26.66 | | | |
| Perimeter | 64 | Chromium | 088807-001 | mg/kg | 8.98 | | 0.96 | 2.87 |
| Perimeter | 64 | Chromium | 088807-002 | mg/kg | 10.90 | | 0.96 | 2.88 |
| Perimeter | 64 | Chromium | 088807-003 | mg/kg | 9.08 | | 0.90 | 2.70 |
| | | **Chromium Average** | | | 9.65 | | | |
| | | **Chromium StdDev** | | | 1.08 | | | |
| | | **CV (%)** | | | 11.20 | | | |
| Perimeter | 64 | Cobalt | 088807-001 | mg/kg | 9.39 | | 0.29 | 0.96 |
| Perimeter | 64 | Cobalt | 088807-002 | mg/kg | 10.90 | | 0.29 | 0.96 |
| Perimeter | 64 | Cobalt | 088807-003 | mg/kg | 8.09 | | 0.27 | 0.90 |
| | | **Cobalt Average** | | | 9.46 | | | |
| | | **Cobalt StdDev** | | | 1.41 | | | |
| | | **CV (%)** | | | 14.87 | | | |
| Perimeter | 64 | Copper | 088807-001 | mg/kg | 14.70 | | 0.32 | 0.96 |
| Perimeter | 64 | Copper | 088807-002 | mg/kg | 17.20 | | 0.32 | 0.96 |
| Perimeter | 64 | Copper | 088807-003 | mg/kg | 12.20 | | 0.30 | 0.90 |
| | | **Copper Average** | | | 14.70 | | | |
| | | **Copper StdDev** | | | 2.50 | | | |
| | | **CV (%)** | | | 17.01 | | | |
| Perimeter | 64 | Iron | 088807-001 | mg/kg | 21100.00 | | 23.90 | 95.80 |
| Perimeter | 64 | Iron | 088807-002 | mg/kg | 24700.00 | | 24.00 | 96.00 |
| Perimeter | 64 | Iron | 088807-003 | mg/kg | 18200.00 | | 22.50 | 89.90 |
| | | **Iron Average** | | | 21333.33 | | | |
| | | **Iron StdDev** | | | 3256.28 | | | |
| | | **CV (%)** | | | 15.26 | | | |
| Perimeter | 64 | Lead | 088807-001 | mg/kg | 8.91 | | 0.10 | 0.38 |
| Perimeter | 64 | Lead | 088807-002 | mg/kg | 12.30 | | 0.10 | 0.38 |
| Perimeter | 64 | Lead | 088807-003 | mg/kg | 6.93 | | 0.09 | 0.36 |
| | | **Lead Average** | | | 9.38 | | | |
| | | **Lead StdDev** | | | 2.72 | | | |
| | | **CV (%)** | | | 28.95 | | | |

**TABLE C-8. Non-radiological Replicate Results for Calendar Year 2010, Soil**

| Location Type | Location | Analyte | Sample ID | Units | Result | Qualifier | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|---|
| Perimeter | 64 | Magnesium | 088807-001 | mg/kg | 8180.00 | | 7.18 | 23.90 |
| Perimeter | 64 | Magnesium | 088807-002 | mg/kg | 9300.00 | | 7.20 | 24.00 |
| Perimeter | 64 | Magnesium | 088807-003 | mg/kg | 7340.00 | | 6.74 | 22.50 |
| | | **Magnesium Average** | | | 8273.33 | | | |
| | | **Magnesium StdDev** | | | 983.33 | | | |
| | | **CV (%)** | | | 11.89 | | | |
| Perimeter | 64 | Manganese | 088807-001 | mg/kg | 622.00 | | 0.96 | 4.79 |
| Perimeter | 64 | Manganese | 088807-002 | mg/kg | 695.00 | | 0.96 | 4.80 |
| Perimeter | 64 | Manganese | 088807-003 | mg/kg | 445.00 | | 0.90 | 4.50 |
| | | **Manganese Average** | | | 587.33 | | | |
| | | **Manganese StdDev** | | | 128.55 | | | |
| | | **CV (%)** | | | 21.89 | | | |
| Perimeter | 64 | Nickel | 088807-001 | mg/kg | 11.30 | | 0.48 | 1.92 |
| Perimeter | 64 | Nickel | 088807-002 | mg/kg | 13.20 | | 0.48 | 1.92 |
| Perimeter | 64 | Nickel | 088807-003 | mg/kg | 10.50 | | 0.45 | 1.80 |
| | | **Nickel Average** | | | 11.67 | | | |
| | | **Nickel StdDev** | | | 1.39 | | | |
| | | **CV (%)** | | | 11.89 | | | |
| Perimeter | 64 | Potassium | 088807-001 | mg/kg | 3480.00 | | 76.60 | 287.00 |
| Perimeter | 64 | Potassium | 088807-002 | mg/kg | 3710.00 | | 76.80 | 288.00 |
| Perimeter | 64 | Potassium | 088807-003 | mg/kg | 4220.00 | | 71.90 | 270.00 |
| | | **Potassium Average** | | | 3803.33 | | | |
| | | **Potassium StdDev** | | | 378.73 | | | |
| | | **CV (%)** | | | 9.96 | | | |
| Perimeter | 64 | Selenium | 088807-001 | mg/kg | 0.48 | U | 0.48 | 0.96 |
| Perimeter | 64 | Selenium | 088807-002 | mg/kg | 0.48 | U | 0.48 | 0.96 |
| Perimeter | 64 | Selenium | 088807-003 | mg/kg | 0.45 | U | 0.45 | 0.90 |
| | | **Selenium Average** | | | 0.47 | | | |
| | | **Selenium StdDev** | | | 0.02 | | | |
| | | **CV (%)** | | | 3.63 | | | |
| Perimeter | 64 | Silver | 088807-001 | mg/kg | 0.50 | U | 0.50 | 2.48 |
| Perimeter | 64 | Silver | 088807-002 | mg/kg | 0.49 | U | 0.49 | 2.47 |
| Perimeter | 64 | Silver | 088807-003 | mg/kg | 0.46 | U | 0.46 | 2.27 |
| | | **Silver Average** | | | 0.48 | | | |
| | | **Silver StdDev** | | | 0.02 | | | |
| | | **CV (%)** | | | 4.75 | | | |

## TABLE C-8. Non-radiological Replicate Results for Calendar Year 2010, Soil

| Location Type | Location | Analyte | Sample ID | Units | Result | Qualifier | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|---|
| Perimeter | 64 | Sodium | 088807-001 | mg/kg | 77.00 | J | 76.60 | 239.00 |
| Perimeter | 64 | Sodium | 088807-002 | mg/kg | 91.60 | J | 76.80 | 240.00 |
| Perimeter | 64 | Sodium | 088807-003 | mg/kg | 84.80 | J | 71.90 | 225.00 |
| | | **Sodium Average** | | | 84.47 | | | |
| | | **Sodium StdDev** | | | 7.31 | | | |
| | | **CV (%)** | | | 8.65 | | | |
| Perimeter | 64 | Thallium | 088807-001 | mg/kg | 0.14 | J | 0.06 | 0.19 |
| Perimeter | 64 | Thallium | 088807-002 | mg/kg | 0.15 | J | 0.06 | 0.19 |
| Perimeter | 64 | Thallium | 088807-003 | mg/kg | 0.13 | J | 0.05 | 0.18 |
| | | **Thallium Average** | | | 0.14 | | | |
| | | **Thallium StdDev** | | | 0.01 | | | |
| | | **CV (%)** | | | 5.59 | | | |
| Perimeter | 64 | Vanadium | 088807-001 | mg/kg | 31.90 | | 1.92 | 9.58 |
| Perimeter | 64 | Vanadium | 088807-002 | mg/kg | 36.50 | | 1.92 | 9.60 |
| Perimeter | 64 | Vanadium | 088807-003 | mg/kg | 30.40 | | 1.80 | 8.99 |
| | | **Vanadium Average** | | | 32.93 | | | |
| | | **Vanadium StdDev** | | | 3.18 | | | |
| | | **CV (%)** | | | 9.65 | | | |
| Perimeter | 64 | Zinc | 088807-001 | mg/kg | 67.80 | | 0.38 | 1.92 |
| Perimeter | 64 | Zinc | 088807-002 | mg/kg | 93.30 | | 0.38 | 1.92 |
| Perimeter | 64 | Zinc | 088807-003 | mg/kg | 58.10 | | 0.36 | 1.80 |
| | | **Zinc Average** | | | 73.07 | | | |
| | | **Zinc StdDev** | | | 18.18 | | | |
| | | **CV (%)** | | | 24.88 | | | |
| | | | | | | | | |

**NOTES:**

**CV = coefficient of variation**

**J = Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL.**

**MDL = Method detection limit.**

**mg/kg = milligram per kilogram**

**PQL = Practical quantitation limit.**

**Std Dev = standard deviation**

**U = The analyte was analyzed for, but not detected. For organic and inorganic analytes the result is less than the effective MDL concentration.**

TABLE C-9.  Non-radiological Replicate Results for Calendar Year 2010, Sediment

| Location Type | Location | Analyte | Sample ID | Units | Result | Qualifier | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|---|
| On-Site | 74N | Aluminum | 088811-001 | mg/kg | 3400.00 | | 13.8 | 46 |
| On-Site | 74N | Aluminum | 088811-002 | mg/kg | 4020.00 | | 14.7 | 49.1 |
| On-Site | 74N | Aluminum | 088811-003 | mg/kg | 5590.00 | | 14.8 | 49.2 |
| | | **Aluminum Average** | | | 4336.67 | | | |
| | | **Aluminum StdDev** | | | 1128.82 | | | |
| | | **CV (%)** | | | 26.03 | | | |
| On-Site | 74N | Antimony | 088811-001 | mg/kg | 0.32 | U | 0.317 | 0.96 |
| On-Site | 74N | Antimony | 088811-002 | mg/kg | 1.62 | U | 1.62 | 4.9 |
| On-Site | 74N | Antimony | 088811-003 | mg/kg | 1.64 | U | 1.64 | 4.96 |
| | | **Antimony Average** | | | 1.19 | | | |
| | | **Antimony StdDev** | | | 0.76 | | | |
| | | **CV (%)** | | | 63.58 | | | |
| On-Site | 74N | Arsenic | 088811-001 | mg/kg | 0.96 | | 0.184 | 0.921 |
| On-Site | 74N | Arsenic | 088811-002 | mg/kg | 0.39 | J | 0.196 | 0.982 |
| On-Site | 74N | Arsenic | 088811-003 | mg/kg | 1.13 | | 0.197 | 0.984 |
| | | **Arsenic Average** | | | 0.83 | | | |
| | | **Arsenic StdDev** | | | 0.39 | | | |
| | | **CV (%)** | | | 46.79 | | | |
| On-Site | 74N | Barium | 088811-001 | mg/kg | 38.00 | | 0.0921 | 0.368 |
| On-Site | 74N | Barium | 088811-002 | mg/kg | 36.90 | | 0.0982 | 0.393 |
| On-Site | 74N | Barium | 088811-003 | mg/kg | 64.50 | | 0.0984 | 0.394 |
| | | **Barium Average** | | | 46.47 | | | |
| | | **Barium StdDev** | | | 15.63 | | | |
| | | **CV (%)** | | | 33.63 | | | |
| On-Site | 74N | Beryllium | 088811-001 | mg/kg | 0.20 | | 0.0184 | 0.0921 |
| On-Site | 74N | Beryllium | 088811-002 | mg/kg | 0.20 | | 0.0196 | 0.0982 |
| On-Site | 74N | Beryllium | 088811-003 | mg/kg | 0.26 | | 0.0197 | 0.0984 |
| | | **Beryllium Average** | | | 0.22 | | | |
| | | **Beryllium StdDev** | | | 0.04 | | | |
| | | **CV (%)** | | | 16.35 | | | |
| On-Site | 74N | Cadmium | 088811-001 | mg/kg | 0.10 | J | 0.0184 | 0.184 |
| On-Site | 74N | Cadmium | 088811-002 | mg/kg | 0.08 | J | 0.0196 | 0.196 |
| On-Site | 74N | Cadmium | 088811-003 | mg/kg | 0.18 | J | 0.0197 | 0.197 |

## TABLE C-9. Non-radiological Replicate Results for Calendar Year 2010, Sediment

| Location Type | Location | Analyte | Sample ID | Units | Result | Qualifier | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|---|
| | | **Cadmium Average** | | | 0.12 | | | |
| | | **Cadmium StdDev** | | | 0.05 | | | |
| | | **CV (%)** | | | 42.04 | | | |
| On-Site | 74N | Calcium | 088811-001 | mg/kg | 14600.00 | | 30.4 | 92.1 |
| On-Site | 74N | Calcium | 088811-002 | mg/kg | 19800.00 | | 32.4 | 98.2 |
| On-Site | 74N | Calcium | 088811-003 | mg/kg | 39700.00 | | 32.5 | 98.4 |
| | | **Calcium Average** | | | 24700.00 | | | |
| | | **Calcium StdDev** | | | 13248.02 | | | |
| | | **CV (%)** | | | 53.64 | | | |
| On-Site | 74N | Chromium | 088811-001 | mg/kg | 2.51 | | 0.184 | 0.552 |
| On-Site | 74N | Chromium | 088811-002 | mg/kg | 2.33 | | 0.196 | 0.589 |
| On-Site | 74N | Chromium | 088811-003 | mg/kg | 3.99 | | 0.197 | 0.591 |
| | | **Chromium Average** | | | 2.94 | | | |
| | | **Chromium StdDev** | | | 0.91 | | | |
| | | **CV (%)** | | | 30.95 | | | |
| On-Site | 74N | Cobalt | 088811-001 | mg/kg | 2.26 | | 0.0552 | 0.184 |
| On-Site | 74N | Cobalt | 088811-002 | mg/kg | 2.83 | | 0.0589 | 0.196 |
| On-Site | 74N | Cobalt | 088811-003 | mg/kg | 3.28 | | 0.0591 | 0.197 |
| | | **Cobalt Average** | | | 2.79 | | | |
| | | **Cobalt StdDev** | | | 0.51 | | | |
| | | **CV (%)** | | | 18.32 | | | |
| On-Site | 74N | Copper | 088811-001 | mg/kg | 5.29 | | 0.0608 | 0.184 |
| On-Site | 74N | Copper | 088811-002 | mg/kg | 5.42 | | 0.0648 | 0.196 |
| On-Site | 74N | Copper | 088811-003 | mg/kg | 6.50 | | 0.065 | 0.197 |
| | | **Copper Average** | | | 5.74 | | | |
| | | **Copper StdDev** | | | 0.66 | | | |
| | | **CV (%)** | | | 11.58 | | | |
| On-Site | 74N | Iron | 088811-001 | mg/kg | 5290.00 | | 4.6 | 18.4 |
| On-Site | 74N | Iron | 088811-002 | mg/kg | 6460.00 | | 4.91 | 19.6 |
| On-Site | 74N | Iron | 088811-003 | mg/kg | 8820.00 | | 4.92 | 19.7 |
| | | **Iron Average** | | | 6856.67 | | | |
| | | **Iron StdDev** | | | 1798.12 | | | |
| | | **CV (%)** | | | 26.22 | | | |

## TABLE C-9. Non-radiological Replicate Results for Calendar Year 2010, Sediment

| Location Type | Location | Analyte | Sample ID | Units | Result | Qualifier | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|---|
| On-Site | 74N | Lead | 088811-001 | mg/kg | 2.75 | | 0.0921 | 0.368 |
| On-Site | 74N | Lead | 088811-002 | mg/kg | 2.56 | | 0.0982 | 0.393 |
| On-Site | 74N | Lead | 088811-003 | mg/kg | 4.68 | | 0.0984 | 0.394 |
| | | **Lead Average** | | | 3.33 | | | |
| | | **Lead StdDev** | | | 1.17 | | | |
| | | **CV (%)** | | | 35.22 | | | |
| On-Site | 74N | Magnesium | 088811-001 | mg/kg | 2010.00 | | 6.91 | 23 |
| On-Site | 74N | Magnesium | 088811-002 | mg/kg | 2580.00 | | 7.37 | 24.6 |
| On-Site | 74N | Magnesium | 088811-003 | mg/kg | 3210.00 | | 7.38 | 24.6 |
| | | **Magnesium Average** | | | 2600.00 | | | |
| | | **Magnesium StdDev** | | | 600.25 | | | |
| | | **CV (%)** | | | 23.09 | | | |
| On-Site | 74N | Manganese | 088811-001 | mg/kg | 147.00 | | 0.184 | 0.921 |
| On-Site | 74N | Manganese | 088811-002 | mg/kg | 183.00 | | 0.196 | 0.982 |
| On-Site | 74N | Manganese | 088811-003 | mg/kg | 273.00 | | 0.984 | 4.92 |
| | | **Manganese Average** | | | 201.00 | | | |
| | | **Manganese StdDev** | | | 64.90 | | | |
| | | **CV (%)** | | | 32.29 | | | |
| On-Site | 74N | Nickel | 088811-001 | mg/kg | 3.62 | | 0.0921 | 0.368 |
| On-Site | 74N | Nickel | 088811-002 | mg/kg | 3.76 | | 0.0982 | 0.393 |
| On-Site | 74N | Nickel | 088811-003 | mg/kg | 5.48 | | 0.0984 | 0.394 |
| | | **Nickel Average** | | | 4.29 | | | |
| | | **Nickel StdDev** | | | 1.04 | | | |
| | | **CV (%)** | | | 24.16 | | | |
| On-Site | 74N | Potassium | 088811-001 | mg/kg | 818.00 | | 73.7 | 276 |
| On-Site | 74N | Potassium | 088811-002 | mg/kg | 1180.00 | | 78.6 | 295 |
| On-Site | 74N | Potassium | 088811-003 | mg/kg | 1850.00 | | 78.7 | 295 |
| | | **Potassium Average** | | | 1282.67 | | | |
| | | **Potassium StdDev** | | | 523.60 | | | |
| | | **CV (%)** | | | 40.82 | | | |
| On-Site | 74N | Selenium | 088811-001 | mg/kg | 0.46 | U | 0.46 | 0.921 |
| On-Site | 74N | Selenium | 088811-002 | mg/kg | 0.49 | U | 0.491 | 0.982 |
| On-Site | 74N | Selenium | 088811-003 | mg/kg | 0.49 | U | 0.492 | 0.984 |

TABLE C-9. Non-radiological Replicate Results for Calendar Year 2010, Sediment

| Location Type | Location | Analyte | Sample ID | Units | Result | Qualifier | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|---|
| | | **Selenium Average** | | | 0.48 | | | |
| | | **Selenium StdDev** | | | 0.02 | | | |
| | | **CV (%)** | | | 3.78 | | | |
| On-Site | 74N | Silver | 088811-001 | mg/kg | 0.10 | U | 0.096 | 0.48 |
| On-Site | 74N | Silver | 088811-002 | mg/kg | 0.10 | U | 0.098 | 0.49 |
| On-Site | 74N | Silver | 088811-003 | mg/kg | 0.10 | U | 0.0992 | 0.496 |
| | | **Silver Average** | | | 0.10 | | | |
| | | **Silver StdDev** | | | 0.00 | | | |
| | | **CV (%)** | | | 1.65 | | | |
| On-Site | 74N | Sodium | 088811-001 | mg/kg | 45.80 | J | 14.7 | 46 |
| On-Site | 74N | Sodium | 088811-002 | mg/kg | 50.30 | | 15.7 | 49.1 |
| On-Site | 74N | Sodium | 088811-003 | mg/kg | 38.00 | J | 15.7 | 49.2 |
| | | **Sodium Average** | | | 44.70 | | | |
| | | **Sodium StdDev** | | | 6.22 | | | |
| | | **CV (%)** | | | 13.92 | | | |
| On-Site | 74N | Thallium | 088811-001 | mg/kg | 0.06 | U | 0.0552 | 0.184 |
| On-Site | 74N | Thallium | 088811-002 | mg/kg | 0.06 | U | 0.0589 | 0.196 |
| On-Site | 74N | Thallium | 088811-003 | mg/kg | 0.09 | J | 0.0591 | 0.197 |
| | | **Thallium Average** | | | 0.07 | | | |
| | | **Thallium StdDev** | | | 0.02 | | | |
| | | **CV (%)** | | | 26.38 | | | |
| On-Site | 74N | Vanadium | 088811-001 | mg/kg | 11.40 | | 0.368 | 1.84 |
| On-Site | 74N | Vanadium | 088811-002 | mg/kg | 11.50 | | 0.393 | 1.96 |
| On-Site | 74N | Vanadium | 088811-003 | mg/kg | 16.00 | | 0.394 | 1.97 |
| | | **Vanadium Average** | | | 12.97 | | | |
| | | **Vanadium StdDev** | | | 2.63 | | | |
| | | **CV (%)** | | | 20.26 | | | |
| On-Site | 74N | Zinc | 088811-001 | mg/kg | 20.50 | | 0.368 | 1.84 |
| On-Site | 74N | Zinc | 088811-002 | mg/kg | 22.70 | | 0.393 | 1.96 |

## TABLE C-9. Non-radiological Replicate Results for Calendar Year 2010, Sediment

| Location Type | Location | Analyte | Sample ID | Units | Result | Qualifier | Decision Level (MDL) | Detection Limit (PQL) |
|---|---|---|---|---|---|---|---|---|
| On-Site | 74N | Zinc | 088811-003 | mg/kg | 36.40 | | 0.394 | 1.97 |
| | | **Zinc Average** | | | 26.53 | | | |
| | | **Zinc StdDev** | | | 8.62 | | | |
| | | **CV (%)** | | | 32.47 | | | |

**NOTES:**

**CV = coefficient of variation**

**J = Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL.**

**MDL = Method detection limit.**

**PQL = Practical quantitation limit.**

**Std Dev = standard deviation**

**U = The analyte was analyzed for, but not detected. For organic and inorganic analytes the result is less than the effective MDL concentration.**

# APPENDIX D

## 2010 STORM WATER SAMPLING RESULTS

# Environmental Surveillance Stormwater Monitoring - 2010

| MONITORING POINT | SAMPLE DATE | ANALYTE | AMOUNT DETECTED | ERROR | MDL | UOM | SAMPLE PREP | NMWQCC Surface Water Standard - Drinking Water Supply* |
|---|---|---|---|---|---|---|---|---|
| SWMP-20 | 7/19/10 | Aluminum | .461 | | 0.01 | mg/L | FILTERED | 5.0 mg/L |
| SWMP-20 | 7/19/10 | Antimony | .000875 | | 0.0005 | mg/L | FILTERED | 0.006 mg/L |
| SWMP-20 | 7/19/10 | Arsenic | .00492 | | 0.0015 | mg/L | FILTERED | 0.010 mg/L |
| SWMP-20 | 7/19/10 | Barium | .13 | | 0.0005 | mg/L | FILTERED | 2 mg/L |
| SWMP-20 | 7/19/10 | Beryllium | <.0001 | | 0.0001 | mg/L | FILTERED | 2 mg/L |
| SWMP-20 | 7/19/10 | Boron | .176 | | 0.004 | mg/L | FILTERED | 0.750 mg/L |
| SWMP-20 | 7/19/10 | Cadmium | <.00011 | | 0.00011 | mg/L | FILTERED | 0.005 mg/L |
| SWMP-20 | 7/19/10 | Chromium | <.0025 | | 0.0025 | mg/L | FILTERED | 0.011 mg/L |
| SWMP-20 | 7/19/10 | Cobalt | .000983 | | 0.0001 | mg/L | FILTERED | 0.05 mg/L |
| SWMP-20 | 7/19/10 | Copper | .0112 | | 0.0003 | mg/L | FILTERED | 0.200 mg/L |
| SWMP-20 | 7/19/10 | Lead | <.0005 | | 0.0005 | mg/L | FILTERED | 0.015 mg/L |
| SWMP-20 | 7/19/10 | Manganese | .0854 | | 0.001 | mg/L | FILTERED | 1.650 mg/L |
| SWMP-20 | 7/19/10 | Mercury | <.000066 | | 0.00007 | mg/L | FILTERED | 0.00077 mg/L |
| SWMP-20 | 7/19/10 | Nickel | .00459 | | 0.0005 | mg/L | FILTERED | 0.700 mg/L |
| SWMP-20 | 7/19/10 | Selenium | <.001 | | 0.001 | mg/L | FILTERED | 0.005 mg/L |
| SWMP-20 | 7/19/10 | Silver | <.0002 | | 0.0002 | mg/L | FILTERED | 0.0032 mg/L |
| SWMP-20 | 7/19/10 | Thallium | .000461 | | 0.0003 | mg/L | FILTERED | 0.002 mg/L |
| SWMP-20 | 7/19/10 | Uranium-238 | 0.00557 | | 0.00005 | mg/L | FILTERED | 0.030 mg/L |
| SWMP-20 | 7/19/10 | Vanadium | .00479 | | 0.003 | mg/L | FILTERED | 0.100 mg/L |
| SWMP-20 | 7/19/10 | Zinc | .00601 | | 0.0026 | mg/L | FILTERED | 10.5 mg/L |
| SWMP-21 | 7/29/10 | Aluminum | .0577 | | 0.01 | mg/L | FILTERED | 5.0 mg/L |
| SWMP-21 | 7/29/10 | Antimony | <.0005 | | 0.0005 | mg/L | FILTERED | 0.006 mg/L |
| SWMP-21 | 7/29/10 | Arsenic | <.0015 | | 0.0015 | mg/L | FILTERED | 0.010 mg/L |
| SWMP-21 | 7/29/10 | Barium | .0386 | | 0.0005 | mg/L | FILTERED | 2 mg/L |
| SWMP-21 | 7/29/10 | Beryllium | <.0001 | | 0.0001 | mg/L | FILTERED | 2 mg/L |
| SWMP-21 | 7/29/10 | Boron | .0319 | | 0.004 | mg/L | FILTERED | 0.750 mg/L |
| SWMP-21 | 7/29/10 | Cadmium | <.00011 | | 0.00011 | mg/L | FILTERED | 0.005 mg/L |
| SWMP-21 | 7/29/10 | Chromium | .00358 | | 0.0025 | mg/L | FILTERED | 0.011 mg/L |
| SWMP-21 | 7/29/10 | Cobalt | .000171 | | 0.0001 | mg/L | FILTERED | 0.05 mg/L |
| SWMP-21 | 7/29/10 | Copper | .00333 | | 0.0003 | mg/L | FILTERED | 0.200 mg/L |
| SWMP-21 | 7/29/10 | Lead | <.0005 | | 0.0005 | mg/L | FILTERED | 0.015 mg/L |

# Environmental Surveillance Stormwater Monitoring - 2010

| MONITORING POINT | SAMPLE DATE | ANALYTE | AMOUNT DETECTED | ERROR | MDL | UOM | SAMPLE PREP | NMWQCC Surface Water Standard - Drinking Water Supply* |
|---|---|---|---|---|---|---|---|---|
| SWMP-21 | 7/29/10 | Manganese | <.001 | | 0.001 | mg/L | FILTERED | 1.650 mg/L |
| SWMP-21 | 7/29/10 | Mercury | <.000066 | | 0.00007 | mg/L | FILTERED | 0.00077 mg/L |
| SWMP-21 | 7/29/10 | Nickel | .00102 | | 0.0005 | mg/L | FILTERED | 0.700 mg/L |
| SWMP-21 | 7/29/10 | Selenium | <.001 | | 0.001 | mg/L | FILTERED | 0.005 mg/L |
| SWMP-21 | 7/29/10 | Silver | <.0002 | | 0.0002 | mg/L | FILTERED | 0.0032 mg/L |
| SWMP-21 | 7/29/10 | Thallium | .00162 | | 0.0003 | mg/L | FILTERED | 0.002 mg/L |
| SWMP-21 | 7/29/10 | Uranium | .00225 | | 0.00005 | mg/L | FILTERED | 0.030 mg/L |
| SWMP-21 | 7/29/10 | Vanadium | .00817 | | 0.003 | mg/L | FILTERED | 0.100 mg/L |
| SWMP-21 | 7/29/10 | Zinc | .0029 | | 0.0026 | mg/L | FILTERED | 10.5 mg/L |

# Environmental Surveillance Stormwater Monitoring - 2010

| MONITORING POINT | SAMPLE DATE | ANALYTE | AMOUNT DETECTED | ERROR | MDL | UOM | SAMPLE PREP | NMWQCC Surface Water Standard - Drinking Water Supply* |
|---|---|---|---|---|---|---|---|---|
| SWMP-12 | 8/2/10 | Alpha, gross | 7.38 | 1.74 | 0.298 | pCi/L | UNFILTERED | 15 pCi/L |
| SWMP-12 | 8/2/10 | Aluminum | .0736 | | 0.01 | mg/L | FILTERED | 5.0 mg/L |
| SWMP-12 | 8/2/10 | Americium-241 | -.216 | 7.69 | 6.5 | pCi/L | UNFILTERED | NE, < MDL |
| SWMP-12 | 8/2/10 | Antimony | <.0005 | | 0.0005 | mg/L | FILTERED | 0.006 mg/L |
| SWMP-12 | 8/2/10 | Arsenic | <.0015 | | 0.0015 | mg/L | FILTERED | 0.010 mg/L |
| SWMP-12 | 8/2/10 | Barium | .0266 | | 0.0005 | mg/L | FILTERED | 2 mg/L |
| SWMP-12 | 8/2/10 | Beryllium | <.0001 | | 0.0001 | mg/L | FILTERED | 2 mg/L |
| SWMP-12 | 8/2/10 | Beta, gross | 10.4 | 2 | 0.618 | pCi/L | UNFILTERED | NE, > MDL |
| SWMP-12 | 8/2/10 | Boron | .0156 | | 0.004 | mg/L | FILTERED | 0.750 mg/L |
| SWMP-12 | 8/2/10 | Cadmium | <.00011 | | 0.00011 | mg/L | FILTERED | 0.005 mg/L |
| SWMP-12 | 8/2/10 | Cesium-137 | -1.79 | 3.31 | 1.6 | pCi/L | UNFILTERED | NE, < MDL |
| SWMP-12 | 8/2/10 | Chromium | .00423 | | 0.0025 | mg/L | FILTERED | 0.011 mg/L |
| SWMP-12 | 8/2/10 | Cobalt | .00026 | | 0.0001 | mg/L | FILTERED | 0.05 mg/L |
| SWMP-12 | 8/2/10 | Cobalt-60 | .0706 | 1.88 | 1.58 | pCi/L | UNFILTERED | NE, < MDL |
| SWMP-12 | 8/2/10 | Copper | .0038 | | 0.0003 | mg/L | FILTERED | 0.200 mg/L |
| SWMP-12 | 8/2/10 | Lead | <.0005 | | 0.0005 | mg/L | FILTERED | 0.015 mg/L |
| SWMP-12 | 8/2/10 | Manganese | .00227 | | 0.001 | mg/L | FILTERED | 1.650 mg/L |
| SWMP-12 | 8/2/10 | Mercury | <.000066 | | 0.00007 | mg/L | FILTERED | 0.00077 mg/L |
| SWMP-12 | 8/2/10 | Neptunium-237 | -.903 | 3.11 | 2.59 | pCi/L | UNFILTERED | NE, < MDL |
| SWMP-12 | 8/2/10 | Nickel | .00112 | | 0.0005 | mg/L | FILTERED | 0.700 mg/L |
| SWMP-12 | 8/2/10 | Radium-226/228 | -71.7 | 13.8 | 35.9 | pCi/L | UNFILTERED | 5 pCi/L |
| SWMP-12 | 8/2/10 | Selenium | <.001 | | 0.001 | mg/L | FILTERED | 0.005 mg/L |
| SWMP-12 | 8/2/10 | Silver | <.0002 | | 0.0002 | mg/L | FILTERED | 0.0032 mg/L |
| SWMP-12 | 8/2/10 | Sodium-22 | .00391 | 1.65 | 1.38 | pCi/L | UNFILTERED | NE, < MDL |
| SWMP-12 | 8/2/10 | Thallium | .000749 | | 0.0003 | mg/L | FILTERED | 0.002 mg/L |
| SWMP-12 | 8/2/10 | Uranium | .000102 | | 0.00005 | mg/L | FILTERED | 0.030 mg/L |
| SWMP-12 | 8/2/10 | Uranium-235 | -5.67 | 14.9 | 8.62 | pCi/L | UNFILTERED | NE, < MDL |
| SWMP-12 | 8/2/10 | Uranium-238 | -70.6 | 125 | 69.2 | pCi/L | UNFILTERED | NE, < MDL |
| SWMP-12 | 8/2/10 | Vanadium | .00654 | | 0.003 | mg/L | FILTERED | 0.100 mg/L |
| SWMP-12 | 8/2/10 | Zinc | .00376 | | 0.0026 | mg/L | FILTERED | 10.5 mg/L |
| SWMP-20 | 8/3/10 | Alpha, gross | 18.3 | 3.95 | 0.305 | pCi/L | UNFILTERED | 15 pCi/L |

# Environmental Surveillance Stormwater Monitoring - 2010

| MONITORING POINT | SAMPLE DATE | ANALYTE | AMOUNT DETECTED | ERROR | MDL | UOM | SAMPLE PREP | NMWQCC Surface Water Standard - Drinking Water Supply* |
|---|---|---|---|---|---|---|---|---|
| SWMP-20 | 8/3/10 | Americium-241 | .877 | 5.82 | 4.75 | pCi/L | UNFILTERED | NE, < MDL |
| SWMP-20 | 8/3/10 | Beta, gross | 18.9 | 3.53 | 0.936 | pCi/L | UNFILTERED | NE, > MDL |
| SWMP-20 | 8/3/10 | Cesium-137 | 1.5 | 1.58 | 1.38 | pCi/L | UNFILTERED | NE, > MDL |
| SWMP-20 | 8/3/10 | Cobalt-60 | .466 | 1.67 | 1.41 | pCi/L | UNFILTERED | NE, < MDL |
| SWMP-20 | 8/3/10 | Neptunium-237 | -.288 | 2.88 | 2.35 | pCi/L | UNFILTERED | NE, < MDL |
| SWMP-20 | 8/3/10 | Radium-226/228 | 8.4 | 11 | 33.1 | pCi/L | UNFILTERED | 5 pCi/L |
| SWMP-20 | 8/3/10 | Sodium-22 | 1.29 | 1.46 | 1.3 | pCi/L | UNFILTERED | NE, < MDL |
| SWMP-20 | 8/3/10 | Uranium-235 | -2.36 | 13.6 | 7.54 | pCi/L | UNFILTERED | NE, < MDL |
| SWMP-20 | 8/3/10 | Uranium-238 | -94 | 93.2 | 51.8 | pCi/L | UNFILTERED | NE, < MDL |
| SWMP-12 | 8/16/10 | Aluminum | .0309 | | 0.01 | mg/L | FILTERED | 5.0 mg/L |
| SWMP-12 | 8/16/10 | Antimony | <.0005 | | 0.0005 | mg/L | FILTERED | 0.006 mg/L |
| SWMP-12 | 8/16/10 | Arsenic | <.0015 | | 0.0015 | mg/L | FILTERED | 0.010 mg/L |
| SWMP-12 | 8/16/10 | Barium | .0498 | | 0.0005 | mg/L | FILTERED | 2 mg/L |
| SWMP-12 | 8/16/10 | Beryllium | <.0001 | | 0.0001 | mg/L | FILTERED | 2 mg/L |
| SWMP-12 | 8/16/10 | Boron | .0155 | | 0.004 | mg/L | FILTERED | 0.750 mg/L |
| SWMP-12 | 8/16/10 | Cadmium | <.00011 | | 0.00011 | mg/L | FILTERED | 0.005 mg/L |
| SWMP-12 | 8/16/10 | Chromium | <.0025 | | 0.0025 | mg/L | FILTERED | 0.011 mg/L |
| SWMP-12 | 8/16/10 | Cobalt | .000982 | | 0.0001 | mg/L | FILTERED | 0.05 mg/L |
| SWMP-12 | 8/16/10 | Copper | .00877 | | 0.0003 | mg/L | FILTERED | 0.200 mg/L |
| SWMP-12 | 8/16/10 | Lead | .0022 | | 0.0005 | mg/L | FILTERED | 0.015 mg/L |
| SWMP-12 | 8/16/10 | Manganese | <.001 | | 0.001 | mg/L | FILTERED | 1.650 mg/L |
| SWMP-12 | 8/16/10 | Mercury | <.000066 | | 0.00007 | mg/L | FILTERED | 0.00077 mg/L |
| SWMP-12 | 8/16/10 | Nickel | .00477 | | 0.0005 | mg/L | FILTERED | 0.700 mg/L |
| SWMP-12 | 8/16/10 | Selenium | <.001 | | 0.001 | mg/L | FILTERED | 0.005 mg/L |
| SWMP-12 | 8/16/10 | Silver | <.0002 | | 0.0002 | mg/L | FILTERED | 0.0032 mg/L |
| SWMP-12 | 8/16/10 | Thallium | .000362 | | 0.0003 | mg/L | FILTERED | 0.002 mg/L |
| SWMP-12 | 8/16/10 | Uranium | .000122 | | 0.00005 | mg/L | FILTERED | 0.030 mg/L |
| SWMP-12 | 8/16/10 | Vanadium | <.003 | | 0.003 | mg/L | FILTERED | 0.100 mg/L |
| SWMP-12 | 8/16/10 | Zinc | .00697 | | 0.0026 | mg/L | FILTERED | 10.5 mg/L |
| SWMP-21 | 8/16/10 | Alpha, gross | 9.67 | 3.97 | 0.796 | pCi/L | UNFILTERED | 15 pCi/L |
| SWMP-21 | 8/16/10 | Aluminum | .687 | | 0.01 | mg/L | FILTERED | 5.0 mg/L |

# Environmental Surveillance Stormwater Monitoring - 2010

| MONITORING POINT | SAMPLE DATE | ANALYTE | AMOUNT DETECTED | ERROR | MDL | UOM | SAMPLE PREP | NMWQCC Surface Water Standard - Drinking Water Supply* |
|---|---|---|---|---|---|---|---|---|
| SWMP-21 | 8/16/10 | Americium-241 | -1.91 | 7.84 | 6.58 | pCi/L | UNFILTERED | NE, < MDL |
| SWMP-21 | 8/16/10 | Antimony | <.0005 | | 0.0005 | mg/L | FILTERED | 0.006 mg/L |
| SWMP-21 | 8/16/10 | Arsenic | .00265 | | 0.0015 | mg/L | FILTERED | 0.010 mg/L |
| SWMP-21 | 8/16/10 | Barium | .0248 | | 0.0005 | mg/L | FILTERED | 2 mg/L |
| SWMP-21 | 8/16/10 | Beryllium | <.0001 | | 0.0001 | mg/L | FILTERED | 2 mg/L |
| SWMP-21 | 8/16/10 | Beta, gross | 37.6 | 6.43 | 0.457 | pCi/L | UNFILTERED | NE, > MDL |
| SWMP-21 | 8/16/10 | Boron | .0981 | | 0.004 | mg/L | FILTERED | 0.750 mg/L |
| SWMP-21 | 8/16/10 | Cadmium | <.00011 | | 0.00011 | mg/L | FILTERED | 0.005 mg/L |
| SWMP-21 | 8/16/10 | Cesium-137 | -3.9 | 3.35 | 1.57 | pCi/L | UNFILTERED | NE, < MDL |
| SWMP-21 | 8/16/10 | Chromium | <.0025 | | 0.0025 | mg/L | FILTERED | 0.011 mg/L |
| SWMP-21 | 8/16/10 | Cobalt | .000351 | | 0.0001 | mg/L | FILTERED | 0.05 mg/L |
| SWMP-21 | 8/16/10 | Cobalt-60 | .364 | 1.78 | 1.51 | pCi/L | UNFILTERED | NE, < MDL |
| SWMP-21 | 8/16/10 | Copper | .00731 | | 0.0003 | mg/L | FILTERED | 0.200 mg/L |
| SWMP-21 | 8/16/10 | Lead | .00408 | | 0.0005 | mg/L | FILTERED | 0.015 mg/L |
| SWMP-21 | 8/16/10 | Manganese | .00735 | | 0.001 | mg/L | FILTERED | 1.650 mg/L |
| SWMP-21 | 8/16/10 | Mercury | <.000066 | | 0.00007 | mg/L | FILTERED | 0.00077 mg/L |
| SWMP-21 | 8/16/10 | Neptunium-237 | 1.75 | 3.38 | 2.88 | pCi/L | UNFILTERED | NE, < MDL |
| SWMP-21 | 8/16/10 | Nickel | .00262 | | 0.0005 | mg/L | FILTERED | 0.700 mg/L |
| SWMP-21 | 8/16/10 | Radium-226/228 | -6.4 | 14.2 | 36.7 | pCi/L | UNFILTERED | 5 pCi/L |
| SWMP-21 | 8/16/10 | Selenium | <.001 | | 0.001 | mg/L | FILTERED | 0.005 mg/L |
| SWMP-21 | 8/16/10 | Silver | <.0002 | | 0.0002 | mg/L | FILTERED | 0.0032 mg/L |
| SWMP-21 | 8/16/10 | Sodium-22 | -1.48 | 1.88 | 1.48 | pCi/L | UNFILTERED | NE, < MDL |
| SWMP-21 | 8/16/10 | Thallium | .000646 | | 0.0003 | mg/L | FILTERED | 0.002 mg/L |
| SWMP-21 | 8/16/10 | Uranium | .00128 | | 0.00005 | mg/L | FILTERED | 0.030 mg/L |
| SWMP-21 | 8/16/10 | Uranium-235 | -5.36 | 15.7 | 8.74 | pCi/L | UNFILTERED | NE, < MDL |
| SWMP-21 | 8/16/10 | Uranium-238 | 34.1 | 124 | 69.8 | pCi/L | UNFILTERED | NE, < MDL |
| SWMP-21 | 8/16/10 | Vanadium | <.003 | | 0.003 | mg/L | FILTERED | 0.100 mg/L |
| SWMP-21 | 8/16/10 | Zinc | .0264 | | 0.0026 | mg/L | FILTERED | 10.5 mg/L |

## Environmental Surveillance Stormwater Monitoring - 2010

| MONITORING POINT | SAMPLE DATE | ANALYTE | AMOUNT DETECTED | ERROR | MDL | UOM | SAMPLE PREP | NMWQCC Surface Water Standard - Drinking Water Supply* |
|---|---|---|---|---|---|---|---|---|
| SWMP-12 | 9/14/10 | Alpha, gross | 5.09 | 1.61 | 0.397 | pCi/L | UNFILTERED | 15 pCi/L |
| SWMP-12 | 9/14/10 | Americium-241 | 3.82 | 2.91 | 2.59 | pCi/L | UNFILTERED | NE, > MDL |
| SWMP-12 | 9/14/10 | Beta, gross | 8.2 | 2.02 | 0.475 | pCi/L | UNFILTERED | NE, > MDL |
| SWMP-12 | 9/14/10 | Cesium-137 | 1.19 | 2.38 | 2 | pCi/L | UNFILTERED | NE, < MDL |
| SWMP-12 | 9/14/10 | Cobalt-60 | -.504 | 2.49 | 2.09 | pCi/L | UNFILTERED | NE, < MDL |
| SWMP-12 | 9/14/10 | Neptunium-237 | 1.17 | 3.45 | 3 | pCi/L | UNFILTERED | NE, < MDL |
| SWMP-12 | 9/14/10 | Radium-226/228 | -14.4 | 16.4 | 35.5 | pCi/L | UNFILTERED | 5 pCi/L |
| SWMP-12 | 9/14/10 | Sodium-22 | 1.36 | 4.09 | 2.05 | pCi/L | UNFILTERED | NE, < MDL |
| SWMP-12 | 9/14/10 | Uranium-235 | -11.2 | 16.4 | 8.18 | pCi/L | UNFILTERED | NE, < MDL |
| SWMP-12 | 9/14/10 | Uranium-238 | -29.1 | 65.7 | 32.9 | pCi/L | UNFILTERED | NE, < MDL |

* Where there was no Drinking Water Supply Standard the lowest numeric criteria was used

Storm Water Sampling Results - 2010

| MONITORING POINT | ANALYTE | SAMPLE DATE | RESULTS |
|---|---|---|---|
| SWMP-04 | Aluminum, Total Recoverable | 6/29/10 | 1.19 mg/L |
| SWMP-04 | Arsenic, Total Recoverable | 6/29/10 | .00233 mg/L |
| SWMP-04 | Cadmium, Total Recoverable | 6/29/10 | .000801 mg/L |
| SWMP-04 | Chemical Oxygen Demand | 6/29/10 | 65.3 mg/L |
| SWMP-04 | Copper, Total Recoverable | 6/29/10 | .0208 mg/L |
| SWMP-04 | Iron, Total Recoverable | 6/29/10 | .874 mg/L |
| SWMP-04 | Lead, Total Recoverable | 6/29/10 | .00518 mg/L |
| SWMP-04 | Magnesium, Total Recoverable | 6/29/10 | 2.36 mg/L |
| SWMP-04 | Mercury, Total Recoverable | 6/29/10 | <.000066 mg/L |
| SWMP-04 | Selenium, Total Recoverable | 6/29/10 | <.001 mg/L |
| SWMP-04 | Silver, Total Recoverable | 6/29/10 | <.0002 mg/L |
| SWMP-04 | Solids, total suspended | 6/29/10 | 25.8 mg/L |
| SWMP-04 | Solids, total suspended | 6/29/10 | 28 mg/L |
| SWMP-04 | Zinc, Total Recoverable | 6/29/10 | .0328 mg/L |
| SWMP-05 | Aluminum, Total Recoverable | 6/29/10 | 4.84 mg/L |
| SWMP-05 | Ammonia | 6/29/10 | .033 mg/L |
| SWMP-05 | Arsenic, Total Recoverable | 6/29/10 | .00471 mg/L |
| SWMP-05 | Cadmium, Total Recoverable | 6/29/10 | .000183 mg/L |
| SWMP-05 | Copper, Total Recoverable | 6/29/10 | .0129 mg/L |
| SWMP-05 | Iron, Total Recoverable | 6/29/10 | 3.45 mg/L |
| SWMP-05 | Lead, Total Recoverable | 6/29/10 | .00726 mg/L |
| SWMP-05 | Magnesium, Total Recoverable | 6/29/10 | 4.57 mg/L |
| SWMP-05 | Mercury, Total Recoverable | 6/29/10 | <.000066 mg/L |
| SWMP-05 | Selenium, Total Recoverable | 6/29/10 | <.001 mg/L |
| SWMP-05 | Silver, Total Recoverable | 6/29/10 | <.0002 mg/L |
| SWMP-05 | Zinc, Total Recoverable | 6/29/10 | .113 mg/L |
| SWMP-11 | Aluminum, Total Recoverable | 6/29/10 | 36.1 mg/L |
| SWMP-11 | Ammonia | 6/29/10 | 3.03 mg/L |
| SWMP-11 | Arsenic, Total Recoverable | 6/29/10 | .00774 mg/L |
| SWMP-11 | Cadmium, Total Recoverable | 6/29/10 | .0111 mg/L |
| SWMP-11 | Chemical Oxygen Demand | 6/29/10 | 287 mg/L |
| SWMP-11 | Copper, Total Recoverable | 6/29/10 | .245 mg/L |
| SWMP-11 | Cyanide, total | 6/29/10 | .0549 mg/L |
| SWMP-11 | Iron, Total Recoverable | 6/29/10 | 28.3 mg/L |
| SWMP-11 | Lead, Total Recoverable | 6/29/10 | .0335 mg/L |
| SWMP-11 | Magnesium, Total Recoverable | 6/29/10 | 13.3 mg/L |
| SWMP-11 | Mercury, Total Recoverable | 6/29/10 | <.000066 mg/L |
| SWMP-11 | Selenium, Total Recoverable | 6/29/10 | <.001 mg/L |
| SWMP-11 | Silver, Total Recoverable | 6/29/10 | .022 mg/L |
| SWMP-11 | Zinc, Total Recoverable | 6/29/10 | .178 mg/L |
| SWMP-15 | Aluminum, Total Recoverable | 6/29/10 | 3.8 mg/L |
| SWMP-15 | Ammonia | 6/29/10 | .38 mg/L |
| SWMP-15 | Arsenic, Total Recoverable | 6/29/10 | .00354 mg/L |
| SWMP-15 | Cadmium, Total Recoverable | 6/29/10 | .000126 mg/L |
| SWMP-15 | Chemical Oxygen Demand | 6/29/10 | 191 mg/L |
| SWMP-15 | Copper, Total Recoverable | 6/29/10 | .0111 mg/L |
| SWMP-15 | Cyanide, total | 6/29/10 | .0024 mg/L |
| SWMP-15 | Iron, Total Recoverable | 6/29/10 | 2.53 mg/L |
| SWMP-15 | Lead, Total Recoverable | 6/29/10 | .00404 mg/L |
| SWMP-15 | Magnesium, Total Recoverable | 6/29/10 | 5.42 mg/L |
| SWMP-15 | Mercury, Total Recoverable | 6/29/10 | <.000066 mg/L |
| SWMP-15 | Selenium, Total Recoverable | 6/29/10 | .00133 mg/L |
| SWMP-15 | Silver, Total Recoverable | 6/29/10 | <.0002 mg/L |
| SWMP-15 | Zinc, Total Recoverable | 6/29/10 | .042 mg/L |

Storm Water Sampling Results - 2010

| MONITORING POINT | ANALYTE | SAMPLE DATE | RESULTS | |
|---|---|---|---|---|
| SWMP-05 | Aluminum, Total Recoverable | 7/7/10 | 2.67 | mg/L |
| SWMP-05 | Ammonia | 7/7/10 | .229 | mg/L |
| SWMP-05 | Arsenic, Total Recoverable | 7/7/10 | .00192 | mg/L |
| SWMP-05 | Cadmium, Total Recoverable | 7/7/10 | <.00011 | mg/L |
| SWMP-05 | Copper, Total Recoverable | 7/7/10 | .0122 | mg/L |
| SWMP-05 | Iron, Total Recoverable | 7/7/10 | 3.03 | mg/L |
| SWMP-05 | Lead, Total Recoverable | 7/7/10 | .00328 | mg/L |
| SWMP-05 | Magnesium, Total Recoverable | 7/7/10 | 2.32 | mg/L |
| SWMP-05 | Mercury, Total Recoverable | 7/7/10 | <.000066 | mg/L |
| SWMP-05 | Selenium, Total Recoverable | 7/7/10 | <.001 | mg/L |
| SWMP-05 | Silver, Total Recoverable | 7/7/10 | <.0002 | mg/L |
| SWMP-05 | Zinc, Total Recoverable | 7/7/10 | .0405 | mg/L |
| SWMP-15 | Aluminum, Total Recoverable | 7/7/10 | .227 | mg/L |
| SWMP-15 | Ammonia | 7/7/10 | .262 | mg/L |
| SWMP-15 | Arsenic, Total Recoverable | 7/7/10 | <.0015 | mg/L |
| SWMP-15 | Cadmium, Total Recoverable | 7/7/10 | <.00011 | mg/L |
| SWMP-15 | Chemical Oxygen Demand | 7/7/10 | 48.1 | mg/L |
| SWMP-15 | Copper, Total Recoverable | 7/7/10 | .00297 | mg/L |
| SWMP-15 | Cyanide, total | 7/7/10 | <.0017 | mg/L |
| SWMP-15 | Iron, Total Recoverable | 7/7/10 | .26 | mg/L |
| SWMP-15 | Lead, Total Recoverable | 7/7/10 | <.0005 | mg/L |
| SWMP-15 | Magnesium, Total Recoverable | 7/7/10 | 1.36 | mg/L |
| SWMP-15 | Mercury, Total Recoverable | 7/7/10 | <.000066 | mg/L |
| SWMP-15 | Selenium, Total Recoverable | 7/7/10 | <.001 | mg/L |
| SWMP-15 | Silver, Total Recoverable | 7/7/10 | <.0002 | mg/L |
| SWMP-15 | Zinc, Total Recoverable | 7/7/10 | .00579 | mg/L |
| SWMP-02 | Solids, total suspended | 7/16/10 | 16.8 | mg/L |
| SWMP-04 | Solids, total suspended | 7/16/10 | 32.6 | mg/L |
| SWMP-06 | Aluminum, Total Recoverable | 7/19/10 | 13 | mg/L |
| SWMP-06 | Arsenic, Total Recoverable | 7/19/10 | .00445 | mg/L |
| SWMP-06 | Cadmium, Total Recoverable | 7/19/10 | .00214 | mg/L |
| SWMP-06 | Copper, Total Recoverable | 7/19/10 | .0171 | mg/L |
| SWMP-06 | Iron, Total Recoverable | 7/19/10 | 6.79 | mg/L |
| SWMP-06 | Lead, Total Recoverable | 7/19/10 | .0462 | mg/L |
| SWMP-06 | Magnesium, Total Recoverable | 7/19/10 | 26.3 | mg/L |
| SWMP-06 | Mercury, Total Recoverable | 7/19/10 | <.000066 | mg/L |
| SWMP-06 | Selenium, Total Recoverable | 7/19/10 | <.001 | mg/L |
| SWMP-06 | Silver, Total Recoverable | 7/19/10 | <.0002 | mg/L |
| SWMP-06 | Zinc, Total Recoverable | 7/19/10 | .122 | mg/L |
| SWMP-20 | Aluminum, Total Recoverable | 7/19/10 | .461 | mg/L |
| SWMP-20 | Arsenic, Total Recoverable | 7/19/10 | .00492 | mg/L |
| SWMP-20 | Cadmium, Total Recoverable | 7/19/10 | <.00011 | mg/L |
| SWMP-20 | Copper, Total Recoverable | 7/19/10 | .0112 | mg/L |
| SWMP-20 | Iron, Total Recoverable | 7/19/10 | .348 | mg/L |
| SWMP-20 | Lead, Total Recoverable | 7/19/10 | <.0005 | mg/L |
| SWMP-20 | Magnesium, Total Recoverable | 7/19/10 | 4.65 | mg/L |
| SWMP-20 | Mercury, Total Recoverable | 7/19/10 | <.000066 | mg/L |
| SWMP-20 | Selenium, Total Recoverable | 7/19/10 | <.001 | mg/L |
| SWMP-20 | Silver, Total Recoverable | 7/19/10 | <.0002 | mg/L |
| SWMP-20 | Zinc, Total Recoverable | 7/19/10 | .00601 | mg/L |
| SWMP-01 | Aluminum, Total Recoverable | 7/26/10 | .431 | mg/L |
| SWMP-01 | Arsenic, Total Recoverable | 7/26/10 | .00173 | mg/L |
| SWMP-01 | Cadmium, Total Recoverable | 7/26/10 | .000417 | mg/L |
| SWMP-01 | Copper, Total Recoverable | 7/26/10 | .00786 | mg/L |

# Storm Water Sampling Results - 2010

| MONITORING POINT | ANALYTE | SAMPLE DATE | RESULTS |
|---|---|---|---|
| SWMP-01 | Iron, Total Recoverable | 7/26/10 | .366 mg/L |
| SWMP-01 | Lead, Total Recoverable | 7/26/10 | .00308 mg/L |
| SWMP-01 | Magnesium, Total Recoverable | 7/26/10 | 1.08 mg/L |
| SWMP-01 | Mercury, Total Recoverable | 7/26/10 | <.000066 mg/L |
| SWMP-01 | Selenium, Total Recoverable | 7/26/10 | .00114 mg/L |
| SWMP-01 | Silver, Total Recoverable | 7/26/10 | <.0002 mg/L |
| SWMP-01 | Zinc, Total Recoverable | 7/26/10 | .0559 mg/L |
| SWMP-04 | Aluminum, Total Recoverable | 7/26/10 | .248 mg/L |
| SWMP-04 | Arsenic, Total Recoverable | 7/26/10 | .00212 mg/L |
| SWMP-04 | Cadmium, Total Recoverable | 7/26/10 | .000173 mg/L |
| SWMP-04 | Chemical Oxygen Demand | 7/26/10 | 59.9 mg/L |
| SWMP-04 | Copper, Total Recoverable | 7/26/10 | .00572 mg/L |
| SWMP-04 | Iron, Total Recoverable | 7/26/10 | .134 mg/L |
| SWMP-04 | Lead, Total Recoverable | 7/26/10 | .0019 mg/L |
| SWMP-04 | Magnesium, Total Recoverable | 7/26/10 | 1.12 mg/L |
| SWMP-04 | Mercury, Total Recoverable | 7/26/10 | <.000066 mg/L |
| SWMP-04 | Selenium, Total Recoverable | 7/26/10 | <.001 mg/L |
| SWMP-04 | Silver, Total Recoverable | 7/26/10 | <.0002 mg/L |
| SWMP-04 | Solids, total suspended | 7/26/10 | 16 mg/L |
| SWMP-04 | Zinc, Total Recoverable | 7/26/10 | .0272 mg/L |
| SWMP-05 | Chemical Oxygen Demand | 7/26/10 | 57.6 mg/L |
| SWMP-05 | Cyanide, total | 7/26/10 | <.0017 mg/L |
| SWMP-05 | Solids, total suspended | 7/26/10 | 17.1 mg/L |
| SWMP-05 | Solids, total suspended | 7/26/10 | 215 mg/L |
| SWMP-07 | Aluminum, Total Recoverable | 7/27/10 | 3.76 mg/L |
| SWMP-07 | Arsenic, Total Recoverable | 7/27/10 | .00226 mg/L |
| SWMP-07 | Cadmium, Total Recoverable | 7/27/10 | .000321 mg/L |
| SWMP-07 | Copper, Total Recoverable | 7/27/10 | .00832 mg/L |
| SWMP-07 | Iron, Total Recoverable | 7/27/10 | 1.65 mg/L |
| SWMP-07 | Lead, Total Recoverable | 7/27/10 | .01 mg/L |
| SWMP-07 | Magnesium, Total Recoverable | 7/27/10 | 2.62 mg/L |
| SWMP-07 | Mercury, Total Recoverable | 7/27/10 | <.000066 mg/L |
| SWMP-07 | Selenium, Total Recoverable | 7/27/10 | .0014 mg/L |
| SWMP-07 | Silver, Total Recoverable | 7/27/10 | <.0002 mg/L |
| SWMP-07 | Zinc, Total Recoverable | 7/27/10 | .0401 mg/L |
| SWMP-16 | Aluminum, Total Recoverable | 7/27/10 | 5.94 mg/L |
| SWMP-16 | Ammonia | 7/27/10 | .781 mg/L |
| SWMP-16 | Arsenic, Total Recoverable | 7/27/10 | .00265 mg/L |
| SWMP-16 | Cadmium, Total Recoverable | 7/27/10 | .000505 mg/L |
| SWMP-16 | Chemical Oxygen Demand | 7/27/10 | 19.1 mg/L |
| SWMP-16 | Copper, Total Recoverable | 7/27/10 | .00678 mg/L |
| SWMP-16 | Cyanide, total | 7/27/10 | <.0017 mg/L |
| SWMP-16 | Iron, Total Recoverable | 7/27/10 | 2.57 mg/L |
| SWMP-16 | Lead, Total Recoverable | 7/27/10 | .0121 mg/L |
| SWMP-16 | Magnesium, Total Recoverable | 7/27/10 | 4.54 mg/L |
| SWMP-16 | Mercury, Total Recoverable | 7/27/10 | <.000066 mg/L |
| SWMP-16 | Selenium, Total Recoverable | 7/27/10 | <.001 mg/L |
| SWMP-16 | Silver, Total Recoverable | 7/27/10 | <.0002 mg/L |
| SWMP-16 | Zinc, Total Recoverable | 7/27/10 | .033 mg/L |
| SWMP-06 | Ammonia | 7/29/10 | .254 mg/L |
| SWMP-06 | Cyanide, total | 7/29/10 | <.0017 mg/L |
| SWMP-13 | Aluminum, Total Recoverable | 7/29/10 | 8.14 mg/L |
| SWMP-13 | Ammonia | 7/29/10 | .0874 mg/L |
| SWMP-13 | Arsenic, Total Recoverable | 7/29/10 | .00505 mg/L |

# Storm Water Sampling Results - 2010

| MONITORING POINT | ANALYTE | SAMPLE DATE | RESULTS |
|---|---|---|---|
| SWMP-13 | Cadmium, Total Recoverable | 7/29/10 | .000232 mg/L |
| SWMP-13 | Chemical Oxygen Demand | 7/29/10 | 12.3 mg/L |
| SWMP-13 | Copper, Total Recoverable | 7/29/10 | .0154 mg/L |
| SWMP-13 | Cyanide, total | 7/29/10 | <.0017 mg/L |
| SWMP-13 | Iron, Total Recoverable | 7/29/10 | 6.39 mg/L |
| SWMP-13 | Lead, Total Recoverable | 7/29/10 | .0679 mg/L |
| SWMP-13 | Magnesium, Total Recoverable | 7/29/10 | 2.06 mg/L |
| SWMP-13 | Mercury, Total Recoverable | 7/29/10 | <.000066 mg/L |
| SWMP-13 | Selenium, Total Recoverable | 7/29/10 | <.001 mg/L |
| SWMP-13 | Silver, Total Recoverable | 7/29/10 | .000245 mg/L |
| SWMP-13 | Zinc, Total Recoverable | 7/29/10 | .0377 mg/L |
| SWMP-21 | Aluminum, Total Recoverable | 7/29/10 | .0577 mg/L |
| SWMP-21 | Arsenic, Total Recoverable | 7/29/10 | <.0015 mg/L |
| SWMP-21 | Cadmium, Total Recoverable | 7/29/10 | <.00011 mg/L |
| SWMP-21 | Copper, Total Recoverable | 7/29/10 | .00333 mg/L |
| SWMP-21 | Iron, Total Recoverable | 7/29/10 | .0956 mg/L |
| SWMP-21 | Lead, Total Recoverable | 7/29/10 | <.0005 mg/L |
| SWMP-21 | Magnesium, Total Recoverable | 7/29/10 | 1.77 mg/L |
| SWMP-21 | Mercury, Total Recoverable | 7/29/10 | <.000066 mg/L |
| SWMP-21 | Selenium, Total Recoverable | 7/29/10 | <.001 mg/L |
| SWMP-21 | Silver, Total Recoverable | 7/29/10 | <.0002 mg/L |
| SWMP-21 | Zinc, Total Recoverable | 7/29/10 | .0029 mg/L |
| SWMP-22 | Aluminum, Total Recoverable | 7/29/10 | 7.74 mg/L |
| SWMP-22 | Arsenic, Total Recoverable | 7/29/10 | .00651 mg/L |
| SWMP-22 | Cadmium, Total Recoverable | 7/29/10 | .0014 mg/L |
| SWMP-22 | Copper, Total Recoverable | 7/29/10 | .021 mg/L |
| SWMP-22 | Iron, Total Recoverable | 7/29/10 | 3.71 mg/L |
| SWMP-22 | Lead, Total Recoverable | 7/29/10 | .0256 mg/L |
| SWMP-22 | Magnesium, Total Recoverable | 7/29/10 | 4.69 mg/L |
| SWMP-22 | Mercury, Total Recoverable | 7/29/10 | <.000066 mg/L |
| SWMP-22 | Selenium, Total Recoverable | 7/29/10 | <.001 mg/L |
| SWMP-22 | Silver, Total Recoverable | 7/29/10 | <.0002 mg/L |
| SWMP-22 | Zinc, Total Recoverable | 7/29/10 | .142 mg/L |

Storm Water Sampling Results - 2010

| MONITORING POINT | ANALYTE | SAMPLE DATE | RESULTS |
|---|---|---|---|
| SWMP-12 | Aluminum, Total Recoverable | 8/2/10 | .0736 mg/L |
| SWMP-12 | Arsenic, Total Recoverable | 8/2/10 | <.0015 mg/L |
| SWMP-12 | Cadmium, Total Recoverable | 8/2/10 | <.00011 mg/L |
| SWMP-12 | Copper, Total Recoverable | 8/2/10 | .0038 mg/L |
| SWMP-12 | Iron, Total Recoverable | 8/2/10 | .117 mg/L |
| SWMP-12 | Lead, Total Recoverable | 8/2/10 | <.0005 mg/L |
| SWMP-12 | Magnesium, Total Recoverable | 8/2/10 | .69 mg/L |
| SWMP-12 | Mercury, Total Recoverable | 8/2/10 | <.000066 mg/L |
| SWMP-12 | Selenium, Total Recoverable | 8/2/10 | <.001 mg/L |
| SWMP-12 | Silver, Total Recoverable | 8/2/10 | <.0002 mg/L |
| SWMP-12 | Zinc, Total Recoverable | 8/2/10 | .00376 mg/L |
| SWMP-23 | Aluminum, Total Recoverable | 8/2/10 | 18.7 mg/L |
| SWMP-23 | Ammonia | 8/2/10 | .332 mg/L |
| SWMP-23 | Arsenic, Total Recoverable | 8/2/10 | .00394 mg/L |
| SWMP-23 | Cadmium, Total Recoverable | 8/2/10 | .000493 mg/L |
| SWMP-23 | Chemical Oxygen Demand | 8/2/10 | 92.2 mg/L |
| SWMP-23 | Copper, Total Recoverable | 8/2/10 | .0171 mg/L |
| SWMP-23 | Iron, Total Recoverable | 8/2/10 | 11.2 mg/L |
| SWMP-23 | Lead, Total Recoverable | 8/2/10 | .0169 mg/L |
| SWMP-23 | Magnesium, Total Recoverable | 8/2/10 | 12.3 mg/L |
| SWMP-23 | Mercury, Total Recoverable | 8/2/10 | .000098 mg/L |
| SWMP-23 | Selenium, Total Recoverable | 8/2/10 | <.001 mg/L |
| SWMP-23 | Silver, Total Recoverable | 8/2/10 | <.0002 mg/L |
| SWMP-23 | Zinc, Total Recoverable | 8/2/10 | .143 mg/L |
| SWMP-04 | Aluminum, Total Recoverable | 8/11/10 | .774 mg/L |
| SWMP-04 | Arsenic, Total Recoverable | 8/11/10 | .00636 mg/L |
| SWMP-04 | Cadmium, Total Recoverable | 8/11/10 | .000152 mg/L |
| SWMP-04 | Copper, Total Recoverable | 8/11/10 | .0101 mg/L |
| SWMP-04 | Iron, Total Recoverable | 8/11/10 | .509 mg/L |
| SWMP-04 | Lead, Total Recoverable | 8/11/10 | .00107 mg/L |
| SWMP-04 | Magnesium, Total Recoverable | 8/11/10 | 4.72 mg/L |
| SWMP-04 | Mercury, Total Recoverable | 8/11/10 | <.000066 mg/L |
| SWMP-04 | Selenium, Total Recoverable | 8/11/10 | .00116 mg/L |
| SWMP-04 | Silver, Total Recoverable | 8/11/10 | <.0002 mg/L |
| SWMP-04 | Zinc, Total Recoverable | 8/11/10 | .00891 mg/L |
| SWMP-05 | Aluminum, Total Recoverable | 8/11/10 | 20.3 mg/L |
| SWMP-05 | Arsenic, Total Recoverable | 8/11/10 | .00896 mg/L |
| SWMP-05 | Cadmium, Total Recoverable | 8/11/10 | .00166 mg/L |
| SWMP-05 | Copper, Total Recoverable | 8/11/10 | .028 mg/L |
| SWMP-05 | Iron, Total Recoverable | 8/11/10 | 16.7 mg/L |
| SWMP-05 | Lead, Total Recoverable | 8/11/10 | .0837 mg/L |
| SWMP-05 | Magnesium, Total Recoverable | 8/11/10 | 8.37 mg/L |
| SWMP-05 | Mercury, Total Recoverable | 8/11/10 | <.000066 mg/L |
| SWMP-05 | Selenium, Total Recoverable | 8/11/10 | <.001 mg/L |
| SWMP-05 | Silver, Total Recoverable | 8/11/10 | .000249 mg/L |
| SWMP-05 | Zinc, Total Recoverable | 8/11/10 | .118 mg/L |
| SWMP-15 | Aluminum, Total Recoverable | 8/11/10 | .438 mg/L |
| SWMP-15 | Arsenic, Total Recoverable | 8/11/10 | .00621 mg/L |
| SWMP-15 | Cadmium, Total Recoverable | 8/11/10 | <.00011 mg/L |
| SWMP-15 | Copper, Total Recoverable | 8/11/10 | .00506 mg/L |
| SWMP-15 | Iron, Total Recoverable | 8/11/10 | .285 mg/L |
| SWMP-15 | Lead, Total Recoverable | 8/11/10 | <.0005 mg/L |
| SWMP-15 | Magnesium, Total Recoverable | 8/11/10 | 2.47 mg/L |
| SWMP-15 | Mercury, Total Recoverable | 8/11/10 | <.000066 mg/L |

Storm Water Sampling Results - 2010

| MONITORING POINT | ANALYTE | SAMPLE DATE | RESULTS |
|---|---|---|---|
| SWMP-15 | Selenium, Total Recoverable | 8/11/10 | <.001 mg/L |
| SWMP-15 | Silver, Total Recoverable | 8/11/10 | <.0002 mg/L |
| SWMP-15 | Zinc, Total Recoverable | 8/11/10 | .00543 mg/L |
| SWMP-04 | Aluminum, Total Recoverable | 8/16/10 | 1.1 mg/L |
| SWMP-04 | Arsenic, Total Recoverable | 8/16/10 | <.0015 mg/L |
| SWMP-04 | Cadmium, Total Recoverable | 8/16/10 | .000487 mg/L |
| SWMP-04 | Chemical Oxygen Demand | 8/16/10 | 28 mg/L |
| SWMP-04 | Copper, Total Recoverable | 8/16/10 | .0113 mg/L |
| SWMP-04 | Iron, Total Recoverable | 8/16/10 | .89 mg/L |
| SWMP-04 | Lead, Total Recoverable | 8/16/10 | .00418 mg/L |
| SWMP-04 | Magnesium, Total Recoverable | 8/16/10 | 2.32 mg/L |
| SWMP-04 | Mercury, Total Recoverable | 8/16/10 | <.000066 mg/L |
| SWMP-04 | Selenium, Total Recoverable | 8/16/10 | <.001 mg/L |
| SWMP-04 | Silver, Total Recoverable | 8/16/10 | <.0002 mg/L |
| SWMP-04 | Solids, total suspended | 8/16/10 | 28 mg/L |
| SWMP-04 | Zinc, Total Recoverable | 8/16/10 | .0419 mg/L |
| SWMP-05 | Ammonia | 8/16/10 | .686 mg/L |
| SWMP-05 | Chemical Oxygen Demand | 8/16/10 | 107 mg/L |
| SWMP-12 | Aluminum, Total Recoverable | 8/16/10 | .0309 mg/L |
| SWMP-12 | Arsenic, Total Recoverable | 8/16/10 | <.0015 mg/L |
| SWMP-12 | Cadmium, Total Recoverable | 8/16/10 | <.00011 mg/L |
| SWMP-12 | Copper, Total Recoverable | 8/16/10 | .00877 mg/L |
| SWMP-12 | Iron, Total Recoverable | 8/16/10 | .0835 mg/L |
| SWMP-12 | Lead, Total Recoverable | 8/16/10 | .0022 mg/L |
| SWMP-12 | Magnesium, Total Recoverable | 8/16/10 | .955 mg/L |
| SWMP-12 | Mercury, Total Recoverable | 8/16/10 | <.000066 mg/L |
| SWMP-12 | Selenium, Total Recoverable | 8/16/10 | <.001 mg/L |
| SWMP-12 | Silver, Total Recoverable | 8/16/10 | <.0002 mg/L |
| SWMP-12 | Zinc, Total Recoverable | 8/16/10 | .00697 mg/L |
| SWMP-13 | Aluminum, Total Recoverable | 8/16/10 | 13.1 mg/L |
| SWMP-13 | Ammonia | 8/16/10 | .117 mg/L |
| SWMP-13 | Arsenic, Total Recoverable | 8/16/10 | .00333 mg/L |
| SWMP-13 | Cadmium, Total Recoverable | 8/16/10 | .000259 mg/L |
| SWMP-13 | Chemical Oxygen Demand | 8/16/10 | 18.5 mg/L |
| SWMP-13 | Copper, Total Recoverable | 8/16/10 | .0155 mg/L |
| SWMP-13 | Cyanide, total | 8/16/10 | <.0017 mg/L |
| SWMP-13 | Iron, Total Recoverable | 8/16/10 | 8.82 mg/L |
| SWMP-13 | Lead, Total Recoverable | 8/16/10 | .062 mg/L |
| SWMP-13 | Magnesium, Total Recoverable | 8/16/10 | 3.16 mg/L |
| SWMP-13 | Mercury, Total Recoverable | 8/16/10 | <.000066 mg/L |
| SWMP-13 | Selenium, Total Recoverable | 8/16/10 | <.001 mg/L |
| SWMP-13 | Silver, Total Recoverable | 8/16/10 | <.0002 mg/L |
| SWMP-13 | Zinc, Total Recoverable | 8/16/10 | .0346 mg/L |
| SWMP-16 | Aluminum, Total Recoverable | 8/16/10 | 65.3 mg/L |
| SWMP-16 | Arsenic, Total Recoverable | 8/16/10 | .0127 mg/L |
| SWMP-16 | Cadmium, Total Recoverable | 8/16/10 | .00137 mg/L |
| SWMP-16 | Copper, Total Recoverable | 8/16/10 | .0281 mg/L |
| SWMP-16 | Iron, Total Recoverable | 8/16/10 | 42.1 mg/L |
| SWMP-16 | Lead, Total Recoverable | 8/16/10 | .0499 mg/L |
| SWMP-16 | Magnesium, Total Recoverable | 8/16/10 | 16.8 mg/L |
| SWMP-16 | Mercury, Total Recoverable | 8/16/10 | <.000066 mg/L |
| SWMP-16 | Selenium, Total Recoverable | 8/16/10 | <.001 mg/L |
| SWMP-16 | Silver, Total Recoverable | 8/16/10 | .000277 mg/L |
| SWMP-16 | Zinc, Total Recoverable | 8/16/10 | .179 mg/L |

# Storm Water Sampling Results - 2010

| MONITORING POINT | ANALYTE | SAMPLE DATE | RESULTS |
|---|---|---|---|
| SWMP-17 | Aluminum, Total Recoverable | 8/16/10 | 7.92 mg/L |
| SWMP-17 | Arsenic, Total Recoverable | 8/16/10 | <.0015 mg/L |
| SWMP-17 | Cadmium, Total Recoverable | 8/16/10 | .00025 mg/L |
| SWMP-17 | Copper, Total Recoverable | 8/16/10 | .00822 mg/L |
| SWMP-17 | Iron, Total Recoverable | 8/16/10 | 5.28 mg/L |
| SWMP-17 | Lead, Total Recoverable | 8/16/10 | .00992 mg/L |
| SWMP-17 | Magnesium, Total Recoverable | 8/16/10 | 2.39 mg/L |
| SWMP-17 | Mercury, Total Recoverable | 8/16/10 | <.000066 mg/L |
| SWMP-17 | Selenium, Total Recoverable | 8/16/10 | <.001 mg/L |
| SWMP-17 | Silver, Total Recoverable | 8/16/10 | <.0002 mg/L |
| SWMP-17 | Zinc, Total Recoverable | 8/16/10 | .0425 mg/L |
| SWMP-21 | Aluminum, Total Recoverable | 8/16/10 | .687 mg/L |
| SWMP-21 | Arsenic, Total Recoverable | 8/16/10 | .00265 mg/L |
| SWMP-21 | Cadmium, Total Recoverable | 8/16/10 | <.00011 mg/L |
| SWMP-21 | Copper, Total Recoverable | 8/16/10 | .00731 mg/L |
| SWMP-21 | Iron, Total Recoverable | 8/16/10 | .425 mg/L |
| SWMP-21 | Lead, Total Recoverable | 8/16/10 | .00408 mg/L |
| SWMP-21 | Magnesium, Total Recoverable | 8/16/10 | 1.19 mg/L |
| SWMP-21 | Mercury, Total Recoverable | 8/16/10 | <.000066 mg/L |
| SWMP-21 | Selenium, Total Recoverable | 8/16/10 | <.001 mg/L |
| SWMP-21 | Silver, Total Recoverable | 8/16/10 | <.0002 mg/L |
| SWMP-21 | Zinc, Total Recoverable | 8/16/10 | .0264 mg/L |
| SWMP-22 | Aluminum, Total Recoverable | 8/16/10 | 16.5 mg/L |
| SWMP-22 | Arsenic, Total Recoverable | 8/16/10 | .00322 mg/L |
| SWMP-22 | Cadmium, Total Recoverable | 8/16/10 | .00039 mg/L |
| SWMP-22 | Copper, Total Recoverable | 8/16/10 | .0157 mg/L |
| SWMP-22 | Iron, Total Recoverable | 8/16/10 | 11.2 mg/L |
| SWMP-22 | Lead, Total Recoverable | 8/16/10 | .0158 mg/L |
| SWMP-22 | Magnesium, Total Recoverable | 8/16/10 | 5.65 mg/L |
| SWMP-22 | Mercury, Total Recoverable | 8/16/10 | <.000066 mg/L |
| SWMP-22 | Selenium, Total Recoverable | 8/16/10 | <.001 mg/L |
| SWMP-22 | Silver, Total Recoverable | 8/16/10 | <.0002 mg/L |
| SWMP-22 | Zinc, Total Recoverable | 8/16/10 | .0742 mg/L |
| SWMP-04 | Solids, total suspended | 8/23/10 | 4.7 mg/L |
| SWMP-04 | Solids, total suspended | 8/23/10 | 5 mg/L |
| SWMP-05 | Cyanide, total | 8/23/10 | <.0017 mg/L |
| SWMP-05 | Solids, total suspended | 8/23/10 | 246 mg/L |
| SWMP-11 | Aluminum, Total Recoverable | 8/23/10 | 69.6 mg/L |
| SWMP-11 | Ammonia | 8/23/10 | 5.33 mg/L |
| SWMP-11 | Arsenic, Total Recoverable | 8/23/10 | .00273 mg/L |
| SWMP-11 | Cadmium, Total Recoverable | 8/23/10 | .0121 mg/L |
| SWMP-11 | Chemical Oxygen Demand | 8/23/10 | 114 mg/L |
| SWMP-11 | Copper, Total Recoverable | 8/23/10 | .206 mg/L |
| SWMP-11 | Cyanide, total | 8/23/10 | .0753 mg/L |
| SWMP-11 | Iron, Total Recoverable | 8/23/10 | 58 mg/L |
| SWMP-11 | Lead, Total Recoverable | 8/23/10 | .0266 mg/L |
| SWMP-11 | Magnesium, Total Recoverable | 8/23/10 | 5.3 mg/L |
| SWMP-11 | Mercury, Total Recoverable | 8/23/10 | <.000066 mg/L |
| SWMP-11 | Selenium, Total Recoverable | 8/23/10 | <.001 mg/L |
| SWMP-11 | Silver, Total Recoverable | 8/23/10 | .0575 mg/L |
| SWMP-11 | Zinc, Total Recoverable | 8/23/10 | .0931 mg/L |

# Storm Water Sampling Results - 2010

| MONITORING POINT | ANALYTE | SAMPLE DATE | RESULTS | |
|---|---|---|---|---|
| SWMP-08 | Solids, total suspended | 9/14/10 | 383 | mg/L |
| SWMP-12 | Aluminum, Total Recoverable | 9/14/10 | .153 | mg/L |
| SWMP-12 | Arsenic, Total Recoverable | 9/14/10 | <.0015 | mg/L |
| SWMP-12 | Cadmium, Total Recoverable | 9/14/10 | <.00011 | mg/L |
| SWMP-12 | Copper, Total Recoverable | 9/14/10 | .0029 | mg/L |
| SWMP-12 | Iron, Total Recoverable | 9/14/10 | .131 | mg/L |
| SWMP-12 | Lead, Total Recoverable | 9/14/10 | <.0005 | mg/L |
| SWMP-12 | Magnesium, Total Recoverable | 9/14/10 | .774 | mg/L |
| SWMP-12 | Mercury, Total Recoverable | 9/14/10 | <.000066 | mg/L |
| SWMP-12 | Selenium, Total Recoverable | 9/14/10 | <.001 | mg/L |
| SWMP-12 | Silver, Total Recoverable | 9/14/10 | <.0002 | mg/L |
| SWMP-12 | Zinc, Total Recoverable | 9/14/10 | .00514 | mg/L |
| SWMP-04 | Aluminum, Total Recoverable | 9/24/10 | .373 | mg/L |
| SWMP-04 | Arsenic, Total Recoverable | 9/24/10 | .00191 | mg/L |
| SWMP-04 | Cadmium, Total Recoverable | 9/24/10 | .000488 | mg/L |
| SWMP-04 | Chemical Oxygen Demand | 9/24/10 | 27.3 | mg/L |
| SWMP-04 | Copper, Total Recoverable | 9/24/10 | .0106 | mg/L |
| SWMP-04 | Iron, Total Recoverable | 9/24/10 | .347 | mg/L |
| SWMP-04 | Lead, Total Recoverable | 9/24/10 | .003 | mg/L |
| SWMP-04 | Magnesium, Total Recoverable | 9/24/10 | 1.84 | mg/L |
| SWMP-04 | Mercury, Total Recoverable | 9/24/10 | <.000066 | mg/L |
| SWMP-04 | Selenium, Total Recoverable | 9/24/10 | <.001 | mg/L |
| SWMP-04 | Silver, Total Recoverable | 9/24/10 | <.0002 | mg/L |
| SWMP-04 | Solids, total suspended | 9/24/10 | 8.67 | mg/L |
| SWMP-04 | Zinc, Total Recoverable | 9/24/10 | .0134 | mg/L |
| SWMP-05 | Aluminum, Total Recoverable | 9/24/10 | 3.62 | mg/L |
| SWMP-05 | Arsenic, Total Recoverable | 9/24/10 | <.0015 | mg/L |
| SWMP-05 | Cadmium, Total Recoverable | 9/24/10 | .00131 | mg/L |
| SWMP-05 | Copper, Total Recoverable | 9/24/10 | .0848 | mg/L |
| SWMP-05 | Iron, Total Recoverable | 9/24/10 | 2.5 | mg/L |
| SWMP-05 | Lead, Total Recoverable | 9/24/10 | .0644 | mg/L |
| SWMP-05 | Magnesium, Total Recoverable | 9/24/10 | 4.23 | mg/L |
| SWMP-05 | Mercury, Total Recoverable | 9/24/10 | <.000066 | mg/L |
| SWMP-05 | Selenium, Total Recoverable | 9/24/10 | <.001 | mg/L |
| SWMP-05 | Silver, Total Recoverable | 9/24/10 | <.0002 | mg/L |
| SWMP-05 | Solids, total suspended | 9/24/10 | 173 | mg/L |
| SWMP-05 | Zinc, Total Recoverable | 9/24/10 | .599 | mg/L |
| SWMP-05 | Zinc, Total Recoverable | 9/24/10 | .679 | mg/L |
| SWMP-06 | Aluminum, Total Recoverable | 9/24/10 | 7.82 | mg/L |
| SWMP-06 | Ammonia | 9/24/10 | .132 | mg/L |
| SWMP-06 | Arsenic, Total Recoverable | 9/24/10 | .00173 | mg/L |
| SWMP-06 | Cadmium, Total Recoverable | 9/24/10 | .000135 | mg/L |
| SWMP-06 | Chemical Oxygen Demand | 9/24/10 | 38.7 | mg/L |
| SWMP-06 | Copper, Total Recoverable | 9/24/10 | .00767 | mg/L |
| SWMP-06 | Iron, Total Recoverable | 9/24/10 | 5.13 | mg/L |
| SWMP-06 | Lead, Total Recoverable | 9/24/10 | .00747 | mg/L |
| SWMP-06 | Magnesium, Total Recoverable | 9/24/10 | 6.25 | mg/L |
| SWMP-06 | Mercury, Total Recoverable | 9/24/10 | <.000066 | mg/L |
| SWMP-06 | Selenium, Total Recoverable | 9/24/10 | <.001 | mg/L |
| SWMP-06 | Silver, Total Recoverable | 9/24/10 | <.0002 | mg/L |
| SWMP-06 | Zinc, Total Recoverable | 9/24/10 | .0241 | mg/L |
| SWMP-13 | Aluminum, Total Recoverable | 9/24/10 | .931 | mg/L |
| SWMP-13 | Ammonia | 9/24/10 | .023 | mg/L |
| SWMP-13 | Arsenic, Total Recoverable | 9/24/10 | <.0015 | mg/L |

Storm Water Sampling Results - 2010

| MONITORING POINT | ANALYTE | SAMPLE DATE | RESULTS |
|---|---|---|---|
| SWMP-13 | Cadmium, Total Recoverable | 9/24/10 | <.00011 mg/L |
| SWMP-13 | Chemical Oxygen Demand | 9/24/10 | 25.1 mg/L |
| SWMP-13 | Copper, Total Recoverable | 9/24/10 | .0151 mg/L |
| SWMP-13 | Iron, Total Recoverable | 9/24/10 | .616 mg/L |
| SWMP-13 | Lead, Total Recoverable | 9/24/10 | .0149 mg/L |
| SWMP-13 | Magnesium, Total Recoverable | 9/24/10 | .804 mg/L |
| SWMP-13 | Mercury, Total Recoverable | 9/24/10 | <.000066 mg/L |
| SWMP-13 | Selenium, Total Recoverable | 9/24/10 | <.001 mg/L |
| SWMP-13 | Silver, Total Recoverable | 9/24/10 | <.0002 mg/L |
| SWMP-13 | Zinc, Total Recoverable | 9/24/10 | .0429 mg/L |
| SWMP-15 | Aluminum, Total Recoverable | 9/24/10 | 3.88 mg/L |
| SWMP-15 | Ammonia | 9/24/10 | .509 mg/L |
| SWMP-15 | Arsenic, Total Recoverable | 9/24/10 | <.0015 mg/L |
| SWMP-15 | Cadmium, Total Recoverable | 9/24/10 | .000483 mg/L |
| SWMP-15 | Copper, Total Recoverable | 9/24/10 | .0163 mg/L |
| SWMP-15 | Iron, Total Recoverable | 9/24/10 | 1.42 mg/L |
| SWMP-15 | Lead, Total Recoverable | 9/24/10 | .0162 mg/L |
| SWMP-15 | Magnesium, Total Recoverable | 9/24/10 | 4.32 mg/L |
| SWMP-15 | Mercury, Total Recoverable | 9/24/10 | <.000066 mg/L |
| SWMP-15 | Selenium, Total Recoverable | 9/24/10 | <.001 mg/L |
| SWMP-15 | Silver, Total Recoverable | 9/24/10 | <.0002 mg/L |
| SWMP-15 | Zinc, Total Recoverable | 9/24/10 | .117 mg/L |
| SWMP-16 | Ammonia | 9/24/10 | .063 mg/L |
| SWMP-16 | Chemical Oxygen Demand | 9/24/10 | 13.7 mg/L |
| SWMP-16 | Cyanide, total | 9/24/10 | <.0017 mg/L |
| SWMP-17 | Aluminum, Total Recoverable | 9/24/10 | .68 mg/L |
| SWMP-17 | Ammonia | 9/24/10 | .064 mg/L |
| SWMP-17 | Arsenic, Total Recoverable | 9/24/10 | <.0015 mg/L |
| SWMP-17 | Cadmium, Total Recoverable | 9/24/10 | <.00011 mg/L |
| SWMP-17 | Chemical Oxygen Demand | 9/24/10 | 16 mg/L |
| SWMP-17 | Copper, Total Recoverable | 9/24/10 | .00218 mg/L |
| SWMP-17 | Cyanide, total | 9/24/10 | <.0017 mg/L |
| SWMP-17 | Iron, Total Recoverable | 9/24/10 | .306 mg/L |
| SWMP-17 | Lead, Total Recoverable | 9/24/10 | .00312 mg/L |
| SWMP-17 | Magnesium, Total Recoverable | 9/24/10 | .853 mg/L |
| SWMP-17 | Mercury, Total Recoverable | 9/24/10 | <.000066 mg/L |
| SWMP-17 | Selenium, Total Recoverable | 9/24/10 | <.001 mg/L |
| SWMP-17 | Silver, Total Recoverable | 9/24/10 | <.0002 mg/L |
| SWMP-17 | Zinc, Total Recoverable | 9/24/10 | .00755 mg/L |
| SWMP-19 | Aluminum, Total Recoverable | 9/24/10 | 5.62 mg/L |
| SWMP-19 | Ammonia | 9/24/10 | .037 mg/L |
| SWMP-19 | Arsenic, Total Recoverable | 9/24/10 | <.0015 mg/L |
| SWMP-19 | Cadmium, Total Recoverable | 9/24/10 | <.00011 mg/L |
| SWMP-19 | Chemical Oxygen Demand | 9/24/10 | 18.3 mg/L |
| SWMP-19 | Copper, Total Recoverable | 9/24/10 | .00555 mg/L |
| SWMP-19 | Cyanide, total | 9/24/10 | <.0017 mg/L |
| SWMP-19 | Iron, Total Recoverable | 9/24/10 | 3.5 mg/L |
| SWMP-19 | Lead, Total Recoverable | 9/24/10 | .00314 mg/L |
| SWMP-19 | Magnesium, Total Recoverable | 9/24/10 | 3.82 mg/L |
| SWMP-19 | Mercury, Total Recoverable | 9/24/10 | <.000066 mg/L |
| SWMP-19 | Selenium, Total Recoverable | 9/24/10 | <.001 mg/L |
| SWMP-19 | Silver, Total Recoverable | 9/24/10 | <.0002 mg/L |
| SWMP-19 | Zinc, Total Recoverable | 9/24/10 | .025 mg/L |
| SWMP-22 | Ammonia | 9/24/10 | .258 mg/L |

# Storm Water Sampling Results - 2010

| MONITORING POINT | ANALYTE | SAMPLE DATE | RESULTS | |
|---|---|---|---|---|
| SWMP-23 | Aluminum, Total Recoverable | 9/24/10 | 7.36 | mg/L |
| SWMP-23 | Ammonia | 9/24/10 | .208 | mg/L |
| SWMP-23 | Arsenic, Total Recoverable | 9/24/10 | .00161 | mg/L |
| SWMP-23 | Cadmium, Total Recoverable | 9/24/10 | .00015 | mg/L |
| SWMP-23 | Chemical Oxygen Demand | 9/24/10 | 100 | mg/L |
| SWMP-23 | Copper, Total Recoverable | 9/24/10 | .00819 | mg/L |
| SWMP-23 | Cyanide, total | 9/24/10 | <.0017 | mg/L |
| SWMP-23 | Iron, Total Recoverable | 9/24/10 | 4.63 | mg/L |
| SWMP-23 | Lead, Total Recoverable | 9/24/10 | .00521 | mg/L |
| SWMP-23 | Magnesium, Total Recoverable | 9/24/10 | 6.92 | mg/L |
| SWMP-23 | Mercury, Total Recoverable | 9/24/10 | <.000066 | mg/L |
| SWMP-23 | Selenium, Total Recoverable | 9/24/10 | <.001 | mg/L |
| SWMP-23 | Silver, Total Recoverable | 9/24/10 | <.0002 | mg/L |
| SWMP-23 | Zinc, Total Recoverable | 9/24/10 | .0646 | mg/L |