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1999 Annual Performance Report

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



The 1999 Annual Performance Report is a publication of the
New Mexico Environment Department DOE Oversight Bureau.

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Executive Summary

The New Mexico Environment Department's Oversight Bureau is funded by a grant from the U.S. Department of Energy with provisions set forth in an Agreement-in-Principle between the State of New Mexico and the U.S. Department of Energy. The agreement provides for state oversight of environmental impacts at three DOE facilities: Sandia National Laboratories (SNL) in Albuquerque, Los Alamos National Laboratory (LANL) in Los Alamos, and the Waste Isolation Pilot Plant (WIPP) near Carlsbad. This Annual Performance Report highlights the activities of the DOE Oversight Bureau for calendar year 1999. You are encouraged to contact the Oversight Bureau for additional copies of this report. The Bureau's address is on the inside cover. This report is also posted on the New Mexico Environment Department's website at www.nmenv.state.nm.us.

The Oversight Bureau has continued working closely with the site-specific citizen advisory boards (CAB) for Sandia and Los Alamos National Laboratories. Bureau staff members attended monthly meetings, gave presentations at board meetings and actively participated in the work of committees. Staff worked with the LANL Neighborhood Environmental Watch Network (NEWNET) project and community representatives in facilitating meetings of the Community Radiation Monitoring Group. Staff also worked with the environmental offices of San Ildefonso, San Juan and Santa Clara Pueblos, and hosted a public meeting at Northern New Mexico Community College where the pueblos, LANL, and the Bureau discussed the status of their respective environmental monitoring programs.

The Oversight Bureau made progress in working with both Los Alamos and Sandia National Laboratories and regulators (among them the U.S. Environmental Protection Agency) in the area of environmental restoration. Bureau staff designed and implemented a process to bring potential problems to the attention of regulators in a timely way so the facility and regulators can resolve the issue before it becomes a significant problem.

At Los Alamos National Laboratory, the Oversight Bureau participated on teams with LANL personnel to resolve issues relating to their proposed No Further Action sites. Bureau staff worked to help complete investigations at town site locations, and helped resolve problems as they arose relating to the cleanup of a seven-acre disposal site known as MDA-P. Staff participated in the development of guidance documents for the evaluation of ecological risk and clean-up levels for PCBs. Other staff members followed the hydrogeologic and canyons investigations being conducted by the Laboratory, and participated in the evaluation of sites for erosion and contaminant transport potential. Staff communicated concerns about residual contamination on Los Alamos County property below an old wastewater treatment facility after our samples revealed elevated levels of radionuclides.

At Sandia National Laboratories, the Oversight Bureau facilitated communication between the regulators and SNL as excavations at the Chemical Waste Landfill proceeded. Oversight of permitting and waste management issues in the operation of the Corrective Action Management Unit was a continuing activity. Bureau staff also participated on a team evaluating the erosion potential of some environmental restoration sites located near watercourses.



Monitoring of air, water, and biota continued at both LANL and SNL. Results were consistent with historical measurements and did not exceed federal or state standards. At LANL, Bureau staff collected samples from wells and springs, both on and off-site, and storm water from five of the LANL major drainages. In addition, Bureau staff worked to better understand and resolve issues relating to the response of the NEWNET gamma radiation monitor to neutrons generated by facilities at TA-18. At SNL, two groundwater-monitoring wells were sampled before they were plugged and abandoned by the Air Force. Samples from wells near the former Inhalation Toxicology Research Institute (ITRI) facility showed concentrations of nitrates similar to previous years.

Finally, in 1999 DOE began shipping both transuranic and transuranic-mixed waste to the Waste Isolation Pilot Plant (WIPP). The Bureau continued to maintain its network of gamma radiation monitors around the WIPP facility and all results were within previous monitoring backgrounds.



Introduction and Program Overview

The mission of the New Mexico Environment Department's DOE Oversight Bureau is to help assure that activities at DOE facilities in New Mexico are protective of public health, safety, and the environment. The DOE Oversight Bureau's activities are funded by a grant from the U.S. Department of Energy in accordance with the provisions set forth in the *Agreement-in-Principle between the State of New Mexico and the U.S. Department of Energy*. This agreement focuses on state oversight of environmental impacts at DOE facilities: Sandia National Laboratories in Albuquerque, Los Alamos National Laboratory in Los Alamos and the Waste Isolation Pilot Plant near Carlsbad.

The *Agreement-in-Principle* resulted from an initiative by DOE to improve its accountability concerning public health, safety and environment protection. States hosting DOE facilities were provided resources to develop and maintain a credible oversight program. The agreement consists of four primary objectives:

- To assess the Department of Energy's compliance with existing laws including regulations, rules, and standards.
- To participate in the prioritization of cleanup and compliance activities at the Department of Energy's facilities.
- To develop and implement a vigorous program of independent monitoring and oversight.
- To increase public knowledge of environmental matters about the facilities, and coordination with local and tribal governments.

The first *Agreement in Principle* became effective on October 11, 1990; the second five year agreement will expire on September 30, 2000. Talks regarding a new agreement are underway.

Personnel and Administration

The New Mexico Environment Department has 27 positions funded in 1999 by the Department of Energy to meet the State of New Mexico's obligation under the *Agreement-in-Principle*.

NMED employees funded by the DOE grant are located at state offices in Santa Fe and at "site offices" in White Rock, and Kirtland Air Force Base in Albuquerque. Environmental oversight and monitoring of the Waste Isolation Pilot Plant is presently accomplished by staff based in Santa Fe.

Inter-Agency Management Group

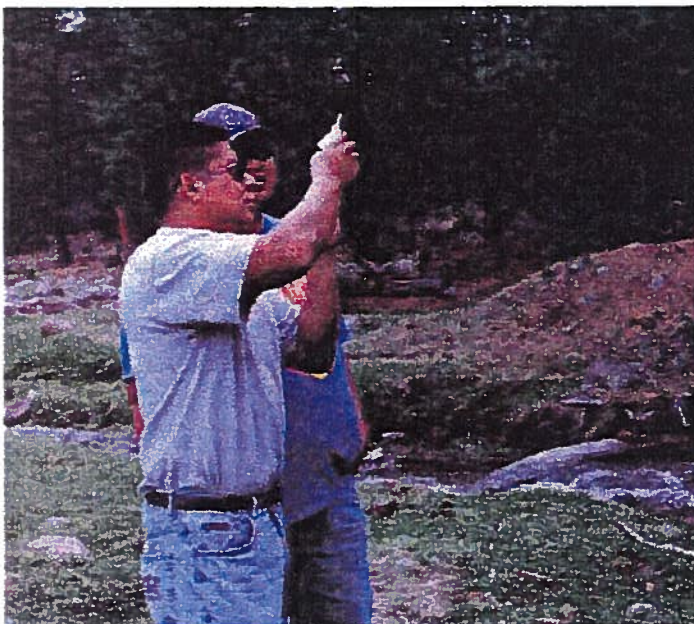
The DOE Oversight Bureau continues to participate in meetings of an inter-agency management group charged with overcoming technical, administrative and regulatory barriers to the clean up of contamination at Sandia and Los Alamos National Laboratories. The Management Implementation Group (MIG) is composed of representatives from the Environment Department, U.S. Environmental Protection Agency, Department of Energy, and Los Alamos and Sandia National Laboratories. The group meets every other month. The ongoing meetings have facilitated greater levels of trust and understanding, and a framework for ensuring progress in the clean-up programs. High performance teams comprised of technical people from the respective organizations are working to address priority sites with contamination at Sandia and Los Alamos. The MIG will be assessing the progress of these teams in achieving their goals.



Intergovernmental Coordination and Public Involvement

Accord Pueblos

The four northern pueblos in closest proximity to LANL are San Ildefonso, Jemez, Santa Clara and Cochiti. These pueblos are referred to as the Accord Pueblos. Each has a *Memorandum of Understanding* (MOU) with LANL for environmental monitoring on their contiguous lands. In the case of the San Ildefonso Pueblo, the Oversight Bureau has developed a working relationship that allows us to collect duplicate samples alongside LANL on Pueblo lands. The Bureau is currently developing similar relationships with the other Accord Pueblos to



Kevin Tafoya and Mike Chavarria, Environmental Specialists for Santa Clara Pueblo, observe a sample of benthic macroinvertebrates collected by the Oversight Bureau from Santa Clara Creek.

expand this sampling. In 1999, a total of 12 drinking water production wells and springs were sampled at San Ildefonso. All results were within the normal range of background. The

intergovernmental coordination that enables this sampling is an excellent example of how cooperation can get an important job done.

Los Alamos County

This year the DOE Oversight Bureau worked with the County of Los Alamos in dealing with concerns over contamination in a county park on land formerly owned by the DOE. Although we coordinated closely with the County on the actual sampling activity, we were less successful in communicating our findings and concerns based on our assessment of the

sampling data. To help facilitate better communication, it was decided that we should participate in ongoing meetings between the DOE and the County dealing with water and wastewater systems and the LANL Environmental Restoration Project's work on County land. In addition, the Los Alamos Area Office of the DOE agreed to forward to the County data provided to them by the Bureau under existing protocols. For additional information, see *Investigations in Acid Canyon*, page 13.

Interstate Technology and Regulatory Cooperation

Roger Kennett, the program manager of the DOE Oversight Bureau's SNL Oversight office was elected Co-Chair of the Interstate Technology and Regulatory Cooperation (ITRC) Work Group. Roger has chaired numerous sub-committees, and is currently head of the Leadership Team, which provides upper level planning and direction for the ITRC. This



is a national coalition of state environmental agencies, the public, tribes, industry stakeholders, and numerous federal agencies. ITRC looks at new technologies that have potential for faster and lower cost solutions to cleaning up wastes at federal/private facilities. ITRC incorporates stakeholder input into a multi-state evaluation matrix and gains a broader understanding of promising new technologies. This approach speeds the approval and use of these technologies.

Several innovative technologies were evaluated in New Mexico when the ITRC Radionuclides Team toured SNL and LANL. Bureau staff observed the operation of the Segmented Gate System, which passes soil along a conveyor belt under two sets of gamma radiation detectors. They also observed a test of an in-situ vitrification process. The process is designed to stabilize buried radioactive materials using high temperatures generated by passing large electrical currents through the subsurface. Finally, the Bureau was invited to participate in an on-site briefing of the Alternative Landfill Cover Design, which had been demonstrated earlier at SNL.

The Investigation at a Residence in White Rock

At the DOE's request, the Oversight Bureau's expertise in hazardous waste site assessment was tapped to assist with the investigation of a private residence in White Rock, New Mexico. A homeowner had recently remodeled her residence and was concerned about the previous owner's use and storage of chemicals including

radioactive substances on site. Apparently, the former owner, a Los Alamos National Laboratory retiree, had operated a small lab on the premises and routinely experimented with depleted uranium as well as other hazardous chemicals.

The Bureau hired an environmental consultant to conduct an initial radiological and hazardous substance screening assessment of the two-acre property. The investigation focused on the residence and two storage sheds located behind the house. Results showed that a small patch of contaminated soil was present below the doorway of one of the sheds. The contamination was determined to be depleted uranium and was slightly elevated above local background. The on-site liquid waste system was also investigated and no elevated levels of hazardous or radioactive constituents were detected. Our assessment also identified a secondary liquid waste disposal system, which was not investigated.

Results from the investigation indicated that there was no significant risk to human health. However, due to the presence of low levels of contamination and the discovery of a secondary liquid waste system, the DOE moved forward to complete a more thorough assessment. During this second assessment, subsurface piping and sewer lines of the secondary system were located and sampled. A commercial lab analyzed the samples. The Bureau and the New Mexico Environment Department concurred with DOE's results that confirmed all residual contamination detected at the White Rock property was far below levels that would pose any risk to current or future residents.



Public Involvement

Citizen Advisory Boards (CABs)

Oversight Bureau members continue to participate actively in the CABs for both SNL and LANL. DOE and SNL presented the Sandia CAB with a number of proposed actions in 1999. As an interested party to this CAB, we provided information on these actions to board members. We also participated in their subcommittees such as the Groundwater and Radioactive Waste task groups and the Outreach Committee to help raise the community's awareness of our respective roles in the oversight of SNL's environmental restoration project. Our Albuquerque staff also spoke to a general membership meeting of the Trumbull Neighborhood Association. We shared information about SNL's legacy waste, our monitoring of the current cleanup activities, and the Bureau's role in these activities.

The Bureau also worked closely with the LANL CAB and its subcommittees. We provided information on numerous No Future Action proposals, on LANL's watershed approach, and further monitoring of the regional aquifer. Members of the CAB shared our concerns with the slow progress and escalating costs of the ground-water investigations at LANL. We assisted the LANL CAB's Environmental Surveillance Committee in developing recommendations designed to address these concerns. These recommendations were submitted to DOE as part of the formal review process.



NMED's Water and Waste Management Division director Greg Lewis with LANL representatives at a public meeting June, 1999 in Los Alamos.

NEWNET and the Community Radiation Monitoring Group

The Neighborhood Environmental Watch Network (NEWNET) program promotes better understanding of the environment through collaboration between the public, government, educational institutions, and industry. Developed by LANL, NEWNET provides real-time gamma radiation and meteorological information to anyone with access to the Internet. Monitoring stations in New Mexico, Nevada, Alaska, Mississippi, and Utah collect information that is transmitted by satellite to earth stations at Los Alamos and Las Vegas, where the data are then made available through the Internet.

In New Mexico, the Bureau facilitates the community program for the NEWNET project through the Community Radiation Monitoring Group (CRMG). It is composed of citizen volunteers, staff members from the Bureau, environmental activist groups, the Department of Energy, LANL, and several northern New



Mexico Pueblos. This group helps develop policy and direction for the NEWNET program.

In 1999, the training of NEWNET station managers and other interested parties in radiation monitoring continued to be a major focus of Bureau activities. The Bureau helped to present information about the New Mexico community radiation-monitoring program to NEWNET station managers and staff of the Alaska Department of Environmental Conservation. Closer to home in northern New Mexico, a four-hour condensed summary and a two-day intensive class were held in the fall for interested parties. Currently, a third course is being developed to provide training in the interpretation of NEWNET data.

During the year, we worked with CRMG's subcommittees on other several issues. The Data Quality subcommittee made significant progress in the preparation of a *Data Quality Objective Statement* (which standardizes the data reported). Another subcommittee focused on problems relating to a NEWNET station at the LANL Kappa Site. At this site, the NEWNET sensors or ionization chambers, which are designed for the detection of gamma radiation, are apparently responding to neutrons from experiments conducted at nearby TA-18. Because the ionization chambers have given an elevated response when this occurs, some of the subcommittee members felt that the Kappa Site sensor should be moved. By the year's end, the consensus of the subcommittee was to leave the sensor in place.

The Bureau also continued to negotiate with LANL for a second NEWNET station in the Albuquerque area. An ad hoc group representing local government, public school officials, teachers, community leaders, the Bureau and SNL as well as LANL personnel selected a location at Rio Grande High School. Under the proposal developed, if LANL would supply the NEWNET station hardware, Albuquerque Public Schools would prepare the

location at the school, and two high school science teachers would share the state manager duties. Bureau staff would perform scheduled maintenance and SNL would evaluate the quality of the data. This NEWNET station in Albuquerque potentially would be a valuable educational tool while providing radiation data for the South Valley community of Albuquerque.

Finally, a Bureau staff member was asked by LANL's NEWNET Project Leader to co-

facilitate a portion of the annual training for NEWNET station managers for the State of Alaska. This was advanced training for station managers held in Fairbanks, Alaska from June 6-14, 1999. The sponsors were the Alaska Department of Environmental Conservation, the University of Alaska, and the NEWNET station managers of Alaska. At



LANL's NEWNET system is part of a larger worldwide system. Jennifer Curtis of Kotzebua, Alaska attended Station Managers training at the University of Alaska.

the training, the Bureau presented how "regular and frequent" meetings with grassroots members of the New Mexico Community Radiation Monitoring Group enriched the NEWNET system. Besides developing a communication link with the Alaska group, the facilitation provided an opportunity to evaluate their program.



Conference Participation and Presentation of Papers

The annual DOE Technical Information Exchange conference was held in Las Vegas, Nevada on October 27, 1999. The Bureau presented an overview of its involvement with SNL's Chemical Waste Landfill. We presented information about the value of reviewing technical documents and commenting while the activity is still in the project planning stages. We also presented a summary of the primary planning document comments issued and the various tools used to report the project's progress.

The Bureau also presented a poster entitled *AIP Group at LANL Illustrates That Sampling Methodology Is Crucial for Proper Site Characterization of Old Manhattan Project Site at Los Alamos*. The poster depicted the results of the Bureau's investigation at Acid Canyon. A copy of the accompanying report is available by contacting the Bureau.

At the New Mexico Environmental Health Conference, held in Albuquerque October 24, 1999, Dr. Robert Weeks presented a paper entitled *The Importance of Proper Interpretation of Environmental Analytical Results*. The paper puts the language of a statistician in non-statistician terms allowing for the proper use and interpretation of environmental analytical chemistry data (which to a large degree defines the cost of environmental mitigation, remediation, and restoration projects).

Educational Outreach to Youth

Two members of the DOE Oversight Bureau's SNL oversight office participated in the 1999 *Northwestern New Mexico Regional Science & Engineering Fair* held at the University of New Mexico. Prior to the judging, two of our scientists evaluated entries from sixth, seventh,



Darlene Goering, Environmental Specialist, answers questions for students on radiation at the Turquoise Train Elementary School during Career Day.

and eighth grade students in the zoology category. The evaluation focused on how the students applied the scientific method to their project—this allowed judges to offer constructive feedback on projects from a different field. Bureau staff interacted with bright and creative young scientists on projects such as fruit fly genetics and turtle and reptile behavior. These projects often had interesting names such as "Earthworms on the Move!"

The New Mexico State Fair

The DOE Oversight Bureau organized and staffed a booth at the State Fair along with other NM Environment Department representatives.



The booth was staffed 12 hours a day for 10 days. Our staff answered questions for the public and provided information and publications on a variety of environmental programs supported by the New Mexico Environment Department. One interesting request was from a member of the public with a potential PCB discharge to her property. We provided information about PCBs and were able to connect her with the appropriate agency.

Publications

The following technical reports were issued during 1999:

NMED/LANL 1996 Soil Results: Data Evaluation and Statistical Comparison, David Englert, November 1999.

Flora and Fauna Sampling Results at Los Alamos National Laboratory, New Mexico During 1995 and 1996, Bryan Vigil and Raymond Montoya, December, 1999.

NMED/DOE/OB Annual Report, June 1999,
New Mexico Department of Environment

Newsletter, *Environmental Report*, Spring
1999, NMED/DOE/OB, April 1999

Newsletter, *Environment Report*, Summer 1999,
NMED/DOE/OB, July 1999

Newsletter, *Environment Report*, Winter 1999,
NMED/DOE/OB, December 1999

A complete list of Bureau reports and publications is available upon request by contacting the DOE Oversight Bureau, 2044-A Galisteo, Santa Fe, New Mexico 87505, (505) 827-1542 or by e-mail:

Judith_Moss@nmenv.state.nm.us. These documents are also available at the New Mexico Environment Department's website: www.nmenv.state.nm.us.



Los Alamos National Laboratory (LANL)

Legacy Waste Cleanup

To facilitate the review of documents and speed the completion of investigations and cleanups at the Los Alamos National Laboratory (LANL), the Oversight Bureau helped to develop a project management structure that includes our staff, regulators, LANL, and DOE representatives. The structure resulted in the formation of "High Performance Teams," with each team focusing on an important or priority problem. Examples include teams working on the investigations at a site known as the "260 Outfall," the development of a core document for the remediation of Material Disposal Areas (MDA), and the preparation of an integrated investigation plan for Technical Area 35.

Besides the High Performance Teams, Bureau staff worked to complete important tasks and resolve significant issues. Staff members helped to review documentation on 190 sites proposed for removal from regulatory oversight under the Hazardous and Solid Waste Amendments (HSWA) permit, and to resolve questions on sites that are not permitted. Others worked with LANL investigators to develop guidance for the assessment of environmental risk. We continued to work with LANL to complete the investigation and remediation of properties located in the Los Alamos town site. Significant efforts were made to promote the completion of the closure of a high explosives disposal site at TA-16 known as MDA-P. We continued to participate in the investigation of the canyons, and monitored the possible transport of contaminants through canyon systems. We encouraged and promoted the work of the Laboratory's hydrogeologic investigators to better understand the movement of contaminants in the aquifer.

Ecological Risk

The investigation and cleanup of legacy waste sites under the Resource Conservation and Recovery Act (RCRA) requires an evaluation of risks to human health and the environment. Acknowledging that protection of human health may not adequately provide for protection of the environment, the U.S. Environmental Protection Agency (USEPA) issued guidance on ecological risk assessments. Based on this guidance and site-specific information, LANL and the New Mexico Environment Department will need to agree on methods for evaluating ecological risks posed by each legacy waste site.

As part of this process, the DOE Oversight Bureau has continued to participate with LANL in the development of a risk-based method for screening sites based on ecological risk factors. In December 1999, LANL issued a guidance entitled, *Screening Level Ecological Risk Assessment Methods* for reaching consensus with regulators, managers, stakeholders, and other interested parties on the methods to be used when screening sites based on ecological risk factors. Bureau members are teaming with LANL to apply these screening methods to environment restoration decisions at the Los Alamos sites.

No Further Action Team Involvement

The DOE Oversight Bureau participated on a team with the Hazardous and Radioactive Materials Bureau and LANL to reach decisions regarding the proposed removal of 190 Solid Waste Management Units (SWMU) from the LANL's Resource Conservation and Recovery Act (RCRA) permit. The SWMUs had previously been investigated and recommended for No Further Action in reports reviewed by NMED. Twice in 1995 and again in September 1996, LANL had requested Class III permit



modifications to remove these units or sites from its RCRA permit.

After an initial review of the requests the team separated the sites into two groups: (1) those that needed additional documentation and (2) those that needed additional sampling. The team reviewed the supporting documentation and data for each of the SWMUs. Team members visited several of the sites to better understand the circumstances surrounding the No Further Action request. Ultimately, the team concurred with 25 of the No Further Action requests based on one of five criteria (**see box below**). It also concluded that some of the remaining sites would require additional sampling before a No Further Action recommendation could be considered. The No Further Action requests for several sites were withdrawn by LANL when the team decided that the sites were not appropriate for No Further Action based on available information.

Drainage Channel Below the Old Catholic Church in Los Alamos

In May 1999, LANL and the DOE Oversight Bureau collected samples in the drainage channel of a septic tank on the property of the Old Catholic church in Los Alamos. The septic system was installed during the early 1940's and

used until the *Central Wastewater Treatment Plan* became operational in late 1947. It processed sanitary sewage from an area where many of the original LANL buildings were located. The drain line from the tank extended to an outfall on the rim of a small drainage channel. Based on a geomorphic survey of the drainage, LANL selected several locations and depths to sample. The Bureau augmented these samples by collecting at different locations and depths. The Bureau's data did not show widespread PCB contamination in the drainage channel as had been expected. However, it did show several metals and radionuclides above background values.

LANL originally investigated the Old Catholic Church site in June 1993 and conducted clean-up activities as part of the investigation. At that time, the tank and its associated drain line were removed and soil samples were collected. The samples revealed several metals, organic chemicals, and radionuclides. In 1994, additional samples collected at the outfall and in the drainage channel below the outfall showed metals and polychlorinated biphenyls (PCBs) at elevated concentrations. LANL investigated the site again in 1998 to address concerns that there was still contamination on the mesa top. Additional samples were collected and a human health screening assessment was conducted on

NFA Criterion 1. The SWMU does not exist; is a duplicate of another SWMU; cannot be located; or is located within another SWMU and, has been or will be, investigated as part of that SWMU.

NFA Criterion 2. The SWMU was never used for the management (that is, generation, treatment, storage or disposal) of RCRA solid or hazardous wastes and/or constituents.

NFA Criterion 3. The SWMU is not known or suspected of releasing RCRA solid or hazardous wastes and/or constituents to the environment. The term "release" means any spilling, leaking, pouring, emitting, emptying, discharging, injecting, pumping, escaping, leaching, dumping, or disposing of hazardous wastes (including hazardous constituents) into the environment.

NFA Criterion 4. The SWMU is regulated under another state and/or federal authority. If the SWMU is known or suspected of releasing RCRA solid or hazardous wastes and/or constituents to the environment, it has been or will be investigated and/or remediated in accordance with the applicable state and/or federal regulations.

NFA Criterion 5. The SWMU was characterized or remediated in accordance with applicable state and/or federal regulations, and the available data indicate that contaminants pose an acceptable level of risk under current and projected land use.



the 1993 and 1998 sample data. No constituents were found at concentrations that posed unacceptable risk to human health on the mesa top portion of the site. LANL is using its data to complete a final report for this site.

Central Waste Water Treatment Plant

LANL began investigating the buried structures, outfalls, and nearby drainages of the Central Waste Water Treatment Plant in 1999. Initially, LANL believed that the wetland below the site, in Graduation Canyon, a tributary of Pueblo Canyon, was the result of runoff from other up-gradient sites. For this reason, the wetland was not originally considered as part of the investigation. However, DOE Oversight Bureau staff working with LANL investigators found drainage patterns along the canyon walls indicating that the treatment plant had discharged non-routine overflows of untreated effluent to the wetland. Based on these findings, LANL's sampling strategy was modified to include the wetland sediments.

The Central Waste Water Treatment Plant dates to the early Manhattan Project days. The plant is located off Highway 502 between the Sombrillo Nursing home and the Los Alamos County airport. From the mid-1940s until the late 1960s, the plant discharged treated and untreated sanitary sewage from residences, businesses, and the Laboratory. In 1967, the land was transferred to Los Alamos County with underground and aboveground structures intact. The County used the land and structures to house their maintenance facilities. Presently, the structures are covered by several feet of fill.

Hydrogeologic Investigations: Year Three

1999 was the third year in the implementation of LANL's Hydrogeologic Workplan. During the past three years, the DOE Oversight Bureau has overseen the implementation of this plan. Under the plan, LANL is drilling 32 deep monitoring

wells in select locations on mesa tops and canyon bottoms to gain a better understanding of the geologic units, especially those that are water bearing. Another important goal is to determine whether there is ground-water contamination. The 32 wells were slated to be installed over an 8-year period. However, as of 1999, LANL had drilled only four deep wells into the regional aquifer, none of which has been completed. The Environment Department has expressed concern over the lack of progress and LANL has implemented some changes intended to accelerate deep well installations.

LANL's most recent deep well was numbered R-15 and was drilled to investigate whether radionuclide contamination exists in the regional water table below Mortandad Canyon. This canyon has historically received radioactive effluent from the treatment facility for liquid radioactive wastewater at Technical Area (TA) 50. For the past seven years, the Bureau has been concerned along with LANL that our data from the shallow water zone in Mortandad Canyon showed nitrate and tritium contamination. By late summer, preliminary results from samples collected at R-15 by both LANL and the Bureau showed no LANL-derived impacts to the deep aquifer, although tritium was detected below regulatory levels in a perched zone about 300 feet above the drinking water table.

At other wells on the west side of LANL at TA-16, samples collected from deep well R-25 showed high explosives contamination. Efforts to assess the extent and amount of this contamination continued throughout 1999. Because of numerous unanticipated technical problems at the well site, proper well development and sampling remained stalled through year's end. However, a major LANL development keyed to the timely characterization of this contamination was the submission of the draft *HE Plume-Chasing Plan*. Produced during the summer as an addendum to the *Building 260 Outfall Study*, the



plan detailed a technical approach for drilling wells to define the extent and amount of contamination below TA-16. Because LANL has scheduled wells to be drilled in 2000, we did a brief review of the plan, focusing on well location, design, and drilling methodology.

PCB Position Paper Development

LANL is in a similar position as many of the nation's aging industrial facilities, which used polychlorinated biphenyl (PCB) compounds prior to 1977 (see box).

There are approximately 150 sites at LANL which have soil contaminated with PCBs. The Bureau was concerned about cleanup approaches of these sites and collaborated with representatives of

the Hazardous Materials Bureau in the development of a position paper regarding risk-based standards for the remediation of PCBs. The position paper recommends that PCB contaminated soils or sediments should be remediated to a concentration of either 1 part per million or to a health risk-based concentration.

PCBs are a class of chlorinated organic compound that were widely used beginning in 1923. They were commonly used in transformers and capacitors, hydraulic and heat transfer equipment, compressors, vacuum pumps, plasticizers, and some paints and inks. Domestic production of commercial PCBs ceased in 1977, however, PCBs in existence at that time are still in use today.

PCBs are a group of stable organic compounds that are toxic and probably carcinogenic to humans and animals. The compounds tend to accumulate in biological systems. They also increase in concentration (biomagnify) through terrestrial and aquatic food chains.

The most significant pathway for exposure to humans is through the consumption of fish from lakes or streams contaminated with PCBs. Toxicological studies indicate that the ingestion of low levels of PCBs may be harmful to humans. Recent improvements in analytical methods make it possible to accurately measure low levels of PCBs in fish and other environmental media.

In addition, it recommends that the concentration of PCBs in soil and sediments should be low enough to prevent any impacts to surface or ground water quality.

Activities at TA-16

Since the 1950s, a large portion of LANL's explosives manufacturing and testing has been done at TA-16, a technical area at the western edge of LANL. Wastewater from explosives machining has been discharged in the headwaters of Cañon de Valle, and waste materials have been disposed in a large landfill known as MDA-P.

In 1998, LANL found high explosives in regional well R-25 at TA-16. Efforts to assess the extent and amount of contamination continued throughout 1999. Because of technical problems at the well site, proper well development and sampling for regulatory purposes remained stalled through year's end. During the summer, LANL prepared a draft *HE*

Plume-Chasing Plan as an addendum to the *Building 260 Outfall Study*. This plan outlined a detailed technical approach for drilling wells near R-25. These plume-chasing wells are



Drilling rig and casing at R-25.

designed to find the extent and amount of contamination below TA-16.



Because the wells are scheduled to be drilled in 2000, we briefly reviewed the document and focused our comments on well location, design, and drilling methodology.

In 1998's Annual Report, we discussed the Bureau's participation in an investigation of the Building 260 outfall, a high explosives machining building in operation since 1951. Previous limits on the quality of discharge water did not prevent the contamination of soils and ground water with high explosive compounds and breakdown products. This year, the Bureau worked with various regulators developing effluent limits to reduce the concentration of contaminants in the discharge stream. The Bureau is also assessing results of previous year's samples for benthic macroinvertebrates (insects, crustaceans, and other animals that live in stream or submerged sediments). Samples were collected in Cañon de Valle downstream of TA-16. These samples are used to evaluate invertebrate community structures as a means of monitoring the health of the stream course. Based on preliminary evaluation of the data, benthic macroinvertebrate communities below TA-16 appear to be healthy and diverse. However, one group of insects was conspicuously missing which may be due to habitat conditions. Additional sampling is planned. Bureau staff also collected samples from springs and surface water near TA-16. Water quality parameters for these samples are being evaluated and the samples did not show evidence of high explosives contamination.

Cleanup at Material Disposal Area-P (MDA-P)

The closure of MDA-P is currently underway and is the largest environmental cleanup project at LANL. The project is managed by LANL's environmental restoration project and overseen by the NM Environment Department regulators as well as the DOE Oversight Bureau. MDA-P is one of 28 MDAs in Los Alamos and is a seven-acre site on the western edge of LANL.

From the 1950s until the mid-1980s, it was a disposal area and landfill for a variety of materials including explosives residues, metal waste from explosives testing, and construction debris from the demolition of World War II-era buildings. In addition to the various high explosives, contaminants of concern include barium, lead, cadmium, and asbestos. A plan to remove and dispose of the waste material, known as a *Clean Closure Plan*, was approved by the New Mexico Environment Department in February 1997. Excavation began in February 1999.

During 1999, Bureau staff reviewed work plans, met with Laboratory personnel, and observed field cleanup activities. The estimated cost for the cleanup is between \$18 and \$20 million. The work is being done in two phases. Phase I includes waste excavation and segregation of hazardous and non-hazardous materials for recycling or off-site disposal. By November 1999, more than 23,000 cubic yards of soil and debris had been removed from the landfill, including approximately 120 pounds of high explosive residues, 1,305 pounds of asbestos, and 3,200 pounds of barium nitrate. The Phase I excavations are scheduled to be completed by 2001. Phase II work is planned to start in year 2000. The work involves confirmation sampling, a human health risk assessment, and an ecological risk assessment.

Surface Water Assessment Team

One of the Bureau's quality assurance measures is that after a Solid Waste Management Unit (SWMU) is identified and cleanup work is being planned, attention should be given to the possibility that contaminants may be moving away from their environmental restoration sites. Particularly, contaminants may be transported by surface-water drainage and erosion. The DOE Oversight Bureau continues to stress the importance of issues relating to surface water transport as an integral part of LANL's environmental restoration work.



We participated in ongoing work relating to LANL's National Pollution Discharge Elimination System permit for monitoring discharges from outfalls and evaluated closed outfalls for deletion from the permitted outfalls.

LANL in conjunction with the Bureau and other representatives of the New Mexico Environment Department developed a standard procedure that includes a matrix for scoring information about erosion potential at environmental restoration sites. The matrix score is used to prioritize or rank sites based on their erosion potential. A Surface Water Assessment Team (SWAT) considers the high and medium scored sites. The team evaluates each site and recommends actions to reduce erosion or contaminant migration. During 1999, the team met eight times, evaluated approximately 70 sites and made appropriate recommendations.

The team has also been important in identifying and resolving other issues relating to surface water and contaminant transport. It has monitored the condition and maintenance of erosion controls, encouraged coordination with the LANL Watershed Management Program, provided input to the aggregation of sites based on watershed groups, and worked with LANL staff to investigate wetlands and canyons.

Canyons Investigations

The canyons investigations being conducted by the LANL's Environmental Restoration Project are intended to characterize sediments that may contain

This is an example of upgraded best management practices at LANL's TA-54, Area G, and includes vegetation, rock stabilized slopes, and silt fences.

contaminants in Los Alamos area canyons. The investigations are described in a series of documents called *Canyons Workplans*. Throughout the year, the DOE Oversight Bureau staff worked with LANL investigators on the review and implementation of various portions of their work plans.

To verify LANL's sampling and analytical methodology, the Bureau collected split sediment samples in Mortandad, Pratt, and Effluent Canyons. The Bureau also collected water samples in DP Canyon wells. Bureau representatives collaborated with LANL to choose locations for several alluvial and intermediate wells, and suggested additional ground water monitoring points above the confluence of Los Alamos Canyon. As a result of the Bureau's review of LANL's DP Canyon tracer study, LANL has installed shallow water monitoring stations to measure water level and monitor tracer movement through the DP Canyon alluvial aquifer.

Investigations in Acid Canyon

The DOE Oversight Bureau re-investigated with both LANL and Los Alamos County residual plutonium contamination in the streambed





sediments of Kinnikinnik Park. The suspect sediments were retrieved from a tributary of Acid Canyon below the former TA-45. TA-45 existed between 1951 and 1964 as a treatment facility for liquid radioactive waste. Located at the edge of a mesa top, TA-45 discharged radioactive effluent generated by nuclear research. Before TA-45 became operational, untreated effluent was discharged into the canyon bottom for about seven years. Following the treatment facility's demolition in 1964, sporadic investigations and cleanup efforts continued until the 1980s. However, these efforts concentrated mainly on removing the buildings and contaminated soil from the mesa top. In 1992, the environmental restoration project investigated Acid Canyon below old TA-45 as a potential release site. Using less-sophisticated sampling techniques than those that LANL currently employs, investigators concluded that the annual radiological dose contribution was below acceptable limits, and the site was proposed for No Further Action in 1996.

The Bureau chose to re-investigate the site because it contained residual radioactive contamination and was located in a public park. Our biased sampling was consistent with a new methodology developed by LANL for the characterization of canyons. The Bureau's results showed considerably higher values than previous results, especially for radionuclides such as plutonium and polychlorinated biphenyls (PCBs). Because of the cooperative efforts by the County, LANL and the Bureau, the environmental restoration project team conducted an aggressive sampling effort in December to refine the characterization of this narrow drainage using the current technical approach. Results from these latest field activities will be combined with all previous data (including the Bureau's) to re-evaluate risk and remediation options.

Sediment and Water Investigations with the U.S. Environmental Protection Agency (USEPA)

During 1998, the U.S. Environmental Protection Agency had visited Los Alamos to perform investigations in Mortandad and Los Alamos canyons. In 1999, there was a jointly coordinated sampling effort between LANL, the USEPA, and the New Mexico Environment Department (NMED) to assess LANL's impacts on water and sediments in several nearby canyons. This year's visit was a follow-up to determine whether the quality of any sampled media near release sites had improved. One key development that warranted a closer look at Mortandad's water quality was the recent upgrade of equipment in the treatment facility for liquid radioactive waste at TA-50. For 1999, the improved treatment process resulted in most of the discharged effluent to Mortandad Canyon meeting the individual radionuclide release guidelines.

Water samples were collected from LANL's southwest area drinking water wells, springs, and surface water near or downstream from LANL's high explosives corridor. These investigations focused on obtaining water quality information and on assessing the well for high explosives contamination. As confirmed by the Bureau, recent and historical data from LANL's drinking water wells showed no evidence of contamination from facility operations. EPA will present results from their water data in 2000.

This year the Bureau collected sediments at LANL in Acid, Mortandad, and Pajarito canyons as well as public lands. The objective was similar in scope to that of our water investigations. For this investigation, we were hoping to evaluate undisturbed background conditions or laboratory-derived impacts from radionuclides and high explosives.



The streambed in Acid Canyon is on an expedited assessment schedule because of the Bureau's recent findings and concerns based on the public's unrestricted access of the area.

In addition, the EPA collected sediment samples from another reach immediately below the tributary we sampled. Data collected by this cooperative effort during the past two years will supplement the environmental restoration project's efforts during upcoming canyons investigations.

Los Alamos County Airport

The Oversight Bureau collected independent samples at a site near the Los Alamos Airport. Nine samples were collected to augment LANL's sampling data and to evaluate their sampling procedures and analytical results. The samples were collected on the mesa top and in the drainages associated with two sites. One site was a septic tank and drain lines that served a former steam cleaning facility. The facility was demolished in 1971 and the septic tank was removed in 1996. The remaining outlet drain line terminates at an outfall which emptied into Pueblo Canyon. The other site is a surface disposal area near the north edge of DP canyon. It consists of piles of concrete and other construction debris.

Samples were analyzed for metals, PCBs, and gross alpha and beta. These samples were also analyzed for pesticides. The samples collected at the septic tank outfall showed five metals at levels slightly above background. Samples collected at the surface disposal area showed three metals at levels slightly above background. The data was used by LANL to augment its data for the preparation of a final report.

Environmental Monitoring

AIRNET Monitoring

AIRNET is the Los Alamos National Laboratory's (LANL) air monitoring program which measures levels of airborne radionuclides and tritium in dust-sized particles and water vapor at regional, perimeter, and on-site LANL stations. LANL also measures levels of ambient gamma and neutron radiation at 93 sites located throughout the facility and surrounding communities. As an independent check of LANL's program, the Oversight Bureau operates its own network of gamma radiation and airborne particulate monitors. We monitored levels of gamma radiation at 12 locations (11 stations near LANL's perimeter and 1 station in Santa Fe) using thermoluminescent dosimeters. The Bureau's levels of gamma radiation were consistent with those measured by LANL and within the range of background.

We also measured airborne radionuclides at four of our five air monitoring stations surrounding LANL. The filters were analyzed for uranium and plutonium isotopes, americium-241, gamma emitting radionuclides, and tritium. The results were consistent with LANL's results, with very low values for plutonium and americium, often below the analytical detection limit. Values for uranium and tritium were consistently two or three orders of magnitude below applicable health standards.

After seven years of evaluating the operation of the Bureau's gamma radiation and airborne particulate monitors, we believe LANL's AIRNET program is appropriate and that their results are consistent with the Bureau's. This project continues to verify LANL's data. Data collected by both LANL and the Bureau can be viewed on the Internet at <http://www.air-quality.lanl.gov>.



Two Gamma Radiation Detection Methods at TA-54

In February 1999, LANL invited the DOE Oversight Bureau staff to participate in an assessment of two technologies to detect gamma radiation—electret and thermoluminescent dosimeters. LANL used these two methods to measure radiation at several locations in Technical Area 54 (the transuranic waste temporary storage facility). LANL investigators determined that gamma radiation results from several thermoluminescent dosimeter stations near waste barrels were elevated relative to past year's results. Additionally, the co-located electrets showed elevated readings, but not as high as those of the thermoluminescent dosimeters.

A large amount of data was evaluated before it was determined that the thermoluminescent dosimeters were over-responding to low energy radiation produced by the waste in the barrels (determined to be mostly americium). The electrets produced a more realistic gamma radiation result. As it turned out, the thermoluminescent dosimeters are calibrated with cesium-137 (which has a fairly high energy gamma radiation emission) so the thermoluminescent dosimeters gave results that were biased high when exposed to low energy radiation. The electrets were not prone to this shortcoming, so they produced a more valid result. This discrepancy in data results has only been observed when measuring low-energy gamma radiation from isotopes such as americium-241. Substantial amounts of this isotope are in barrels at TA-54 waiting to go to the Waste Isolation Pilot Plant (WIPP).

This incident reinforced the importance of the Bureau's role as an independent evaluator. LANL had to decide which data set was more reliable to report—electret or thermoluminescent dosimeter. Since the electrets produced more reliable results at this specific site, the Bureau and LANL agreed to report data from the

electrets rather than thermoluminescent dosimeters to federal and state officials. Although electrets were the agreed upon methodology for this specific condition at TA-54, thermoluminescent dosimeters will continue to be used as the preferred method of gathering gamma radiation data for LANL's monitoring program at other locations.

Monitoring at the Pajarito Site (TA-18)

During the year, the DOE Oversight Bureau worked closely with the Community Radiation Monitoring Group (CRMG) on data quality and other radiation monitoring issues. Particularly, we worked to understand and resolve issues related to the measurement and reporting of monitoring data from the albedo dosimeters and the high-pressure ionization chamber (PIC) at TA-18. The Bureau's efforts concerned the relationship of measurements between the two systems (the dosimeters and the PIC), and the appropriate monitoring location for the hypothetical on-site maximum exposed individual.

The Pajarito Site (TA-18) is the location of the facilities that study the behavior of critical assemblies of nuclear materials. Critical assemblies provide a controlled means of assembling sufficient quantities of fissionable material (that are required for a self-sustaining nuclear chain reaction) such that various shapes, sizes, and configurations can be safely studied. Work at the site supports such programs as Stockpile Management, Stockpile Stewardship, Emergency Response, Nonproliferation, and Nuclear Safeguards. Experiments at the site produce both photons (gamma radiation) and neutrons, each of which contributes to measurable levels of radiation at Pajarito Road, a DOE owned road generally open to the public. The road is closed during experiments in which there is the potential of a radiation dose greater than one mrem to someone standing on the road.



LANL maintains a system of instruments to monitor both radiation and dose on the perimeter of TA-18 (see box below). Some of these instruments are dosimeters designed to measure dose from photons, and some are "albedo dosimeters" designed to measure dose from neutrons. In addition, one NEWNET station, a high-pressure ionization chamber, is located within 100 meters of the TA-18 perimeter fence and less than a kilometer from certain critical assemblies at TA-18.

As reported in the Los Alamos National Laboratory's 1997 Environmental Surveillance Report, an annual evaluation of dose is to consider our work force and public. The Laboratory calculates dose to an individual who is in transit through LANL property. This hypothetical person is known as the "on-site maximally exposed individual" (on-site MEI). The facility at TA-18 provides the largest contribution to an on-site MEI dose. In evaluating the on-site MEI dose, the Laboratory has two standard scenarios. The first is a driver in a car passing the facility at 10 times per day, 250 days per year, and traveling 40 miles per hour. The second is a slow jogger who passes the facility twice each day (one trip out and back), 250 round trips per year, at a speed of 3 miles per hour.

The resulting calculations predict the driver of the car would receive an annual dose of 4 mrem and the jogger 5 mrem. Assuming the jogger is a resident of Los Alamos, and received a 1-mrem dose from contaminated soils and air, the jogger's total annual dose attributable to sources at LANL would be 6 mrem. This can be compared to the estimated annual dose from natural sources for persons living in Northern New Mexico of 360 mrem.

This detector responds to both gamma and neutron radiation LANL provides quantitative data on its web site within four hours of collection. The web site address is <http://newnet.lanl.gov>.

Soil and Sediment

During 1999, the DOE Oversight Bureau collected samples at 21 soil and sediment sampling stations and had the samples analyzed for a limited suite of radionuclides and metals. In some cases, we analyzed for metals that LANL did not; in other cases, we analyzed for certain radionuclides (strontium-90 and isotopic uranium) using alternative analytical methods. Although the data are preliminary, they appear to be consistent with LANL's data. Except for a few locations affected by known historical LANL releases, the levels of metals and radionuclides measured were consistent with regional background.

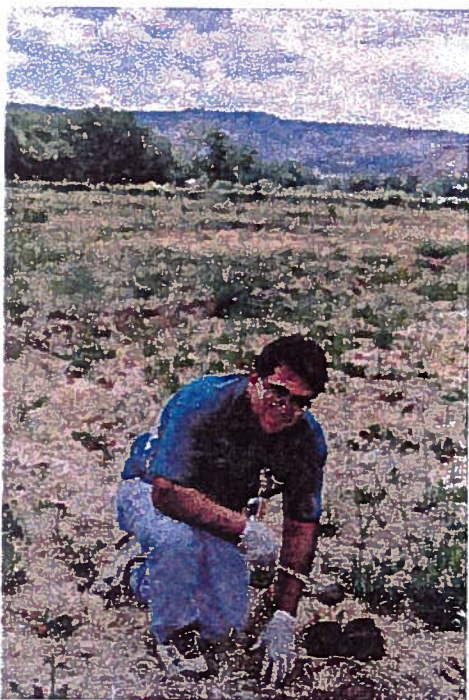
As part of an investigation of background radionuclide and metal concentrations in the soil, the Bureau identified 15 "off-site background" locations with soils similar in nature to soils found on LANL property. We then collected samples at these locations and had them analyzed by an independent laboratory. As this report goes to press, the laboratory analysis has not been completed.

Bureau geologist David Englert issued a technical report, *NMED/LANL 1996 Soil Results: Data Evaluation and Statistical Comparison* (NMED/DOE/AIP-99/2). This report compared the Bureau's results to for samples collected from 16 soil-sampling stations. The samples were analyzed for beryllium, lead, uranium isotopes, and plutonium isotopes. The Bureau's results were generally similar to the LANL's although there were slight differences in the lead and uranium data. With the exception of beryllium, all measurements were significantly less than health-based risk levels. Beryllium measurements were at or near health-based risk levels, and this level is only slightly higher than natural background.



Flora and Fauna

In December of 1999, the DOE Oversight Bureau issued a technical report, *Flora and Fauna Sampling Results at Los Alamos National Laboratory, New Mexico during 1995 and 1996* by Raymond Montoya and Bryan Vigil (NMED/DOE/AIP-99-3). This report summarizes the Bureau's 1995 and 1996 split/independent flora and fauna sampling results. Our results for these constituents, with the exception of lead, which was lower than LANL's, was similar to the results obtained by the LANL.



Raymond Montoya, Environment Specialist, conducts soil sampling north of LANL in the Española Valley.

This report also described results from Cochiti Reservoir fish samples analyzed for mercury and polychlorinated biphenyl (PCB) compounds. The concentrations of mercury fell in the range of the New Mexico Fish Consumption Guidelines. The mercury concentrations were similar to those found in fish from other reservoirs in the state, most of which have fish

consumption advisory levels. The concentrations were similar to those reported by LANL in fish samples from 1991 to 1999. Two fish samples from Cochiti Lake contained PCBs.

In addition, in 1999, as part of its ongoing assessment of LANL's ecological surveillance program, the Oversight Bureau collected 11 fish samples from Cochiti and Abiquiu reservoirs. The samples were analyzed for PCBs and mercury. The analytical results for mercury appear to be consistent with LANL's results and within the range of historical data. The analytical method used to analyze the biological material for PCBs typically gave results at or below the method quantification limit. Significant efforts were made during this year to identify improved analytical methods. Two fish samples were subjected to a more sensitive analysis method, and these data are currently being evaluated.

Depending on the results of these analyses, the remaining samples may be analyzed using the new method.

Water

Historically, LANL's environmental surveillance program has collected water samples at many fixed stations, on-site stations, and in nearby communities. The DOE Oversight Bureau's water-monitoring staff collected 60 samples from on-site and offsite wells, springs, and surface water stations in addition to collecting storm water in five of LANL's seven major drainages.

Although much of the Bureau's other water-sampling efforts during the year were concentrated on the laboratory's deep well drilling project, it did collect verification samples primarily from older monitor wells in Los Alamos and Mortandad canyons. These sampling events were coordinated with both the U.S. Environmental Protection Agency (USEPA) and LANL to satisfy DOE's



environmental surveillance requirements at the facility. More importantly, however, we sampled many of these wells to gain some insight into the quality of shallow ground-water during normal seasonal fluctuations of ground-water levels—among other things. These data will provide a snapshot in time of the water chemistry and be useful for LANL's scientists who will use computer models for assessing subsurface water volume chemistry and flow rates in these canyons for contaminant transport.



Ralph Ford-Schmidt, Environmental Specialist, records field data while sampling in Pajarito Canyon.

Discharges and Emissions

Erosion Controls at TA-54

In June 1999, a severe rainstorm damaged the erosion controls around TA-54, Area G. This site is where LANL's Low Level Waste Disposal Facility and Transuranic Waste Inspection Storage Project is located. Following

the storm, the DOE Oversight Bureau and LANL representatives visited the site to assess damage to erosion controls and storm water monitoring stations. One item observed was sediment crossing Pajarito Road and burying a storm-water runoff monitoring station at the fenceline of TA-54. Because of the storm, Bureau personnel recommended that:

- single silt fence barriers supplement multiple barriers;
- filled fences be replaced,
- damaged silt fences be repaired, and
- upgraded permanent catchment basins be repaired.

LANL was proactive and began immediate repair of damaged barriers and, at the Bureau's encouragement, installed additional erosion controls.

In July, the Bureau revisited TA-54 to further evaluate these erosion controls and to observe what impact new construction may have had on waste disposal sites and water drainage patterns. As part of this evaluation, Bureau and LANL personnel collected samples behind a silt fence. The results showed plutonium-239 and americium-241 at levels slightly above background—demonstrating the need for continued review of the placement, design, and maintenance of erosion controls. Later, in August during LANL's Annual Compliance Inspection visit, the Bureau accompanied LANL staff on the TA-54 National Pollution Discharge Elimination System Compliance Inspection and again inspected the erosion control measures. We found that the erosion devices had withstood the effects of subsequent rains and erosion.

Equipment Upgrades at TA-50

LANL's radioactive liquid waste treatment facility treats waste from the Plutonium Facility (TA-55), the Radiochemistry Site (TA-48), the Chemistry and Metallurgy Research Building (TA-3), the Tritium Systems Test Facility



(TA-21) as well as other smaller LANL sources. This treated water is discharged at the head of Mortandad Canyon through a National Pollution Discharge Elimination System (NPDES) permitted outfall. Periodic LANL water quality reports have documented exceedances of the New Mexico Water Quality Control Commission (NMWQCC) ground-water standards for fluoride and nitrate and occasionally exceeding the National Pollutant Elimination System (NPDES) effluent limits for chemical oxygen demand, zinc, pH, and the DOE's guidelines for radionuclide concentrations. Over time this discharge has infiltrated and contaminated the alluvial aquifer in Mortandad Canyon.

During 1999, the DOE Oversight Bureau staff observed the installation of new and upgraded equipment at LANL's Radioactive Liquid Waste Treatment Facility at TA-50. A tubular ultrafiltration system and a reverse osmosis system were installed at this facility, which treats radioactive and chemical liquid wastes. In addition, LANL is continuing to modify its operating procedures at generator sites to further reduce the wastewater requiring treatment. Now that the new equipment is installed and operating, TA-50's effluent stream meets the NMWQCC's ground water standards. With the new equipment and procedures in place, individual radionuclide concentrations are now within DOE guidelines; however, in late 1999 the sum of the radionuclides still exceeded the threshold prescribed by DOE guidance. LANL has stated that it is committed to continually improving the quality of the discharge water. Early next year an Electrodialysis Reversal Treatment Unit and a mechanical evaporator

will be installed. With this additional equipment, LANL should be able to meet the NPDES, NMWQCC and the DOE requirements. The equipment upgrades mentioned above are a result of the Bureau's continuing collaboration with LANL and have been discussed for several years.

Improving Effluent Limits at the HEWTF

During 1999, the DOE Oversight Bureau collaborated with LANL, the U.S. Environment Protection Agency (USEPA), and the Surface Water Quality Bureau to improve effluent limits at LANL's new High Explosives Waste Treatment Facility (HEWTF). With these new limits in place, the Bureau, LANL, and US EPA are confident liquid discharges from the HEWTF will not contaminate the soils or groundwater. These new limits were established after effluent from another facility involved with high explosives (Building 260), contaminated the soils and groundwater with high explosive compounds and breakdown products. Building 260 was the site of high explosives machining in 1951.

Prior to 1999, a NPDES permit issued by USEPA regulated the water quality from Building 260's outfall. The permit, however, did not limit the concentration of high explosives in the discharge water. As part of LANL's response to this, Building 260's outfall was terminated in 1996, and the discharge water is now collected in sumps and then trucked to the new HEWTF. The Bureau continues to monitor and participate in the ongoing investigation and cleanup of the outfall of Building 260.



Sandia National Laboratories

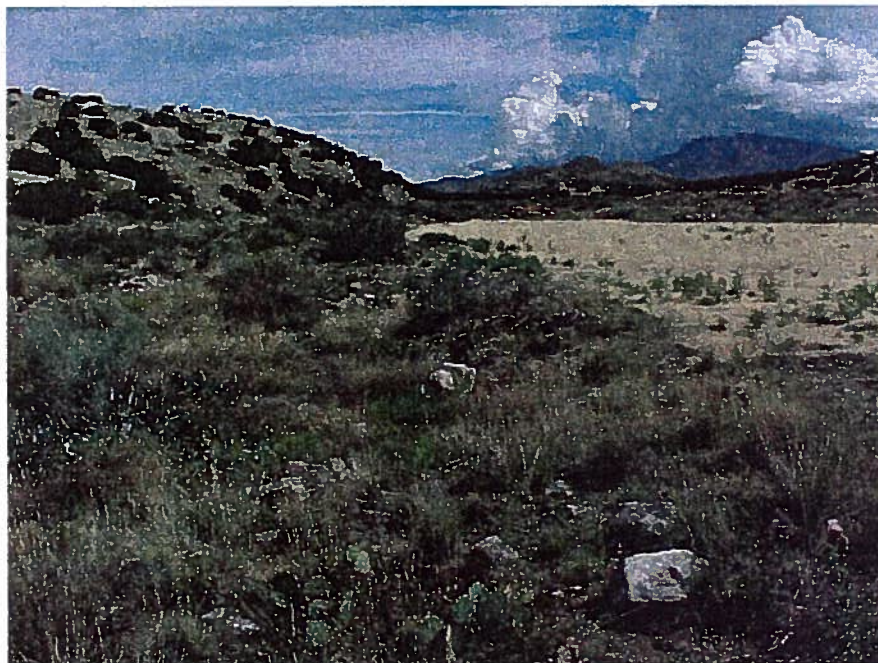
Legacy Waste Cleanup

Early and frequent involvement describes the Bureau's working relationship with Sandia National Laboratories (SNL). In 1999, SNL provided a significant number of opportunities for the Bureau to participate in multiple phases of their legacy waste environment restoration projects. These phases included the initial characterization of the site (to understand the type and extent of contamination) and continued through to several No Further Action requests. This collaboration was best exemplified when the Bureau negotiated an agreement with SNL to expand a remediation plan and include the soil beneath a bunker. The Bureau wanted to eliminate all doubt about this bunker and especially the possibility of a second remedial action for the soil under the bunker. The heart of this collaborative relationship with SNL is the negotiation of sampling plans. For a plan to be sufficient, it must clearly state the data gathering (sampling) objective, and how that objective will be accomplished.

While the data gathering and fieldwork progressed at various sites, Bureau members observed numerous sampling and cleanup activities to verify that the specific plan was being followed. For example, erosion control measures were inspected before, during, and after remediation efforts at a number of sites. Some of these inspections required multiple site visits after the cleanup at

key locations. In addition, the Bureau collected samples at selected sites for independent evaluation of environmental conditions. In one case, our samples confirmed that a high Sandia reading for tritium in a soil pile was in error.

For the first time in 1999, our office reviewed the final draft versions of No Further Action proposals for a number of environmental restoration sites. Being involved in the various stages of project development for most sites in this group (SNL calls this group Round 13 NFA Proposals) provided the knowledge base for the Bureau to recommend specific cleanup actions. The rate of regulatory approval has improved with SNL's consideration of our comments on their final documents and there is better coordination throughout the environmental restoration process.



Jute with new growth taking hold covers the field and mound in this photo and is an example of Sandia's environmental restoration efforts at the 94F site.



Chemical Waste Landfill

SNL began excavating the Chemical Waste Landfill (CWL) in the East Central Area under what is called a "voluntary corrective measure." This excavation was the focus SNL's environmental restoration project during 1999. The corrective measure consists of digging up contaminated soil, other wastes, then segregating, and transporting the wastes to the nearby Corrective Action Management Unit (CAMU). Oversight of SNL's activities occupied much of our time. Bureau staff visited the site weekly to observe the progress of the excavation and met frequently to discuss concerns with project managers. The weekly site visits included a Bureau staff member donning protective clothing and entering the excavation area to observe sampling of the soil conditions beneath a liner in a pit formerly used to dispose chromic acid. As SNL encountered unexpected materials and contemplated improvements to the project, the Bureau provided timely feedback based on our knowledge of the regulatory perspective.



This photo shows the dark stained soil beneath the old Chromic Acid Pit. Staff of the Oversight Bureau monitor work at this Chemical Waste Landfill with Rich Kilbury dressing out in Level B to take this photo.

As excavation progressed, Sandia realized the rate of excavation based on methods in the original plan would cause the project to run longer and cost more than projected. The Bureau worked as part of a team with SNL to modify process changes in the screening and managing wastes to improve the rate of excavation.

The CWL had operated from 1962 until 1985. Liquids and solids known to be disposed in the landfill include acids, oxidizers, reducers, organics, reactives, and metal salts. Because of the dates of operation, the landfill is regulated as an Interim Status Facility, which under the Resource Conservation and Recovery Act (RCRA) regulations generally requires a more formal review processes. The landfill excavation is permitted under a closure plan modification approved by the New Mexico Environment Department (NMED) in March 1997. Some of the operational changes proposed in 1999 required additional modifications to the closure plan. We acted as an interface between SNL and state regulators to refine the details of the closure plan modifications, made recommendations that complied with appropriate regulatory requirements, and allowed for a more efficient operation. The modifications include the following:

- Establishing a controlled access transportation corridor between the CWL and the CAMU.
- Extending the Site Operational Boundary to allow for on-site management of larger waste volumes.
- Utilizing waste segregation procedures, including the addition of a commercial power screen.
- Leaving the excavations of each area open until the whole project is complete.

While agreeing with the intent of the modifications, the Bureau expressed concerns about controlling storm water, as large portions



of the landfill will remain open for a longer period. SNL addressed those concerns with a thorough runoff/runoff control program. In conformance with the RCRA regulations, the Bureau encouraged a temporary authorization request allowing excavation to continue pending approval of a Class II modification to the closure plan.

Septic Systems Investigations

From discussions with DOE, Sandia National Laboratories (SNL) investigators, and state regulators, the Oversight Bureau took the lead on developing a decision tree for guiding investigations of septic tank disposal systems. The Bureau considers septic tank disposal systems a high priority for investigation and corrective action because of significant potential for ground-water contamination.

Approximately 150 septic tank disposal systems were used for disposal of domestic and industrial wastewater at SNL test facilities. About 119 of these systems are not currently listed on SNL's Resource Conservation and Recovery Act (RCRA) permit, and are commonly referred to as "non-ER septic systems." Recognizing that some of the septic systems were not used for disposal of hazardous waste, the Bureau determined that comprehensive investigation of the 119 systems was not warranted.

A decision tree was developed as a logic tool for guiding the investigations of sites with the highest potential for contamination. It allows for examining a subset of all the septic systems and applying the results to the rest. Based on current knowledge of the sites, the methodology presented in the decision tree is expected to reduce the number of monitoring wells required and to lower the overall cost of the investigation. Following the discussion and refining of the criteria, SNL and DOE formally submitted the decision tree as part of a sampling and analysis plan to the regulatory authority.

Bureau staff and SNL investigators completed visual site inspections at 115 of the non-ER septic system sites to confirm the existence and nature of the systems. We jointly reviewed all information available for each of the sites to identify those that will, or will not, require further environmental characterization and assessment. The escalating investigative techniques that may be used at each site based on the decision tree include passive surface soil vapor surveys, shallow soil sampling, deep soil vapor sampling, and ground water monitoring.

From the field work and operational record review done on the 119 non-ER systems to date, the SNL and Bureau team determined that 57 probably qualify for No Further Action status now, 58 systems need additional investigation, and 4 are still under preliminary investigation.

Lurance Canyon Burn Site Activities

The Lurance Canyon Burn Site is currently used to test fire survivability of transportation containers, weapon components, simulated weapons, and satellite components.

Historically, this site was used to test high explosives. It is located on a thin veneer of unconsolidated sediments overlying fractured bedrock in the upper portion of the Lurance Canyon drainage. The presence of elevated metals and volatile organic compounds have been confirmed in soils at the Burn Site. Groundwater samples from a well drilled in 1998, at approximately 2000 feet down gradient of the site, showed contamination by fuel constituents and nitrate. A number of individual environmental restoration sites exist at this Burn Site. The DOE Oversight Bureau was involved in oversight activities related to several of these sites in 1999.

Following previous recommendations from the Bureau, SNL installed two new monitoring wells near the Burn Site. One well was installed east of the Burn Site to provide information on up gradient ground water quality



or groundwater that was not affected by operations at the Burn Site. The other well was located immediately down gradient, closer to a suspected source of groundwater contamination that was discovered in 1998. The Bureau split groundwater samples from both new wells with SNL for comparison of the data. Our samples were taken using a conventional pumping method as well as SNL's minimal purge method.

During review of the voluntary corrective measures plan for ER Site 94C, also known as the "bomb burner discharge line," the Bureau emphasized that the soils investigation should focus beneath the connections of the discharge line sections. SNL agreed and removed the entire length of the drain line. Our staff sampled the soil in the trench below the drain line to verify SNL data. The trenching of this site revealed a thin layer of depleted uranium below the land surface but above the drain line. Bureau staff members observing the excavation were able to discuss in the field possible changes to the corrective measures plan that would address this unexpected discovery.

Surface Water Assessment Team Participation

A group called the Surface Water Assessment Team (SWAT) representing the DOE Oversight Bureau, the Surface Water Quality and the Hazardous & Radioactive Materials Bureaus, the DOE, and SNL met four times in 1999 to review the results of erosion assessments performed by SNL and to determine whether additional erosion controls were indicated at the sites.

Sites were visited prior to the meetings to determine current conditions. Bureau staff were able to make significant contributions based on their knowledge of site conditions including the status of any remediation efforts.

Recommendations from this team increased awareness of surface water concerns at SNL.



Bill Curry, Environmental Specialist, checking one of the air monitoring stations the Oversight Bureau maintains around the perimeter of Sandia National Laboratories. (Unfortunately after this photo was taken, we lost Mr. Curry to a heart attack—he is missed).

Environmental Monitoring

Gamma Radiation and Airborne Radionuclides

The DOE Oversight Bureau continues to measure ambient gamma radiation at twelve locations on Kirtland Air Force Base (KAFB) and several surrounding communities to detect possible radioactive emissions from SNL operations. This is accomplished by placing monitors, i.e., thermoluminescent dosimeters, next to SNL monitors. By establishing this dual



monitoring system, the Bureau provides a credible and independent source of SNL's data. Measurements from these monitors are expressed as "annual radiation dose equivalents" and are what an individual would receive at a monitoring site. The dose equivalent estimate based on Bureau measurements in 1999 correlates favorably with SNL's data.

The Bureau also collects air samples for radionuclide analysis at four air-monitoring stations on KAFB. Two stations are located at the southern boundary of the base, one at the northern boundary near the Four Hills community, and one at the University of New Mexico. Airborne particulates are captured on filters, and water vapors trapped in cartridges filled with silica gel. The particulates are analyzed for the presence of various radioactive elements. The water vapor is analyzed for the presence of tritium, a radioactive isotope of hydrogen. The results are compared to environmental standards and guidelines established by Environmental Protection Agency and DOE. None of the Bureau's samples collected in 1999 exceeds state or federal standards. However, no data were collected during the first quarter of the year because all four pumps were out of service from January to April for routine repairs.

Groundwater Sampling at Inhalation Toxicology Research Institute (ITRI)

Since 1993 the DOE Oversight Bureau has collected ground water samples twice each year from monitor wells near the former ITRI. Prior

The Bureau's 1999 data indicate radiation levels consistent with natural background.

to 1999, water quality data from six wells had shown nitrate concentrations in excess of the

federal drinking water standard. Including the 1999 sampling, no increasing trends have been detected in the groundwater at ITRI. This year

the ITRI sampling was reduced to one event per calendar year.

The ground water contamination resulted from wastewater disposal into ponds. This disposal practice ceased in 1992 and the ponds are no longer a source of contamination. The Bureau will continue to monitor the four wells installed in 1994 and 1995 and seven of 19 ITRI wells. With cooperation of the Pueblo of Isleta, three New Mexico Environment Department (NMED) wells were installed on pueblo land to investigate the possible movement of contaminated ground water from the ITRI facility.

Bureau Gets Last Chance Ground Water Data

The Kirtland Air Force Base Environmental Group decided to plug and abandon two ground water monitoring wells because they were unusable for long-term monitoring program. The DOE Oversight Bureau received permission from the Air Force and collected samples from the wells to add to its database of ground water quality information for KAFB. An independent laboratory for basic water chemistry, metals, analyzed the samples and volatile organic compounds and indicated no contaminants.

Storm Water Pollution Prevention Plan

Sandia National Laboratories (SNL) protects surface water quality through the requirements of a federal permit issued by the U.S. Environment Protection Agency (USEPA). The Bureau reviewed Sandia's *Storm Water Pollution Prevention Plan* within the context of federal regulations. We recommended changes to the plan including the number of monitoring locations and descriptions of how SNL will deal with erosion controls at environmental restoration sites. DOE and SNL proactively involved the Bureau in selecting additional storm water monitoring locations to comply



with the USEPA's National Pollutant Discharge Elimination System Multi-Sector Storm Water Permit.

The only storm water sample the Bureau collected in 1999 was adjacent to environmental restoration Site 30 (the old Reclamation Yard) in Technical Area I. The Bureau began collecting samples at Site 30 in 1998 to monitor the possible transport of polychlorinated biphenyls (PCBs) from the site. We decided that three samples would give a more complete picture of the potential discharge and took the third sample in the spring of 1999. The results of this sample were in agreement with previous samples, showing no significant concentrations of priority pollutant metals, and no PCBs.

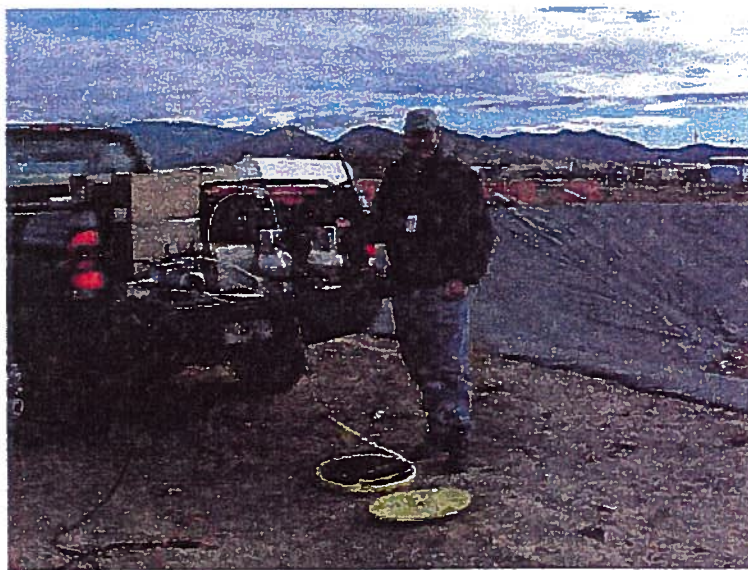
Soil, Sediment, Water, and Vegetation

In August, the DOE Oversight Bureau continued its program of sampling soil, sediment, vegetation, and water at locations on the perimeter of Kirtland Air Force Base and in the surrounding community. Bureau staff accompanied SNL personnel to sample approximately ten percent of the total SNL sampling locations, allowing us to compare analytical data with Sandia's. The samples were analyzed for gross alpha and beta, specific radionuclides, and tritium. The Bureau uses these samples to compare concentrations of radionuclides to health-based levels, and compare off-site concentrations to on-site concentrations. This year, each type of radiological data was similar to published background levels at the locations sampled.

Discharges and Emissions Corrective Action Management Unit

The DOE Oversight Bureau continued its oversight of permitting and waste management issues related to operation of the Corrective Action Management Unit (CAMU) at Sandia National Laboratories. CAMUs are required by the Resource Conservation and Recovery Act (RCRA) regulations to manage hazardous waste from the cleanup of contaminated sites. Most of the waste managed at the CAMU is expected to come from the Chemical Waste Landfill (CWL) located next to the CAMU. The CAMU began receiving contaminated soil from the landfill in 1999. The Bureau evaluated the waste handling and tracking systems for the management of this waste and found them to be effective and reliable. The U.S. Environmental Protection Agency (USEPA) regulates the operation of the CAMU, while the CWL is regulated by the New Mexico Environment Department.

As excavation at the landfill proceeded, SNL unexpectedly encountered tritium—a radioactive isotope of hydrogen. The



Rich Kilbury, Environmental Specialist, collects vadose zone vapor samples at Sandia's CAMU.



concentrations were low, but above background.

To evaluate whether the contaminated soils could be safely disposed of at the CAMU, the Bureau researched relevant regulations and the SNL plan for managing the soils. Based on this review, the Bureau concluded that the soils could be safely managed at the CAMU, and supported USEPA's approval of a permit modification allowing the management of the tritium contaminated soils at the CAMU.

The Bureau worked with SNL to evaluate soil vapor conditions in the unsaturated zone beneath the CAMU before waste is placed in the containment cell. The containment cell is an engineered facility consisting of a series of liners with leak detection systems. Sandia is collecting samples of soil vapor from a series of boreholes to establish baseline concentrations of organic contaminant soils at the CAMU.

Compliance Achievements for Mixed Waste

The DOE Oversight Bureau reviewed SNL achievements for low-level mixed waste treatment and disposal and compared these accomplishments to requirements of the *Site*

The Federal Facility Compliance Act (FFCA) of 1992 authorized a nation-wide program to develop mixed waste treatment technologies that comply with the land disposal requirements of the Resource Conservation and Recovery Act. In response to the FFCA, SNL produced a Site Treatment Plan that establishes schedules for the treatment and disposal of legacy and newly generated wastes at SNL. In 1995, the New Mexico Environment Department issued a compliance order to enforce the provisions of the plan.

Treatment Plan developed pursuant to the Federal Facility Compliance Act of 1992 (see box). SNL's current low-level mixed hazardous waste inventory covered by the *Site*

Treatment Plan is approximately 93 cubic meters. These 93 cubic meters requiring waste treatment and disposal are categorized into 19 treatability categories. There are also 11 treatment technology categories contained in the *Site Treatment Plan*. During 1999, four required milestones were met and all treatment plan requirements were satisfactorily completed.

The Bureau worked with SNL and a technology vendor to determine the regulatory requirements for the demonstration of a new treatment technology. The technology can potentially treat many types of low-level mixed waste. A demonstration of this technology will take place in 2000.

Gamma Irradiation Facility Pool Leak

In June 1999, SNL notified the New Mexico Environment Department (NMED) of a leak from its Gamma Irradiation Facility Pool (see box, page 28). The DOE Oversight Bureau was designated by the Environment Department to evaluate and track SNL's investigation of the leak. In comparing and reviewing SNL water balance calculations and water quality analyses, the Bureau confirmed that the leakage rate was low (15–20 gallons per day). The quality was better than most drinking water supplies. However, the NMED, the Bureau, and SNL agreed that because of the nature of the work conducted at the Gamma Irradiation Facility, it was necessary to identify and eliminate the source of the leak.

Initially, SNL discovered the leak because of a need to add more water than would normally be required to compensate for evaporation losses. Tests isolated the leak near the top of the pool where the water is diverted to the treatment system. The Bureau agreed with SNL's proposed remedy to seal welded joints in a metal trough, which decreased the leak to about five gallons per day. The variability in pool evaporation makes it difficult to precisely



measure such a low leak rate, and these five gallons may be insignificant.

The Gamma Irradiation Facility is an experimental facility within SNL Technical Area V where scientists study radiation effects on objects placed in a gamma radiation environment. When not in use, sealed gamma ray sources used in experiments are stored under water in the Gamma Irradiation Facility Pool. Water shields workers at the facility from radiation and must be of high purity. To maintain this high quality, water is continuously drained and passed through a series of water quality monitors and treatment processes.

After initial corrective action, SNL resumed maintenance operations, consisting of high pressure washing, brushing, and vacuuming of the lower walls and bottom of the pool.

When the leakage rate increased again, SNL used the same testing procedures as before, but the leak could not be isolated. One possible source is welded joints near the bottom of the pool. SNL discussed possible actions to address the leakage with the Bureau and is preparing a proposal for its review.

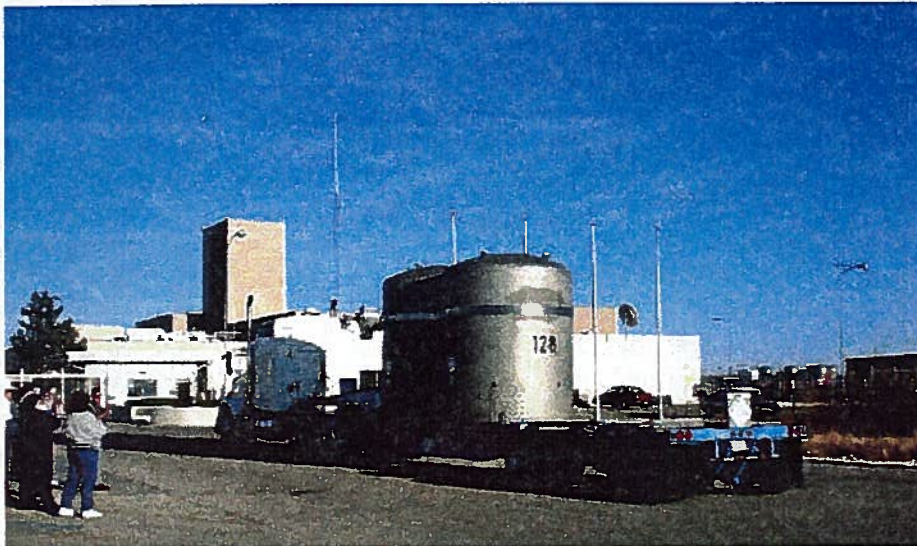


Waste Isolation Pilot Plant

We continued to maintain our network of six gamma radiation monitors around the perimeter of the Waste Isolation Pilot Plant (WIPP). We also worked with other members of the Environment Department and representatives of

the DOE and Westinghouse to investigate and remove a number of *Solid Waste Management Units* from the facility's permit.

In March, the Department of Energy began shipping transuranic waste to WIPP.



In October 1999, the Environment Department approved Hazardous Waste Facility Permit, and shipments under the permit began shortly thereafter.