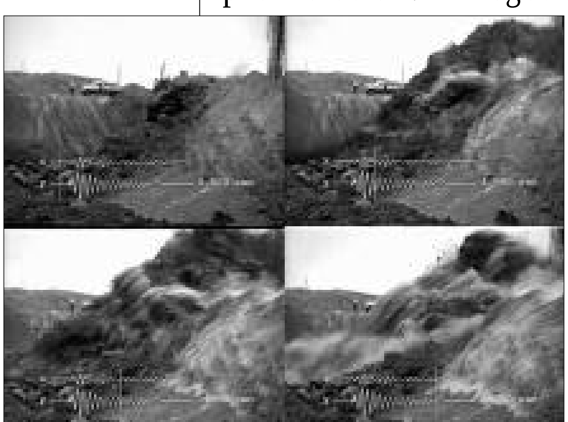
LOS ALAMOS NATIONAL LABORATORY
WHERE SCIENCE MAKES A DIFFERENCE

DATELINE
LOS ALAMOS

EXPLOSIONS PROVIDE DATA NEEDED TO ASSURE COMPLIANCE WITH NUCLEAR TEST-BAN TREATY

SEISMIC TECHNOLOGY USED TO DISTINGUISH UNDECLARED NUCLEAR TESTS FROM OTHER GROUND-MOTION SOURCES

The United States and more than 100 other nations are currently negotiating in Geneva a Comprehensive Test-Ban Treaty to reduce the danger posed by nuclear weapons proliferation. If negotiated and ratified, the so-called "zero-yield" agreement will ban all nuclear weapons tests and all other nuclear explosions.



The four videotape frames show a single-shot mining explosion at half-second intervals. The squiggle at the bottom of each frame indicates ground motion. The proposed global network of monitors will be able to distinguish between the squiggles generated by a mining blast, such as this one, or a clandestine nuclear explosion.

←

A global network of seismic monitors will provide the primary technology for affirming participating nations' compliance with the treaty. Los Alamos researchers are verifying the integrity of the proposed network, which will use seismic monitors to identify clandestine nuclear explosions detonated

DATELINE: LOS ALAMOS

➔ Researchers from Los Alamos are working with the U.S. mining industry to develop a seismic library of different types of ground motion. In this photo, a mining crew pumps an explosive into a drill hole.

below the earth's surface and in the oceans. The network must also be able to identify naturally occurring events such as earthquakes and mining detonations so they are not misinterpreted as nuclear explosions.

The seismic monitors will distinguish ground motion caused by earthquakes and non-nuclear explosions from motion caused by nuclear blasts. Any type of ground motion, regardless of its source, can be measured and characterized by features such as wave frequency and wave amplitude.

Los Alamos has a wealth of seismic data archived from its years of conducting underground nuclear tests at the Nevada Test Site. By working with the U.S. mining industry to build a database for chemical explosions used in routine excavation, Los Alamos researchers are working to develop a complete seismic library that will make it possible for scien-

DATELINE LOS ALAMOS

A MONTHLY PUBLICATION OF THE PUBLIC AFFAIRS OFFICE OF LOS ALAMOS NATIONAL LABORATORY

LOS ALAMOS NATIONAL LABORATORY, AN AFFIRMATIVE ACTION / EQUAL OPPORTUNITY EMPLOYER, IS OPERATED BY THE UNIVERSITY OF CALIFORNIA FOR THE U.S. DEPARTMENT OF ENERGY UNDER CONTRACT NO. W-7405-ENG-36

EDITOR
Diane Banegas

MANAGING EDITOR
Meredith Coonley
(505) 665-3982 • suki@lanl.gov

STAFF WRITER
Theresa Salazar

CONTRIBUTING WRITERS
Kathy DeLucas • Jacqueline Paris-Chitanvis
Gary Kleiwer • James E. Rickman • Kelly Stoddard

CONTRIBUTING PHOTOGRAPHERS
Fred Rick • James E. Rickman
LeRoy N. Sanchez • Gary Warren

PRINTING COORDINATOR
G.D. Archuleta

LOS ALAMOS NATIONAL LABORATORY
PUBLIC AFFAIRS OFFICE, MS P355
LOS ALAMOS, NM 87545

DATELINE: LOS ALAMOS

tists to determine where and when an explosion happened and whether the explosion has a nuclear "thumbprint."

Scientists detonated the last U.S. nuclear test in September 1992. Later in the same month, Congress imposed a moratorium on testing, which President Clinton extended indefinitely. All the declared nuclear powers have followed the U.S. moratorium except China and France. President Clinton announced Aug. 11 that negotiating a Comprehensive Test-Ban Treaty to reduce the danger posed by nuclear testing is one of his administration's highest priorities.

His decision to pledge U.S. support for a "zero-yield" ban goes beyond previous treaties because it rules out even low-yield nuclear tests and small-scale "hydronuclear" experiments that use no more than 4 pounds of TNT. By comparison, the blast that destroyed the Oklahoma City federal building contained the equivalent of 2 1/2 tons of TNT.

Assuring compliance with a comprehensive test ban means the international monitoring system must be sensitive enough to detect the smallest nuclear blasts and accurate enough to distinguish industrial explosions of any type and size from covert nuclear tests.

The Los Alamos researchers predict that an effective global monitoring system will have about 50 regional stations and 100 to 200 auxiliary

←

In the top photo, Los Alamos researcher Craig Pearson (left) logs in the number of ground-motion events recorded while colleague Wendee Brunish changes a battery in the data-acquisition system. In the bottom photo, Pearson and Brian Stump (left), also of Los Alamos, install a seismonitor in an open-pit coal mine.

DATELINE: LOS ALAMOS

Los Alamos researchers combine multiple types of data to characterize mining explosions. In this photo, a wave form created by an explosion has been superimposed on a video of the actual explosion.

stations that continuously detect and measure ground motion from all directions. Many of these stations will be dual-use, recording data in support of the treaty as well as for scientific purposes, such as studies of earthquakes and Earth's internal structure.

Each primary monitoring station will record a ground motion as an analog signal, convert the signal to digital form, archive the record at the station, and ship it via satellite link to an international data-receiving center. As information pours into the center from all 50 regional stations, automated data processors will review the data streams, looking for evidence that an event has occurred. When additional data is needed to refine the characterization of the event, the auxiliary stations can be queried.

A prototype of the network is now being tested under the Group of Scientific Experts from the Conference on Disarmament. For now, an office managed by Advanced Research Projects Agency in Arlington, Va., is serving as the international data center. Ultimately, the monitoring network will be put into place by the Comprehensive Test-Ban Treaty Organization after the treaty is ratified. The location of the final international center will be decided as part of treaty negotiations. Costs for stations and operations will be shared among the countries participating in the treaty.

A camera overlooking an open-pit coal mine.

Other technologies, including hydroacoustic wave monitoring (pressure waves in the oceans), infrasound monitoring (pressure waves in the atmosphere), and ground-based radionuclide monitoring will be used in conjunction with seismic monitoring to verify treaty compliance. These technologies will also be supported by the CTBT organization.

Research conducted by Los Alamos in support of the Comprehensive Test-Ban Treaty will also give the U.S. mining industry useful information about the efficiency of their explosions. Ideally, companies want maximum explosive power and minimal side effects like air pollution and objectionable ground motion.

In addition to gathering seismic data for non-nuclear explosions, the Los Alamos scientists are recording visual and acoustic data a few hundred meters from the blast.

Once they have multi-media profiles of explosions at close range, they will characterize the same type of explosion at distances of a few kilometers and thousands of kilometers. Ultimately, the data bank will make it possible to identify and characterize ground-motion from any type of explosion.

←

Research in support of the Comprehensive Test-Ban Treaty can assist the mining industry in making its explosions more efficient. Mining companies want more bang for the buck, with the least damage to the environment. This blast removed a layer of dirt that blanketed the coal seam. The soil will be replaced once the coal is removed.

CONTACTS: BRIAN STUMP AND CRAIG PEARSON
GEOPHYSICS
(505) 667-1004 • E-MAIL: stump@lanl.gov

DATELINE: LOS ALAMOS

LOS ALAMOS AND BANDELIER TIE SOIL EROSION TO CLIMATE-INDUCED VEGETATION CHANGE

STUDY CAN SERVE AS ENVIRONMENTAL MODEL FOR HOW DROUGHT CHANGES WOODLAND AREAS

Los Alamos scientists are studying soil erosion processes in Bandelier National Monument.

Los Alamos environmental scientists are working with a National Biological Service ecologist stationed at Bandelier National Monument and a geomorphologist from the University of Colorado to find out how a severe drought in the 1950s transformed a ponderosa pine forest into a piñon-juniper woodland.

The researchers are measuring vegetation changes, water flow, and soil erosion on a two-and-a-half-acre site on a mesa top overlooking Frijoles Canyon in Bandelier National Monument. Like much of the land in Bandelier, the site has a history of intensive grazing and fire suppression, and it experienced a severe drought during the 1950s.

Begun in 1992, the study shows that boundaries between different types of vegetation shifted rapidly over large areas as a result of the drought. Vegetation boundaries typically shift in response to climate change, but most studies of such shifts have shown them to occur over the course of a century or longer. The shift at Bandelier occurred in a few decades, creating dramatic changes in the ground cover that contributed to rapid erosion rates.

Understanding soil erosion processes is essential for land-management decisions at Los Alamos, a 43-square-mile site, and Bandelier, a 51-square-mile park southwest of Los Alamos that includes Anasazi ruins and an extensive wilderness back country. At Los Alamos, a key concern is how environmental contaminants move, while Bandelier considers as its most pressing management issue the stability of archaeological sites.

DATELINE: LOS ALAMOS

Since archaeological artifacts and environmental contaminants can travel with soil displaced by runoff, the study will help researchers determine which archaeological sites to preserve first and which contaminated areas to remediate first. On a larger scale, the study could provide a model for changes predicted in many semiarid regions in response to global climate warming.

The researchers are using field observations, historic records, and aerial photographs of the area that span 1935 to 1991. In addition, one researcher has reconstructed local fire history back to the 1600s using fire-scarred trees. With these records, the researchers have been able to show that ponderosa pine forests — which once dominated the study site and similar areas— were replaced by piñon trees and juniper shrubs.

The drought and an associated outbreak of bark beetles decimated the large ponderosa pine trees on the dry sites of the Pajarito Plateau, where Los Alamos and Bandelier are situated. Grass cover, already reduced by livestock grazing, apparently suffered further devastation by the drought, triggering accelerated soil erosion.

The researchers have set up instruments to monitor erosion rates and weather conditions, measure sediment and runoff, and observe vegetation changes as part of their study. Since most of the major rain and runoff events happen only a few times a year and only during certain seasons, it takes some time to collect a body of data large enough to answer key questions.

But data collected so far reveal that current erosion rates will strip the watershed of all its soil in less than 100 years. The runoff and erosion processes are fundamental to understanding how archaeological fragments or soil contaminants move across landscapes.

The information will help Bandelier identify which unexcavated sites need to be protected. Because the same principle applies to soil contaminants, the study will help members of Los Alamos' Environmental Restoration Program manage and remediate contaminated sites.

CONTACT: DAVID BRESHEARS
ENVIRONMENTAL SCIENCE
(505) 665-2803 • E-MAIL: daveb@lanl.gov

What do piñon trees, pottery shards, and soil contaminants have in common? All three are giving researchers clues about the erosion processes in a drought-affected piñon-juniper woodland. The data will help archaeologists and environmental researchers determine which historic sites or contaminated areas need to be stabilized quickly.

DATELINE: LOS ALAMOS

RESEARCH REVEALS UNEXPECTED RAIN RUNOFF IN PONDEROSA PINE FORESTS

STUDY FORECASTS HOW WATER MOVES CONTAMINANTS THROUGH SOIL

In another environmental study, Los Alamos researchers have found that clay soils in some ponderosa pine forests act more like a sluice than a sponge during periods of prolonged rainfall or snowmelt.

By comparing the chemistry of individual rain storms to that of water weeping from the ground afterward, the researchers found unexpected runoff behavior in the semiarid ponderosa pine forest areas near Los Alamos.

Instead of rainwater seeping into the clay and porous volcanic rock below the shallow soil layer and staying until it evaporates, the researchers found that the rainwater can move laterally through the soil very rapidly during periods of intense precipitation.

The research could help environmental remediation experts better determine whether contaminants — like those that leach out of mine tailings or buried industrial waste — might spread with water movement. The information will help focus cleanup efforts on sites that pose the greatest threat to their immediate environments.

The researchers began their study during the winter of 1992 on an 870-square-meter plot of forest land on Laboratory property several miles west of the town of Los Alamos. The plot is rigged with a self-contained weather station and equipment that measures soil water movement at the ground's surface, at the subsurface boundary between the upper soil and a dense clay layer, and in a portion of the tuff bedrock.

Data of weather and soil conditions are transmitted back in real time to computers at a control center, where the researchers can see how water is moving during rainstorms or snowmelt.

Water from each storm contains a mix of naturally occurring chemical isotopes and ions that can act as a

Los Alamos researcher Brent Newman stands inside the sampling box containing pipes that trap runoff from different depths in the soil. The self-contained weather station is over his left shoulder.

↓

DATELINE: LOS ALAMOS

↑

Newman empties a runoff sample from the collection pipe into a vial.

"signature" for a meteorological event. The researchers collect the water from each event and analyze it for oxygen-18 and deuterium — stable isotopes present in minute quantities — as well as chloride concentrations. They then analyze water samples from the surface and subsurface collectors and compare the results.

Using isotopic signatures and concentrations of chloride ions, the researchers have found that during dryer periods, surface and shallow subsurface water moving through the soil come from precipitation events that occurred more than a month earlier.

However, during periods of heavy rain or snowmelt, water draining from the site in the clay layer has nearly the same isotopic signature as the rain, presumably because of spaces in the soil known as macropores. These macropores serve as superhighways for large volumes of water that flow through the soil after heavy showers.

In the Southwest, most of the annual precipitation comes in the form of snowfall and brief, heavy rains. The macropore flow keeps the water moving from one area to another during rain storms. What hits the ground in one spot will be meters downslope in no time.

The Los Alamos researchers contend that the importance of macropore flow as the runoff mechanism in a semiarid environment has been overlooked by conventional hydrologic models. Until now, scientists have maintained that rain and snowmelt in semiarid environments were absorbed and held in the ground, moving only by evaporation or plant uptake.

New data obtained by this work and other long-term environmental studies seriously challenge earlier scientific notions about shallow ground-water movement.

This sample of subsurface runoff will be analyzed and compared with samples taken from deeper in the ground and at surface level. Newman and his colleagues have found that water can move laterally through the soil at very rapid rates instead of seeping into the ground.

↓

CONTACTS: BRENT NEWMAN AND BRAD WILCOX
ENVIRONMENTAL SCIENCE
(505) 667-3021 • E-MAIL: bnewman@lanl.gov

DATELINE: LOS ALAMOS

EXPERIMENTS PREDICT WEAPON RESPONSE TO PENETRATING PROJECTILES

RESEARCH HELPS TO ENSURE THE SAFETY AND SECURITY OF STOCKPILED WEAPONS

Los Alamos researcher Gary Laabs aligns a laser to produce a speckle pattern of light on a block of high explosives.

When it comes to nuclear weapons safety, Los Alamos researchers are ensuring that defense customers get no unwanted bangs.

Researchers need to predict how explosives inside a weapon might react when projectiles, like terrorists' bullets, violently penetrate the weapon. To better understand the reaction process, Los Alamos researchers are taking high-speed photographs of shock waves generated by projectiles when they hit blocks of high explosives.

Their work will provide scientists with the information necessary to build computer models that predict what will happen to a nuclear weapon if it is involved in an accident.

Accurate experimental data are important to those researchers who need to predict exactly the shape of the initial pressure wave to model different accident scenarios, because the shape of the wave determines how the explosive could release the energy of the entire weapon. The current database on the mechanical response and behavior of explosives is limited and has restricted the development of accurate computer models.

The detonation of a high explosive is initiated by a small shock wave that strongly compresses the explosive at a point and causes it to heat up and burn. The ignition reaction happens so rapidly that the pressure of the reaction products compresses the fuel around it, causing that fuel, in turn, to heat up and react, and so the detonation proceeds to spread out from the point of initiation just like a spherical wave. This compression-driven reaction travels at supersonic velocities and is called a detonation wave. The leading edge of the detonation wave is a shock front.

Dateline: Los Alamos

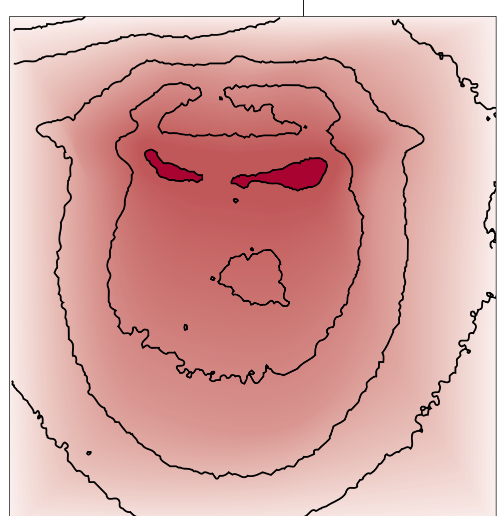
Scientists have long debated two theories on the shape of the deformation wave produced by a blunt penetrator. One theory is that a single wave moves from the center of the penetration, diffusing the force and heat in a three-dimensional arc around the point of penetration. The second theory speculates that two distinct waves may travel side-by-side away from the impact point with sharp peaks resembling cones, rather than a single arc.

Experiments conducted by the Los Alamos researchers offer a preliminary solution to this classic problem in mechanics known as the Prandtl Punch Problem. According to their data, the first mechanical theory is correct — the displacement travels in one arched wave.

The researchers used a blue-green laser, a high-speed camera, and a specially designed gas gun to measure the wave and overcome the constraints of studying motion that occurs on a microsecond time scale.

The blue-green laser is configured so that the light forms a speckle pattern on the block of high explosives. The research team fired a small, brass projectile from a gas gun into the block of high explosives while a high-speed camera recorded the event on film. After firing the gun and reviewing the images captured on film, the researchers determined where the laser's speckle light had distorted, indicating where the shock wave had traveled. Using infrared photography, the researchers also showed how heat traveled through the material, demonstrating again the shape of the penetration wave.

In this temperature profile of an object after impact by a projectile, the temperature is highest at the point of impact (dark red), and cools as the distance from the impact point increases.



The researchers used conventional explosives in their experiments but can apply the same experimental methods to insensitive explosives, which were developed at Los Alamos in the 1970s to dramatically decrease the possibility of detonation during accidental insults.

This work is supported by the Department of Energy and the Department of Defense/Office of Munitions under the joint DoD/DOE Munitions Technology Development Program and by Los Alamos' Explosives Technology Program.

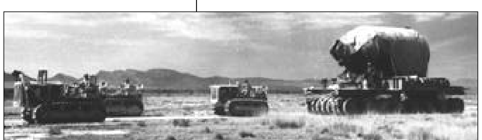
CONTACT: BLAINE ASAY
EXPLOSIVES TECHNOLOGY
(505) 667-3266 • E-MAIL: bwa@lanl.gov

DATELINE: LOS ALAMOS

"JUMBINOS" UNEARTHED AT RESTORATION SITE

Environmental cleanup efforts at Los Alamos have turned up a treasure trove of Manhattan Project-era artifacts.

The most intriguing finds were scale models of "Jumbo," the huge vessel commissioned for the 1945 Trinity test to capture the fissionable material if the Trinity device was a dud. Jumbo was designed by Los Alamos scientists Bob Henderson and Roy Carlson and built by Babcock and Wilcox Corp. of Barberton, Ohio.



Jumbo weighed more than 200 tons and was the largest pressure vessel in the world at the time it was built. It was shipped to the test site in southern New Mexico, but Jumbo's fate changed when scientists abandoned plans to detonate the world's first nuclear explosion inside the vessel. Instead, Jumbo stood idle through the historic test on a tower 800 feet from ground zero. (For more on Jumbo, see the "Countdown to Trinity" article in the June-July 1995 issue of *Dateline: Los Alamos*.) Jumbo's remains are still at Trinity Site.

From the top: In 1945 Jumbo was hauled across the desert to Trinity Site on a special 64-wheel trailer where it was hoisted atop a steel tower 800 yards from ground zero. The huge vessel survived the blast unscathed, but its tower was demolished.

The little Jumbos, nicknamed "Jumbinos," which were recently unearthed at Los Alamos, were made sometime before 1945. They were subjected to test explosions in preparation for the Trinity test. They are cylindrical iron containers about a foot across and 3 feet long. One Jumbino with its bottom blown out weighs about 500 pounds.

The Jumbinos and other artifacts found during the cleanup efforts will be cataloged and stored at the Laboratory's Bradbury Science Museum.

A member of a crew working with Los Alamos' Environmental Restoration Project examines a "Jumbino" recently unearthed along with other Manhattan Project-era debris.

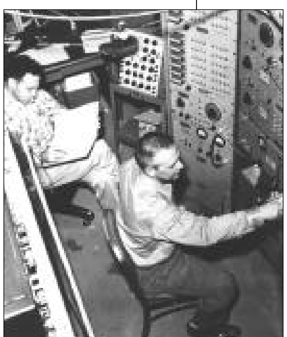
CONTACT: CHERYL ROFER
GEOLOGY AND GEOCHEMISTRY
(505) 667-2988 • E-MAIL: rofer@lanl.gov

DATELINE: LOS ALAMOS

LOS ALAMOS PIONEER WINS NOBEL PRIZE FOR PHYSICS

FREDERICK REINES HONORED FOR DISCOVERING THE NEUTRINO

Los Alamos pioneer Frederick Reines, now a physics professor emeritus at the University of California at Irvine, recently became a Nobel Prize-winning physicist.



← Frederick Reines (left) and Clyde Cowan are pictured here monitoring recording equipment at Hanford in an early experiment that gave hints of the existence of the free neutrino. Photo courtesy of Hanford Works

Reines, who joined the Laboratory in 1944, was honored recently by the Royal Swedish Academy of Sciences for his work at Los Alamos in the 1950s with the late Clyde Cowan. The two researchers were the first to detect experimentally the neutrino, a subatomic particle with no charge and little or no mass.

Neutrinos are produced in the sun when it fuses hydrogen into helium. They react weakly with matter. Scientists estimate that only one in 10 billion of the neutrinos traveling through Earth ever encounter another particle.

To track down their elusive target, Reines and Cowan in the spring of 1953 set up a large and novel liquid-scintillation system as a sensitive detector for the tiny particle near an atomic production reactor at the Hanford, Wash., plant. Although the evidence obtained at Hanford pointed to the existence of the neutrino as a particle in the free state, the experiment was not entirely conclusive.

The physicists returned to Los Alamos and devised a more complex detecting system to better select the neutrino signals from confusing background "noise" caused by radioactive and cosmic rays. In 1956, after conducting research at the Savannah River Site in South Carolina with the help of a group of scientists that included Los Alamos researchers Austin McGuire, Francis Harrison, and Harold Kruse, Reines and Cowan announced that they had collected experimental evidence for the existence of the free neutrino.

Twenty years earlier, Nobel laureates Enrico Fermi and Wolfgang Pauli had theorized the existence of such a particle to account for the mysterious disappearance of energy from a radioactive process known as beta decay. Neutrino studies are still ongoing at Los Alamos, and scientists are still debating whether a neutrino has mass.

Reines shares the Nobel Prize for physics with Martin L. Perl of Stanford University. Perl also was honored for his work with subatomic particles. ◆

DATELINE: LOS ALAMOS

PATENTLY CREATIVE

LOS ALAMOS INVENTIONS USEFUL TO INDUSTRY

Patents are a form of "intellectual property" granted by the U.S. Patent and Trademark Office. Patents granted for scientific research and innovation are known as "utility" patents, a category that recognizes inventions useful for industry and commerce. Since its origin in 1943, Los Alamos National Laboratory has garnered more than 1,000 patents. Descriptions of some patents awarded this year follow:

NEW METHOD FOR TREATING LUNG CANCER

Lung cancer is the number one cancer killer in the United States. Los Alamos scientists recently received a patent for a new method of treating lung cancer when the malignancy is still too small to show up on a chest X-ray. The method uses a combination of porphyrin, a synthetic compound, and copper-67, a radioactive isotope. The porphyrin serves as the vehicle that delivers the radioactive copper to cancerous cells in the lung. Like a microscopic Trojan horse, porphyrin releases its radioactive contents inside the cells and kills them. After killing the cancer, the copper-67 undergoes radioactive decay and remains harmlessly inside the body. A previous patent was awarded to the Los Alamos scientists for a technology that uses porphyrin alone as a cancer-screening agent. By adding the porphyrin compound to a sample of sputum coughed up from the lungs, patients can be diagnosed with lung cancer earlier than ever before possible. Any cancer cells in the sputum absorb much more of the porphyrin than normal cells and fluoresce bright red when the sample is illuminated with ultraviolet light. Using this method to screen large populations of patients at risk for cancer could give patients an advantage over the disease. CONTACT: DEAN COLE (301) 903-3268

NEW CHEMICAL PROCESS REMOVES HEAVY-METAL CONTAMINANTS FROM WASTE-WATER STREAMS

A new water-treatment process developed at Los Alamos removes actinide-metal and heavy-metal contaminants from waste water and produces less radioactive sludge than existing methods. The process uses a mixture of potassium ferrate and an additional water-soluble salt to precipitate out radioactive contaminants such as plutonium, cadmium, and uranium. Actively used around the country and licensed to a company in Denver, this chemical process results in less radioactive sludge, a cost-saving advantage, and at the same time does not increase the levels of chemical additives left in the treated waste-water stream. The process reduces the metal-ion contaminant concentration in the water to well within EPA guidelines for waste streams discharged into the environment. In the past few years, there has been an increased interest by the water-treatment industry in the use of strong-oxidizing ferrate salts as a substitute for some chlorination disinfection processes. Chlorination is much less expensive, but environmental concerns about chlorinated organics are prompting a serious look at non-chlorinating agents for these uses. The Los Alamos water-treatment process has become important for environmental cleanup and waste-water treatment in Department of Energy sites. CONTACT: PAUL DEININGER (505) 667-8776 • E-MAIL: deininger@lanl.gov

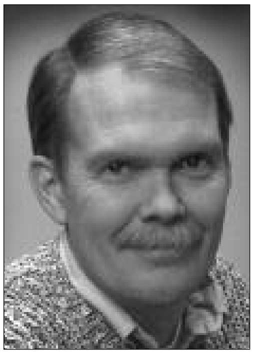
MICROSENSOR FOR VOLATILE ORGANIC COMPOUNDS

Los Alamos' chemical microsensor is a radical departure from standard polymer film microsensors used by scientists and the chemical industry to detect volatile organic compounds. Polymer films absorb atmospheric gases and change color or electrical conductivity when they detect contaminants. But polymer sensors don't last long and can't easily pinpoint specific contaminants. Los Alamos' dime-sized microsensor consists of a sensing layer of molecules bonded directly to an electrical transducer that converts mechanical signals into electrical signals. Tiny, cone-shaped molecules made of cyclodextrin, a component of starch, organize along the transducer so that one end of each molecule attaches to the transducer and the other end extends as a "bucket" that can readily trap specific organic toxins. The microsensor can be used to monitor air pollution wherever organic contaminants are released. Two examples are monitoring air quality near gas stations and detecting organic contaminants in the stack emissions at production sites. The unique Los Alamos method of attaching the molecular buckets directly to the detector means the sensing reaction occurs right at the interface between the detector and the environment. This allows chemists to build in, at the molecular level, favorable properties for specific contaminants. By changing the size and electrical polarity of the buckets, the microsensors can be customized to track specific organic toxins. Direct bonding also gives the microsensor long-term stability. CONTACT: BASIL SWANSON (505) 667-5814 • E-MAIL: basil@lanl.gov

DATELINE: LOS ALAMOS

BRIEFLY ...

LOS ALAMOS VOLCANOLOGIST LEADS INTERNATIONAL ASSOCIATION. Grant Heiken recently was elected president of the International Association of Volcanology and Chemistry of Earth's Interior.



Members of IAVCEI study volcanic rocks and mineral deposits, and the physics behind magma generation and flow, among other topics. The association currently is assessing volcanic hazards as part of the International Decade for Natural Disaster Reduction Project, a 10-year United Nations initiative in which potentially dangerous volcanoes in 13 countries have been selected for intense research that could help reduce volcanic catastrophes worldwide. Heiken, who has worked at Los Alamos for 20 years on projects ranging from geothermal exploration to volcanic hazards assessment, will be working with an executive committee of volcanologists and geologists from Italy, South Africa, Australia, Brazil Russia, Indonesia, and Japan.

IN THIS ISSUE:

Los Alamos National Laboratory — Where Science Makes a Difference

DATELINE LOS ALAMOS

A Monthly Publication of the Public Affairs Office of Los Alamos National Laboratory

Nonprofit Organization
U.S. Postage Paid
Los Alamos, NM
Permit No.107

LALP-95-2-12

Los Alamos NATIONAL LABORATORY