



**New Mexico Environment Department  
DOE Oversight Bureau**



**2007 Annual Report**  
**Environmental Oversight and Monitoring  
at Department of Energy Facilities  
in New Mexico**

**New Mexico Environment Department DOE Oversight Bureau  
Annual Report 2007**

**Cover Photograph**

First flush of stormwater flowing down Sandia Canyon, an ephemeral stream at Los Alamos National Laboratory, from a small summer thunderstorm. Water from streams like this one flows into the Rio Grande or recharges groundwater.

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**List of Abbreviations and Acronyms Used**

AIP	Agreement-In-Principle
AIRNET	Air Radioactive Particulate and Tritium Monitoring Network at LANL
AQB	Air Quality Bureau (NMED)
BMP	Best Management Practices
BSL-3	Bio-Safety Lab, Level Three
CCNS	Concerned Citizens for Nuclear Safety
CDC	Centers for Disease Control and Prevention
CEMRC	Carlsbad Environmental Monitoring and Research Center (WIPP)
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act of 1980 (also known as “Superfund”)
CH Waste	Contact Handled Waste (WIPP)
COOC	Compliance Order on Consent
CRMG	Community Radiation Monitoring Group
CWA	Clean Water Act
D & D	Decommissioning and Demolition
DARHT	Dual Access Radiographic Hydro Test Facility
DDT	DichloroDiphenylTrichloroethane
DOE	U.S. Department of Energy
DOE/NNSA	National Nuclear Security Administration of the DOE, operators of the LASO, SSO, and WSO
DOE OB	DOE Oversight Bureau (Bureau) of the NMED
DPR	Direct Penetrating Radiation
EA	Environmental Assessment
EMIG	Effluent Monitoring Improvement Group (WIPP)
EIS	Environmental Impact Statement
EES-6 Group	Earth and Environmental Sciences Division at LANL
EMSR	Environmental Monitoring, Surveillance and Remediation (Committee) (NNMCAB)
EPA	U.S. Environmental Protection Agency
EVEMG	Embudo Valley Environmental Monitoring Group
FFCA	Federal Facility Compliance Act
FFY	Federal Fiscal Year
GAP	Government Accountability Project
GIS	Geographic Information Systems
GNEP PEIS	Global Nuclear Energy Partnership Programmatic Environmental Impact Statement
GTCC LLW	Greater-Than-Class C Low-Level (Radioactive) Waste
HEPA	High Efficiency Particulate Air
HWB	Hazardous Waste Bureau (NMED)
IEER	Institute for Energy and Environmental Research
IWD	Integrated Work Document
LANL	Los Alamos National Laboratory, the physical location
LANS	LANS, LLC is the Los Alamos National Security, Limited Liability Corporation, the operators of the LANL facility

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LANSCE	Los Alamos Neutron Science Center (LANL)
LASG	Los Alamos Study Group
LASO	Los Alamos Site Office (DOE)
LA-UR	Los Alamos – Unclassified Report (LANL)
LC/MS/MS	Liquid Chromatography/Mass Spectrometry/MS (Tandem MS)
LRRI	Lovelace Respiratory Research Institute (Formerly the Inhalation Toxicology Research Institute)
LVAS	Low-Volume Air Sampling
MDA	Material Disposal Area
MW	Monitoring Well
MWL	Mixed Waste Landfill (SNL)
NAS	National Academy of Sciences
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NMDOH	New Mexico Department of Health
NMDOT	New Mexico Department of Transportation
NMED	New Mexico Environment Department
NMWQCC	New Mexico Water Quality Control Commission
NNMC	Northern New Mexico College
NPDES	National Pollutant Discharge Elimination System
NNMCAB	Northern New Mexico Citizens' Advisory Board
NNSA	National Nuclear Security Administration
NRC	Nuclear Regulatory Commission
PCB	Polychlorinated Biphenyl
PPE	Personal Protective Equipment
QAPP	Quality Assurance Project Plan
RAC	Risk Assessment Corporation
RACER	Risk Analysis Communication Evaluation Reduction
RCRA	Resource Conservation and Recovery Act
RH Waste	Remote Handled Waste (WIPP)
RSRL	Regional Statistical Reference Level
R-Well	Regional Aquifer Monitoring Well
Ri-Well	Intermediate Aquifer Monitoring Well
SAP	Sampling Analysis Plan
SEIS	Site Environmental Impact Statement
Sandia	Sandia Corporation, the operators of the SNL/NM facility
SNL	Sandia National Laboratories/New Mexico, the physical location of the facility in Albuquerque
SSO	Sandia Site Office (DOE)
SWMU	Solid Waste Management Unit
SWQB	Surface Water Quality Bureau (NMED)
TA	Technical Area
TLD	Thermoluminescent Dosimeter
TMDL	Total Maximum Daily Load
UNM	University of New Mexico
USGS	U.S. Geological Survey

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VOC	Volatile Organic Compound
WIPP	Waste Isolation Pilot Plant, the physical location southeast of Carlsbad
WQH	Water Quality and Hydrology (LANL)
WSO	WIPP Site Office (DOE)
WTS	Washington Tru Solutions (WIPP), operators of the WIPP facility



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## **EXECUTIVE SUMMARY**

The mission of the New Mexico Environment Department DOE Oversight Bureau is to assure that activities at DOE facilities in New Mexico are managed and controlled in a manner that is protective of public health and safety, and the environment. The mission is achieved through four primary objectives: (1) Assessing DOE management of its New Mexico facilities to assure attainment of public health and environmental standards; (2) Providing inputs to DOE for prioritization of its cleanup and compliance activities; (3) Developing and implementing an independent monitoring and oversight program; and (4) Increasing public knowledge and awareness of environmental matters at DOE facilities in New Mexico.

In order to meet these objectives, the New Mexico Environment Department DOE Oversight Bureau (Bureau) continues to develop and implement vigorous monitoring and assessment programs at Los Alamos National Laboratory (LANL), Sandia National Laboratories (SNL), the Waste Isolation Pilot Plant (WIPP), and areas surrounding these facilities. These programs include both joint and independent evaluations for environmental and public health protection of all media, including air, soils and sediments, groundwater, and surface water. The focus of these evaluations is on the potential contaminant levels of heavy metals, organic and inorganic compounds, and radionuclides.

The Bureau conducts radioactive particulate and tritium monitoring of the air at WIPP, SNL and LANL. Results have correlated well with facility-generated particulate and tritium data, as applicable. The Bureau conducts penetrating radiation monitoring using Electret devices at all three facilities and results correlate well with facility-generated data from Thermoluminescent Dosimeters (TLDs) and fall within expected background ranges. The WIPP Oversight Section has added monitoring locations along the WIPP route, and it continues to collect samples from the exhaust shaft at WIPP. The SNL Oversight Section has Electret monitoring stations as far away from KAFB as Placitas and Los Lunas. All LANL Oversight Section air monitoring stations are currently co-located with facility units. However, consideration is being given to independent monitoring in the LANL region by the Bureau.

The Bureau assesses the potential impacts of past and present activities at LANL by monitoring groundwater conditions of municipal supply wells, the regional aquifer, surface water and ephemeral streams conditions, stormwater events, and springs. As part of the groundwater monitoring, the Bureau is providing stable isotope, tritium/helium, radiocarbon and noble gas data to support the determination of contaminant-mixing fractions, diffusion-dispersion gradients, contaminant travel times, spatial variations in recharge and variability in recharge rates. Stormwater monitoring at LANL focuses primarily on characterizing and quantifying offsite contaminant transport in the Los Alamos Canyon watershed. The Bureau provides

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estimates of the inventory of plutonium transported and compares total PCB and dioxin levels to State water quality criteria.

The Bureau assesses the potential impacts at SNL by splitting samples from groundwater and soil collections and by independent sampling after stormwater events. Stormwater monitoring at SNL focuses on documenting water quality below solid waste management units (SWMUs) and the burn site.

The Bureau has conducted biota monitoring at LANL and SNL, and it is developing Quality Assurance Project Plans (QAPPs) to initiate soil, sediment and biota monitoring at WIPP. The Bureau collaborated with the Embudo Valley Environmental Monitoring Group to collect additional environmental samples to determine the source of the anomalous uranium measurements found in the lettuce in 2006. Eight acequia water samples and nine soil samples were collected in the Embudo Watershed to broaden baseline data and evaluate the possible sources of uranium. Results for metals, low-level isotopic plutonium, isotopic uranium, americium, and strontium have been compared to the LANL regional statistical reference levels (RSRL). The Bureau collected fish tissue samples from fish caught at Cochiti and Abiquiu reservoirs and had the samples analyzed for polychlorinated biphenyls, organochlorinated pesticides, polybrominated diphenyl ethers (flame retardants), dioxin/furans, arsenic and methyl mercury. Data from these samples will be used to re-evaluate consumption advisories to the public on the Rio Grande for PCBs and mercury. The Bureau sampled the benthic macroinvertebrate (aquatic insect) communities in the watersheds flowing from LANL into Pajarito, Sandia and Los Alamos canyons to evaluate post-Cerro Grande fire watershed recovery.

The Bureau monitors wastewater discharges at both LANL and SNL. The Bureau monitored effluent from four NPDES outfalls at LANL and at the wastewater outfall at SNL. The Bureau evaluates legacy waste at decommissioning and demolition sites as well as construction sites at LANL and SNL, and advises facility staff on erosion control using best management practices.

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**DOE OVERSIGHT BUREAU**

## **Background**

On June 27, 1989, the Secretary of Energy announced a 10-point initiative that addressed the need for the Department of Energy (DOE) to improve its accountability in the areas of public health, safety, and environmental protection. The initiative allowed states with DOE facilities direct access to those facilities and provided funding to underwrite the costs of state oversight of DOE environmental monitoring programs. To implement this program, the DOE entered agreements, collectively known as the Agreements-in-Principle, with various states. In October 1990, New Mexico Governor Garrey Carruthers signed the first Agreement-In-Principle, known then as the Environmental Oversight and Monitoring Agreement between the United States Department of Energy and the State of New Mexico. In November 2000, Governor Gary Johnson signed the third, and most recent, five-year Agreement-In-Principle, which has subsequently been extended through September 2008.

In 2004, DOE and the State of New Mexico joined in discussions to establish a DOE Oversight Bureau office in Carlsbad, NM for the oversight of activities at the Waste Isolation Pilot Plant (WIPP). These discussions were the result of the loss of the Environmental Evaluation Group (EEG) which was established by federal law for the independent oversight of the design and disposal phases of the WIPP project. In 2004, DOE and NMED established a separate basic Agreement-In-Principle for WIPP. In late 2005, a revised and comprehensive AIP was developed between the State of New Mexico and the DOE along with a separate Scope of Work and Statement of Joint Objectives to further specify the roles of NMED oversight for WIPP operations. The agreement between the NMED and the DOE provides for three years of funding at \$600,000 per year, payable in equal quarterly installments. The agreement is set to expire on June 30, 2008 after which the Bureau will apply to DOE for continued financial assistance for oversight operations.

## **Financial**

The responsibilities of the Bureau are outlined in the *Agreement-in-Principle (AIP) between the State of New Mexico and the U.S. Department of Energy for Environmental Oversight and Monitoring*. The Bureau receives 100% of its funding from the federal government in the form of a financial assistance award (grant). As part of the federal grant process, the Bureau prepares and submits a workplan in support of the AIP objectives, and the Bureau outlines the specific projects needed to be funded for each site (LANL, SNL, LLRI, and WIPP).

The AIP funding for FFY07 began with receipt of \$144,000 on 11/08/06 for work under the continuing resolution for the first 45 days of the new federal fiscal year. A second distribution of

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\$500,000 was received on January 11, 2007 and a third distribution of \$1,378,433 was received on April 25 bringing total revenue for FFY 2007 to \$2,022,433 from the period beginning October 1, 2006. The workplan projects for WIPP were funded separately. For calendar year 2007 they were fully funded at \$0.6M.

The Congressional Budget Request (February 2007) from the US DOE for the Federal Fiscal Year (FFY) 2008 included \$1.511 million dollars for both the New Mexico and Texas AIPs (Agreements-In-Principle) [page 439, DOE/CF-018 Volume 5]. Texas was anticipated to receive \$311,000 of that amount leaving \$1.2 million available for the New Mexico AIP. This amount was insufficient to meet the needs of the Oversight Bureau and the public interest. The DOE budget request did not contain sufficient detail to determine if Long Term Environmental Stewardship (LTES) funding would be available to offset the zero budget requested for Sandia National Laboratories for Environmental Management in 2008 [page 26, U.S. DOE FY2007 Operating Plan by Appropriation, March 16, 2007]. An appropriate funding level for a robust DOE Oversight Program over DOE laboratory operations in New Mexico for fiscal year 2008 would require approximately \$2.1 million. In addition, funding of the Oversight Bureau WIPP operation will end with the final payment under the WIPP settlement agreement on June 30, 2008.

Prior-year funding shortfalls by DOE placed significant constraints on the ability of the Bureau to conduct environmental monitoring at both laboratories. However, EPA Region VI provided analytical funding to support the environmental monitoring program during FFY06/07. The EPA provided \$38,761 (\$33,562 – LANL, \$5,199 – SNL) for first quarter FFY07 Bureau groundwater, stormwater, and air quality monitoring. The EPA Region VI RCRA program provided \$62,298 in analytical funds (\$52,904 – LANL, \$9,394.43 – SNL) for second quarter FFY07 Oversight Bureau groundwater, stormwater, and air monitoring at LANL and SNL.

### **Administrative**

New security/access badges have been issued to all Q-cleared staff. The new badges are valid for 1-year ending on 9-30-08.

The LANL Oversight Section submitted a revised SHASP (Site Health and Safety Plan) to cover NMED environmental work at LANL and vicinity for FFY08 (10/1/07 thru 9/30/08). The SHASP contains an overview of definitions and Health and Safety guidance (e.g., training on PPE) useful for developing IWDs to perform environmental work at LANL. The NMED IWDs are currently being revised for in-progress and FFY08 activities at LANL.

Kim Granzow of the LANL Oversight Office was chosen as the Environment Department Employee of the Quarter for her assistance to the Groundwater Quality Bureau in developing GIS-generated maps for the Superfund Section.

All LANL Oversight Office and Santa Fe Technical Support Office staff members who may have reason to enter the high explosives (HE) corridor for Bureau activities completed an annual refresher training “TA-16 Site Specific Training for the High Explosives Area.” The training

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outlines the requirements to access the High Explosives Area of TA-16 Engineering Facility Operations Division.

All LANL Oversight Office and Santa Fe Technical Support Office staff members have completed the CPR refresher required by the LANL Sections Health and Safety Plan.

The LANL Oversight Office and Santa Fe Technical Support Office staff members completed the Fire Extinguisher Training: Designated Worker and Fire Watch Self-Study and Hands-On training, Radworker II, Traffic Safety and Special Materials Convoys, Excavation/Soil Disturbance as part of the required training matrix under the LANL Oversight Office Health and Safety Plan.

Erik Galloway of the Santa Fe Technical Support Office completed the Certified Inspector of Sediment and Erosion Control (CISEC) course at LANL. The program is geared to certify and to recognize inspectors who work with and understand the EPA 2003 Construction General Permit (CGP) requirement, and to train those not yet certified or who want to become certified inspectors. He also completed the certification exam and is now a Certified Inspector of Sediment and Erosion Control. He also attended the annual StormCon conference and received advance erosion control training in stormwater compliance, stormwater pollution prevention plan preparation and conducting construction-site inspections.

The Bureau welcomed two Technical Interns at the LANL and SNL sites who were employed to perform technical/data support and field activities throughout the summer. The interns completed all required general employee training and CYBER Security training

Ralph Ford-Schmid has been the Acting Staff Manager in for the Sandia Oversight Section for most of the year. The position was advertised and Barry Birch was selected. He started in November.

Tacy Van Cleave resigned her position as a Hydro-geologist – O at the SNL Oversight Office. All paperwork to advertise the vacancy was submitted and the position was advertised beginning the first week in July. Chris Armijo, who had earlier been an intern at the SNL Oversight Office, was selected in October to fill the position.

The WIPP Oversight Office staff manager Tom Klein resigned and Environmental Scientist Dean Foster began to serve as acting staff manager. He also left the Department, and Tom Kesterson has been the acting Staff Manager for the remainder of the year. The office has been understaffed throughout the year. The Staff Engineer position was advertised, but the selected candidate declined the offer. Positions will be advertised during 2008.

The WIPP Oversight Office staff scientists attended safety and orientation training prior to filter collection activities as required by DOE.

### **Legal/Legislative**

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The WIPP AIP is set to expire on June 30, 2008, and it may be extended by mutual agreement of the signatories. The Department will enter negotiation with DOE for the extension of the AIP and the WIPP AIP.

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## **LOS ALAMOS NATIONAL LABORATORY**

### **Public Outreach at LANL**

#### *Environment Day at the 2007 Legislature*

Albuquerque, Santa Fe and White Rock Office staffs attended the “Environment Day” at the State Capitol in Santa Fe. The Bureau provided informational flyers, LANL maps that illustrated certain environmental impacts, and staff business cards. The event was intended to give exposure of current environmental issues to New Mexico lawmakers and their staffs. The NMED, other State Departments and Tribal Governments all participated.

#### *DOE and LANS Public Meeting on Greater-Than-Class-C Low-Level Waste EIS*

Staff attended a public meeting in Los Alamos hosted by DOE to discuss “Public Scoping for the Greater-Than-Class C Low-Level Radioactive Waste (GTCC LLW) Environmental Impact Statement (EIS).” The total volume of the DOE GTCC LLW is approximately 3,000 cubic meters. The DOE proposes to select one or more locations for developing disposal capability for GTCC LLW using one or more disposal methods:

- Disposal of radioactive waste in a geologic repository (WIPP, Yucca Mountain, other)
- Use of an enhanced near-surface disposal facility
- Disposal in an intermediate depth borehole facility.

#### *DOE and LANS Public Meeting on MDA B Remediation*

Staff attended a public meeting in Los Alamos hosted by DOE to brief the public on the current schedule for remediation of Material Disposal Area B (MDA B) in accordance with the Compliance Order of Consent between NMED and the DOE/LANL. Initial activities began in 2006 and will extend into 2009. The MDA B is located on DP Road in Los Alamos and was the first disposal area for nuclear weapons waste generated at LANL, and it was used only from 1944 through 1948.

#### *DOE and LANS Public Meeting on the Global Nuclear Energy Partnership Programmatic Environmental Impact Statement (GNEP PEIS).*

Staff attended a public scoping meeting in Los Alamos hosted by DOE to discuss the Global Nuclear Energy Partnership Programmatic Environmental Impact Statement (GNEP PEIS). Under the programmatic proposal, LANL would recycle spent fuel and destroy its long-lived radioactive components. The GNEP will accomplish this by designing, building and operating 3 facilities:

- A nuclear fuel recycling center that would separate spent fuel into reusable and waste components and then manufacture new nuclear fuel using the reusable component;

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- An advanced recycling center that would destroy long-lived radioactive elements in the new fuel while generating electricity;
- An advanced fuel cycle research facility that would perform research into spent fuel recycling processes and other advanced nuclear fuel cycles.

The DOE is recommending that the GNEP PEIS consider 13 sites, both DOE and non-DOE locations (ANL, Hanford, INL, LANL, ORR, Paducah, Portsmouth, SRS, Atomic City, ID, Barnwell SC, Hobbs NM, Morris IL, Roswell NM) as possible locations for one or more of these facilities. Internationally, GNEP involves two programmatic initiatives: reliable fuel services, and promotion of proliferation-resistant nuclear power reactors suitable for use in developing economies.

*Nuclear Watch Informational Exchange*

Staffs from the White Rock and Santa Fe offices participated in a meeting to exchange information with members of the activist group “Nuclear Watch” who in turn were accompanied by some members of other activist groups out of Washington State, Boston, Mass and Chelyabinsk, Russia. The visitors were interested in what environmental functions the Bureau performs at LANL.

*Annual Fall UNM Water Forum*

Staff participated in the “Annual Fall UNM Water Forum” in Albuquerque. This year’s forum topics included: “Rio Grande Seminar Series,” “The 2006 Monsoon,” “Hydraulic Landscapes of Community Acequias: A Public Welfare Perspective” and “Urban Flood Demonstration Program in the Middle Rio Grande,” which were of particular interest to participants.

*Embudo Valley Environmental Monitoring Group (EVEMG)*

Staff created a version of the direct penetrating radiation database for use by the EVEMG, entered existing data, and wrote documentation of the database for public use.

Staff responded to a request from Sheri Kotowski (EVEMG) and provided a Bureau map of the extent Cerro Grande fire, detailing the May 10, 2000 fire plume covering Embudo, and Dixon.

*NNSA Public Scoping Meeting at Los Alamos for the “Complex 2030” Supplemental Programmatic Environmental Impact Statement*

Staff attended the NNSA Public Scoping Meeting for the “Complex 2030” Supplemental Programmatic Environmental Impact Statement in Albuquerque and Los Alamos as well as the Internal (DOE badge holder only) meeting held in Los Alamos.

During a recess, staff, along with Ms. Alice Williams of DOE, met with J.D. Campbell (Chairman of NNM CAB) to discuss Bureau functions, accomplishments (including working with the 4-Accord Pueblos), and funding status at LANL and other New Mexico DOE facilities. Mr. Campbell spoke very highly of the Oversight Bureau and its interactions with the Northern New Mexico Citizens’ Advisory Board (NNMCAB) over the past five years.

*The NNM CAB Environmental Monitoring and Surveillance Committee*



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Staff attended the January 2007 Environmental Monitoring, Surveillance and Remediation (EMSR) Committee Meeting of the NNM CAB. Key agenda highlights were:

- Update on chromium and neptunium contamination at LANL with an update from the LANS chromium project and monitoring results of radionuclide detections in the drinking water.
- The LANS timeline presentation, including:
  - a. The LANS submittal of an Interim Measures Investigation Report (IMIR) to NMED Hazardous Waste Bureau (HWB) for chromium contamination in groundwater on 11/30/06;
  - b. The Interim Measures Summary specifying that the Cr source consisted of 58,000 – 230,000 lbs of Cr (VI) released between 1956 – 1972 from the power plant cooling towers at the head of Sandia Canyon;
  - c. The validation of the current LANS conceptual model of the pathway and Cr (VI) distribution;
  - d. The NMED/HWB approval of the IMIR on 12/27/2006;
  - e. The proposal to incorporate Cr work into the next phase of the Sandia Canyon work plan; and
  - f. An update to the Sandia Canyon workplan that would be due to NMED/HWB on 2/2/07.

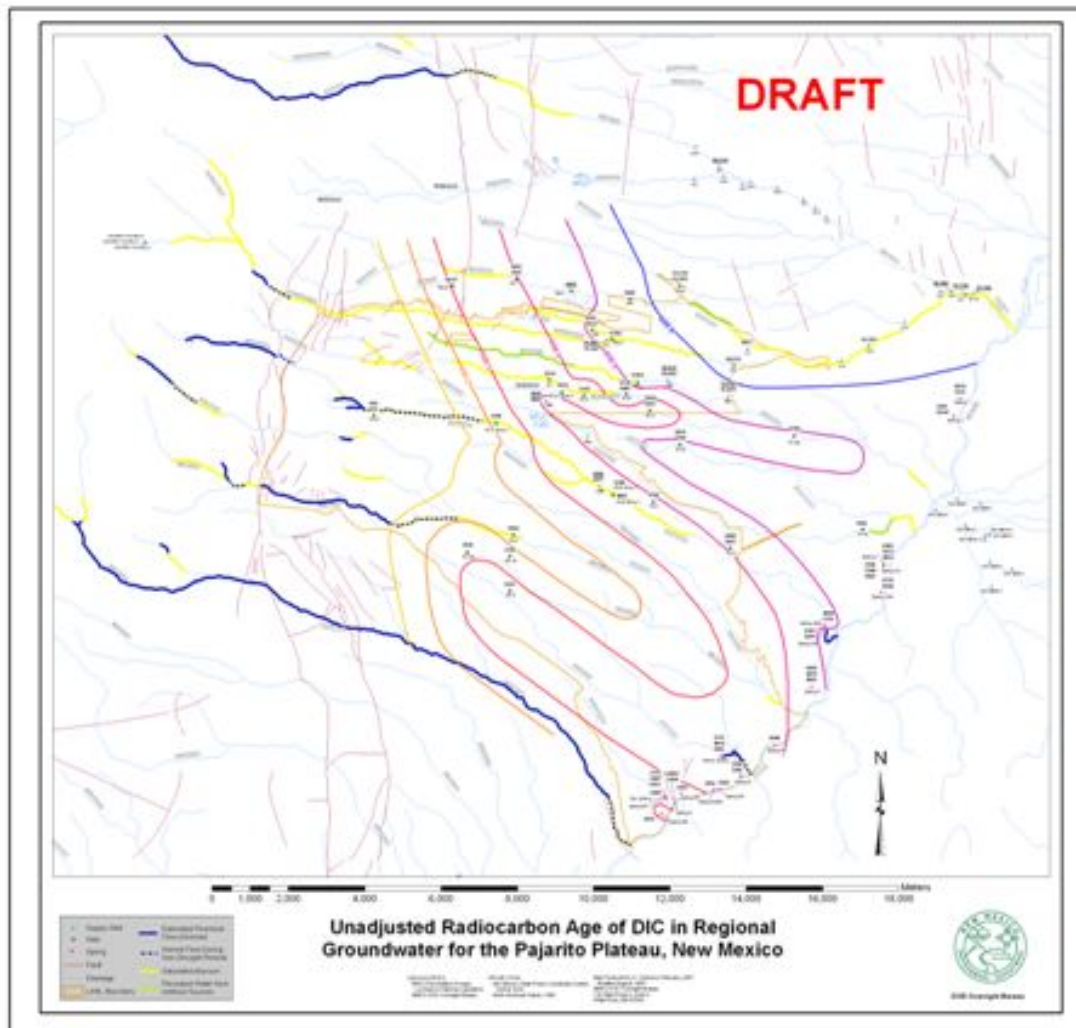
It was apparent to NNM CAB participants that the effluent containing the Cr (VI) had completely infiltrated through the subsurface to deeper aquifer horizons within 5000 meters from the power plant source. Additionally, LANS showed recent Mo (molybdenum) study results (Mo has similar pathway characteristics as Cr) that apparently provide valid interpretation information that the majority of the historical Cr (VI) has already passed through the vadose zone and must now be in deeper water-bearing zones or aquifers (most likely, the regional aquifer).

Staff attended the NNM CAB Combined Committee Meeting, including the Waste Management and the Environmental Monitoring, Surveillance and Remediation committees. The LANS presented highlights from the report, “Overview of Mortandad Canyon Investigation and Implications on Groundwater Monitoring.” This project was keyed to the characterization and remediation of radionuclides in Mortandad Canyon, which have been deposited by LANL operations from 1963. The report summary listed investigations for sediment, surface water and baseflow; alluvial, intermediate, and regional groundwater; and vadose zone. The objectives were to define the nature and extent of contamination, human-health and ecological risk assessments, and a conceptual model for fate and transport. In a special session the committee representatives discussed a groundwater model being built by LANS. The CAB members and other interested parties were requested to provide inputs.

### *USGS and LANL-Hosted Unsaturated Zone Interest Group Meeting at Los Alamos*

Staff presented a brief discussion (complete with posters and maps) for the USGS and LANL-hosted Unsaturated Zone Interest Group meeting at Los Alamos. Staff discussed the Bureau radio-carbon age-dating findings using a 3X3 ft age-isopleth contour map using all of the Bureau regional aquifer age data, as shown below.

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*American Geophysical Union (Professional Society)*

Monty Vesselinov of LANS presented a Bureau abstract to the American Geophysical Union in San Francisco, CA when staff was unable to attend and make the presentation. The abstract summarized the NMED and LANL current perchlorate investigations titled: “Trace Perchlorate in Background Ground Water and Local Precipitation, Northern Rio Grande Basin, New Mexico.”

*Technical Review*

Staff continued to provide technical recommendations to DOE and the HWB associated with the LANL Well Screen Analysis and Well Rehabilitation Projects. The LANS is currently

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developing a revised Pilot Project Report that will identify its strategy for regional well rehabilitation and/or abandonment.

Staff reviewed the LANL revised Background Groundwater Report. The Bureau submitted comments and recommendations to both DOE and HWB. The report is required by the NMED Compliance Order On Consent (COOC) and compiles, evaluates and provides chemical and radionuclide background concentration values for different occurrences of groundwater (i.e., perched, intermediate and regional) on the Pajarito Plateau and in the vicinity of LANL.

Bureau staff assisted and observed the LANS and HWB staffs sampling of Regional Well R-23i, an intermediate depth well in Pajarito Canyon located southeast of MDA G (Low-Level Radioactive waste and interim retrievable TRU-Waste storage area). Water analyses included tritium, VOCs and carbon-14 (for age-dating purposes).

The Bureau continues to contribute technical recommendations to both DOE and HWB staffs associated with drafting the LANL Well Background Report and Well Rehab Projects. At issue during two meetings was analytical information describing two regional wells. Both wells had been sampled in 2006, but the analytical results had not been reported to staffs of either the Oversight Bureau or HWB. Both wells contained high explosives concentrations below MCLs, and one of the wells had been included in the inventory of the background report. The HWB staff considered the regional well containing low levels of high explosives to be inappropriate for inclusion as a background reference. As a result, LANS withdrew the well from the draft background report, corrected the background results, and resubmitted the document for final review.

Staff completed Geographical Information System (GIS) work for the CERCLA Section of the Groundwater Quality Bureau. The project involved identifying and plotting residential wells near the Homestake Uranium Mill Superfund Site near Grants in which a specified contaminant concentration (10 analytes are considered) exceeded one or more of the following ground water standards: Federal Maximum Contaminant Level (primary or secondary), New Mexico Water Quality Control Commission, or site/aquifer-specific. Staff provided eight different aquifer GIS coverage's (maps).

Staff reviewed the draft report "Citizen Environmental Monitoring, Los Alamos, New Mexico Region" and provided a short email reply to its chief author Tom Carpenter of the Government Accountability Project. The report describes radioactivity results from predominantly dust media collected from Los Alamos and White Rock residences, the Bureau office in White Rock and sediments from the Los Alamos area. The report highlighted dust results from a Los Alamos residence and from the Bureau office bathroom vent duct because they were elevated among the set of some 80 samples (roughly 3+ times higher for total counts in nR/g, alpha and beta activity). Overall, the data from this draft report indicate higher values in Los Alamos and White Rock, but those results also show considerably more variation than at the other regional locations. The report lacks a sufficient number of samples in the database and lacks consistency with accepted protocols to draw meaningful conclusions. However, the report brings up a possible concern because the Bureau does not currently monitor dust for radionuclides as part of its oversight activities at LANL.

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Staff participated in several phone conferences with LANS and HWB concerning the status and future use of regional well R-35. It has developed an unexpected accumulation of clay (bentonite) sediment in the lowest screened interval, which may preclude its use for monitoring the chromium contamination in the vicinity below Sandia Canyon.

Staff provided recommendations to the HWB concerning the placement of five new regional aquifer-monitoring wells at MDA H, L, and G. The NMED well recommendations matched a printout for a 95% confidence level of a model LANL had run to theoretically select the best locations based on current geo-hydrological parameters.

Staff accompanied LANS personnel during a 4-day period to help collect soil-gas samples. Staff also provided GPS support to correct coordinates and produce a map.

### *Interactions with Local Citizen Activist Groups*

#### **CMRR Excavation Assessment**

Staff met with CCNS Director Joni Arends and Bob Gilkeson (CCNS Technical Support) to discuss the sampling strategy for the CMRR excavation area. The agreed-to path forward was to design a field assessment tool to measure VOCs during low-pressure barometric conditions in (an) ambient location(s) and in bedrock fractures within the excavation site's northeast wall using a hand-held PID. The northeast wall cracks are significant to measure because of their proximity (less than ½ mile) to MDA C where a subsurface solvent plume is present. All assessment results will be made available to DOE, HWB and CCNS for their input to any follow-up activities.

#### **Embudo Valley**

Staff provided a presentation regarding the findings of the Embudo Valley Produce study to the Embudo Valley Watershed Group at Picuris Pueblo Headquarters. The audience received the presentation well, and asked many questions, particularly regarding watershed impacts. In support of concerns by the local residents, staff intends to expand the study to include an alpine-level investigation of potential contaminants and their origins.

Staff also gave a presentation regarding the findings of the Embudo Valley Produce study to National Center for Frontier Communities headed by Carol Miller.

### *The LANL Risk Analysis, Communication, Evaluation, and Reduction (RACER) Project*

Staff, along with representatives from the Hazardous Waste Bureau, attended the Risk Analysis, Communication, Evaluation, and Reduction (RACER) Project presentation in Santa Fe, which was hosted by John Till, President of Risk Assessment Corporation (RAC), the software development contractor. Mr. Till reported that the RACER Project would be funded thru FFY08. The RAC is working on a Risk Analysis Tool, and it has developed a new Data Analysis Tool, which it plans to have available on the web in July 2008. Staff is working to make data transfer to the database possible. Staff will collaborate with LANL to make sure that analytes, methods, and other data fields are in a uniform format.

### *Interactions with local Pueblos*

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Bureau staff presented stormwater, groundwater, and spring water quality data collected on Pueblo properties to San Ildefonso Pueblo and discussed surface water quality issues in lower Los Alamos Canyon. Arrangements were made for continued collaborative monitoring of a variety of media on Pueblo lands.

Bureau staff teamed with Picuris Pueblo members to sample soil, produce, and irrigation water at gardens located in the Pueblo.

Bureau staff accompanied representatives of Santa Clara Pueblo on a tour of their lands along the Rio Grande to determine appropriate sampling locations and analytical suites to evaluate Pueblo uses of sediments and clays.

### *Pajarito Plateau Watershed Partnership*

Bureau staff participated in pre-construction meetings to discuss stormwater controls for the County of Los Alamos Diamond Drive Construction Project Phase 1. The Pajarito Plateau Watershed Partnership is a regionally based group of citizens, professionals, and government officials who meet monthly to address issues affecting watersheds on the eastern flank of the Jemez Mountains in northern New Mexico, including LANL.

### *Espanola Basin Technical Advisory Group*

Bureau staff participated in the 6<sup>th</sup> Annual Espanola Basin Workshop “Geology and Hydrology of the Espanola Basin” held at Santa Fe Community College.

### *Community Radiation Monitoring Group (CRMG)*

Bureau staff hosted multiple meetings of the CRMG. Highlights are as follows:

- The Bureau presentation of FFY06, fourth quarter and FFY07, first quarter air monitoring summaries;
- Current CRMG Issues and Concerns regarding Pueblo de San Ildefonso, Other Pueblos, Embudo Valley Environmental Monitoring Group (EVEMG) and LANS;
- The CCNS concerns regarding the closure by LANS staff a few years ago of AIRNET stations 77, 78 and 79 that previously operated at an old firing site in the vicinity of the DAHRT. The Bureau is aware of these concerns and is working with all CRMG members to identify monitoring gaps in facility perimeter stations;
- The Bureau presentation of recent monitoring at the Airport Ash Pile cleanup activities that also identified inadequate notification procedures between the agencies;
- The scope of air-monitoring by the Bureau staff at the MDA-B cleanup project on DP Road;
- The projected budget for the Bureau and the effects that an anticipated reduction in DOE funding would have on its air monitoring programs;
- Issues and concerns with the New Mexico North Central Regional Exercise Process Seminar and the role the Bureau may play in the Area 3 Regional Exercise;
- The application by LANS staff for an air permit to operate three diesel-powered generators at TA-33;
- Unplanned tritium releases known to have occurred at the LANL TA-54 Facility during the May-June 2006 timeframe;

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- Status of the current NESHAP Audit at LANL presented by representatives from LANS;
- The Bureau summary of recent development of solar-powered AIRNET stations;
- The sampling schedule for the Bureau of the CMRR excavation at TA-55.
- The draft SAP for analyzing dust and other such particulates for radionuclides was discussed. The joint study (DOE Oversight Bureau and LANS) was initiated due to concern following the publication of the Government Accountability Project (GAP) report in July, which highlighted measurements of alpha and beta activity in household dust samples.

### *National Academy of Science Groundwater Program Assessment at LANL*

Bureau staff members attended a meeting hosted by the National Academy of Sciences (NAS) for a briefing on their report: “*Plans and Practices for Groundwater Protection at the Los Alamos National Laboratory.*” The Finding and Recommendations were:

- Sources and Source Controls - NAS recommended that LANL complete the characterization of major disposal sites and their inventories.
- Contaminant Pathways and the Interim Monitoring Plan - NAS recommended that LANS demonstrate better use of its current understanding of contaminant transport pathways in the design of its groundwater monitoring program. Also, LANS should add a site-wide perspective to its future groundwater monitoring plans.
- Monitoring and Data Quality - NAS recommended that LANS ensure that measurements of contaminants at concentrations that are at or near background levels or near analytical detection limits (i.e., Method Detection Limits and Practical Quantitation Levels) are performed and reported in ways that are scientifically and statistically sound. Also, LANS should plan and carry out geochemical research on the interactive behavior of contaminants, materials introduced in drilling and well completion, and the geologic media.

### *Emergency Exercise Plan*

Bureau staff participated in the NM North Central Regional Three-Year Exercise Plan Seminar hosted at the Cities of Gold in Pojoaque Pueblo. One object of the seminar was to translate and integrate Federal, State and regional strategic goals into objectives for the 3-year exercise plan. The seminar format consisted of 10 Workgroups that were facilitated by a member of the government and/or public. The NMED staff participated in the Community Concerns/Media and Los Alamos County Workgroups. An exercise was designed and developed that would evaluate the operational capabilities of north central New Mexico emergency management systems. The exercise will consist of coordinating an area response to an emergency scenario. During the mock-incident, a large explosive is accidentally detonated at MDA-B (TA-21). Contractors are killed and injured, and the explosion releases radionuclides to the atmosphere from known sources at MDA-B. The role of the Bureau in this exercise is to perform as a liaison to DOE, NMED, local and distant communities and tribes within a 50-mile radius of LANL. The chief function of the Bureau during an emergency event at LANL is to monitor the environment outside the perimeter of “immediate human danger” established by LANS and State emergency response officials. Thus through a collaborative effort of the Oversight Bureau, LANS, other NMED Bureaus and distant communities; air monitors would be strategically located, set up and operated throughout the duration of an emergency event. When air monitoring data reports are

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received, the team will model the pathway, exposure and risk from contaminants, and forward the information to the emergency command center officials as well as the affected public.

### *Technical Reports*

Bureau scientific staff members from the White Rock and Santa Fe Offices published the following technical reports during 2007:

*“Distribution of Radionuclides in Northern Rio Grande Fluvial Deposits near Los Alamos National Laboratory, New Mexico.”* Bureau staff published this report along with Richard Mayer of the Environmental Protection Agency Region VI. The report evaluates overbank sediment results from along the Rio Grande collected over six-years (1998 – 2004) by Bureau scientists. NMED concurrently issued a press release which stated: “The New Mexico Environment Department released a report today that identifies and measures radiological contamination from past operations at Los Alamos National Laboratory in sediment along the Rio Grande. The levels of radiological contaminants pose no immediate health risk. However, NMED Secretary Ron Curry and NMED scientists urge LANS to do more to stop radionuclides from continuing to wash down the river. NMED and the city of Santa Fe have been working collaboratively with LANS to determine appropriate mitigation and other measures to assure safety of downstream water supplies. If implemented appropriately, those measures should assure the safety of Santa Fe’s water supply.” The complete report is available at [http://www.nmenv.state.nm.us/doe\\_oversight/pubs.htm](http://www.nmenv.state.nm.us/doe_oversight/pubs.htm)

*“Radiogenic and Stable Isotope and Hydrogeochemical Investigation of Groundwater, Pajarito Plateau and Surrounding Areas, New Mexico.”* Bureau scientific staff members from the LANL Oversight Office were supporting authors for the LANS technical report submitted to DOE in July 2007. The entire report is available in full text on the World Wide Web at [www.osti.gov/servlets/purl/912635-83Fnm9/](http://www.osti.gov/servlets/purl/912635-83Fnm9/). It has been included in the Department of Energy's Information Bridge, which offers online public access to the vast DOE collection of R&D reports.

*“Erosion Control Tubes: Special Considerations.”* Bureau scientific staff in the Santa Fe Office published an article in "Land and Water Magazine," the primary trade magazine for Erosion and Sediment Control. The article focused on potential problems with the use of Erosion Control Tubes as a best management practice at hazardous waste and radioactive waste sites.

Bureau staff provided four mini-papers at the New Mexico Geological Society (NMGS) 2007 Fall Field Conference at Los Alamos that focused on the Geology of the Jemez Region. These papers were published in the road-log section of the Guide Book. Staff also presented an overview of the radiological regional background soil study at the Los Alamos Airport Incinerator Site. In the conference guidebook, Bureau scientific staff in the Santa Fe Office provided a report entitled, “Post Cerro Grande Fire Storm Water Transport of <sup>239/240</sup>Pu in Suspended Sediments from Pueblo Canyon, Los Alamos County, New Mexico.” The paper provides quantitative estimates of the amount of <sup>239/240</sup>Pu transported offsite from Pueblo Canyon from 2000 to 2006 due to heavy flooding and destabilized stream banks after the Cerro Grande Fire.

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*“Trace Perchlorate in Ground Water, Northern Rio Grande Basin, New Mexico.”* The LANL Oversight office staff submitted a paper that discusses results from 153 groundwater and 13 precipitation samples for perchlorate ( $\text{ClO}_4^-$ ). Data from perched groundwater within the Sierra de Los Valles and the mountain front area near the Pajarito fault zone, perched lenses of saturation at intermediate depths beneath canyon-bottom alluvial aquifers, and the regional drinking-water aquifer were evaluated above background for  $\text{ClO}_4^-$ .

*“New Mexico Environment Department Radionuclide Background Study in Northern New Mexico Soils.”* Bureau scientific staff in the Santa Fe Office submitted this paper to describe the levels of radionuclides in soils of northern New Mexico, as determined by Bureau staff.

*“An Update on Water Resources from Springs in the Los Alamos Area, New Mexico.”* The LANL Oversight Office staff submitted a paper that characterizes perennial and intermittent surface-water flow from both newly-discovered and previously-identified springs. The data set from 89 previously undocumented perennial and ephemeral springs is presented including digitally corrected GPS location coordinates, estimated and measured flow rates, geologic discharge units, field parameters and trace elements. The report also discusses natural and anthropogenic (caused or produced by humans) radionuclides such as tritium and uranium, and the stable isotopes deuterium and oxygen-18. Data provided in this report were collected during the period of 1994 through 2004.

### **Environmental Monitoring at LANL**

#### *NPDES Monitoring Assessment*

Bureau staff submitted all data from samples collected at NPDES Outfall 051 (TA-50) during 2006. Split samples had been collected both at the sink inside the treatment facility (the “permitted” sampling location) and at the actual outfall pipe below the facility. Sampling was conducted at the beginning of flow and 20 minutes later to determine if differences in constituent concentrations could be detected.

- The TDS concentration increased slightly at the end of pipe compared to the value at the sample sink.
- Americium concentration was initially 15 times higher at the end of pipe than at the sink, and it dropped to 2 times higher after 20 minutes.
- The  $^{239/240}\text{Pu}$  concentration was 6 times higher at the end of pipe than at the sink, and it dropped to approximately the same value after 20 minutes.
- There was little or no difference in metals results between the end of pipe and the sample sink.

Bureau findings suggest that some radioisotopes are leaching from the discharge pipe into the effluent during the early part of the discharge but concentrations drop to comparable levels after the discharge pipe is flushed with effluent. This is most likely due to standing water in the discharge pipe left over from the previous discharge. At no time did the individual isotopes exceed the DOE Derived Concentration Guidelines (DCGs) (DOE internal radioactive discharge limits). Data were not available on any other isotopes.

#### *Spill Assessment and Response*



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Bureau staff completed evaluation of thirty-nine (39) spill response reports, dating from 2000 to 2006. The Bureau determined LANS had met spill response requirements in accordance with 20.6.2.1203 NMAC of the Water Quality Control Commission. Bureau staff provided SWQB and DOE with a letter recommending the closeout of all thirty-nine spills. All outstanding LANL spills have subsequently been taken off NMED books.

Bureau staff assessed potential erosion in TA-21 at MDA-T following two potable water releases. Erosion impacts were minimal in both cases. The water did not appear to impact any solid waste management units/areas of concern (SWMUs/AOCs).

Bureau staff conducted assessments and closed outstanding spill reports at TA-21, TA-33, TA-3 and spill reports of radionuclide-contaminated rain water at TA-21 and TA-54.

Bureau staff investigated a domestic sewage spill at TA-49.

Bureau staff submitted a spill response assessment on an oil spill at TA-3 to DOE and SWQB. The report noted that the LANS response and cleanup appeared adequate. Staff recommended that no further action should be required at this time.

*Evaluation of Erosion Control Measures at DOE-LANL Construction Sites and Legacy Waste Sites*

Bureau staff conducted an erosion assessment of an improper solid waste disposal site at Sigma Mesa and provided DOE a stormwater assessment report.

Bureau staff conducted site evaluation and erosion control assessments at TA-50, TA-35, and TA-55, and submitted reports to DOE.

Bureau staff submitted a letter to DOE and met with LANL site managers about erosion control issues at SWMU73-002 (Airport Ash Pile). The DOE initiated actions to address the stated issues.

Bureau staff met with LANS WQ/RCRA staff and conducted site evaluations at TA-3 LASO, the DOE administration building, and the R-35 well site. Overall, all stormwater controls were implemented and maintained properly, except for a few areas at LASO where silt fence installation was not properly completed. Corrective actions were suggested and implemented.

Bureau staff submitted a site evaluation report to DOE on stormwater and erosion controls at TA-55. This report documented that significant sediment deposits and debris from the site impacted several stormwater drains. Staff provided recommendations that would prevent sediment from entering the storm drains, and the recommendations were implemented.

Bureau staff submitted findings of a stormwater and erosion controls assessment at the Chemistry and Metallurgy Research Replacement Project (CMRR) under construction adjacent to TA-55. The TA-55 construction site was highly impacted by the removal and stockpiling of large quantities of dirt. Significant improvements were noted during a subsequent site evaluation, after a one-inch rainfall.

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Bureau staff submitted findings of a stormwater and erosion controls assessment at MDA-V (TA-21) Restoration Site. Actual site remediation activities had been completed and much of the site was already stabilized using a Bonded Fiber Matrix (BFM) with seed additive. The site was well maintained and clear of debris. The LANS staff had implemented all suggestions and had made further improvements.

Bureau staff submitted a stormwater and erosion control assessment at deep aquifer monitoring well R-35. Site management at TR-35 had employed proper stormwater management techniques to comply with permit requirements.

*Stormwater below Solid Waste Management Units and Federal Facility Compliance Agreement Monitoring*

Bureau staff requested that LANS and NMED resume the Surface Water Assessment Team (SWAT) meetings that had not been held since March of 2006. In the past, the monthly SWAT meetings were held to discuss surface water quality issues at LANL. The meetings were not resumed in 2007.

Bureau staff alerted LANS Water Quality staff to a concentration exceedance of cyanide in Sandia Canyon stormwater below the wetlands. The concentration was nearly twice the Water Screening Action Level. The LANS WQ/RCRA is reviewing the quality assurance and quality control measures and procedures and investigating possible sources.

*Regional PCB in Surface Water of the Upper Rio Grande Watershed*

Bureau staff attended one meeting with LANL, DOE, and NMED/SWQB to discuss numerous issues relating to a regional study on PCBs in surface water. The late start, shortage of equipment, previously committed staff time, and the complexity of issues this project brings together caused this project to be postponed until FFY08. Staff will enter into discussions in early FFY08 with LANL, DOE, and the SWQB to develop a study plan that meets all parties' needs.

*Stormwater Monitoring*

Bureau staff provided all stormwater analytical data reports for 2006 to the DOE.

Bureau staff acquired LANL excavation permits and deployed monitoring equipment at twenty-five locations to support a contaminant transport study in the Los Alamos Watershed and the Total Maximum Daily Load (TMDL) project, which is to be jointly executed with SWQB staff. Six of these stations were specifically designed for the contaminant transport study in the Los Alamos watershed and the remaining stations supported the TMDL project. Staff used a combination of automated samplers, stage height recorders, and single stage environmental liquid samplers to monitor stormwater flows and contaminant levels. During installation, cross sections were measured and recorded at each site for channel dimensions. Channel dimensions are developed to estimate storm event flow dynamics and to compare cross sections from previous years. These comparisons identify the changes in the form and function of the stream channels.

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Fifty-two samples were collected and submitted to a laboratory for analyses. Analytes of concern included  $^{238}\text{Pu}$  and  $^{239/240}\text{Pu}$  in water and suspended sediments, gross alpha, suspended sediment, PCB congeners, dioxin/furans, polybrominated diphenyl ethers (PBDE), and metals. Most of these samples were collected from the 6 Los Alamos watershed stations during thirteen (13) storm events. Two additional stations were selected to measure dioxin/furan movement in the Pajarito/Two Mile Watersheds. The remaining 17 stations were designed to provide samples and data for the SWQB TMDL project. Results are pending.

### *Embudo Valley Watershed Monitoring*

Bureau staff submitted all 2006 Embudo Valley produce data to DOE. Staff had collected samples to address the quality of produce grown by Embudo Valley residents. Staff collected 6 lettuce and 4 apple samples at 8 locations within the Embudo watershed along with one commercial lettuce sample from a Santa Fe grocery. Staff compared the analytical results to background references developed by LANS and the Bureau. Some study findings are:

- Several measurements of uranium isotopes were reported above the background references. The uranium isotope ratios appear to indicate uranium in disequilibrium and the levels of uranium are higher than previously reported background reference values;
- Plutonium, americium, cesium, and strontium radioisotopes, and most metals were not detected or were reported below the background reference levels. Staff evaluations suggest these measurements represent naturally occurring elements, conditions from atmospheric fallout of pre-1963 nuclear tests, or were inconclusive;
- Eleven trace elements and heavy metals were measured above background, including aluminum, antimony, arsenic, barium, calcium, cobalt, iron, manganese, potassium, sodium, and vanadium. Multiple anthropogenic activities could lead to these levels and they are not indicative of a Laboratory impact.

Bureau staff presented the produce findings to the residents of the Embudo Valley that participated in the study. Staff also gave a presentation regarding the findings of the Embudo Valley Produce study to National Center for Frontier Communities.

Bureau staff collected additional samples to determine the source of the anomalous uranium measurements found in the lettuce. Eight acequia water samples and nine soil samples were collected in the Embudo Watershed to broaden baseline data and evaluate the possible source of uranium measurements found in lettuce. These samples were submitted to a contract laboratory and measured for  $^{238}\text{Pu}$  and  $^{239/240}\text{Pu}$ ,  $^{234}\text{U}$ ,  $^{235}\text{U}$ ,  $^{238}\text{U}$ , strontium 90 ( $^{90}\text{Sr}$ ), cesium 137 ( $^{137}\text{Cs}$ ), metals, and major cations and anions. All acequia water quality results met irrigation, wildlife habitat, and livestock watering criteria. The levels of  $^{234}\text{U}$  and  $^{238}\text{U}$  in acequia water were compared to 95 isotopic uranium results collected from 1997 through 2005 from the Rio Grande near the Pajarito Plateau or tributaries that drain the Pajarito Plateau. Acequia results from this study had median  $^{234}\text{U}$  and  $^{238}\text{U}$  values that were 2.5 and 1.9 times higher than the median values from the Pajarito Plateau respectively. The median  $^{234/238}\text{U}$  ratio in the acequia waters was 2.1, which is similar to the median ratio of 1.7 found in the Embudo lettuce in 2006.

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Several measurements of metals were above regional statistical reference levels (RSRLs) at some of the garden plots. Measurements of radionuclide isotopes were below RSRLs at all garden plots and the mean uranium measurements were less than one-half the RSRLs.

One sample was collected at the top of the Embudo watershed, at Truchas Lake. Several measurements of radionuclide isotopes and metals in soils were reported above RSRLs at the one non-garden plot location, the Truchas Lake site.  $^{90}\text{Sr}$ ,  $^{137}\text{Cs}$ ,  $^{239/240}\text{Pu}$ , antimony, cadmium, lead, mercury, and selenium exceeded LANL RSRLs. The elevation of the Truchas Lake site was 11,415 ft, the soil was thin (<2 inches deep) and it had high levels of organic mater.

Bureau staff evaluations suggest the concentrations of iron, barium, and calcium in garden plot soils that exceed the RSRLs were most likely due to accumulation from long-term use as irrigated garden plots. There is no evidence of LANL-derived material, as radionuclide measurements in the garden plots are all below RSRLs. The levels of uranium in the 2006 lettuce samples appear to be due to the elevated levels of uranium in the acequia irrigation waters and not the levels of uranium in the soils. The  $^{234}\text{U}/^{238}\text{U}$  isotopic ratios in both the 2006 lettuce and the 2007 acequia waters are similar suggesting that the availability of the uranium isotopes in the irrigation water determines the concentrations found in irrigated lettuce crops.

Bureau staff interprets the uranium concentration variability in acequia waters to be related to the inhomogeneous nature of the geologic matrix in the mountains of the Embudo watershed. The granitic rocks of the Sangre de Christos most likely contribute to the higher levels of uranium than those found in waters of the volcanic Pajarito Plateau.

The levels of  $^{90}\text{Sr}$ ,  $^{137}\text{Cs}$ , and  $^{239/240}\text{Pu}$  found at the Truchas Lake location stand out as exceptions. The levels of these radionuclides significantly exceed the RSRLs and in the case of  $^{137}\text{Cs}$ , approaches the screening action level of 5.7 pCi/g used by LANL. The  $^{90}\text{Sr}$  concentrations exceeded the LANL references by 6 times and up to 17 times the mean of the garden plot sites. These levels could represent historical operational or accidental releases from the Laboratory. They most likely are due to atmospheric fallout of pre-1963 nuclear tests. Concentrations of  $^{137}\text{Cs}$  measured from alpine sites (elevation 11,200 feet) and montane sites (10,800 feet) in northern Colorado show similar, if not higher values due to atmospheric fallout. Staff intends to extend this study by collecting additional samples from high-elevation sites in late 2008 and 2009 to determine variability and assess origins of these contaminants in the mountains of northern New Mexico.

### *Groundwater Monitoring*

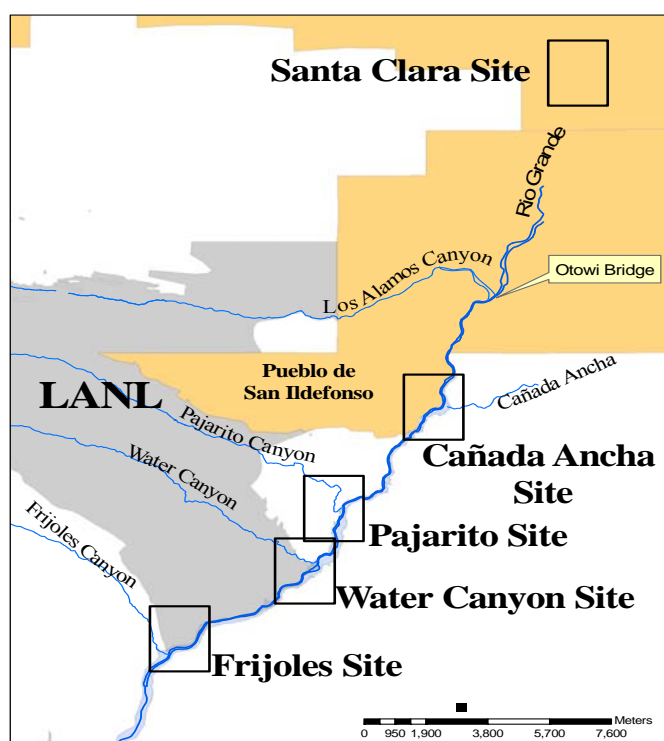
Bureau staff submitted all groundwater data from samples collected in 2006 on Pueblo de San Ildefonso property to the Pueblo Governor and to the Pueblo environmental staff.

Bureau staff submitted all regional aquifer monitoring well data and verification monitoring results from samples collected in 2006 to DOE.

Bureau staff finalized maps for a tritium/helium groundwater age dating paper co-authored with LANL scientists.

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Bureau staff collected split samples with LANL from regional, intermediate, and alluvial (perched) aquifer monitoring wells. Samples were used for carbon-14 ( $^{14}\text{C}$ ) age dating and then analyzed for metals, other radioisotopes, and specific sets of anions and cations. Staff developed a groundwater age isopleth (contour) map reflecting analysis of the regional aquifer  $^{14}\text{C}$  age data (unadjusted). Staff collected and compiled data that also suggests the ages do not need to be adjusted based on changes of  $^{13}\text{C}$  compositions along the regional flow path at the water table. In general, these data show that younger recharge waters beneath canyons such as Pajarito, Water, and Frijoles are mixing with older regional aquifer water. The younger-than-expected ages for the springs in Chaquehui Canyon area and Ancho Spring and Spring 6 may be (or could be) due to the mixing of younger recharge waters derived from Water Canyon and Frijoles Canyon with older regional ground water. (See map below.)



Bureau staff obtained split samples with LANL from regional well R-17 in Pajarito Canyon for noble gas analysis. Staff continues to collect noble gas samples in regional wells as part of the FFY07 and FFY08 Ground Water Project. Staff is discussing with LANL representatives writing a joint report on the analysis. The LANL staff is providing recommendations for well selection and project scope for Bureau consideration.

Bureau staff accompanied LANS Water Quality staff to investigate whether groundwater monitoring wells TH-5 and TH-6 located south of TA-54 in Pajarito Canyon contained any water. The TH-6 well is documented with a total depth (TD) of 300 feet, but field measurement indicated the well bottomed out at around 465 feet and the hole was dry. The TH-5 well is

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documented with a TD of 163 feet, but the sounder bottomed out at 33.5 feet and the well was dry, too.

Bureau staff collected summer (monsoon season) precipitation samples at the White Rock NMED site in support of a LANL project to analyze recharge pathways to the various groundwater levels. Samples were collected through early September for analysis of hydrogen and oxygen isotopes. Understanding oxygen and isotopic variation in precipitation events along elevation gradients is essential to determining recharge pathways to alluvial aquifers, which subsequently recharge intermediate, perched aquifers and ultimately the regional aquifer beneath the Pajarito Plateau. Recharge/infiltration estimates provide the upper flow boundary for the LANL regional aquifer flow and transport model, which predicts contaminant flow paths and the nature and extent of groundwater contamination. Results are pending.

*Los Alamos County & Pueblo Drinking Water Monitoring*

The LANL Oversight office and Santa Fe Technical Support office staffs collected samples from five (5) Santa Fe (Buckman) and seven (7) Los Alamos County supply wells for metals and radioisotope analysis.

Bureau staff submitted drinking water monitoring results for water supply wells to Los Alamos County & City of Santa Fe. The Bureau was asked by the City of Santa Fe to re-analyze samples submitted during the second quarter. This was to confirm a previous detection of plutonium-238 reported by LANL from a Buckman well. The Bureau's analytical laboratory had archived the remaining water from the earlier sampling and was able to run low-level isotopic plutonium and low-level tritium. Results for the re-analyses were non-detect for all plutonium isotopes and tritium. A comparison of our data with LANL data is in progress. LANL Oversight Office staff submitted all drinking water monitoring results for 2006 and early 2007 to DOE

Bureau staff entered Oversight Bureau legacy data (1994 - 2001) into database.

*Determining Aquifer Hydro-Geologic Characteristics at the Los Alamos National Laboratory*  
Bureau staff downloaded and digitally corrected United States Geological Service (USGS) piezometer sampling locations and sent them to USGS.

*Background Perchlorate in Ground Water Project*

Bureau staff continued to compose the background perchlorate report. A peer review draft has been distributed to outside reviewers for comment.

*The White Rock Canyon White Rock Canyon Springs Monitoring*

Bureau staff submitted all springs monitoring results (including White Rock Canyon Springs) for 2006 and to DOE. Staff collected 6 spring samples for noble gases.

The LANL Oversight office and Santa Fe Technical Support office staffs collected additional samples from springs in White Rock Canyon to complete the effort initiated during the September 2006 White Rock Canyon environmental surveillance sampling event. Several substances such as hydrazine and polychlorinated biphenyls (PCBs) were not analyzed from

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collected samples while accompanying LANL during the September raft trip because of holding-time or storage space limitations.

Bureau staff collected the following samples independent from the split samples collected with LANL staff:

- 24 springs for metals and  $^{90}\text{Sr}$ ;
- eight (8) springs for  $^{14}\text{C}$ ;
- ten (10) springs for high explosives;
- seventeen (17) springs for perchlorate;
- five (5) springs for hydrazine;
- one (1) for perchlorate; two (2) snow pack samples for perchlorate and two (2) springs for perchlorate;
- Spring 3A and Turkey Spring for  $^{14}\text{C}$  and tritium; and
- Spring 3AA along Blue Dot Trail in White Rock Canyon for noble gases.

Bureau staff accompanied Pueblo de San Ildefonso environmental staff to collect samples at Spring 1 to be analyzed for PCBs using the hi-resolution congener method. The samples were analyzed to confirm a LANL detection of Aroclor 1262 in Spring 1 during 2005. The hi-resolution congener analysis of Spring 1 indicated that the level of Total PCB was 0.010 pg/L, which is 64 times less than the New Mexico human health water quality criterion. This indicates that the LANL detection of Aroclor 1262 was a false positive.

Bureau staff accompanied Pueblo de San Ildefonso environmental staff to sample Spring 1 and Sandia Spring for noble gases, and LA Spring for  $^{14}\text{C}$  and stable isotopes. The noble gas,  $^{14}\text{C}$ , and stable isotope analysis supports in-progress work by LANS and NMED to determine “Big Picture” water ages and contaminant pathway evaluations for groundwater below the Pajarito Plateau.

Bureau staff guided LANS staff to Spring 6 and 9 in White Rock Canyon collect a  $\text{CO}_2$  soil-gas sample to support in-progress work by LANS.

Eight staff members from DOE OB, HWB and GWQB coordinated ground water sampling activities with LANL for the White Rock Canyon (WRC) spring sampling project. The Bureau collected samples from thirteen springs for a suite of parameters that included radionuclides ( $^{90}\text{Sr}$ , Isotopic Uranium and Low-Level Gamma –emitters) and Volatile Organic Compounds (VOCs).

*Direct Penetrating Radiation Monitoring*

Bureau staff continued to collect readings from the DPR network of twelve Electret monitoring stations at, and in the vicinity of, Los Alamos. Staff submitted the second and third quarter FFY06 data report to DOE for DPR results near LANL. The data set showed no elevated values and represents ambient or background DPR at these locations. Additionally, all the results tracked well with previous data collected at the same locations since 2005.

Bureau staff submitted to LASO, DPR analysis of readings near LANL, for the first and second quarters of calendar year 2007 (2<sup>nd</sup> and 3<sup>rd</sup> Quarters FFY07). The calculated doses for the two

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quarters from the 12 NMED Electret stations ranged from 30.6 mRem to 49.8 mRem. These values are well within the normal trend for DPR at the NMED stations. The Bureau is awaiting statistical software to develop a standard graphical package for data submittal to DOE.

Bureau staff worked with the technical lead from the EVEMG to troubleshoot its Electret database. The EVEMG has been collecting DPR measurements over the past couple of years at locations within the vicinity of Dixon, NM using Electret technology. Although EVEMG is adequately performing the DPR sampling, the technical lead requested some supplemental expertise from NMED so that he could better retrieve the data and produce high quality reports in a timelier manner. Bureau staff created a version of its own DPR database, entered existing data, and composed documentation of the database for use by the EVEMG.

The EVEMG and the Bureau continue to interact monthly at the Community Radiation Monitoring Group meetings held every second Wednesday of the month.

### *Low-Volume Radioactive Particulates and Tritium Monitoring*

Bureau staff continued to collect samples and reviewed results from previous quarters.

Bureau staff has begun shipping tritium samples bi-weekly to increase data quality and get results back in a timely matter to recognize and address unplanned tritium releases at LANL.

Bureau staff submitted FFY06 fourth-quarter AIRNET samples from the five co-located (with LANL) perimeter stations for analysis. The fourth-quarter samples will be analyzed for isotopic americium, uranium, and plutonium along with tritium. The fourth-quarter samples were analyzed using a high-resolution radioisotope method for better sensitivity. Data analysis is still pending.

Bureau staff submitted all four quarterly particulate and tritium gel samples for analyses. Staff provided monthly updates to CRMG on air monitoring at LANL, and no anomalies have been noted.

Bureau staff submitted orders for sampling station improvements (external sampling heads at two air houses) and for a 24-volt sampler for the off grid independent sampling. Bureau staffs at both LANL and SNL are working to standardize air program methodology at both facilities.

### *High-Volume Air Quality Monitoring*

Bureau staff completed sampling at the airport ash pile remediation site as part of the Airport Ash Pile Remediation Project. The samples were submitted for analyses of radionuclides, metals, dioxins and furans. Results are pending.

Bureau staff prepared for MDA B background sampling. Through the data quality objective process, staff identified a need for timers capable of providing on and off intervals of unequal durations. Staff coordinated with the vendor and initiated retrofitting the high-volume air samplers.



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Bureau staff submitted TA-21, MDA-B background air monitoring samples for analyses of radionuclides and metals. The data results will provide a baseline prior to initiation of the MDA-B remediation.

Bureau staff coordinated with the LANL air quality group on types of equipment needs for MDA-B remediation monitoring. The MDA-B remediation was scheduled to commence in September 2007. The Bureau would collect hi-volume samples at designated intervals during the remediation. Results are pending.

### *Contaminants in Fish Tissue Monitoring*

Ralph Ford-Schmid of the Santa Fe Technical Support staff attended the Annual EPA Contaminants in Fish Tissue Forum in Portland, Maine. Staff compiled fish tissue data from Cochiti and Abiquiu reservoirs, and McAllister Lake and an assessment will be provided to DOE. Data assessment and evaluation for fish consumption advisory recommendations continue. Bureau staff assisted environmental staff from Santa Clara Pueblo and the Bureau of Reclamation to collect four fish tissue samples from the Rio Grande at Santa Clara Pueblo. Five-fish composite samples of carp, sucker, catfish, and white bass were collected from about a two-mile reach of the Rio Grande. The fish samples are archived by Santa Clara pending coordination with the Pueblo on a joint Memorandum of Understanding. Expediting the analyses is important to allow any update to the current NMED Fish Advisory for the Rio Grande.

### *Benthic Macroinvertebrate (aquatic insect) Monitoring*

Bureau staff sorted 16 macro-invertebrate samples from 4 sites on the Pajarito Plateau area in order to facilitate the assessment of invertebrate communities through a professional contractor. Staff updated the macro-invertebrate Sampling and Analysis Plan. Macro-invertebrate populations are a long-term indicator of the chemical, biological and physical health of flowing waters. Such density and diversity of species, numbers of individual within taxa, and overall population numbers reflect water quality stressors and/or water quality trends.

Bureau staff reviewed new Surface Water Quality Bureau protocol for collecting benthic macroinvertebrate samples in preparation for a training session for the Santa Clara Pueblo staff scheduled for the first quarter of FFY08.

### *Other Monitoring*

Bureau staff collected 12 snowmelt runoff samples at 10 stations. These samples were archived and a subset was sent to be analyzed for EES-6 stable isotopes and major anions.

Bureau staff collected seven precipitation samples (4-13-07 snow event and 5-2-07 rain event) for stable isotope analyses.

Bureau staff accompanied Marvin Gard (LANL, EES) to sample for soil gas at the Camp May area. The data collection supports an in-progress LANL study. Staff provided GPS/GIS field support.

Bureau staff met with the LANL air quality group to scope out a joint scientific project for collection and analysis of work-space environmental dust and other such media. Radionuclides

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are the analytes of interest, and the results can be provided in a similar context as the findings made public by the Government Accountability Project.

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## **SANDIA NATIONAL LABORATORIES**

### **Public Outreach at SNL**

#### *Interactions with local Pueblos*

Bureau staff coordinated with Isleta Pueblo to collect groundwater samples from the NMED wells located on Pueblo land that are part of the groundwater monitoring system for Lovelace Respiratory Research Institute (LRRI) legacy and operational discharges.

#### *NM Regional Science Fair*

Bureau staff judged the NM Regional Science Fair junior environmental science category. The winner of this group did a study of different erosion controls. The Oversight Bureau representative was also a special awards judge in senior/junior engineering and physics.

#### *DOE/DOD Quarterly Public Meeting*

Bureau staff attended DOE/DOD quarterly public meetings.

Bureau staff attended the semi-annual DOE/DOD meeting. The Sandia representatives discussed plans to restart the community working group to update the citizens' checklist for Long Term Environmental Stewardship that would be discussed during the quarterly public meetings. Bureau staff also attended the Environmental Stewardship Community Checklist meetings that started the following week and began reviewing the citizens' checklist that was completed nearly four years ago.

#### *Training*

Bureau staff attended a two and half day training EPA Risk Assessment for Superfund Sites that was presented by the U.S. EPA.

Bureau staff participated in the NMED outreach meeting where the draft department branding of letterhead, business cards, etc. was reviewed. The NMED participation in the state fair was also discussed.

#### *Working with Students*

Bureau staff participated in bringing a group of Title I (homeless) APS students to Sandia National Laboratories to help educate this sector of the community. These students go to an after school tutoring program and research careers in medicine, engineering, and science. Currently, there are at least 3300 Albuquerque Public School students that are Title I.

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Bureau staff attended the Middle Rio Grande Workgroup meeting in Rio Rancho. The Pueblo of Sandia presented their draft surface water quality criteria that they proposed to EPA.

Bureau staff presented an “aquatic life in streams” interactive display with living aquatic insects in a virtual stream. The presentation was given at the Manzano Mesa Elementary kindergarten class. The presentation included using a poster entitled “Aquatic Invertebrates of New Mexico” along with an aquatic insect collection where students could not only see pictures and descriptions of the insects but also see examples, both living and preserved.

### *Interactions with Professional Organizations*

Bureau staff participated in the National State Laboratory Assessor’s teleconference to discuss discrepancies in holding times for hexavalent chromium in drinking water versus wastewater.

Bureau staff attended a meeting of the New Mexico Engineering Foundation.

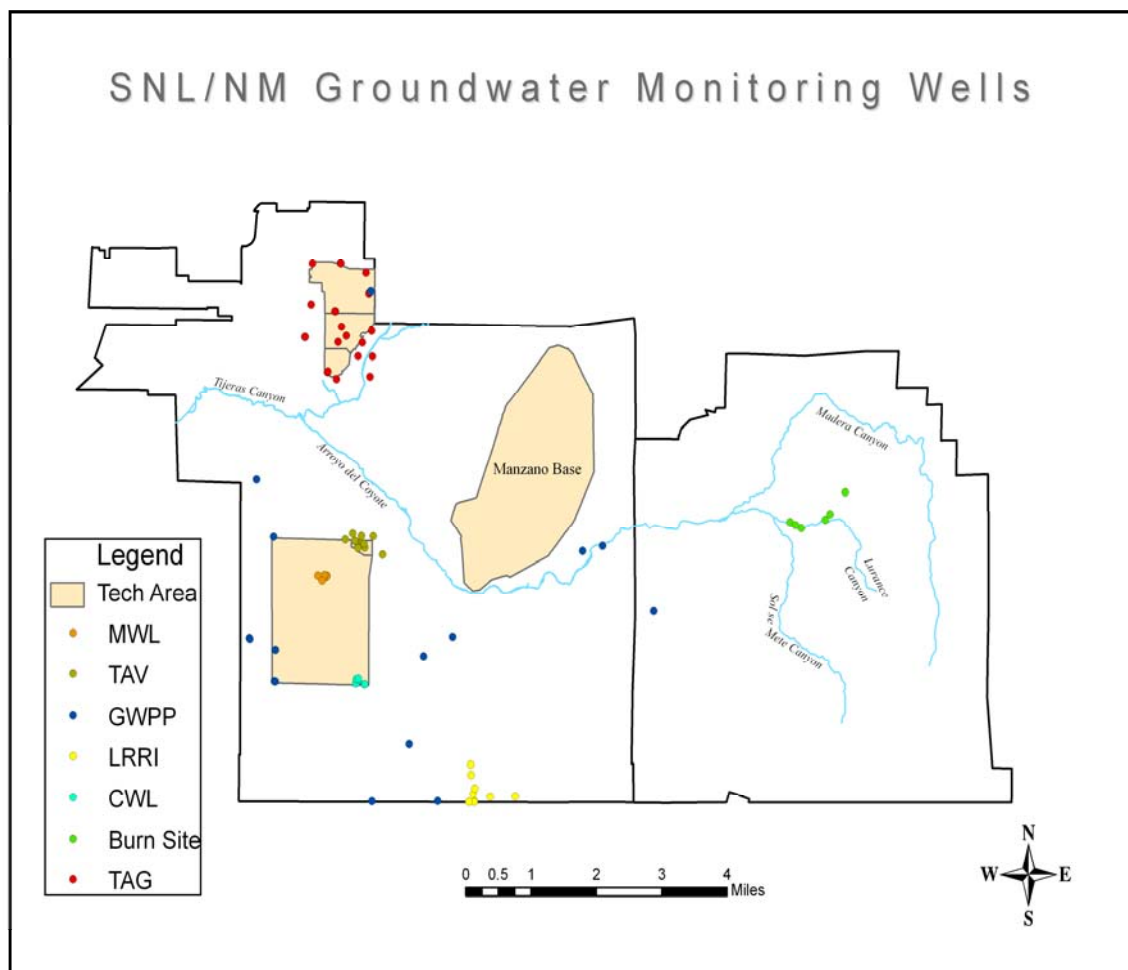
## **Environmental Monitoring at SNL**

### *Groundwater Monitoring*

Groundwater monitoring is the largest undertaking by the Bureau staff at SNL. It consumes 40% of the allocated staff hours, and a budget of \$88,011.24. This project evaluates groundwater parameters to determine whether there is any change in groundwater contamination at SNL and also to determine if Sandia data results obtained by their analytical laboratory compare to data obtained by the Bureau as an independent verification. Groundwater samples collected at SNL are based on Sandia sampling protocols and standard operating procedures. Each monitoring well is purged of required standing well volume and groundwater field parameters (D.O., pH, conductivity, turbidity, and temperature) are measured until stabilization prior to sample collection. Each month the Bureau and Sandia staffs meet to coordinate monitoring efforts and to report analytical results as well as sampling difficulties. The Bureau staff provides periodic reports to DOE with copies to Sandia.

The groundwater monitoring wells are scattered throughout the SNL property, as indicated below and shown on the accompanying site map.

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Project Area	Monitoring Network	Sampling Frequency
Groundwater Protection Program (GWPP)	11 monitoring wells and 1 spring (site-wide)	Annually
Chemical Waste Landfill (CWL)	9 monitoring wells	Semi-annually
Mixed Waste Landfill (MWL)	7 monitoring wells	Annually
Technical Area V (TA-V)	12 monitoring wells	Quarterly
Tijeras Arroyo Groundwater (TAG)	27 monitoring wells	Quarterly/semi-annually/annually
Burn Site	6 monitoring wells	Quarterly
Lovelace Respiratory Research Institute (LRRI)	11 monitoring wells	Semi-annually

The Bureau staff has contracted with four primary certified laboratories to conduct chemical analyses, and they have sub-contracted to several other certified laboratories for specialty analyses, such as radionuclides. The primary laboratories used in 2007 included Paragon Analytics and

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Pinnacle Analytical Laboratory. Analytes being investigated include Target Analytical List (TAL) metals, high explosives compounds, numerous organic and inorganic compounds, and radionuclides. The following are highlights of the sampling and analyses efforts conducted by staff as part of the General Groundwater Monitoring (Environmental Restoration) Project. Data results are compared to applicable Maximum Allowable Concentrations (MAC) from the New Mexico Water Quality Control Commission (WQCC) (20.6.2.3103A NMAC Human Health Standards) and Maximum Contaminant Levels (MCL) from the EPA National Primary Drinking Water Regulations (40 CFR 141).

**GWPP**

Analytical results from monitoring well SWTA3-MW4, collected in December 2006 were submitted to DOE. The sample was analyzed for Volatile Organic Compounds (VOC), Diesel Range Organics (DRO), Gasoline Range Organics (GRO) and High explosive (HE) compounds. No organic or HE compounds were detected above the laboratory method detection limits and demonstrates that there is no cause for concern with respect to these constituents.

**CWL**

The Bureau collected independent and split groundwater samples at Chemical Waste Landfill (CWL) monitoring wells CWL-MW2BL, -BW4A, -MW5L, -MW5U, -MW6U, and -MW4. Samples were analyzed for VOCs, TAL metals, tritium and polychlorinated biphenyls (PCBs).

No VOCs were detected above their associated MCL at any monitoring wells.

Chromium was detected at monitoring well CWL-MW4 at a concentration of 0.142 mg/L, which slightly exceeded the MCL of 0.1 mg/L. Chromium data collected by Sandia recorded a concentration of 0.007 mg/L at CWL-MW4, which is 20 times less than the sample collected by the Bureau. Both samples were collected at the same time and sent to the same analytical laboratory. The Bureau sample was re-analyzed and yielded the same concentration. Sandia was unable to re-analyze its sample. CWL-MW4 will be re-sampled in 2008 and chromium concentrations will be compared with Sandia data.

Total PCB concentrations from all samples collected were below the Human Health Standards of 0.001 mg/L.

**MWL**

One sample was collected from monitoring well MWL-MW4. The sample was analyzed for VOCs, total (unfiltered) and dissolved (filtered) TAL metals, perchlorate, gamma spectroscopy, gross alpha/beta, isotopic uranium and isotopic radium. All parameters were below established MCLs.

**TA-V**

Between June and September 2007, the Bureau staff split groundwater samples with Sandia staff at Technical Area-V (TA-V) monitoring wells: TAV-MW1, -MW2, -MW3, -MW4, -MW5, -MW6, -MW7, -MW8, -MW9, LWDS-MW1 and -MW2. Samples were submitted for organics, radiological, total and dissolved TAL metals and general chemistry analyses.

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Results for total and dissolved TAL metals from all samples collected at Tech Area-V monitoring wells were below established MACs and MCLs.

Analyses were performed for gamma spectroscopy, gross alpha/beta, tritium, isotopic radium and isotopic uranium. All radionuclides analyzed at TAV monitoring wells were below established MCLs.

Inorganic chemical analysis was performed for nitrate plus nitrite (NPN). Nitrate concentrations exceeded the MCL of 10 mg/L at monitoring wells TAV-AVN-1, TAV-MW6, and LWDS-MW1. The results were 10.1 mg/L, 10.2 mg/L, and 13.1 mg/L respectively. Historical data provided by Sandia indicate that nitrate concentrations at the first two wells have been stable to slightly increasing over time. NPN concentration at LWDS-MW1 compares well to historical data provided by Sandia. Trending analysis performed by Sandia at LWDS-MW1 suggests that nitrate levels appear to be slightly decreasing over time.

Trichloroethylene (TCE) was detected above the MCL of 5 µg/L at monitoring wells TAV-MW6 and LWDS-MW1. TCE concentrations at TAV-MW6 during two sampling events in 2007 were 7.2 µg/L and 8.3 µg/L, respectively. Concentrations at LWDS-MW1 were 13.5 µg/L and 14 µg/L. Trending analysis performed by Sandia suggests that TCE concentrations at TAV-MW6 have been increasing over time and concentrations at LWDS-MW1 indicate that TCE has been slightly decreasing.

### **TAG**

During 2007 the Bureau staff collected groundwater samples from TAG monitoring wells: TJA-2, -3, -4, -6, -7, TA1-W-01, -W-03, -W-06, -W-08, TA2-SW1-320, -W-01, -W-19, -W-26, and WYO-4. Samples were submitted to an independent analytical laboratory for organic, radiological, total and dissolved metals and general chemistry analyses.

The dissolved iron concentration of 1.6 mg/l at TA-1-W-08 slightly exceeded the MAC of 1.0 mg/L. The Bureau recommended that this well be sampled for dissolved iron during the next SNL sampling event.

Nitrate concentrations exceeded the MCL of 10 mg/L in five wells. Elevated concentrations ranged from 41.7 mg/L at TJA-4 to 10.2 mg/L at TJA-2. Analytical results were comparable to previous sampling events.

TCE was detected above the MCL of 5 µg/L in monitoring wells WYO-4 and TA2-W-19. The WYO-4 had TCE concentrations at 7.0 µg/L, 7.69 µg/L and 5.6 µg/L during three sampling events in 2007. TCE concentrations at TA2-W-19 were 5.7 µg/L and 5.39 µg/L. Based on historical data provided by Sandia, TCE concentrations in these wells vary from stable to slightly increasing over time.

### **Burn Site**

Groundwater samples were collected from Burn Site monitoring wells: CYN-MW3, MW4, MW6, MW7, MW8, and MW1D. Samples were analyzed for organics, radionuclides, metals, HE and inorganics.

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The NPN concentrations exceeded the MCL of 10 mg/L in monitoring well CYN-MW6 during both sampling events. Concentrations were 21.4 mg/L and 23.3 mg/L. The NPN was also detected above the MCL at monitoring well CYN-MW3 at a concentration of 12.2 mg/L. In addition, fluoride exceeded the MAC of 1.6 mg/L from a sample collected at monitoring well CYN-MW1D including the duplicate sample. The results from these samples were 1.80 mg/L and 1.83 mg/L respectively. Results are comparable to past sampling events. Trending analysis performed by Sandia indicates that NPN concentrations at CYN-MW6 have continually exceeded the MCL and have been stable to slightly decreasing over time. In addition, trending analysis at CYN-MW3 demonstrates that NPN concentrations have been slightly decreasing over time.

Uncorrected gross alpha was detected above the MCL of 15 pCi/L at monitoring wells: CYN-MW4, -MW6, -MW7 and -MW8. Uncorrected gross alpha activity ranged from  $15.2 \pm 4.75$  pCi/L at CYN-MW6 to  $54.3 \pm 11.1$  pCi/L at CYN-MW4. Unfortunately, these well samples were not analyzed for isotopic uranium. Thus, the corrected gross alpha values were not determined. This omission will be corrected in the request for analyses for the FFY 2008, 2<sup>nd</sup> quarter sampling. The Bureau plans to compare those corrected and uncorrected results with the results from FFY 2007 quarterly analyses. Trending analysis done by Sandia on CYN-MW4 indicates that corrected gross alpha has consistently exceeded the MCL for drinking water standards, and it has been slightly increasing over time. The Bureau recommends that Sandia continue to sample these wells for gross alpha.

Concentrations of RDX and O-Nitrotoluene were detected above the Method Detection Limit (MDL) at CYN-MW3. The O-Nitrotoluene was also detected above the MDL at CYN-MW6. These analytical values were 'J' qualified, indicating the concentrations were detected above the MDL, but not in a sufficient amount to be quantified reliable. Well CYN-MW3 was re-sampled for HE, and no compounds were detected above the MDL.

### **LRRI**

During May and December Bureau staff split groundwater samples with Lovelace Respiratory Research Institute (LRRI) staff at LRRI monitoring wells: ITRI-MW4, -MW6, -MW9, -MW11, -MW17, -MW18, -MW19, IP-1, -3, -5 and NMED-1. Samples were analyzed for organics, TAL metals, general chemistry and radionuclides. The LRRI operation is not part of SNL.

Organic analyses were performed for Diesel Range Organics (DRO), Gasoline Range Organics and Volatile Organic Compounds (VOCs). No organic compounds were detected in any of the wells sampled at LRRI.

Total uranium was detected above the MCL of 0.03 mg/L at a concentration of 0.0504 mg/L at monitoring well ITRI-MW4.

Uncorrected gross alpha activity in ITRI-MW4 was  $32.084 \pm 5.431$  pCi/L, which exceeds the MCL of 15 pCi/L. When gross alpha was corrected by subtracting the activity for total uranium the value dropped, but was still above the MCL. Corrected gross alpha activity at ITRI-MW4



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was 26.106 pCi/L. The Bureau plans on beginning a trending analysis of gross alpha at ITRI-MW4 to evaluate any trend.

Fluoride was detected above the NM MAC standard of 1.6 mg/L at six (6) monitoring wells. Elevated concentrations ranged from 1.64 mg/L at ITRI-MW9 to 2.13 mg/L at NMED-1. Sulfate was detected above the MAC of 600 mg/L at ITRI-MW4 at a concentration of 620 mg/L. The TDS concentration was also detected above the MAC of 1000 mg/L at ITRI-MW4, ITRI-MW17 and ITRI-MW19. Concentrations were 1650 mg/L, 1280 mg/L, and 1350 mg/L respectively. The NPN concentrations were all below the MCL and MAC of 10 mg/L.

Trending analysis performed by the Bureau staff from previous sampling events indicates fluoride concentrations at ITRI-MW9, MW17, MW18 and NMED-1 have been stable to slightly decreasing over time. Fluoride concentrations at ITRI-MW4 and -MW11 have been stable to slightly increasing over time. In addition, sulfate and TDS concentrations at ITRI-MW4 have been decreasing over time.

### *Direct Penetrating Radiation*

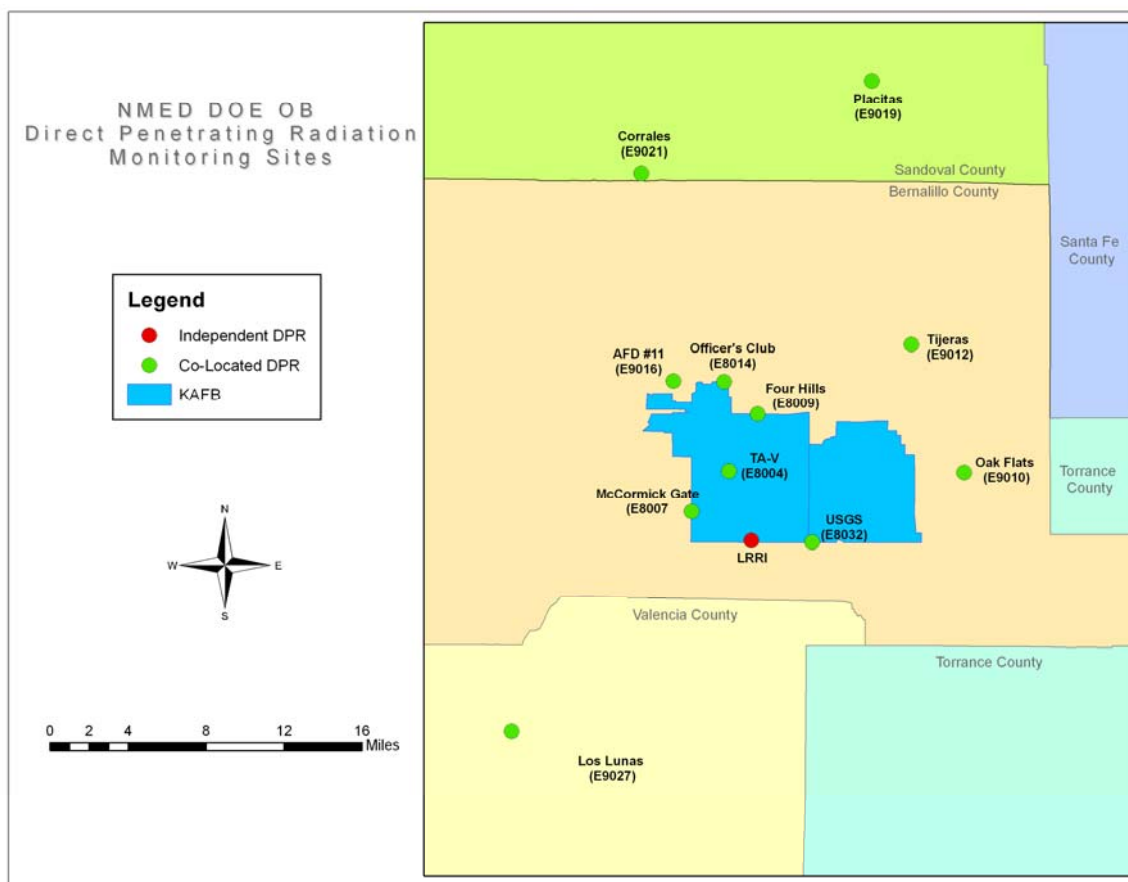
The Bureau uses Electret passive ion chambers to evaluate the ambient gamma radiation at SNL. The Electret passive ion chamber functions on the principle of ion pair production resulting from gamma photons interacting with air molecules within an air-vented "S" type chamber of predetermined volume to reduce the voltage of a charged Teflon™ disk. The voltage drop is proportional to the amount of gamma photons passing through the chamber. By using the change in voltage, a dose in units of milliRem (mrem) at a particular location can be determined with the use of a pre-prepared software algorithm.

During 2007 the Bureau staff continued to collect quarterly DPR measurements from all 12 Electret stations. There is a total of 6 stations on base located at Four Hills, TAV, USGS, McCormick Gate, Officer's Club, and ITRI/LRRI. Off-site stations are located at Albuquerque Fire Station #11, Oak Flats campground, Bernalillo County Fire Department #10 (Tijeras), Placitas Fire Station, Corrales Fire Station, and Los Lunas Fire Station. All Electret stations are co-located with Sandia TLDs except for the ITRI/LRRI station.

Bureau staff submitted data results from (February-June) to DOE for review and comment. Unfortunately a direct comparison with Sandia TLDs could not be made for this time frame. The Sandia TLD readings were collected between January-April and NMED measurements were collected between February-June. The Bureau modified its monitoring schedule to fit the Sandia TLD schedule to facilitate direct comparisons of the two measurements.

Data results were also submitted to DOE for third and fourth calendar quarter 2007. The overall DPR average from the on-site locations was closely related to the overall average taken from off-site locations. The DPR measurements taken by the Bureau tend to be somewhat higher than Sandia TLDs, but both systems indicate comparable results.

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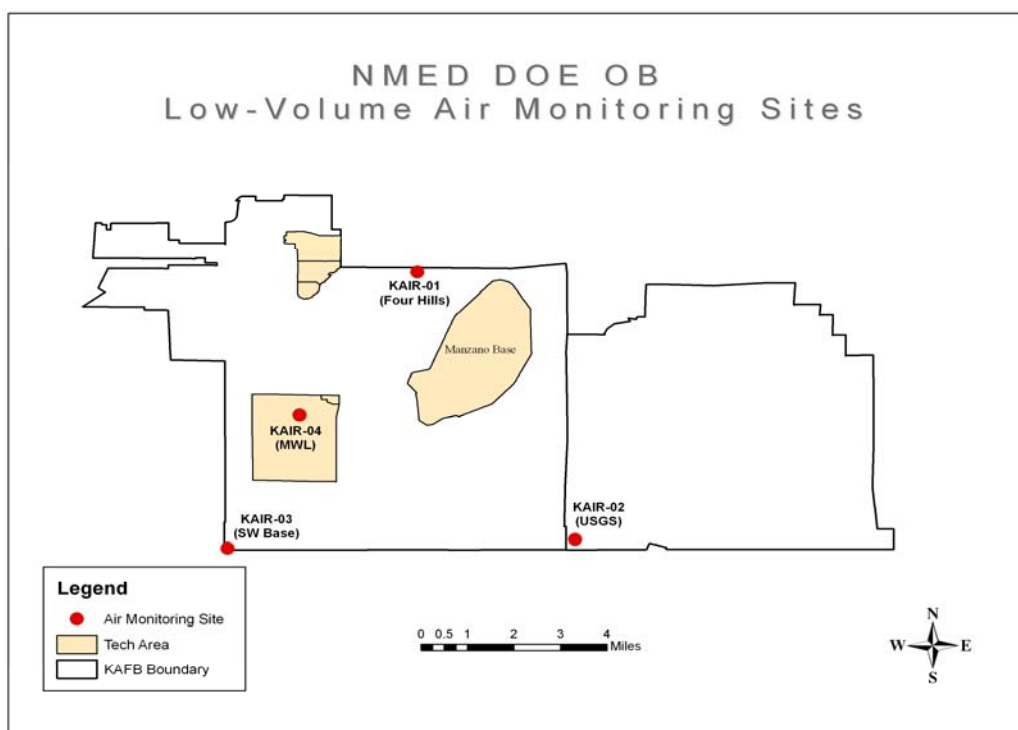
### *Low-Volume Radioactive Particulates and Tritium Air Monitoring*

This project evaluates the ambient air concentrations of gross alpha/beta, isotopic americium, isotopic plutonium, isotopic uranium, gamma emitting isotopes, and tritium at the SNL. The Bureau operates air monitoring stations to collect airborne particulate matter and water vapor at Sandia using NMED sampling protocols and procedures. Air particulate matter consists of minute “dust” particles collected on a polypropylene particulate filter. Water vapor is collected by passing a known volume of air through a silica gel-filled cartridge, a hydrophilic compound that traps ambient air moisture.

Staff collects samples from three perimeter locations and one on-site location. Perimeter locations include Four Hills (KAIR-01), USGS (KAIR-02), and SW Base (KAIR-03). The on-site station is located directly north of the Mixed Waste Landfill (KAIR-04). Particulate filters from each site are collected bi-weekly and composited at the end of each quarter. Tritium cartridges are exchanged bi-weekly at the MWL, and they are exchanged after each quarter from the perimeter locations.

Air particulate filters and silica gel samples from third and fourth calendar quarter were shipped for analysis. Third quarter data results were delivered to DOE without any reported anomalies. Fourth quarter air data analysis is currently under review and will be reported to DOE during 2008.

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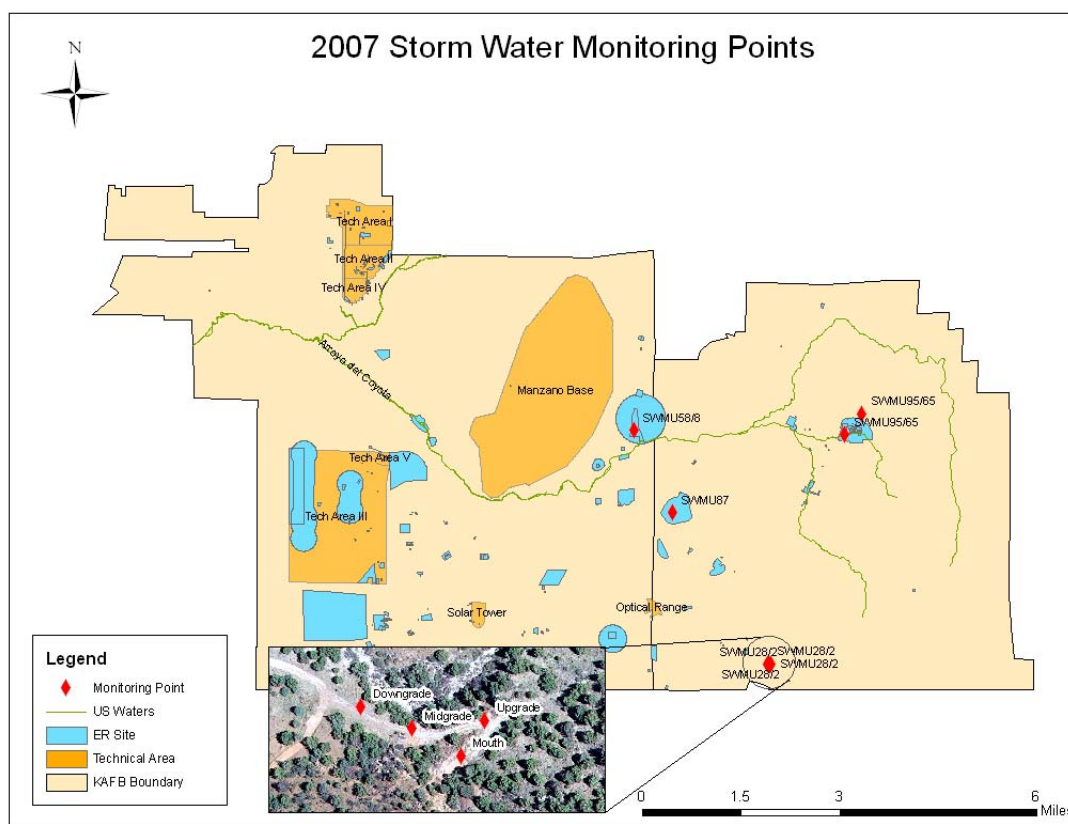


### *Storm Water Monitoring*

Bureau staff deployed ten single stage sampling units throughout Kirtland Air Force Base in order to collect samples up-gradient and down-gradient of Solid Waste Management Units (SWMUs). The stormwater monitoring project evaluates contaminant migration off of SWMUs to ensure engineering controls and management practices at SNL are effective and in working order. The SWMUs of concern include 28/2 (Mine Site – 4 monitoring points), 87 (SNL building 9990 – 1 monitoring point), 95/65 (Burn Site – 2 monitoring points), and 58/8 (Coyote Canyon Blast Area – 3 monitoring points).

During the first quarter of 2007 Bureau staff collected 12 samples, which were analyzed for radionuclides, metals, and suspended sediment. Third quarter samples were analyzed for PCBs, suspended sediment concentration, dioxins/furan, dissolved and total metals, high explosives, and radionuclides. Samples were collected in early December from SWMU 28/2, 58/8, and 87 and analyzed for dissolved metals, dioxins/furans, radionuclides, gross alpha/beta, gamma spectroscopy, isotopic uranium, and high explosives. All stormwater data analysis is currently under review and will be reported to DOE during 2008.

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### *High Explosives Monitoring*

Bureau staff submitted the 2005 High Explosives Data Submittal Letter to DOE. Staff collected a total of eleven samples to be analyzed for High Explosives (HE) in groundwater. Samples were collected from groundwater monitoring wells at TAV (8), Lurance Canyon (2), and Tijeras Arroyo Groundwater (TAG) (1). All samples collected from SNL monitoring wells indicated non-detects for all HE compounds.

### *D & D Activities (Demolition and Decommissioning) Monitoring*

Bureau staff submitted air samples collected before and during Building 806 demolition. Samples were analyzed for asbestos, radiological constituents, and metals.

Bureau staff coordinated with analytical laboratory for proper sample preparation (splitting) of FFY06 high volume air samples from Building 806 demolition. Eight (8) PCB soil samples from Building 806 basement were lost due to refrigerator failure.

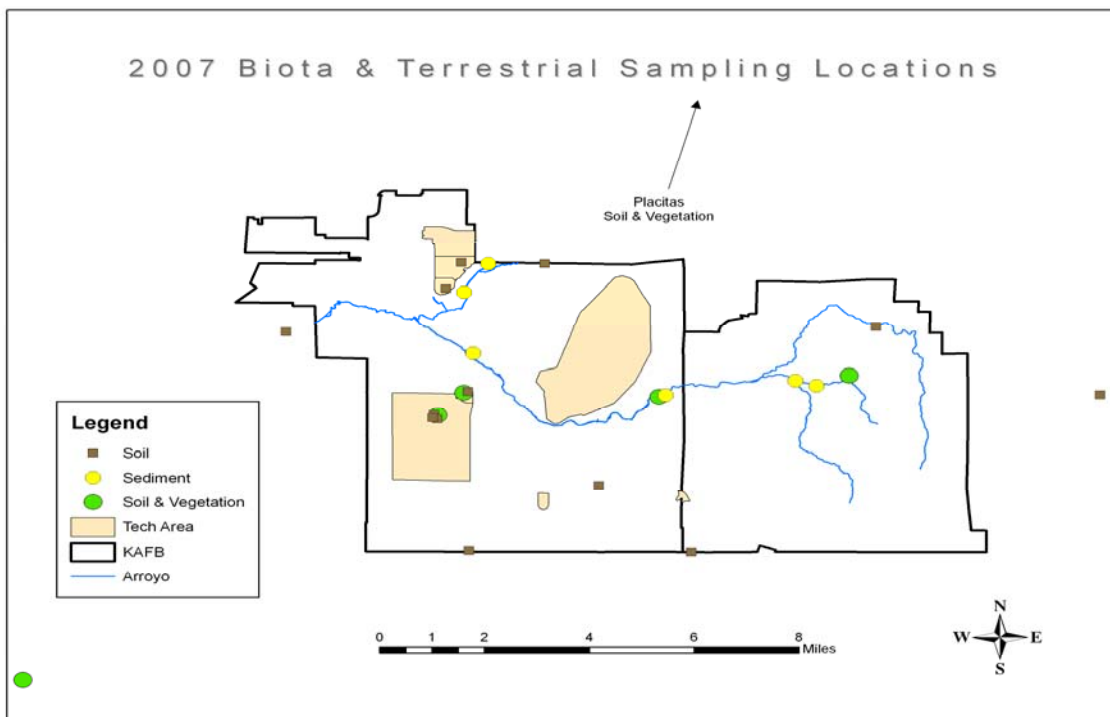
Bureau staff began compiling and evaluating Building 806 demolition data.

### *Biota/Terrestrial Monitoring*

Between June and July 2007, the Bureau staff split surface soils, arroyo sediments, and vegetation samples with Sandia personnel from various on-site, perimeter, and off-site locations.

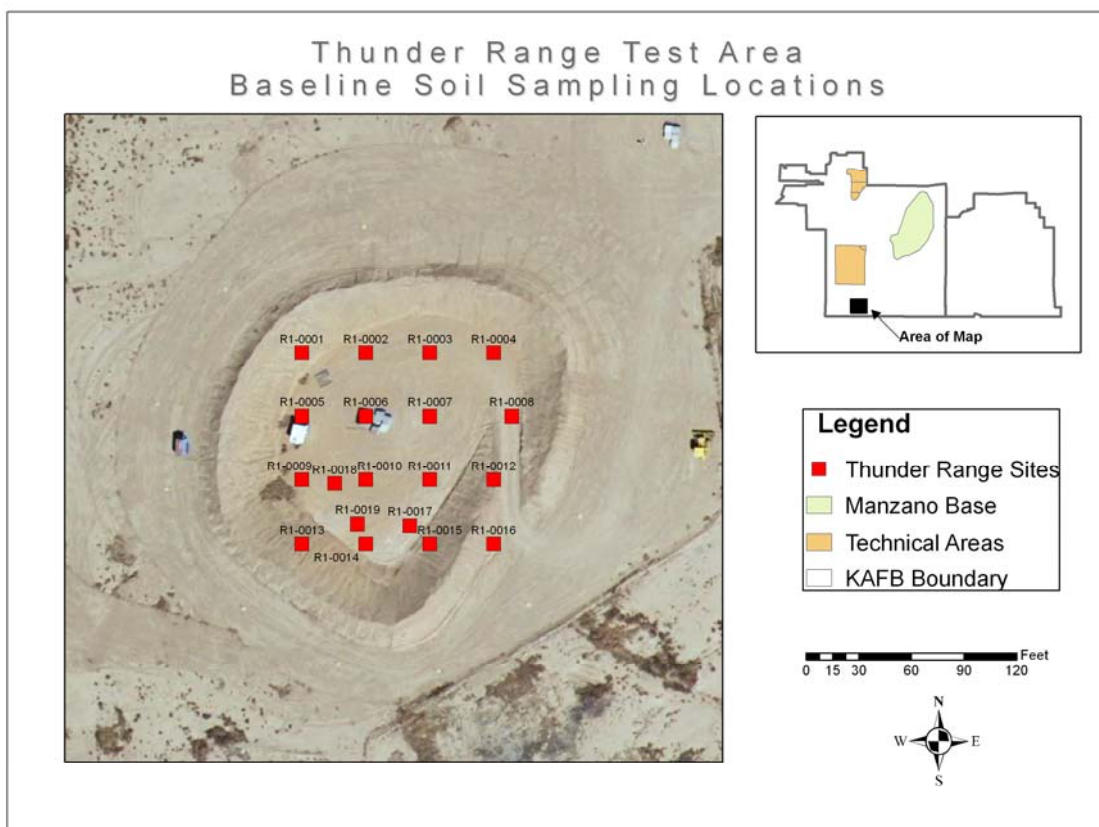
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Bureau staff collected a total of 38 Biota and Terrestrial samples from 29 different locations, which consisted of 22 soil, 9 vegetation, and 7 sediment samples. Bureau staff sent the samples to an independent laboratory for Target Analyte List (TAL) metals plus total uranium and Gamma Spectroscopy analyses. The biota and terrestrial data analysis is currently under review and will be reported to DOE during 2008.



On September 4, 2007 the Bureau staff split surface soil samples with Sandia personnel near and around the bermed area at the shock tube in the old ER-91 Lead Firing Site designated as T-Range-1 (Thunder Range). Staff collected soil samples from nineteen (19) locations for the purpose of determining baseline conditions against which potential future impacts to the environment from operations could be evaluated. Sample collection sites were included in a dense, 16-point grid superimposed over the circular basin within the range. In addition, 3 judgmental samples were collected from discolored or low-level areas that showed signs of water accumulation. Soil samples were collected from the surface to a depth of 2 inches and sent to an independent analytical laboratory for Target Analyte List (TAL) metals plus total uranium, High Explosives (HE) and Perchlorate analyses.

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The Bureau data results are compared to applicable New Mexico Residential and Industrial Soil Screening Levels (SSLs), EPA Region-6 Risk-Based Human Health Medium Specific Screening Levels, and Sandia data results.

Arsenic levels were at or above the Residential SSL of 3.9 mg/kg at six locations and above the Industrial SSL of 17.7 mg/kg at one location. Elevated arsenic levels ranged from 3.9 mg/kg at three locations to 30 mg/kg from sample TR-R1-0010-SS. Lead was detected above the NMED Residential SSL of 400 mg/kg from sample TR-R1-0001-SS and was also detected above the industrial SSL of 800 mg/kg from sample TR-R1-0011-SS. Lead concentrations from these two locations were 730 mg/kg and 17,000 mg/kg, respectively. The analytical laboratory analyzed this sample using two different methods. The TAL metals by ICP-MS method 6020 yielded a concentration of 17,000 mg/kg. The second method, method 6010, yielded a concentration of 16,000 mg/kg.

The laboratory later re-analyzed a separate aliquot of the original sample for lead using method 6020 by ICP-MS. The result of lead from the second aliquot was 78 mg/kg, which is below residential and industrial SSL of 400 mg/kg and 800 mg/kg, respectively. It was determined that a particle of lead from the Thunder Range test area was introduced into the original sample, thus resulting in the higher concentration in the original aliquot.

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Nitroglycerin, 2,4-Dinitrotoluene, PETN, and RDX were all detected above the MDL at Thunder Range. Each of these HE compounds was below the New Mexico residential and industrial SSL. Perchlorate was detected at eight locations. The samples from six of these locations were qualified by the analytical laboratory as “J” designation, indicating that the values were estimated. Perchlorate concentrations ranged from 0.000104-0.0026 mg/kg.

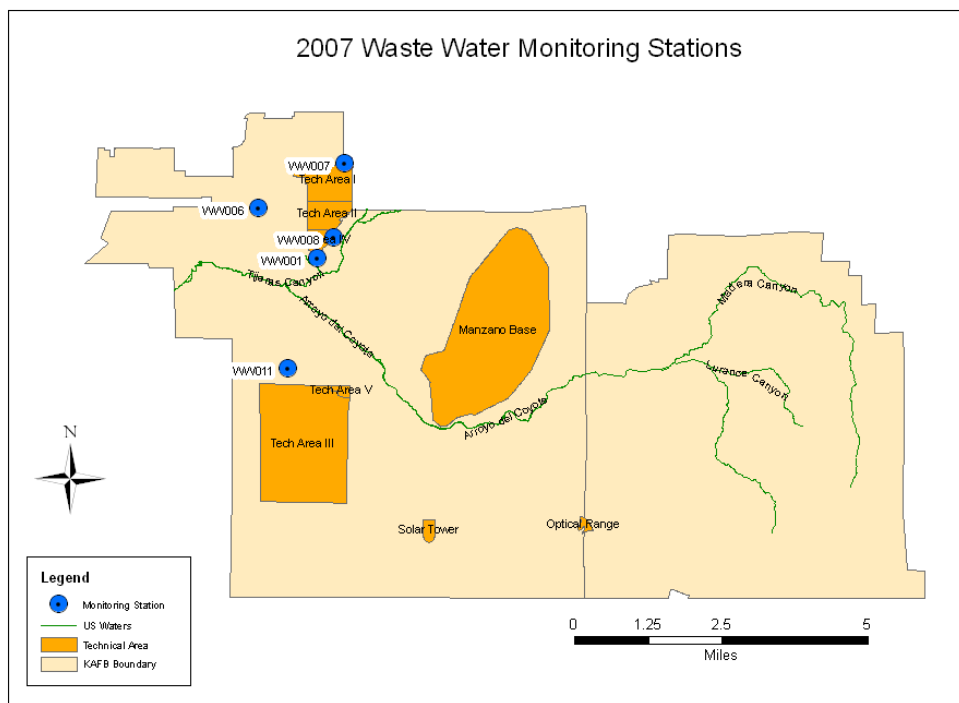
After reviewing both data sets, an additional sampling event has not been recommended. The data collected from Thunder Range will provide the Bureau and Sandia with a strong baseline against which to evaluate potential future operational impacts at Thunder Range.

*NPDES Outfall Monitoring (Waste Water Monitoring)/Spills*

The Bureau staff monitors wastewater discharge points from Sandia National Laboratory Technical Areas for constituents pursuant to the effluent discharge permit issued by the City of Albuquerque. Wastewater flows through individual monitoring stations where the flow is measured as it passes through flumes constructed in “man holes” adjacent to each location. Wastewater sampling is used to appraise the effectiveness of the Sandia implemented engineering controls or management practices to prevent an inadvertent release of radioactive materials into the effluent stream.

Bureau staff submitted the 2005, 2006 and 2007 waste water monitoring results to DOE for review. Samples were analyzed for gross alpha/beta, Target Analyte List (TAL) metals + U, and gamma spectroscopy. All sample concentrations were below limits listed in the Albuquerque Bernalillo County Water Utility Authority Sewer Use, the Wastewater Control Ordinance and the Sewer Release Standards of the 20.3.4 NMAC.

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*Technical Review*

The Bureau is converting historical data files for the Sandia Oversight office. Many of the historical files are either only in hard-copy format, or an incompatible electronic data deliverable (EDD) format. The outcome of this effort will lead standardization of site environmental data in a local database.



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## **WASTE ISOLATION PILOT PLANT**

### **Public Outreach at WIPP**

#### *WIPP Quarterly Meetings*

Bureau staff participated in the WIPP Quarterly meetings where Oversight Bureau activities are reported to DOE and stakeholders.

#### *Training*

Bureau staff completed Radiation Worker II and general employee training in addition to department required training. Staff scientists Thomas Kesterson and Dean Foster participated in safety and orientation training specific to filter collection activities at the site as required by DOE.

### **Environmental Monitoring At WIPP**

#### *National Emissions Standards for Hazardous Air Pollutants (NESHAP) Monitoring*

Bureau staff continued collection of filters at Station A, the NESHAP compliance point, with assistance from CEMRC. Station A filters from August 2005 to June 2006 were composited into monthly allotments, and were shipped to Pinnacle Laboratories in Albuquerque for analyses. An additional 6 months of Station A air filters were composited and shipped for analyses. Together these two sets of samples will conclude analyses on air filters collected during 2005 and 2006.

Air filters from the WIPP mine ventilation system exhaust shaft continue to be collected and archived for shipment to contract Laboratories.

The Bureau has received results from WIPP “Station A” NESHAP air filters in the form of a data report from Paragon Analytics. There were no detections of transuranic isotopes during the eleven months of daily filter collection from August 2005 to June 2006. Paragon has been experimenting with various digestion/muffle techniques to maximize the dissolution of particulates from the synthetic filter media.

#### *WIPP Volatile Organic Compound (VOC) Monitoring Program Audit*

Bureau staff observed surveillance (audit) of the WIPP volatile organic compound (VOC) monitoring program. The VOC program collects data on the airborne volatile organic compounds emanating from nuclear waste drums disposed in the underground waste disposal rooms at WIPP. Overall, the VOC program is determined to be adequate, satisfactorily implemented, and effective.

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### *Direct Penetrating Radiation Monitoring*

Bureau staff deployed Electret gamma monitors in July 2006 and collected our first direct penetrating data at the WIPP site on October 19<sup>th</sup>, 2006. Gamma doses ranged from 10.8 – 12.1  $\mu\text{rem/hr}$  within and at the WIPP exclusive-use boundary fence. The control Electret located in Carlsbad registered 11.3  $\mu\text{rem/hr}$  suggesting that WIPP nuclear waste disposal activities did not elevate gamma doses in the vicinity of the facility above background levels.

Gamma radiation surveillance utilizing Electret devices has been expanded to include six additional Electret devices as stipulated in the revised Electret QAPP document. The devices are deployed around the WIPP exclusive use boundary.

Bureau WIPP oversight staff will continue collecting quarterly Electret data on a routine basis. All sampling location descriptions and sample numbering schemes are being compiled and forwarded to Bill Bartels of the LANL Oversight Office so results will be entered into the Oversight Bureau's state-wide Access database.

### *Groundwater and Surface Water Monitoring*

Bureau staff reviewed the semi-annual discharge monitoring report and forwarded comments to NMED Ground Water Quality Bureau and WIPP DOE point of contact.

### *Low Volume Radioactive particulates and Tritium Monitoring*

The Bureau has purchased air sampling equipment to establish particulate monitoring stations around the WIPP facility and in the city of Carlsbad. These efforts are part of a Bureau wide effort to standardize equipment and methodologies within the particulate air monitoring program.

Bureau staff completed the DRAFT low volume air sampling QAPP.

Bureau staff began collecting radiological air samples from 6 low volume air samplers. Three air monitoring stations are located at the WIPP site, one is located in the town of Malaga, one is located in the city of Carlsbad, and one is located in the city of Artesia. The three samplers are deployed in cities along the WIPP waste transportation route in order to determine background radiological conditions in these population centers and to establish Bureau capability for detecting releases that might be attributable to WIPP trucks in the future. These three cities are providing secure sampling locations and access to electricity at each site. The Carlsbad Bureau staff will be changing low volume air filters at these locations on a weekly basis.

### *Surface Water, Soil, and Biota Monitoring*

Bureau staff has obtained sampling protocols and data quality objective procedures for DOE contractor monitoring of surface water, soil, animal tissue, and vegetation at WIPP. Bureau staff will use these documents as guidance for generating WIPP specific sampling QAPPs as well as a programmatic QAPP for the Bureau.

Bureau staff has been working with the DOE in an effort to gain access to the real-time WIPP Waste Information System (WWIS). Access to this data is essential for meaningful oversight of WIPP.

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*RCRA Compliance Monitoring*

The “fugitive drum” that was discovered to contain liquid disallowed under the hazardous waste permit was safely removed from the underground and packaged for shipment back to Idaho. Bureau staff was closely involved in observing all retrieval operations including planning and dry runs utilizing full scale mockups of waste handling procedures. Multiple media articles tracked the progress of the retrieval process. Internal reports to NMED officials were augmented by direct reports from the Bureau staff.