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New Mexico Environment Department
DOE Oversight Bureau

2002 Annual Report

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

The 2002 Annual Report is a publication of the

New Mexico Environment Department DOE Oversight Bureau

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Executive Summary

The U.S. Department of Energy (DOE) funds the New Mexico Environment Department's DOE Oversight Bureau through a grant with provisions set forth in an Agreement-in-Principle between the State of New Mexico and the Department of Energy. The agreement provides for state oversight of environmental impacts at four facilities: Sandia National Laboratories and the Lovelace Respiratory Research Institute in Albuquerque, Los Alamos National Laboratory in Los Alamos, and the Waste Isolation Pilot Plant near Carlsbad.

This report highlights the activities of the DOE Oversight Bureau for calendar year 2002. This report is also posted in the New Mexico Environment Department's website at www.nmenv.state.nm.us.

Funding to the New Mexico Environment Department under the agreement has remained stable in recent years, although that portion derived from the Environmental Management Division has declined significantly. In response to these declining revenues, the Environment Department successfully lobbied the DOE National Nuclear Safeguards Administration for supplemental funding in Federal Fiscal Year 2002.

Under contract to the New Mexico Environment Department, Risk Assessment Corporation, completed and evaluation of risks to public health from the May 2000 Cerro Grande fire. According to the study, the risk to the public of contracting cancer from breathing Laboratory-derived chemicals and radioactive materials in the Cerro Grande smoke plume was less than 1 chance in 10 million. The study concluded that risks from exposure to particulate matter in the smoke were greater than the risks from the radionuclides and chemicals in the smoke.

During 2002, Oversight investigators collected samples of storm water runoff to provide information to estimate the amount of contaminants leaving Los Alamos National Laboratory. During a single storm in June 2002, they measured plutonium-239 in lower Pueblo Canyon at a concentration of 197 picocuries per liter, which is significantly greater than concentrations measured in storm water before the Cerro Grande fire, and lower than the concentration of 350 picocuries per liter modeled by Risk Assessment Corporation.

The Cerro Grande fire burned over the Pueblo Canyon watershed; nearly 100 percent of the upper watershed experienced a high intensity burn. To monitor changes caused by increased erosion in the lower part of this canyon, Oversight investigators continued work on the geomorphic evaluation of lower Pueblo Canyon that was begun in 2001. They are coordinating with Laboratory representatives in these canyon monitoring and restoration efforts.

In the 2001 annual report, we discussed the results of fish samples collected from Cochiti and Abiquiu Reservoirs. The samples showed concentrations of polychlorinated biphenyls that were higher than Environmental Protection Agency screening levels. Because of this and similar findings by Los Alamos National Laboratory, the Oversight, the Surface Water Quality Bureau and the Laboratory are collaborating on a regional investigation into the distribution of the chemicals in the upper Rio Grande watershed.

At Sandia, Oversight representatives monitored investigations and reviewed documents relating to environmental restoration sites known as Drains and Septic Systems. They placed a high priority on the investigation of these systems, and worked with state regulators, DOE, and Sandia to develop a systematic investigative approach. At some sites, selected on the basis of suspected historical discharges, they monitored shallow drilling and split soil samples with Sandia. Oversight investigators continued groundwater monitoring at Sandia's Chemical Waste Landfill, using both low-flow and conventional pumps, at two wells that have shown trichloroethylene contamination.

In response to public concerns, an Oversight bureau representative investigated whether High Level Waste was placed in Sandia's Mixed Waste Landfill. In the late 1970s and early 1980s, Sandia National Laboratories conducted high temperature experiments that involved irradiating small amounts of spent nuclear fuel in Sandia's Annular Core Research Reactor. According to an initial review of documents, the fuel packages were removed before the canisters were disposed at the Mixed Waste Landfill. The investigation found no evidence to indicate that High Level Waste was disposed in the Mixed Waste Landfill.

During 2002, the Oversight Bureau continued to encourage collaboration to promote the success of the National Laboratories' environmental restoration and monitoring projects. The Bureau maintained communication with nearby Pueblos and local governments, and shared information about the status of environmental conditions and activities that relate to the Laboratories.

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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 Oversight Bureau's activities are funded by an annual 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 for Environmental Oversight and Monitoring.* This agreement is one of a number of such agreements initiated by DOE in the early 1990s.

The New Mexico *Agreement-in-Principle* (AIP) focuses on state oversight of environmental impacts at three DOE facilities in New Mexico: Sandia National Laboratories and Lovelace Respiratory Research Institute in Albuquerque, and Los Alamos National Laboratory in Los Alamos. The Agreement directs the State of New Mexico to develop and implement a program of environmental monitoring and oversight. It also directs the State to coordinate with local and tribal governments, and to work to increase public knowledge of environmental matters relating to DOE facilities. The current agreement, initiated in October 2000, is effective through September 30, 2005.

Personnel and Administration

New Mexico Environment Department personnel funded by the DOE grant are located at offices in Santa Fe and at "site offices" in White Rock, and on Kirtland Air Force Base in Albuquerque. A total of 21 positions were supported under the grant in federal fiscal year 2002.

Funding to the New Mexico Environment Department under the AIP has been stable in recent years, although that portion derived from the Environmental Management Division has declined. In response to these declining revenues, the Environment Department successfully lobbied the DOE National Nuclear Security Administration (NNSA) for supplemental funding in Federal Fiscal Year 2002. This is viewed as an important development, as both Sandia and Los Alamos National Laboratories are classified as NNSA facilities and therefore receive the bulk of their funding from the NNSA. As complex, dynamic facilities whose work involves the use of both toxic and radioactive substances, their ongoing missions represent potential impacts to the environment and public health. Activities conducted by the Environment Department under the agreement provide an independent check on the impact of operations at these facilities.

FUNDING SOURCE	$, FFY99	**$, FFY00**	**$, FFY01**	**$, FFY02**
DOE-EM	1,751,000	1,605,000	1,326,000	808,300
CERRO GRANDE	0	100,000	409,700	598,500
DOE-NNSA	0	0	0	300,000
TOTAL	1,751,000	1,705,000	1,735,700	1,706,800

Intergovernmental Coordination and Public Outreach

In 2002, Oversight Bureau representatives continued working with the Pueblos, other local governments, and citizen groups. The bureau involved the public in progress meetings throughout the duration of an independent assessment of health risks from the Cerro Grande fire. Bureau investigators made presentations to groups that work to maintain and enhance the natural resources of the east Jemez Mountains and worked with the Albuquerque community on long-term stewardship issues at Sandia.

Cerro Grande Fire Risk Assessment

The Cerro Grande fire risk assessment was completed in June. Under a contract to the New Mexico Environment Department, Risk Assessment Corporation, headed by Dr. John Till, evaluated risks to public health from the Cerro Grande fire that burned over Los Alamos National Laboratory property.

According to the study, the risk of contracting cancer from breathing Laboratory-derived chemicals and radioactive materials in the Cerro Grande smoke plume was less than 1 chance in 10 million. The risk of cancer from breathing chemicals and radioactive materials contained in the smoke from the burning of the natural forest vegetation was greater than from LANL-derived materials, but still less than 1 chance in 1 million. The study further concluded that risks from exposure to particulate matter in the smoke were greater than the risks from the radionuclides and chemicals in the smoke.

The risk assessors also evaluated potential risks from chemicals and radioactive materials released to surface water. The largest potential risk was associated with eating fish from the Rio Grande or Cochiti Reservoir. They estimated the risk of developing cancer from exposure to the predicted concentrations of chemicals and radionuclides in surface water or sediments to range from 3 and 20 in a million.

Risk Assessment Corporation investigators also suggested improvements for collecting information that would be useful in estimating health risks, and for communicating risks to the public. They stressed that an independent agency should have primary responsibility for communicating risks to the public. They also emphasized the need for a well-coordinated emergency plan, and the need to have systems in place to collect appropriate monitoring data.

The Oversight Bureau held nine informal public progress meetings during the study, usually with members of the risk assessment team in attendance. The Bureau distributed draft documents, and provided opportunities for the public to provide comments. Members of the team met with public groups, including groups from Taos, Los Alamos, and Albuquerque. Risk Assessment Corporation held three general public meetings, one in Pojoaque, one in Los Alamos, and the final one in Santa Fe in June 2002.

Complete results of the assessment are available at www.nmenv.state.nm.us/DOEOB.

Public and Governmental Involvement

Environmental Stewardship and Community Groups at Sandia

Late in 2001, DOE released a draft Long Term Environmental Stewardship Plan to address post-closure issues related to Sandia's Environmental Restoration Project. Albuquerque staff joined with community members to provide constructive criticism to the plan, especially in the area of public outreach. Participants felt the plan should contain specific language addressing how Sandia plans to maintain community awareness about the original nature of wastes, any measures that might have been taken to reduce risk from the wastes, and how sites with residual contamination will be monitored and controlled. We also participated in working groups formed to give DOE specific recommendations for delivery of information via general outreach, educational outreach, and a web site to enhance Sandia's Long Term Environmental Stewardship Plan. By the end of the year, the groups provided recommendations on information content and how it should be delivered. Based on the recommendations, a model educational program is under development, and Sandia began constructing a web site. The web site group made recommendations and encouraged cooperation between Sandia and Bernalillo County Environmental Health Department to pilot web based environmental information using the LandTrek system. LandTrek uses Geographical Information System technology to provide detailed information about contaminated sites including soil and water quality analyses, decision documentation, and land use restrictions.

We participated in a workshop sponsored by Tulane and Xavier Universities to discuss developments in science and technology related to implementation of long-term environmental stewardship. Workshop topics included innovative monitoring technologies, long-term sentinel indicators, innovative risk assessment approaches, social science and risk communication, and institutional controls.

Work with San Ildefonso Pueblo

On behalf of the Environment Department we worked with the Pueblo of San Ildefonso Department of Environmental and Cultural Preservation to develop a Memorandum of Understanding that was signed early in 2002. We coordinated with Pueblo environmental investigators to collect ground water and storm water samples in the vicinity of Pueblo lands that border the Laboratory. We work with Pueblo representatives through the East Jemez Resource Council and the Pajarito Plateau Watershed Partnership, and continue to share our environmental data with the Pueblo.

East Jemez Resource Council

In May, a member of the Oversight Bureau gave a presentation to the East Jemez Resource Council on contaminated sediment transport. The East Jemez Resource Council is an organization of federal, state, pueblo, and county officials who meet on regular basis to maintain and enhance the natural and cultural resources of the east Jemez Mountains. The talk emphasized the need to understand the different types of sediment transport and how such knowledge can be used in controlling contaminant transport from storm events.

Citizen's Advisory Board Environmental Monitoring and Surveillance Committee

The Northern New Mexico Citizen's Advisory Board Environmental Monitoring and Surveillance committee works to ensure early and ongoing community access to Los Alamos National Laboratory monitoring and surveillance information. In past years, the committee addressed ground water, air, and liquid discharge issues. In 2002, the Bureau continued to provide information to the committee. Early in the year, the committee worked to develop recommendations on the management of perchlorate, which has been used at the Laboratory. The committee held a work session on analytical protocols for evaluating low levels of contaminants such as perchlorate, and other ground-water monitoring issues.

Community Radiation Monitoring Group

The Oversight Bureau facilitates monthly meetings of the Community Radiation Monitoring Group. In the fall of 2002, Los Alamos National Laboratory, working with the group, developed a "NEWNET Goals and Operations" statement. NEWNET is an acronym for the Neighborhood Environmental Watch Network, a Laboratory program for radiological monitoring near radiological sources and in local communities.

The statement says that the Laboratory's goal is to provide quality radiation measurements at locations of interest to the public. It lists twelve operational principles that the Laboratory will use in implementing NEWNET. One of the principles states that the Laboratory will provide data of known quality based on measurements taken from within a 50-mile radius of the facility, and another says that the Laboratory will maintain a web site that provides public access to current monitoring data.

Los Alamos National Laboratory posts NEWNET data on the web at http://newnet.lanl.gov.

Regional Science Fair

In early March, White Rock Oversight staff helped judge the Northeastern New Mexico Regional Science and Engineering Fair, held at New Mexico Highlands University. This regional fair qualifies competitors for the New Mexico State Science and Engineering Fair that is held in Socorro. For several years, bureau representatives have judged Junior and Senior division projects in the chemistry, physics, and environmental science categories.

Albuquerque Area Outreach

School to World Career Day

At the third annual "School to World" career event in March, over 1,500 8th and 9th grade students talked with people representing 150 careers including performing arts, medicine, engineering, law enforcement, and the military. We represented employment in state government and environmental protection programs to students with different maturity levels and diverse backgrounds. We emphasized how the students' course work might relate to their future work in the environmental field.

In March Sandia Oversight staff judged the Northwest New Mexico Regional Science and Engineering Fair on the campus of the University of New Mexico. In our fifth year at this event, staff judged Botany, Environmental Science, and Microbiology categories in the Junior Division. The Junior Division includes students from sixth through eighth grade. The top projects chosen go on to compete in state, national, and international competitions.

This year staff members were invited back to judge both the spring and fall Rio Rancho High School Science Expos in April and December. The two events provide opportunities for students to improve their projects in preparation for regional and state competitions. In the limited time we have with each student, we attempt to relate some of our real world experience to their projects.

Los Alamos National Laboratory

Legacy Waste Cleanup

Regional Aquifer Characterization

During the year, we continued working with Laboratory investigators who are implementing the Hydrogeologic Workplan to characterize the regional aquifer. In 2002 Workplan activities involved installing and sampling monitoring wells in Los Alamos, Mortandad and Pajarito Canyons, and Cañada del Buey.

Staff members reviewed well drilling plans and reports, participated in data quality objective development, and collected samples at seven wells. They reviewed and submitted comments on the "Los Alamos and Pueblo Canyon Work Plan Addendum Surface Water and Alluvial Groundwater Sampling and Analysis Plan," dated February 2002. Comments on the investigation plans for these canyons focused on improving the process for determining the distribution of known contaminants within the canyons. They attended meetings of the Laboratory's Hydrogeologic Characterization Program and reviewed reports and meeting notes. Our samples from the regional wells confirmed results reported by the Laboratory. No samples were collected from intermediate-depth wells due to resource constraints. However, it is noteworthy that the Laboratory found perchlorate at a concentration of 179 ppb in a Mortandad Canyon intermediate well. While it has been known for some time that the shallow alluvial aquifer had high levels of perchlorate contamination, this finding was significant in that it documented that the contamination is migrating vertically.

Surface Water Assessment Team Recognition

In April 2002, Ralph Ford-Schmid and Barbara Hoditschek of the Oversight Bureau were recognized by Los Alamos National Laboratory for their work as members of the Surface Water Assessment Team to reduce erosion and the transport of contaminated storm water and sediment from Laboratory property following the Cerro Grande fire.

The Surface Water Assessment team includes representatives from the Oversight Bureau, the Surface Water Quality Bureau, and Los Alamos National Laboratory. The team developed and applied a procedure, known as Standard Operating Procedure 2.01, to evaluate and prioritize sites that have the potential for erosion and contaminant transport by surface water.

Ralph and Barbara worked with the team to identify Solid Waste Management Units that have concentrations of PCBs greater than 1 part per million, and worked to assure that erosion controls were in placed at these locations. For the Laboratory's Storm Water Monitoring Program, they worked to coordinate the completion of a Data Quality Objective Process that will facilitate regulatory approval of the storm water monitoring approach, and they evaluated and reported on the erosion controls and stabilizations installed after the Cerro Grande fire. Barbara continues to coordinate with the Laboratory storm water investigators to implement a study at Technical Area-46 to assess different types of erosion controls.

Effectiveness of Single Stage Samplers

A White Rock staff member developed a project to evaluate the effectiveness of erosion controls. The investigation, which was conducted in cooperation with Los Alamos National Laboratory, demonstrated the feasibility of using single-stage automated samplers to collect suspended sediment from storm water runoff. Beginning in 2001and continuing into 2002, the effectiveness of erosion control structures installed below Technical Area 46 after the Cerro Grande fire was evaluated. Samples of storm water were collected at locations upstream and downstream of the erosion control structures in 2001 and 2002. Results from laboratory analysis of the samples will be used to evaluate the effectiveness of the erosion controls in reducing the transport of contaminants from contaminated sites.

Samplers were checked after each appreciable rainfall from July through September. The sampler is designed to collect the "first flush" sample of runoff and then seal itself off with a float valve to preserve sample integrity. It is mechanically automated (no power source required) making it useful in remote locations. Checking the sampler involved looking to see if the collecting hole was open or closed. If the hole was closed, the sampling jug was removed and capped and replaced with a new jug. Although a sample would be collected after as little as a 0.1-inch rainfall in some channels, a larger rainfall of 0.2 to 0.3 inch rainfall was necessary in most channels to provide a sample.

This research has confirmed that a single-stage sampler can be used to collect samples of storm water runoff in small erosion channels. The single-stage samplers functioned without incident in most cases; that is, the float valves worked and the first flush sample was sealed off. Occasionally during the heavier rainfall events, fine particles would clog the spring for the pin used to trigger the sampling device. Also, because the samplers were partially buried in the ground and exposed to the environment, they were subject to forest floor activities. In one instance, a pocket gopher covered the sampler with soil. In another, tracks at the site indicated that an elk or a deer had stepped on the sampler and sprung the float valve. On two occasions the samplers did not collect a sample because windborne trash (plastic garbage bags) covered the sampler.

Surface Water Assessment Team

The Surface Water Assessment team includes representatives from the Oversight Bureau, the Surface Water Quality Bureau, and Los Alamos National Laboratory. The team meets regularly to review new information and make recommendations designed to reduce the potential for surface water transport of hazardous or radioactive materials from Los Alamos.

In January 2002, Laboratory management requested that the team participate in the development of Data Quality Objectives to guide compliance monitoring required by the Laboratory's Multi-Sector General Storm Water Permit. This permit regulates the discharge of storm water from certain industrial activities. The team developed objectives for monitoring at both Solid Waste Management Units (SWMUs) and Conventional Industrial Activity sites.

According to the Laboratory's general storm water permit, SWMUs are classified with Hazardous Waste Treatment, Storage or Disposal facilities as Sector K industrial activities, and require the development of Storm Water Pollution Prevention Plans and storm water monitoring.

To monitor storm water runoff at Conventional Industrial Activity sites, the Laboratory uses a telemetry-based system, which includes automatic water samplers and flow meters located in drainages below the industrial activity. At some locations, SWMUs are located in those drainages. When this is the case, the Data Quality Objectives developed by the team specify that storm water samples will be analyzed for the parameters that apply to the industrial activity, and also for the Sector K Benchmark Parameters that apply to the SWMUs.

In addition, the group considered how best to monitor SWMUs that are not associated with conventional industrial activities. It was agreed that the Laboratory should first address some 109 SWMUs that had been previously identified as having high erosion potential. The discussion then focused on how to consolidate the 109 sites to produce a manageable set of monitoring points. A list of criteria was developed to describe a "substantially identical outfall" and proposed eliminating monitoring at SWMUs that met the criteria.

Once the list of 109 sites has been reduced based on the "substantially identical" criteria, the next step will be to identify clusters of sites that are candidates for aggregated sampling. The purpose will be to find one or more sampling points that adequately characterize the runoff from the aggregated group of SWMUs.

Collaboration on PCB Investigation

In last year's annual report, we discussed the results of fish samples that we collected from Cochiti and Abiquiu Reservoirs. The samples showed concentrations of polychlorinated biphenyls (PCBs) that were higher than EPA screening levels. As a result of these and similar results from samples collected by Los Alamos National Laboratory, the Oversight and Surface Water Quality Bureaus and the Laboratory are collaborating on a regional investigation into the distribution of PCBs in the upper Rio Grande watershed. We are collecting fish, soils, and storm water for PCB analysis. We are also deploying "fat bags," which are semi-permeable membrane devices that mimic the fatty parts of fish. The fat bags are placed in the river for 30 days and are analyzed for PCBs. The investigation will continue in 2003 with additional fish, fat bags, sediment, and storm water sampling.

Dumping Of Sewage Water

On a Sunday morning in late July, a member of the Bureau discovered Los Alamos County workers illegally discharging liquid waste into Acid Canyon. A Los Alamos County liquid waste pumping truck had backed up to the edge of Acid Canyon and was discharging its contents to the canyon below. Young people at the nearby Los Alamos Swim Center stated that County trucks frequently were seen dumping liquid down into the canyon. The Oversight Bureau notified the New Mexico Environment Department Surface Water Quality Bureau.

A Los Alamos County Environmental Compliance Specialist, having been contacted by the Surface Water Quality Bureau, conducted an investigation of the July release. The County responded that potable water mixed with mud, not sewage water, was discharged to the canyon bottom. We questioned this response, noting that our staff member had identified a distinct strong sewage odor associated with the discharge. However it was asserted that the County trucks are indeed used for liquid waste hauling, but that July release was muddy potable water that may have smelled like sewage because the trucks are not routinely cleaned after each sewage haul.

To prevent future occurrences, the Los Alamos County Environmental Compliance Specialist promised to write a procedure that would require that all waste liquids be taken to the Bayo Waste Water Treatment Plant for disposal on the sludge drying beds. He also asked be notified again if we were to see any repeat occurrences.

Environmental Monitoring

Database Development and GIS Support

Two years ago, Oversight staff at the White Rock office began working with Los Alamos National Laboratory to develop a computerized database for the storage and retrieval of our environmental monitoring data. Up to this point the office had relied on individual investigators to manage data on their desktop PCs, typically on spreadsheets. This practice raised issues with respect to data quality and did not facilitate comparisons with Laboratory data. The database is based on a template developed by the Laboratory's Water Quality and Hydrology Group. With the Laboratory's help, the database is now operational. A replica of the database was given to the personnel at our Sandia office, and they have begun to use it to store their data.

In 2002, we began to implement systems for the direct electronic importation of the bureau's contract laboratory analytical data into the database. We worked closely with our contract laboratories to bring them onboard with delivering data electronically. To date, all but two of the most frequently used laboratories have successfully supplied electronic data, and we expect that soon the remaining two will have this capability. We have also put in place systems to check the data and the formatting before it is imported into the database

Much of our other database work involved building queries that generate reports on the ground and surface water data. We wrote approximately 190 queries, and developed eighteen report templates to automatically extract data from the database tables.

We are using Geographical Information System software and Global Positioning tools to produce visual displays that improve the quality of our environmental data evaluations and help us to understand physical changes at the Laboratory. At the White Rock office, we have direct access to geographic data through a Laboratory organization called GIS Lab and from the Risk Reduction and Environmental Stewardship group.

During 2002, we began a detailed reconnaissance of the Pajarito Plateau and White Rock Canyon to accurately locate springs using Global Positioning tools, locate and document new springs, collect field parameters (water conductivity, pH, and temperature), and characterize the flow of stream reaches that are supplied by springs. A total of 44 springs were documented. There are approximately five known springs where we still need to obtain coordinates and field parameters. In early 2003, we will continue reconnaissance of undocumented springs in White Rock Canyon and Lower Water Canyon.

Direct Penetrating Radiation and Air Particulate Monitoring

The Oversight Bureau monitors ionizing radiation at 16 locations using thermoluminescent dosimeters. Fourteen of these are in the Los Alamos Area; one is located nearer to Santa Fe, at the Buckman well field. Our radiation monitoring results for 2002 were within the range of natural background.

The Los Alamos and Sandia Oversight offices are investigating the use of a technology other than thermoluminescent dosimeters for measuring direct penetrating radiation, including gamma. The alternative technology uses E-Perm® electret passive ion chambers. This investigation is discussed in more detail in the Sandia Environmental Monitoring section. As at Sandia, the data from the electrets has trended well with previous data.

We also monitored for airborne americium, plutonium, tritium, and uranium isotopes at five Laboratory boundary locations. The results were consistent with the Laboratory's, and below applicable health standards. Our measurements of tritium were consistently lower than the Laboratory's measurements. We are in the process of upgrading our equipment and procedures for tritium monitoring to match the improvements that the Laboratory has made in its systems.

Monitoring of Omega West Reactor

In 2002, Los Alamos National Laboratory began removal of the Omega West reactor at Technical Area 2 in Los Alamos Canyon. In the fall of the year, Concerned Citizens for Nuclear Safety asked an Oversight representative if there might be elevated airborne releases of radioactive material during removal operations. The group's interest was partly the result of higher-than-background gamma radiation readings that they had taken from a location approximately 200 meters from the reactor.

To respond to questions from Concerned Citizens, an Oversight Bureau representative met with contractor health physics staff to discuss possible radiation sources and levels that might be observed during reactor removal operations. The radioactive sources were located and identified as short-term exposure concerns to workers while the reactor vessel was being moved to the Technical Area 54 Waste Disposal Site for permanent disposal. Gamma radiation levels at the reactor site gate and along the cyclone fence at the west end of the facility ranged from 65 to 80 μR/h. Typical natural background gamma radiation in this area ranges from 20 to 25 μR/h. The difference between the value at the gate and background is approximately 55 μR/h. At this rate, a person would have to stand at the gate for 75 days to receive a dose equal to the DOE public limit of 100 mrem.

Pueblo Canyon Geomorphology Project

The Cerro Grande fire burned the forests along the western boundary of Los Alamos National Laboratory. In the most severely burned areas, vegetative cover was eliminated and the ability of the soil to accept water was reduced. As a result, storm water flows in canyons below the burned area increased in frequency and magnitude. These flows accelerated erosion in the canyons, and increased the downstream transport of sediments and contaminants.

The fire particularly impacted the Pueblo Canyon watershed; nearly 100 percent of the upper watershed experienced a high intensity burn. To monitor changes caused by increased erosion in the lower part of this canyon, Oversight investigators continued work on the geomorphic evaluation of lower Pueblo Canyon that was begun in 2001. The evaluation was initiated to demonstrate the applicability of a system of stream channel mapping for evaluating current channel conditions and predicting future changes. Using standard surveying techniques (tape and laser level), global positioning tools, and geographic information systems, they measured channel dimensions, and then used the measurements to estimate hydraulic parameters. This information can be used for estimating and predicting the magnitude of erosion, deposition, and sediment transport in response to changes in stream flows.

The geomorphic study will increase understanding of the fluvial systems in the canyons and will provide information that can be used in designing systems to mitigate transport of contaminants from storm water runoff. Oversight investigators are coordinating with Laboratory representatives in these canyon monitoring and restoration efforts.

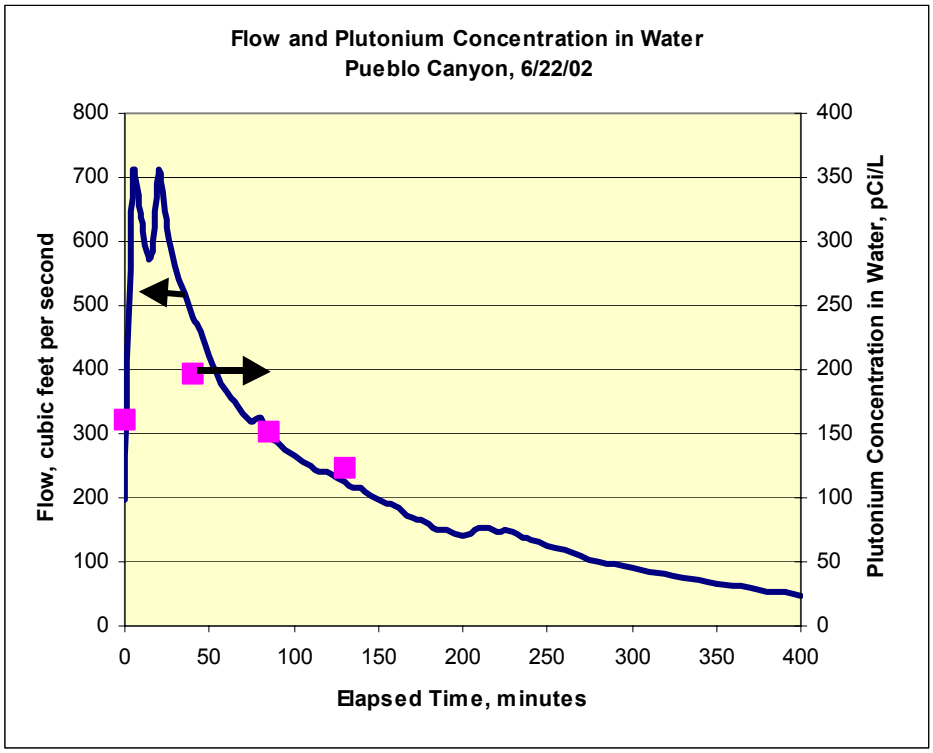
Storm Water Monitoring

During 2002, we continued collecting samples of storm water runoff to provide information needed to estimate the amount of contaminants leaving Los Alamos National Laboratory. Most of the samples were from canyons that are known to contain contaminants. To better understand natural or background contributions to contaminant levels, we also collected some samples from locations upstream of the Laboratory.

We collected 32 storm water samples from five canyons. Our samples showed that in general, the highest concentrations of radionuclides and metals are associated with the higher flows, normally during the first hour of flow. This is because the first flush of the storm water surge carries the highest concentrations of suspended sediment, and most metals and radionuclides bind to sediments.

Based on 2001 data, we expected that Pueblo Canyon storm water would contain higher concentrations of metals and radionuclides than Los Alamos, Water, or Pajarito Canyons. This is because contaminants were released directly into Pueblo Canyon, and increased storm water flows after the Cerro Grande fire are mobilizing these legacy contaminants currently stored in canyon sediments. Therefore we collected most of our samples in Pueblo Canyon and its tributaries.

As expected, we found higher levels of radionuclides in the Pueblo Canyon downstream samples. This is because legacy wastes distributed throughout the lower canyon are being eroded during high-flow storm events.



During a single storm in June 2002, we measured plutonium-239 in lower Pueblo Canyon at a concentration of 197 picocuries per liter. This concentration is significantly greater than concentrations measured in storm water before the Cerro Grande fire. It is lower than the concentration of 350 picocuries per liter modeled by Risk Assessment Corporation.

However, when we measured metals in upstream and downstream Pueblo Canyon samples, we found higher levels of metals in the upstream samples. This may be due to townsite runoff, legacy wastes from an old sewage treatment plant, or high levels of native soils washed from the burned slopes of upper Pueblo Canyon.

We collected two samples in Sandia Canyon, one from an upstream location below Diamond Drive and one from a downstream location below the Sandia wetlands. Sandia Canyon originates in Technical Area 3, where the Administrative Complex is located. Compared to other portions of the Laboratory, Technical Area 3 has a high percentage of impermeable surfaces such as rooftops, parking lots, and roads. Because of this, localized rainstorms can cause nearly instantaneous storm water flows in the canyon. We found elevated levels of metals, primarily cadmium, chromium, copper, manganese, molybdenum, lead, selenium, mercury, and zinc in suspended sediment leaving the Sandia wetlands.

Risk Assessment Corporation modeled risks from chemicals and radionuclides released to surface water after the Cerro Grande fire. They used a value of 350 picocuries per liter in water to estimate the risk to a subsistence fisherman living at the confluence of Los Alamos Canyon and the Rio Grande. Their assessment indicated that the increased risk for this fictitious individual to develop cancer would range from 3 to 20 in a million.

In addition to collecting samples of storm water runoff in Pueblo and Sandia Canyon, we also collected samples in Guaje and Pajarito Canyons, and Cañada del Buey. Levels of gross alpha, mercury, or selenium exceeded Livestock and Wildlife Watering standards in some of the samples. Most of the exceedences were in samples from Pueblo Canyon as shown in the table below.

	Exceedences of WQCC Livestock and Wildlife Watering Standards in 2002 Storm Water Samples		
	Mercury	Selenium	Gross Alpha
Pueblo	8/9[(1)]	6/9	19/20
Sandia	0/2	0/2	1/2
Guaje	2/2	1/2	2/2
Pajarito	0/2	1/2	2/2
Cañada del Buey	0/1	0/1	1/2

[(1)] 8/9 means eight exceedences out of nine analytical results

Groundwater Monitoring

Los Alamos Oversight staff collected ground-water samples at 45 locations. Most of the samples were collected on Laboratory property, although 10 were collected on the Pueblo of San Ildefonso. Many of the samples were collected as split samples, and were compared to a subset of the Laboratory's data. There were no unexpected results, and where results were higher than background, the values closely tracked the Laboratory's.

Oversight staff collected independent samples at eight locations that included one well and seven springs. The samples were analyzed for a limited group of contaminants, including strontium-90, tritium, nitrate, and perchlorate. The samples were analyzed for perchlorate using a new method for detecting perchlorate at low concentrations. Perchlorate was found at concentrations greater than 20 parts-per-billion in the perched alluvial aquifer in Mortandad Canyon, a significant perchlorate source term. Levels at or below the proposed drinking-water standard (1 ppb) were found in the intermediate and regional aquifers beneath several canyons. We detected low levels of perchlorate at several deep aquifer springs in White Rock Canyon.

We continue to find higher-than-background concentrations of strontium-90 in the perched aquifer/alluvium of Los Alamos and Mortandad Canyons. Above background tritium was observed in each aquifer type beneath the Laboratory and in several White Rock Canyon Springs.

Perchlorate in Groundwater

For the past seven years, Laboratory investigators have found perchlorate in alluvial groundwater at concentrations up to 3000 parts per billion (ppb). Samples from the regional aquifer have shown concentrations up to 7 ppb.

The method currently approved by the U.S. Environmental Protection Agency (EPA) for perchlorate analysis is known as Ion Chromatography. However, the method has a detection limit that is near the EPA's provisional 4 to 18 ppb drinking water advisory level. A different method, suggested to us by DOE representatives, Liquid Chromatography/Mass Spectrometry/Mass Spectrometry (LC/MS/MS), has a detection limit more than ten times lower than Ion Chromatography.

Perchlorates are both man-made and naturally occurring. Man-made perchlorate entered the environment during the 1940's as an ingredient in rocket and missile systems. Since then, it has been used in many industrial processes including nuclear reactors, electroplating, paint manufacturing, and chemical analytical operations. Perchlorate is used at Los Alamos for actinide and explosives research.

Perchlorate became a health issue in the early 1990's, when the Environmental Protection Agency (EPA) conducted a preliminary toxicological risk assessment. Although the overall health impact of low doses of perchlorate is currently not well defined, the EPA found that ingestion of perchlorate-contaminated water may cause adverse health affects.

At this time there are no federal health standards for perchlorate, but several states including Texas and California have issued action levels of 4 and 18 part per billion (ppb) respectively. In 1998, EPA added perchlorate to its Safe Drinking Water Act Contaminant Candidate List, and set a provisional action level range of 4 to 18 ppb. EPA recently conducted an additional toxicity assessment for perchlorate that is in draft form and is currently available for review by the public and the scientific community. EPA concludes that a draft estimate for drinking water would be set at 1 ppb. Additional information concerning EPA's latest toxicity assessment can be found at www.epa.gov/safewater/.

At Los Alamos, the primary risk to the public is from the ingestion of perchlorate through the drinking-water system.

In the fall of 2001, the New Mexico Hazardous Waste Bureau and the EPA collected ground water samples at the Laboratory and had them analyzed for perchlorate using the new LC/MS/MS method. The analytical results indicated numerous detections of low concentrations of perchlorate. However, both the DOE and the Laboratory had reservations about the analytical results. Therefore, Oversight investigators resampled thirteen locations, and again had the samples analyzed by LC/MS/MS. The analyses confirmed the initial results at twelve out of thirteen locations.

To further investigate the accuracy of the new method, we conducted four performance evaluations. A total of 28 samples were analyzed by 3 different contract laboratories. Each evaluation involved having one laboratory spike a sample with a known quantity of perchlorate, and then sending the unmarked spiked samples to a second laboratory for analysis. For the small sample set, the spike recoveries were acceptable, and results from the three laboratories were consistent.

Our overall results show a favorable performance for the LC/MS/MS method for analysis of perchlorate at concentrations of less than one part per billion. In 2003, we will be working with the Laboratory and the DOE on continued evaluation of this analytical method.

Evaluation of Analytical Method for Strontium-90

Oversight Bureau samples routinely show strontium-90 in water from DP Spring. The spring is located in DP Canyon, a small tributary to Los Alamos Canyon. DP Canyon drains a portion of Technical Area 21, the strontium-90 source term. From 1994 to 2002, we have measured concentrations ranging from 40 to 120 pCi/L.

As a check of our contract laboratories, and to provide information about the analytical variability that we might expect in samples at these concentrations, we sent water from DP Spring to four of our contract laboratories for analysis. We collected, field filtered, and preserved a four-liter sample, then divided it into four portions, and sent the one-liter portions to our contract laboratories for strontium-90 analysis by gas flow proportional counting.

The analytical results ranged from 39.7 to 60.2 pCi/L, with a mean of 48.5 pCi/L. From these four samples, we can say that at concentrations near 48.5 pCi/L, we can expect analytical variability (at the 95% confidence level) to be in the range of plus or minus 30 %.

New Spring in White Rock Canyon

In early October, Oversight Bureau investigators discovered a new spring along the Rio Grande immediately below the town of White Rock. They found the spring while accompanying investigators with Concerned Citizens for Nuclear Safety (CCNS) who were rafting down Rio Grande through White Rock Canyon to collect environmental data. The spring, actually in the streambed of the river, was exposed by the record low levels of the river as a result of the recent drought.

On a follow-up trip, we took field measurements of the water and collected samples for chemical analysis. The analytical results confirmed the field measurements that indicated the spring had different characteristics than others nearby. The analytical results showed low levels of tritium; and nitrate and uranium at levels below the U.S. Environmental Protection Agency drinking water standard, and unusual water chemistry parameters. The water chemistry, and findings of contaminants, indicated that the spring might have a different source than the others in the area that we have sampled. The Laboratory is conducting isotopic studies that may be useful in linking the spring to ground water chemistries from other upstream canyons.

Discharges and Emissions

Diesel Spill at Technical Area 21

Oversight Bureau personnel worked with Los Alamos National Laboratory and the Environment Department's Hazardous Waste Bureau to track a diesel fuel release at Technical Area 21.

In February 2002, the Laboratory discovered that approximately 48,000 gallons of diesel fuel had disappeared from a 50,000-gallon above ground storage tank system located next to the Technical Area 21 steam plant. Initially it was thought that the fuel oil was either moved during the Cerro Grande Fire or had been stolen. However, there was no documentation indicating the fuel had been moved, and inventory control documentation since the fire (as late as November or December, 2001) indicated that the tank was almost full at that time.

The tank stored fuel oil for an emergency backup generator. Because the tank is used to store emergency backup fuel, it is exempt from the release detection requirements of the New Mexico Petroleum Storage Tank Regulations. Also, the entirety of the technical area is in the process of being decommissioned. For these reasons, the facility support subcontractor, Johnson Controls, apparently did not perform the preventative maintenance work that is customarily performed on storage tanks. After realizing that the fuel had leaked into the ground, Johnson Controls tested the tank and associated underground piping system. A leak was found in a badly corroded portion of the piping system leading from the tank to the generators inside the steam plant.

Laboratory personnel collected samples of water from two nearby drinking water supply wells and did not find any contamination. To determine the extent of contamination, Laboratory contractors conducted further investigations including geoprobe and borehole drilling, analysis of drilling cores and cuttings, and computer modeling. The investigation confirmed that the diesel fuel extended to depths of greater than 100 feet. The Laboratory has selected a contractor to conduct the remediation and the contractor is preparing a cleanup plan.

Radioactive Waste Disposal

Bureau representatives worked to resolve safety and regulatory issues relating to drum storage stacking and aisle space requirements at the Laboratory's Technical Area 54 Area G radioactive waste disposal facility. They are also working waste management personnel at the Laboratory to maintain awareness of regulatory requirements relating to the shipment of transuranic and mixed waste to the Waste Isolation Pilot Plant near Carlsbad.

Sandia National Laboratories

Legacy Waste Cleanup

Sandia's Environmental Restoration Project reached significant goals in 2002. Project workers began backfilling the completed Chemical Waste Landfill (CWL) excavation, and placed treated contaminated soil from the landfill in the Corrective Action Management Unit (CAMU). Oversight Bureau representatives helped navigate the complex regulatory pathway toward reaching these goals by participation in the CWL/CAMU High Performing Team and collecting verification samples at the CAMU.

More broadly, we provided input on draft decision documents emphasizing the importance that the documents describe the complete picture of an Environmental Restoration site. We suggested linking the history of a site's environmental investigations with the corrective measures. We also recommended that the history should be followed by a clear presentation of the human and ecological risk posed by any residual contamination, and a description of resulting post-closure controls. Our objective with these suggestions was to improve regulatory and public acceptance as the project transitions into Long-Term Environmental Stewardship.

In other projects, we monitored fieldwork on the Drains and Septic Systems investigation, and split soil and groundwater samples. We also observed corrective actions at Site 28-2 following the unexpected discovery of material containing depleted uranium near the mine site entrance.

Drains and Septic Systems

Oversight representatives monitored the investigations at a group of environmental restoration sites known as Drains and Septic Systems. We placed a high priority on the investigation of these systems, and worked with state regulators, DOE, and Sandia to develop a systematic investigative approach. At some sites, selected on the basis of suspected historical discharges, we monitored shallow drilling and split soil samples with Sandia.

The drain systems are broadly distributed across Kirtland Air Force Base, and include one adjacent to our own office building. During the year, Sandia completed passive soil vapor and subsurface soil sampling at the 61 sites that continue to be Areas of Concern. Groundwater monitor wells were drilled next to suspect drain systems at four of the sites. This was done according to the systematic investigative approach, when site information indicated the potential for ground water contamination.

Because elevated concentrations of high explosives had been detected in soils at the Explosives Preparation Facility (Building 9960), we split a groundwater sample with Sandia from a monitoring well constructed near the site. We did not detect high explosives in the groundwater sample, but our data confirmed Sandia's findings of an unusually high arsenic concentration. As arsenic contamination was not known to have occurred at this site, we met with the facility investigators to consider the cause of the elevated concentration. Characteristics of the groundwater indicated that the arsenic might be naturally occurring. Other than this unusual result, there was no indication of groundwater contamination from the drain systems.

Chemical Waste Landfill and CAMU

Sandia made significant progress in 2002 in the voluntary corrective actions geared toward final closure of the Chemical Waste Landfill and CAMU. The Bureau continued its oversight of landfill excavation activities, and observed the backfilling of the northern portion of the Chemical Waste Landfill. Residually contaminated soils meeting risk-based criteria were limited to placement at a depth greater than 10 feet. The southwest area of the landfill represented the final major excavation and removal action at the facility. Sandia removed soil to a greater depth than originally planned to remove concentrations of PCBs.

We continued our groundwater monitoring efforts at the landfill, collecting samples from two wells that have shown trichloroethylene. Samples were obtained using both low-flow and conventional pumps in order to evaluate the relative performance of the two different ground-water sampling methods. Volatile organic compound results, the primary constituents of concern, were comparable with both methods, each reporting trichloroethylene at levels below the regulatory standard. The higher pumping rate of the conventional pump yielded a 70-fold increase in sample turbidity. These turbidity levels would not be expected to occur naturally in the ground water formation but are likely the result of stirring up sediment within the well casing. The concentrations of total metals were therefore not comparable. We suggested that Sandia propose a low-flow method that complies with the Department's guidance on low-flow sampling.

Before the end of the year, all excavated landfill soils were treated with low temperature thermal desorption and soil stabilization as required. We observed proof of performance tests for the desorption unit, and collected replicate emission samples for independent confirmation of test results. Prior to the test, we coordinated with Sandia on appropriate emissions monitoring and sampling methods. For example, we recommended that tritium samples be collected from the treatment stack at a point following the scrubber stage (a pollution control device) to determine actual tritium emissions.

Prior to start-up of full-scale treatment, Oversight Bureau representatives met with Environment Department, City of Albuquerque officials, and Sandia personnel, to discuss the performance test sample results. We supported the technical interpretation of data and identified appropriate emission benchmarks for the analysis. Our efforts contributed to the timely regulatory authorization to proceed with Low Temperature Thermal Desorption treatment of soils.

We continued our participation on the CWL/CAMU High Performing Team and monitored other site-related field activities including the repair and successful testing of the CAMU vadose zone monitoring systems. By the end of 2002, the placement of soils in the CAMU containment cell was complete and CAMU cover installation was in progress.

Mixed Waste Landfill

In 2001, Bureau investigators split groundwater samples with Sandia to help identify the cause of recurring detections of low levels of toluene in Mixed Waste Landfill monitor well MW-4. After removal and repair of a damaged packer at MW-4, we collected a follow-up sample at this well. Results from two samples split with Sandia in 2002 verified that toluene was no longer detected following repair of the packer. Our analysis of the magnitude, frequency and extent of toluene contamination in samples from this monitor well supports the contention of Sandia that the contamination was the result of leakage past the packer from upper zones in the well.

We also split groundwater samples from Mixed Waste Landfill monitoring wells MW-5 and MW-6. Sandia installed these wells in the fall of 2000 to provide better down gradient coverage as well as accommodate a locally declining water table. We did not find any volatile organic compounds in any of the samples.

Consistent with Sandia's results, the highest uranium concentration in our samples from MW-5 and 6 was 0.0089 mg/L. This level is greater than the New Mexico Environment Department's approved maximum background concentration of 0.0052 mg/L. However, the ratios of uranium isotopes in the samples were consistent with naturally occurring ratios. Isotopic ratios of uranium from well MW-4 were similar. Barium was also reported in one well at a level slightly above the approved maximum background concentration of 0.120 mg/L. This slight elevation was also consistent with Sandia's results.

Unexpected Removal at Mine Site 28-2

Solid Waste Management Unit 28-2 is the last of the 10 mines sites to receive no further action status, pending resolution of the investigation of the interior of the mine. We participated in a reconnaissance visit to the mine after Sandia notified us that a yellow, fiberboard like material containing depleted uranium was encountered while installing signs and fencing outside the mine entrance. At the time the contamination was believed to be limited, and a Voluntary Corrective Action to remove the material was planned for the spring of 2002.

Bureau representatives observed corrective actions and participated in site decisions. A radiological survey indicated additional contamination in a berm leading to the entrance of the mine. Several large chunks and many smaller fragments of depleted uranium were recovered using a backhoe and hand tools. Due to the unexpected extent of contamination indicated by the radiological survey, we encouraged Sandia to systematically work through the entire berm to isolate and remove contamination. While we expressed concern that lack of an approved work plan for the corrective action could bring into question the validity of work performed, our observations indicated the removal operation was adequate.

Environmental Monitoring

Part of the Oversight Bureau's mission is to monitor environmental media. Environmental monitoring programs are used by Sandia and the Oversight Bureau to detect environmental impacts from ongoing activities at the facility. To do this, we monitor ambient gamma radiation, and sample groundwater, wastewater, vegetation, and soil. Often we sample at the same times and locations that Sandia does to evaluate the adequacy of their data and monitoring programs. We also operate four independent continuous air monitors, three on the perimeter of Kirtland Air Force Base and one at the Mixed Waste landfill.

Airborne Radionuclides

The Bureau continued air sampling at three locations along the perimeter of Kirtland Air Force Base. In January we moved a monitor that had operated at an off-site location for seven years, and began monitoring at Sandia's Mixed Waste Landfill. Prior to the move we analyzed for isotopic uranium and plutonium at all four stations. Similar analyses were done on samples from all stations in 1995 and 1996. Combined, we used these data as a baseline for assessment of future samples.

At all monitoring locations, airborne particulate is collected on spun glass filters and water vapor is collected in silica gel filled columns. The particulate is analyzed for airborne radionuclides by gamma spectroscopy, and water vapor analyzed for the presence of tritium, a radioactive isotope of hydrogen. Since the start of the year, we also performed isotopic uranium and plutonium analysis on the particulate from the South West Base and the Mixed Waste Landfill stations.

To date, the concentrations of uranium and plutonium from the Mixed Waste Landfill and South West Base have been similar to each other, and to the baseline established by the 1995-1996 samples and more recent results. The results were also well below human health based standards.

Tritium analysis is conducted at all stations and the 2002 values indicate that the Mixed Waste Landfill data ranges from two to ten times more than data from the other stations. Air concentrations of tritium from the Mixed Waste Landfill still range from a thousand to nearly ten thousand times less than the human health based standards. No samples exceeded Federal standards for dose to the public via the air pathway.

DOE is subject to EPA regulations regarding emissions into the air of hazardous pollutants, including radionuclides. EPA regulations are listed under 40 CFR 61 Subpart H, National Emission Standards for Hazardous Air Pollutants, or NESHAPS. The standards state "Emissions of radionuclides to the ambient air from Department of Energy facilities shall not exceed those amounts that would cause any member of the public to receive in any year an effective dose equivalent of 10 mrem per year."

To protect radiological workers, DOE has derived concentrations of radionuclides that would result in a committed effective dose equivalent of 100 mrem per year from ingestion of water or inhalation of air. These concentrations are listed in Figure III-1 of DOE Order 5400.5 and are called Derived Concentration Guides (DCGs).

The DCG for inhaled air containing tritium is 1×10^{-7} µCi/mL. Tritium concentrations that we measure at the Mixed Waste Landfill are the range of 1×10^{-11} µCi/mL. These concentrations are approximately 10,000 times less than the DCG.

Ambient Gamma Monitoring

Since 1992, we have measured ambient gamma radiation at twelve locations within the greater Albuquerque area using thermoluminescent dosimeters. Six dosimeters are located throughout Kirtland Air Force Base and six are in the surrounding communities. All but one are placed next to Sandia monitors to allow for data comparison. According to our monitors, gamma radiation levels on Kirtland Air Force Base or the surrounding communities do not exceed background for the area.

In early 2002, the Oversight Bureau began considering E-Perm® electret passive ion chambers as an alternate method for measuring gamma radiation. An electret is a charged Teflon™ disk in a small chamber that discharges proportionally to the amount of radiation that it receives. Since mid-year, the Bureau has been evaluating this technology alongside the thermoluminescent dosimeters at all Sandia locations. So far, the data from the electrets trend well with previous Bureau and Sandia data. However, the readings are somewhat higher than from the thermoluminescent dosimeters, a finding that is consistent with the known sensitivity of the electrets to a wider range of gamma radiation.

Storm Water Monitoring

To monitor for possible transport of contaminants from contaminated sites by storm water, we placed single-stage storm water samplers in arroyos downstream of a group of environmental restoration sites in the Lurance Canyon area. However, the sporadic rainfall in 2002 did not create enough flow to obtain samples. Although we did not collect any storm water samples, we worked with representatives of the Sandia monitoring programs to determine the alternative means of monitoring impacts to surface water.

In addition to overseeing cleanup of legacy waste sites, the Bureau selectively oversees current activities at Sandia National Laboratories to assess whether they are protective of human health and the environment.

Terrestrial Surveillance

In July, Bureau staff members participated with Sandia personnel in their annual terrestrial surveillance sampling. Sandia samples soils and vegetation from Kirtland Air Force Base and around metropolitan Albuquerque. Normally we sample at approximately 10% of Sandia's locations and at generally the same locations each year to investigate trends in radionuclides that are present in the environment. In 2002, we added a new location at Sandia's Mixed Waste Landfill to monitor for any elevated radionuclides at the former landfill. All data appeared similar to previous years data. Based on our air monitoring results we expected the Mixed Waste Landfill samples to show slightly elevated tritium readings, however the results were instead similar to offsite data.

Ground Water Monitoring at LRRI

In 2002, the NMED, Groundwater Bureau renewed the groundwater discharge plan governing post-closure monitoring for the Lovelace Respiratory Research Institute's (LRRI) closed sewage lagoons. With the renewal, the Bureau continued taking ground water samples with the facility. We sampled three facility wells and another four wells installed by the Bureau, including three on the Pueblo of Isleta. The purpose of the split sampling was to verify LRRI analytical results and independently confirm local groundwater quality. Samples were analyzed for general water chemistry (major anions and cations, nitrate and total dissolved solids) and fluoride.

Generally the results indicate that groundwater quality is at the expected background condition or improving from the historical impact. New Mexico Water Quality Control Commission (WQCC) standards for chloride, sulfate, and total dissolved solids continue to be exceeded in two facility monitor wells, however the concentrations exhibit a downward trend. Nitrate, the primary contaminant of concern, has not exceeded the standard since the second half of 2000. Fluoride was consistently observed in all wells near the WQCC standard of 1.6 mg/L and probably represents a locally elevated background value resulting from regional fluoride deposits.

Discharges and Emissions

Oversight of ongoing operations included providing technical input for portions of Sandia's Hazardous Waste Operating Permit renewal, conducting general assessments of waste management processes at Sandia's Technical Area 5 and the Lovelace Respiratory Research Institute, involvement in Sandia's facility decontamination and decommissioning process, and sampling of wastewater discharged from Technical Areas 3 and 5.

Although we did not observe any burn tests at the Lurance Canyon Burn Site this year, we evaluated plans for new test facilities. The facilities include a thermal test complex that will provide an alternative to testing in Lurance Canyon. We found that the design of the new facility will result in reduced emissions compared to the emissions from the current open burn tests. Open pan burn test capability will continue to be an option at the Lurance Canyon Burn Site.

We scaled back our analysis of Sandia's technical basis for deleting specific quantities of mixed waste from the Site Treatment Plan inventory as the state's Hazardous Waste Bureau expanded its role in this area. We verified the adequacy of 21 such requests, and suggested some improvements to tracking and documenting the process.

Nuclear Materials Assessment

In response to public concerns, Oversight bureau staff investigated whether High Level Waste was put in Sandia's Mixed Waste Landfill. The investigation involved an assessment of the management of spent nuclear fuels. As defined by the Nuclear Regulatory Commission, High Level Waste includes spent nuclear fuel and the wastes resulting from reprocessing spent nuclear fuel.

In the late 1970s and early 1980s, Sandia National Laboratories conducted high temperature experiments that involved irradiating small amounts of spent nuclear fuel in Sandia's Annular Core Research Reactor. According to our earlier review of documents relating to the Mixed

Waste Landfill, fuel test packages were contained in two sets of stainless steel canisters along with sensors and other instrumentation. Some canisters from these experiments were placed in the Mixed Waste Landfill. The question that we wanted to answer was: were the fuel materials also placed in the Mixed Waste Landfill? The documents indicated that the fuel packages were removed before the canisters were disposed. Interviews with personnel who worked on the experiments confirmed this was the case.

To increase our confidence in the earlier review, we received a detailed briefing about the fuel experiments and nuclear fuel management at Sandia. We also reviewed information about the experiments and documents that discussed the storage locations for some of the tested fuel packages. As we learned more about the experiments, we confirmed that all nuclear fuels, both spent or fresh, tested or not, are considered Special Nuclear Material. Special Nuclear Material is highly controlled and must be inventoried to the nearest gram, so any amount greater than 0.5 gram is tracked.

Based on our document review, for most of the experiments, the test canisters were never opened. The canisters along with the fuels are currently in storage at Sandia, where they are being managed and tracked as Special Nuclear Material. We have seen some of the canisters, and were able to confirm that the records corresponded to the canisters in storage.
One project, consisting of two experiments, involved opening the canisters and removing the fuel as part of the post-irradiation analysis. The canisters from that project were disposed in the Mixed Waste Landfill, and the fuel is in containerized storage at Sandia and is being managed as Special Nuclear Material. We are in the process of verifying the storage location of the containerized fuel.

To date, we have found no evidence that indicates that High Level Waste was disposed in the Mixed Waste Landfill. For the remaining packages, we are in the process of tracking the spent fuels through a classified database, and verifying that the materials are properly stored and accounted for.

Waste Water Sampling

To monitor for radiological or chemical releases to the City of Albuquerque sewer system, Sandia samples wastewater from a manhole north of Technical Areas 3 and 5. Each sample is a composite of many samples collected over 24 hours and is split with the Oversight Bureau and the City. Due to budget constraints, in 2002 the City reduced the frequency of samples collected from this location from four to two times per year.

The Bureau analyzes its portion of the samples to monitor for radiological releases into the sewer system, and to confirm Sandia's results. We submitted our samples to an independent laboratory for gross alpha-beta and gamma spectroscopy analysis. The concentrations of radionuclides in our samples did not exceed reference values from the State of New Mexico Radiation Protection Regulations for release to a sewer system, and the results compared favorably to Sandia's data.

Spills and Discharges

The Bureau occasionally receives notification of inadvertent discharges that occur at Sandia. This year we reviewed three spill reports and one notice of intent to discharge at Sandia. The three spills all occurred at Sandia's Technical Area 1. One spill involved a sewage overflow resulting from construction activities. Another was from a ruptured potable water line, and the third was a release of about nine ounces of a hazardous material, mercury. The majority of the mercury spilled on the floor of a storage building during disassembly of some electrical equipment. Each of these incidents had limited impact on the environment, and the corrective actions taken to mitigate the impacts of these releases were satisfactory.