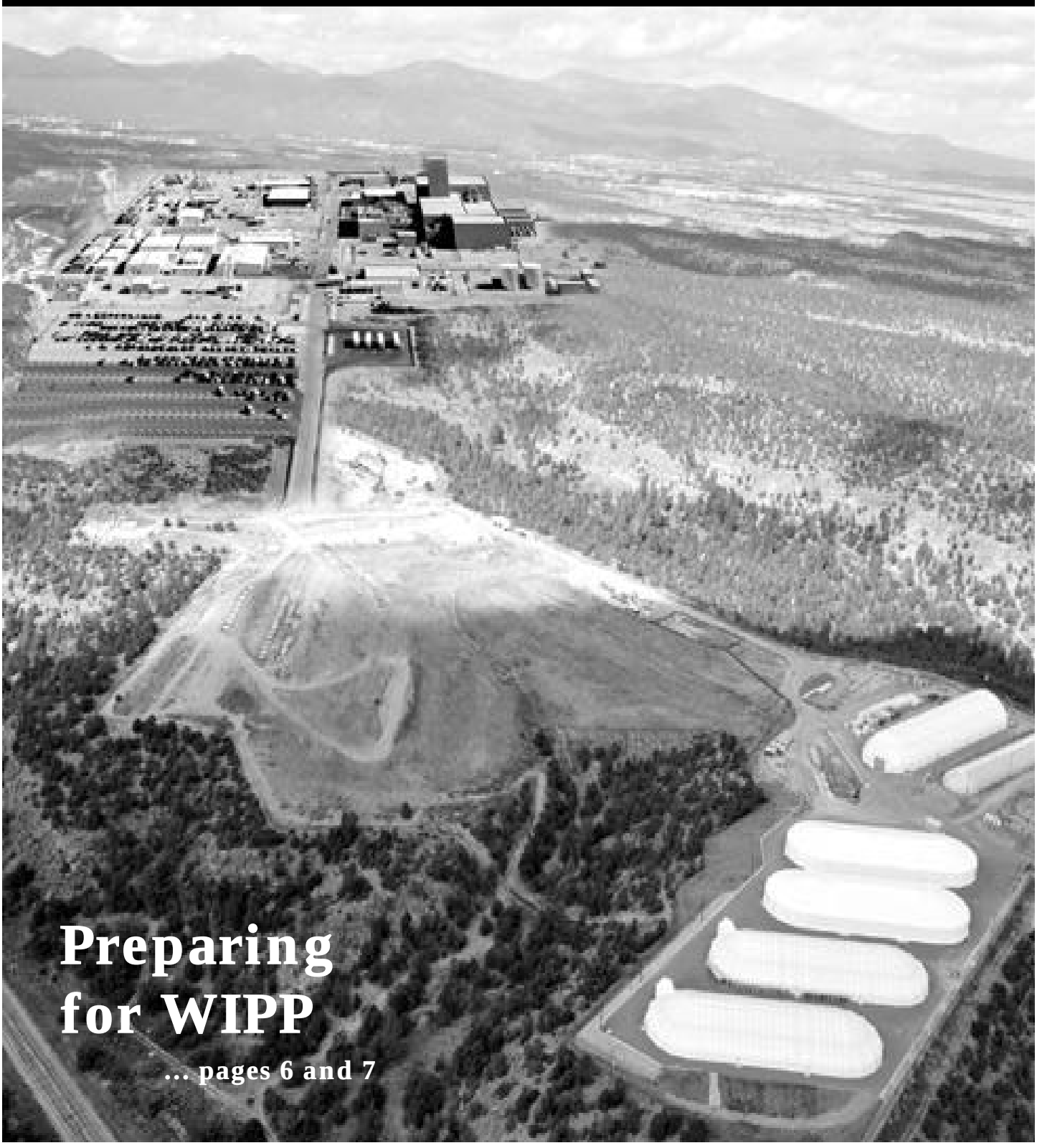
Reflections

Los Alamos National Laboratory Vol. 3, No. 7 • August 1998



Preparing for WIPP

... pages 6 and 7

A Department of Energy/University of California Laboratory

About the cover ...

This composite illustration shows aerial shots of TA-54, the Lab's primary waste storage area, and the WIPP site near Carlsbad. Illustration by Edwin Vigil.

Inside this issue ...

Reflections

Reflections, the Laboratory monthly publication for employees and retirees, is published by Public Information (PA-1). The staff is located at TA-3, Building 100, and can be reached by e-mail at *newsbulletin@lanl.gov*, by telephone at 7-6103, by fax at 5-5552 or by regular Lab mail at Mail Stop C318. The individual telephone numbers are listed below.

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Printed on recyclable paper

editor's journal

Stop by, look and listen

As I write this column, it's Safety Days '98 at the Laboratory, a week in which employees are reminded of the need for safety awareness and asked to recommit to working safely. The featured speaker for this year's observance was Charlie Morecraft. Charlie, a former refinery worker, mesmerized employees with his energetic, in-your-face discussion of how he came to value safety following a life-threatening accident on the job.

Hearing Charlie got me thinking about how many wonderful speakers we've had here at the Lab over the years. We've had Nobel laureates, National Academy of Science members, presidents, senators, preachers, poets, security experts, musicians, lawyers, novelists, physicians, professors, sports figures, military personnel ... . You name a profession, and we've probably had someone in it speak at the Lab. And it has cost employees nothing to show up and listen. Yet many of us haven't.

I don't know if it's lack of interest, hectic schedules, supervisors who won't allow employees to take time away from work to attend or what. But in recent years, I have noticed a really poor — sometimes almost nonexistent — turnout at Lab talks. I've been told there was a time when almost every talk at the Lab was well attended, and I admit that I have been to some that were filled to capacity. But the capacity ones have been few and far between.

I first noticed the lack of attendance a few years ago when I was a writer for the Newsbulletin. I vividly recall going to cover talks that had the promise of being very interesting, only to find the host, a handful of employees and myself scattered around a large auditorium. And I won't even discuss the poor attendance at some of the speaking events held during various monthly observances at the Lab.

When I've found myself in a nearly empty room listening to a well-prepared and well-delivered talk, I've felt badly for the speaker who has traveled so far. But mostly, I've been embarrassed for the Lab. Embarrassed because our seeming apathy belies the number of enlightened and informed people who work here — people in all job series who are constantly seeking to know more and who may have benefited from hearing the speaker's words.

Maybe we just get too caught up in day-to-day work. Maybe, just maybe, we need to take a little time every now and then to hear someone from outside the Lab discuss a topic or an issue. Who knows, the information may help us do our jobs better, or we simply may become better informed, which can only add to our value as employees.

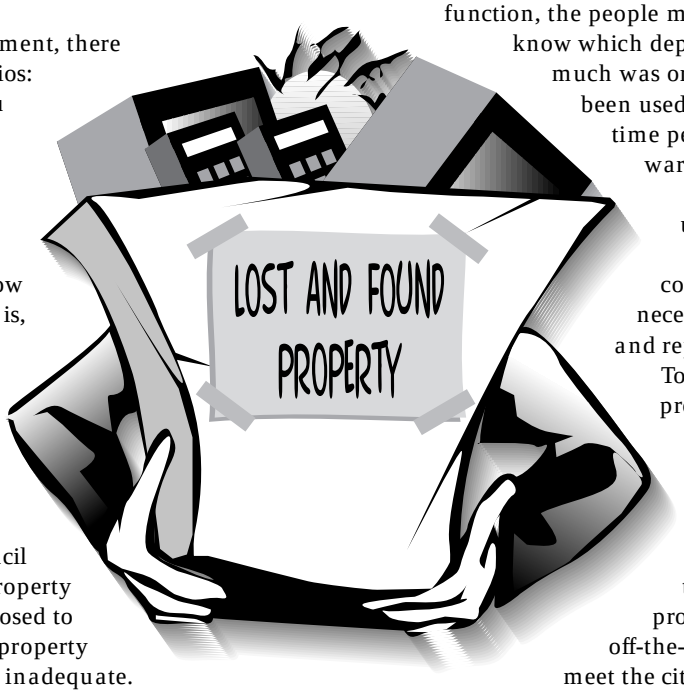
So, I challenge you to make the time to attend some of the talks at the Lab. Don't know who's speaking or when? The calendar section of the Newsbulletin (www.lanl.gov/newsbulletin) notes the times and locations of most Lab talks, and director's colloquia and special talks are advertised on the main Newsbulletin page (see the July "Reflections" for more on director's colloquia). Fliers noting talks also are posted in various locations around the Lab. Just take a look, and sooner or later you'll probably find a talk or two that will interest you. Then stop by and give a listen.

Getting a grip on property

by Ternel N. Martinez

In the world of property management, there really are only three possible scenarios: You know where the property is, you don't know where the property is, and the property is definitely gone. With two of these scenarios, a property administrator at least knows where he or she stands.

If, however, you simply don't know where a particular piece of property is, like a computer or government vehicle, then the situation gets a little more complicated, especially when about 3,000 items valued at $22 million need to be accounted for.



That's the situation the Española City Council finds itself in. The council pretty much knew that its current property management system, which is supposed to account for all real estate, personal property and vehicles that the city owns, was inadequate. But it didn't know by how much.

Enter the Laboratory.

Española City Councilor Floyd Archuleta (who also works in the Community Involvement and Outreach Office), Mayor Pro Tem Chris Roybal, City Manager Max Sanchez and Finance Administrator Lillian Brooks met with Business Operations (BUS) Division Director Allen Johnston on April 7 and asked if anyone in his division could help assess Española's property management system and come up with solutions. Shortly thereafter, Johnston asked Joe Roybal of Property Management (BUS-6) if he would volunteer some of his time and help the city.

Roybal was asked to assist the city because of his 20 years of experience in governmental property management. A certified professional property manager, Roybal also is director for curriculum development at the National Property Management Association and president of its local chapter.

"I found out that the city's property management system is very archaic, a little bit above word processing," said Roybal, who spent about 100 hours researching and analyzing the city's system. "The system barely meets the city's requirements."

Among his findings were the following:

• The city does not have an asset management manual that lays out to the managers property- management regulations, policies and procedures.

• No department currently is held accountable for its respective property.

• The city does not have a centralized property database capable of producing property reports and totals. Also, purchases are processed, but it's unclear whether such orders are done simply by telephone or whether there is some documentation to go with the purchases.

• While the city does maintain a type of stores (inventory) function, the people managing the warehouse do not know which department ordered the items, how much was ordered, whether the items have been used up or what's left for any given time period. No records of items in the warehouse are kept, either.

• While the city tags its property using a standard numerical series sequence, it would prefer a bar code system capable of capturing all necessary data for quicker inventory and reporting requirements.

To rectify the situation, Roybal proposed developing and implementing a city property management manual; initiating and distributing a policy statement to all department managers, setting policies on responsibilities and accountability for all property in their care; installing an off-the-shelf software program that will meet the city's assets program needs; implementing a centralized receiving point where all property can be properly received, tagged and assigned to the appropriate steward; developing and implementing a stores program; and installing the necessary software to run a barcoding system.

Roybal has finished writing the property management policy statements for the city, covering everything from the responsibilities of all who deal with city property to waste, fraud and abuse, and the consequences for misusing city property.

Roybal said the city should determine the organizational structure of its Property Management Department and locate the needed work space for its new centralized receiving and warehouse operation.

Training is a big issue as well, he pointed out. "Property management training must be offered to all managers and custodians and to those who will maintain the new database," he said. Training for stores personnel also is essential, he added. Because the Lab will be performing the training for all these, the cost to the city again is zero.

So what will be the total cost to the city of Española for this new property management system, complete with training, software and policies? It really should cost no more than $10,000, said Roybal. "I think they're very comfortable with the cost assessment." Roybal also pointed out that putting the property management essentials in place probably will require two people, one of them being a computer technician. Roybal will conduct all training in Española.

Roybal gave the policy statements to the city manager and city clerk during a June 18 meeting in City Hall. "They were very appreciative and said they really needed something like this," he said.

SWEIS: Basic blueprint for Laboratory operations

The draft Site-Wide Environmental Impact Statement for the Laboratory was released for public comment last May. It examines the potential impacts of Lab activities during the next 10 years for four reasonably foreseeable operational levels — the no-action alternative, the reduced-operations alternative, the expanded-operations alternative and the "greener" alternative.

This information will be used in Department of Energy decision-making regarding overall levels of operations DOE should plan to implement at the Laboratory, as well as specific projects proposed and analyzed in the SWEIS. The document also will help provide baseline information about Laboratory operations and their impacts that will be used in future analyses performed under guidelines of the National Environmental Protection Act.

Laboratory support of the SWEIS has been provided by the SWEIS Project Office (ESH-EIS), which is led by Doris Garvey. Corey Cruz of the Environmental Impact Statement Project Office at DOE's Albuquerque Operations Office has the overall responsibility of preparing the document. Cruz took some time recently to answer questions about the SWEIS.

Corey Cruz of the Environmental Impact Statement Project Office at DOE's Albuquerque Operations Office

Why is the SWEIS important to the Lab?

The SWEIS is the mechanism by which the DOE expects to make decisions regarding planned operational levels for the Laboratory, implementation of the pit production mission, disposal of low-level radioactive waste over the next 10 years and several project-level proposals at the Los Alamos Neutron Science (LANSCE) Division. The SWEIS also will result in the identification of mitigation actions to be implemented in conjunction with these decisions. Finally, the SWEIS will serve as the baseline NEPA document for LANL operations for at least the next five years (future proposals will be analyzed on the basis of "departures" from the operations and impacts presented in the SWEIS). In total, these comprise a sizable potential for influencing the activities undertaken at the Laboratory, the Lab's ability to take on new work, the cost and time required to complete future NEPA documents and the human health and environmental impacts of LANL operations.

What were some of the important findings in the SWEIS?

Each reader will likely reach his or her own conclusions on what information in the SWEIS is the most important. Many of the DOE staff involved in the preparation of this document identified the following items as important ones: many of the environmental impacts of Lab operations (and many of the human health impacts, as well) are driven by the legacy contaminants from past operations (that is, the contributions of ongoing operations are small compared to the contaminants already in the environment); peak electrical power reliability is a concern under any of the SWEIS alternatives, and peak electrical power supply (which varies with the season) is not sufficient to meet supply year-round, except under the reduced operations alternative (while the DOE and the Laboratory have been working on this issue, the SWEIS helps to clarify the extent of the problem and the urgency with which it must be addressed); and the existing footprint of the Area G low-level waste disposal facility is insufficient to accommodate the waste generated over the next 10 years under any of the alternatives analyzed.

What happens to the SWEIS if the Lab's mission gets changed suddenly?

DOE mission changes substantial enough to significantly change the impacts analyzed in the SWEIS would certainly have to be made considering the results of a programmatic NEPA review — these processes are deliberative, and I wouldn't char-

acterize such a decision as sudden. But once such a decision is made, there are various processes within NEPA that DOE could utilize, depending on the type and magnitude of the change.

Why is the expanded-operations scenario preferred?

As the DOE complex shrinks, the work assigned to DOE is accomplished by each of the remaining sites taking on a larger share. In addition, the implementation of the stockpile stewardship program, absent underground nuclear testing, is continuing (with corresponding increases in associated research and testing activities anticipated). Finally, the role of the DOE laboratories in improving the U.S. economic competitiveness through basic research and cooperative agreements continues. In short, there are a number of indicators that LANL is playing a major (and growing) role in the fulfillment of DOE missions. As such, it appears prudent to prepare for higher levels of operations at LANL.

How does this affect the amount of waste generated by the Lab?

For the expanded-operations scenario, the amount of chemical waste generated annually by the Lab would be 3,249,000 kilograms (7,162,745 pounds); for low-level and mixed low-level waste, it should be 12,873 cubic meters (16,864 cubic yards), and for transuranic and mixed transuranic waste, the amount generated by the Lab should be 546 cubic meters (715 cubic yards).

What about the waste generated under the other alternatives?

Under the no-action scenario, chemical waste generation is 2,886,000 kilograms (6,362,476 pounds). For low-level and mixed low-level waste, it would be 9,752 cubic meters (12,775 cubic yards), while transuranic and mixed transuranic waste generation would be 537 cubic meters (703 cubic yards). Under reduced operations, the figures for the three waste types mentioned are 2,878,000 kilograms (6,344,839 pounds), 9,581 cubic meters (12,551 cubic yards) and 190 cubic meters (249 cubic yards), respectively. And the greener alternative has a chemical waste generation of 2,890,000 kilograms (6,371,294 pounds), 10,825 cubic meters (14,181 cubic yards) of low-level and mixed low-level waste and 250 cubic meters (328 cubic yards) of transuranic and mixed transuranic waste.

What exactly is the greener alternative? How feasible is this alternative?

The greener alternative was added to the scope of the SWEIS as a result of public input. The public comments received during scoping indicated that, in addition to the operational levels of no action, reduced operations and expanded operations, another alternative was desired that reflected a refocused Laboratory — a fully functioning lab with reduced emphasis on weapon applications and increased emphasis on non-weapons applications, including fundamental scientific research, nonproliferation, energy efficiency and waste minimization. This alternative is within the upper and lower levels of operations defined by the expanded- and reduced-operations alternatives, respectively. The DOE determined that this was a reasonable alternative, and it is being considered by DOE decision-makers to the same extent as the other alternatives. This alternative is feasible, but such a reduction in weapons applications of Los Alamos activities would require redirection regarding national security mission support.

How long did it take to complete the draft, and how long will it take to produce the final SWEIS after the comment period is over?

We started to prepare the draft SWEIS in early FY 1996 (after the Implementation Plan was issued), although preliminary work on the SWEIS was started as early as 1994. The initial activities in FY 1996 focused on developing detailed descriptions of the alternatives and providing data for analyses based on the detailed alternative descriptions. The draft SWEIS was signed by DOE in April 1998. The public comment period for the draft SWEIS ended on July 15. It is expected that the final SWEIS will be completed in November 1998, considering the comments received on the draft SWEIS; the timing of the final SWEIS is highly dependent on the comments received and the types of actions appropriate to address the comments.

What was the cost of the SWEIS?

The SWEIS was parametrically estimated to cost about $25 million (including Laboratory and SWEIS contractor costs). After scoping, we established a total estimated cost of about $21 million. To date, we have costed just over $20 million; the final cost will depend on the number and types of changes made to prepare the final SWEIS based on consideration of comments received on the draft SWEIS.

What have been some of the comments you've received during the public meetings?

I'd rather not elaborate on these right now, since the process is still ongoing. I will note that the types of comments received have ranged from comments on national security policy, to those on international proliferation/nonproliferation issues, to comments on the adequacy of specific analyses of resource impacts, to specific questions and comments on the numbers and calculations in the SWEIS.

Before packaging and shipping comes characterizing

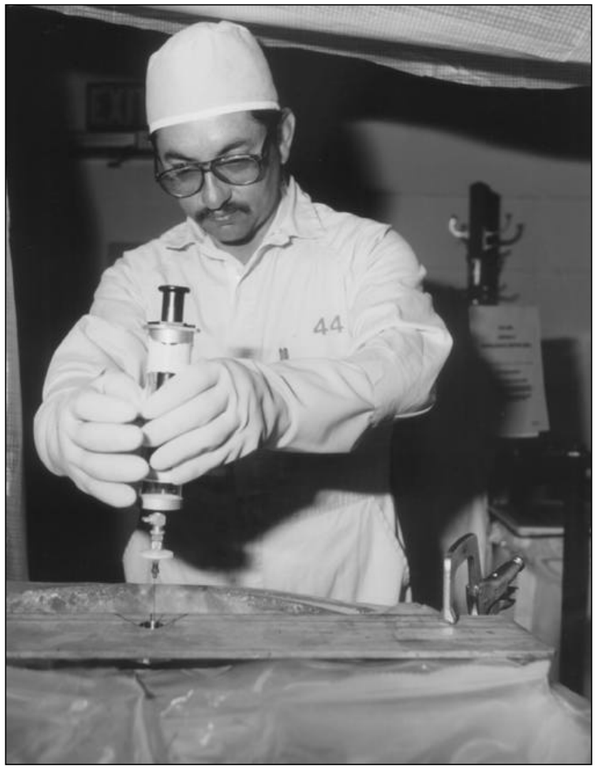


Photo above left: Ricky Baros of Environmental Science and Waste Technologies (CST-7) uses a syringe to collect a headspace gas sample of a drum of transuranic waste at Technical Area 50. The sample is analyzed for concentrations of volatile organic compounds, hydrogen and methane. Baros does the sampling under a hood as a precautionary measure to prevent any release of radioactive material.

Left: David V. Martinez of Organic Analysis (CST-12) injects a headspace gas sample into a gas chromotograph mass spectrometer at Technical Area 50 to determine the identity and quantity of volatile organic compounds, methane and hydrogen. Photos by Presley Salaz of Imaging Services (CIC-9).

by Steve Sandoval

There are more than 8,000 cubic meters, or about 40,000 drums, of transuranic waste stored at Los Alamos' Technical Area 54 waste facility. Much of that waste is mildly radioactive and is scheduled to be shipped to the Waste Isolation Pilot Plant in southeastern New Mexico.

But before any waste is packaged and certified for shipping, it undergoes an ardous process to ensure that it meets all applicable state and federal regulations and can be shipped to the WIPP facility. This process is called transuranic waste characterization and certification, according to Sandy Wander of Environmental Science and Waste Technologies (CST-7).

'Certification is a critical step towards the opening of WIPP and it also paves the way toward a safer environment.'

The transuranic waste intended to be shipped to WIPP in the first shipments consists of protective clothing, tools, glassware and equipment contaminated with radioactive elements heavier than uranium from Lab research, primarily at Technical Area 55.

Plastic, rags, paper, rubber and plastic-based and cellulose-based waste also are packaged in drums. Plastic-based waste includes, but may not be limited to, tape, polyethylene and vinyl, gloves, plastic vials, Tygon tubing, polyvinyl chloride plastic, Teflon products, plexiglas and dry box gloves.

Cellulose-based waste includes, but may not be limited to, rags, wood, paper, cardboard, lab coats and overalls, booties and cotton gloves.

The Laboratory last year became the first Department of Energy facility to have its WIPP waste processes — characterization, certification and transportation — approved by DOE's Carlsbad Area Office. Several state and local watchdog groups and government agencies, including the Environmental Protection Agency and the New Mexico Environment Department, also have pored through thousands of pages of documents and exhibits on the Lab's processes prior to shipping waste to WIPP.

"Certification is a critical step towards the opening of WIPP, and it also paves the way toward a safer environment," said Environmental Management (EM) Program Office Director Tom Baca. "This achievement was possible because of the unique ability that the Laboratory has in forming multidisciplinary teams integrating the talents of scientists, engineers and operational experts to solve problems of national importance."

The estimated $2 billion Waste Isolation Pilot Plant is located a half-mile underground in ancient salt beds 26 miles southeast of Carlsbad. The project is designed to demonstrate the safe, permanent disposal of radioactive transuranic waste left from the production of nuclear weapons. Some of the waste intended for WIPP has been retrieved from underground storage at Los Alamos' Area G and is now being stored above ground at the Laboratory.

Wander said that on average, about one drum of transuranic waste is created in a day at Los Alamos, or about 300 drums a year. In the first of many steps in the WIPP waste-characterization process, all drums are X-rayed — a process called radiography — and examined until waste experts at the Lab are assured that only allowed items are packaged.

She said a certain percentage of drums are opened for visual examination and to validate results of the X-ray process.

Each drum also is measured for its level of radioactivity, said Wander. The radioassay process measures the amount and type of radioactive material in each drum. The techniques used are appropriate for the specific waste stream, and they meet the quality objectives of the program, she said.

'The certification process comprises many validation and verification steps to ensure that the data meets the stringent data quality objectives of the Transuranic Waste Program Plan.'

The drums are next analyzed for hydrogen, methane and volatile organic compounds, a process called headspace gas analysis.

In this process, once the drums have been allowed to set for three days to equilibrate the temperature, sampling personnel use a gas-tight syringe to draw a sample of gas from beneath the drum lid. The syringe is then used to inject the sample into a gas chromatograph/mass spectrometer for analysis.

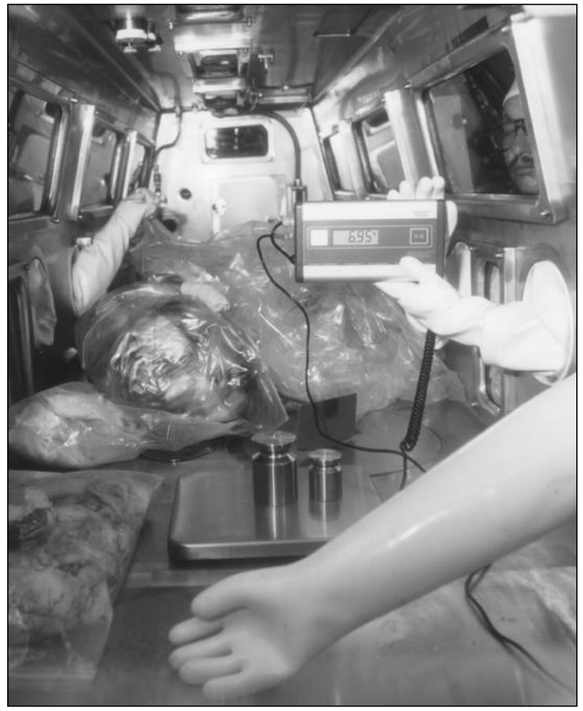
If a drum contains solidified materials, such as soil or solidified sludge, a sample of the material is collected and analyzed for hazardous chemicals. This process also is required to meet hazardous waste regulations of the federal Resource Conservation and Recovery Act, said Wander.

Once these characterization activities are completed, the results are verified and all information is compared with WIPP's acceptance criteria. Any shipments must then be approved by WIPP before shipping, she said.

"The certification process comprises many validation and verification steps to ensure that the data meets the stringent data quality objectives of the Transuranic Waste Program Plan," said Wander. "The entire project staff has learned how to document everything they do.

"I'm sure they feel as I do, that not only was it exciting to be the first site in the complex to receive certification authority, but it's a privilege to be working toward the opening of the nation's first geologic repository for nuclear waste."

More information about WIPP is available at http://www.wipp.carlsbad.nm.us/ online.



Ricky Baros of CST-7 uses weights to calibrate a scale in a glove box. Wastes such as those shown in the plastic bags are separated by type and then weighed before packaging in drums. The bag in the lower left corner of the photo contains rags.

Drake elected chair of UCRS board

Bob Drake

Bob Drake of Energy and Environmental Analysis (TSA-4) was elected chair of the University of California Retirement System Advisory Board for fiscal year 1999. This is the first time a national laboratory employee has ever served in this capacity.

Drake, a Lab economist and 17-year employee, was first elected to the board in 1991 and was re-elected to a second four-year term in 1995. Only one person from each UC-operated lab can serve on the board at any one time.

The nine-member board serves in an advisory capacity to the UC president on matters concerning UC retirement system plans, such as the UC Retirement Plan, the Defined Contribution Plan and the Tax-Deferred 403(b) plan.

Membership in the UCRS includes about 100,000 active members, 25,000 former UC employees and 25,000 retirees. Retirement plan assets currently are valued at about $34 billion, with an additional $5 billion in 403(b) plan assets.

Two co-author winning paper

Jeffrey Bloch and **James Theiler** of Space and Remote Sensing Sciences (NIS-2) recently won the 1997 American Institute of Aeronautics and Astronautics award for Best Paper.

AIAA is a nonprofit organization whose primary purpose is to advance the arts, sciences and technology of aeronautics and astronautics and to foster and promote the professionalism of those engaged in these pursuits. Founded and based in the United States, AIAA has nearly 30,000 members worldwide.

Bloch and Theiler co-authored the winning paper, "ALEXIS Spacecraft Attitude Reconstruction with Thermal/Flexible Motions Due to Launch Damage," with Mark Psiaki of Cornell University; Robert Dill and Richard Warner of AeroAstro (an aerospace company that helped build ALEXIS, or Array of Low Energy X-ray Imaging Sensors); and former NIS-2 graduate research assistant Sean Ryan, now at the University of Colorado, Boulder.

The paper beat out more than 200 other papers submitted to the AIAA Guidance, Navigation and Control Technical Committee during its conference held last Aug. 11 through 13 in New Orleans. The paper also was published in AIAA's Journal of Guidance, Control and Dynamics.

Jeffrey Bloch

James Theiler

Kendrick receives Lab's bi-annual Postdoctoral Prize

Brian Kendrick

Brian Kendrick of Theoretical Chemistry and Molecular Physics (T-12) is the winner of this year's Postdoctoral Prize. The bi-annual prize was created in 1976 by then-Laboratory theoretical physicist Leon Heller, now a Lab associate in Biophysics (P-21). It is awarded to a Lab postdoctoral appointee for the best article in theoretical physics (any theoretical analysis of physical systems) that is published or accepted for publication by a certain date.

Kendrick, now a technical staff member in T-12, won for a two-part series of papers he had written in 1996 and had published in the Journal of Chemical Physics. The first paper was titled "Geometric Phase Effects in H + O2 Scattering: I. Surface Function Solutions in the Presence of a Conical Intersection."

The second paper was titled "Geometric Phase Effects in H + O2 Scattering: Recombination Resonances and State-to-state Transition Probabilities at Thermal Energies."

Kendrick will receive $500 and a certificate and will present his work at a colloquium sometime this month. The prize money is provided by Heller, who has paid the cash award out of his own pocket since the program's inception.

Kendrick, who has been at the Lab about five years, has had several papers published in various scientific journals, including the International Journal of Quantum Chemistry, Physical Review Letters, Physical Review A, Chemical Physics Letters and the Journal of Mathematical Physics.

He graduated summa cum laude with a bachelor's degree in electrical engineering from Texas Tech University in 1987 and received his doctorate in physics from the University of Texas at Austin in 1992.

Pacheco named to Santa Fe Chamber of Commerce board

Charles "Chuck" Pacheco

Laboratory employee **Charles "Chuck" Pacheco** has been named to the board of directors of the Santa Fe County Chamber of Commerce.

Pacheco is a community outreach manager for Santa Fe in the Community Involvement and Outreach (CIO) Office. He manages the Laboratory's new Santa Fe Outreach Center located on Old Pecos Trail.

Pacheco was appointed to a three-year term on the chamber's board of directors, which promotes economic development in Santa Fe and Santa Fe County.

Pacheco has worked for the Laboratory 15 years. Before joining CIO

continued on Page 9

July employee service anniversaries

35 years
Robert Harris, LANSCE-6
John Puckett, NIS-7

30 years
Jacobo Baca, NIS-5
Steven Bourret, NIS-5
Robert Martin, ESH-4
L.P.R. Martinez, ESH-1
Reynaldo Morales, QP
Walter Sommer Jr., APT-TPO
Lois Sylvia, S-5
Donald Wade, X-NH

25 years
Evan Ballard, ESA-DE
Joel Dendy Jr., T-7
Gloria Garcia, BUS-3
Charles Hall, DX-7
Rudolph Henninger, X-HM
Jo Ann Howell, CIC-8
Calvin Moss, NIS-6
J. S. Sandoval, DX-8
Kristine Smith, LANSCE-12
Alex Velasquez, LANSCE-5
Richard Werbeck, LANSCE-7

20 years
Francis Addessio, T-3
Eric Bjorklund, LANSCE-6
Clint Bowyer, ESA-WE
Clemente Garcia, NIS-6
Felix Garcia, MST-7
Jamie Gardner, EES-1
S. Robert Goldman, X-PA
Antonio Gonzales, ESA-WMM
Hiroshi Hoida, NIS-5
Floraida Martinez, ESA-WMM
Paul Mendoza, NMT-1
Velma Montoya, NMT-1
John Mosley, NMT-5
Joseph Price, DX-1
Thomas Reecer, ESA-WMM
Alfredo Rey, ESA-DE
Gerald Salazar, NMT-8
Karl Staudhammer, NMT-11
William Verzino, NIS-3
Peter Walsh, P-24
David Whitfield, S-5

15 years
Sandra Baca, NWT-PO
Kathy Bull, HR-7
Richard Epstein, NIS-2
Brenda Espinoza, MST-STC
Janine Fales, ESA-EA
Michael Fehler, EES-4
Karen Fenimore, CIT-TC
Keith Fife, NMT-2
Charles Goulding, NIS-6
William Gregory, DX-6
Elaine Guenette, LANSCE-3
Linda Hill, APT-PDO
Jon Hinckley, ESA-DE
Richard Macek, ESA-EA
Judy Martinez, NMT-5
Leroy Martinez, FE-6
Richard Mason, NMT-11
James Matzke, EM-SWO
Augustine Ortiz, NMT-8
Antonio Redondo, T-12
Ralph Riley, NIS-9
Alice Rodriguez, CST-25
Benjamin Sanchez, LANSCE-6
Paul Sayka, ESA-EPE

10 years
Stephen Birdsell, ESA-TSE
Douglas Coombs, HR-3
Richard Ford, CIC-4
Clifford Fortgang, LANSCE-9
Pia Griego, BUS-5
Michael Hundley, MST-10
R.J. LaBauve III, ESH-5
Mary Maes, GR
Timmy Martinez, CIC-13
Jane Nordholt, NIS-1
Leta Picklesimer, DX-1
Douglas Ranken, CIC-12
Dolores Romero, LANSCE-6
Jeffrey Schinkel, P-23
James Shannon, DX-3
Gary Shipley, BUS-7
Louise Trujillo, NMT-1

5 years
Douglas Anson, TSA-5
Kathleen Armstrong, EM-ER
Scott Elliott, EES-8
Jan Gammel, T-1
Robert Hampton, TSA-7
Suzanne Johnston, ESA-WE
Bryan Koehler, FE-6
Aaron Koskelo, CST-1
John Park, NMT-5
Victor Rutherford, ESH-13
William Tumas, CST-18
Douglas Wedman, NMT-6

To catch ...

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Sanderson's next guigna trip took place in November 1997. He spent about $12,000 of his own money to buy equipment (the equipment he used the last time belonged to Sundquist), rent a house, lease a vehicle and make other necessary arrangements. His stay this time was six weeks, and his success was bigger. "Within a 13-day span, I had caught six guignas," he said, noting that the Leonard X. Bosack and Bette M. Kruger Charitable Foundation provided $20,000 so he could continue his studies during this trip.

Unlike before, he had plenty of tranquilizers available. With the help of a technician, Sanderson radio-collared the animals he trapped to track where and how they live. He also took their physical measurements, such as body weight and temperature, leg length and skull width. Each guigna was released within about six hours of capture.

"We thought guignas were nocturnal. It turns out they are active day and night. We thought they ate only rodents. It turns out they eat basically any creature that's available. We thought they lived in trees. It turns out they are terrestrial," he said.

Just one month after returning home from that visit, Sanderson went back a third time for another six weeks. "The Chilean government is very happy with my work so far," he said. The government has asked him to return still again on Sept. 1 not only to continue his studies on the guigna — which, by the way, means "thief" in the local Spanish — but on all South American cats, in particular the Andean mountain cat. This one is found above the 13,000-foot level in the Andes Mountains.

The Bosack and Kruger Foundation has committed another $30,000 to pay for Sanderson's guigna research, and he has another grant proposal pending with National Geographic for research on the mountain cat. But he made it clear he's going regardless of whether the organization finally accepts his proposal.

"Most small cats are never studied. All we know is that they exist," he said. With luck, the guigna may one day be known not just for existing, but for flourishing.

Pacheco ...

continued from Page 8

in 1997, he was a senior staffing representative in Staffing (HR-5).

Pacheco earned a degree in Latin American Studies from University of New Mexico and a master's degree in business administration, also from UNM.

He is a member of the board of directors of Santa Fe Partners in Education, which advocates for education programs in the public schools; the Santa Fe Rotary Club; and the board of directors of Santa Feans for Responsible Growth.

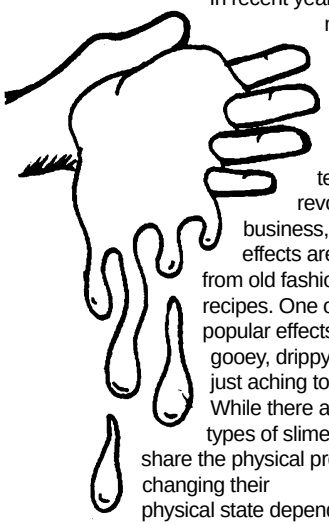
In Memoriam

Vida B. Grissom

Laboratory retiree Vida B. Grissom, died June 8 in White Rock. She was 84. A native of Kentucky where she graduated from Berea College and High School with a degree in business, Grissom came to the Laboratory in November 1943. One of her first duties at Los Alamos was to set up the first high school for children of employees working at the Laboratory. She was a clerk typist and later a supply and alternate property supervisor and receiving office supervisor in the former Materials Management (MAT) Division. She retired from the Lab in 1970 and worked for EG&G, a major Laboratory contract company, from 1974 through 1986. She returned to the Laboratory in 1988 as an administrative clerk on casual, limited-term status in the former International Technology (IT) Division. She left the Lab in 1994.

"Science at Home" is a publication developed by Science Education (STB-SE) to interest children, particularly those in grades four through eight, in science through hands-on activities. We are reprinting experiments from the book, along with other scientific activities, for employees to share with their families, or just to enjoy themselves.

Slime Time



In recent years, television and movies have taken the science of special effects to new heights. While lasers and digital technology have revolutionized the business, some of the best effects are still cooked up from old fashioned chemical recipes. One of the most popular effects is slime, the gooey, drippy green stuff that's just aching to be touched. While there are many different types of slime available, most share the physical property of changing their physical state depending on how they are handled.

In this activity you will make three different concentrations of slime. You will experiment and observe to determine whether the substances behave more like a liquid or a solid. When you are finished with this activity, dispose of the slime in the garbage can. Don't pour any of the materials down the sink because they could clog the drain.

The stuff you'll need

1/3 cup corn starch; 1/2 cup warm water; 3 small bowls; paper towels; food coloring; newspaper or paper towel to cover your work area; pencil; measuring cups; and measuring spoons

Here's the plan

1. Place the three bowls in a row on the paper towels. Put two tablespoons water in each bowl.

2. In the first bowl, add 1 tablespoon of cornstarch and 1 drop of food coloring. Mix them together with your hands. How does the mixture feel? What shape is it? What does it look like? Does it behave more like a liquid or a solid? Compare it to what you know about water and rocks.

Be sure your family works together. Have everyone touch and talk about the mixtures.

3. In the second bowl, use your hands to mix two tablespoons of cornstarch and three drops of food coloring. How does this mixture feel? What does it look like? How is it the same and how is it different from the other solution? What happens when you try to push your fingers into it? What does it look like? Does it behave more like a liquid or a solid?

4. In the third bowl, use your hands to mix 2 tablespoons plus 1 teaspoon of cornstarch and 5 drops of food coloring. How does this mixture feel? What does it look like? How is it the same and how is it different from the other mixtures? Is it more like a solid or liquid?

5. Now add and mix 1/2 teaspoon of cornstarch to the third bowl. Add another 1/2 teaspoon of cornstarch and mix. Hold the mixture in the open palm of your hand over the bowl. Describe what happens to the mixture.

6. Explore how this mixture reacts when you tip the bowl, when you squeeze it, when you relax your fingers in it, or when you shove your fingers into it. What do you find surprising about this mixture?

7. Review your observations. Which mixture behaved most like a liquid, and which was most like a solid? How would you classify each mixture? Is it solid or liquid?

Wrap-up

All three of the slimes share characteristics of both a liquid and a solid. When left alone a solid keeps its size and shape, while a liquid flows, taking the shape of its container. At first glance you might think the slime mixtures are simple liquids, but there is more to them than meets the eye.

What's going on here?

These solutions are really suspensions. In suspensions, tiny solid particles are spread out very finely through a liquid. Given enough time, these solids usually settle to the bottom of the container. What makes your slime mixtures even more impressive is that the individual particles are invisible to the naked eye. In addition, they are extremely hard to filter out and often do not settle. Such a mixture is called a colloid. Under extreme magnification, the solid parts are visible. As you found out in your experiment, some colloids behave in unusual ways under pressure. When little or no force is applied, the material flows like a liquid. But when sudden pressure is applied, the mixture turns rigid and behaves like a solid. As you went from mixture one to three, you increased the concentration of solid in the suspension and therefore increased this tendency to turn solid.

Under sudden pressure, most liquids shear or move out of the way. When you jump into a pool of water, for example, you sink to the bottom. This happens because the viscosity or resistance to flow is the same in all directions. Liquids that behave this way are called Newtonian fluids because they follow the rules that Isaac Newton determined in the 1700s. The slime you mixed falls into a special class of liquids called non-Newtonian fluids because they don't follow Newton's rules of flow. Instead of having an even viscosity, the resistance to flow in non-Newtonian fluids changes as pressure is applied. When suddenly sheared, the solid particles "lock up." The more pressure you apply, the thicker or more viscous the liquid becomes. Even though they act solid for a little while, these mixtures are liquids because they will eventually flow and change shape.

Where does this happen in real life?

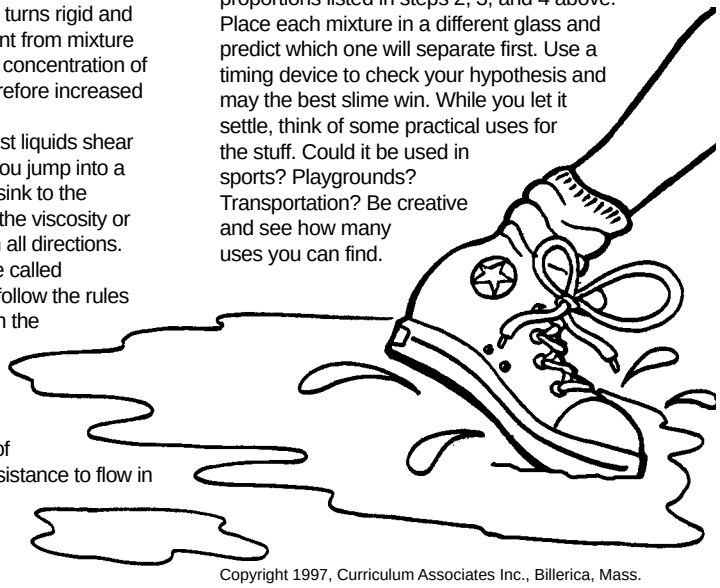
You might think that your non-Newtonian slime is a rare form of fluid, but you experience the same type of phenomenon every time you try to pour ketchup on a hamburger. Every time you hit the bottle, you shock the liquid inside, which changes its viscosity, or resistance to flow, temporarily turning the ketchup solid in the bottle. Though it might seem like it takes forever, the best approach is to simply turn the bottle over, hold it steady, and wait it out. If you want to save time, try storing your ketchup upside down in the refrigerator. That way, gravity has already helped you out!

Another non-Newtonian fluid that makes its way into the movies is quicksand. Unlike your slime mixtures which turned solid when sheared, quicksand starts out thick with a high viscosity, and turns more liquid when pressure is placed on it. If you should accidentally encounter some of this gooey stuff, all you need to do is stay very still, and you should pop up to the top like a cork!

Now try this

As any good cook can tell you, the primary use of cornstarch is as a thickener in gravy and soups. By increasing the viscosity of the gravy, it not only "sticks to your ribs," but keeps from pouring off the plate. Check out a number of different gravy and soup recipes to see what other thickeners are used. Do you think any of these would make an equally effective slime? Try it out and see!

One other property of suspensions is that the solid portion usually settles out with time. To see how the concentration of solids affects the settling velocity, take three tall, thin drinking glasses and mix up some fresh slime in the proportions listed in steps 2, 3, and 4 above. Place each mixture in a different glass and predict which one will separate first. Use a timing device to check your hypothesis and may the best slime win. While you let it settle, think of some practical uses for the stuff. Could it be used in sports? Playgrounds? Transportation? Be creative and see how many uses you can find.



This month in history

August

1846 — New Mexico is annexed to the United States

1939 — Albert Einstein writes a letter to President Roosevelt mentioning the potential destructive power of an atomic weapon

1943 — Groundbreaking in Oak Ridge, Tenn., for the first plant to produce uranium-235 needed for atomic weapons

1945 — Atomic bombs are dropped on Hiroshima and Nagasaki, and Japan surrenders days later

1951 — The bridge over Los Alamos Canyon is completed as the longest and highest steel arch bridge in New Mexico at the time

1961 — The East German government builds a wall across Berlin to discourage emigration to West Berlin

1963 — The Laboratory's scientific museum opens in Room 136 of the AP Building across the street from Fuller Lodge

1974 — President Richard Nixon resigns in the wake of the Watergate scandal

1978 — The UPDATE telephone news service begins at the Laboratory

1988 — U.S. and Soviet scientists monitor an underground nuclear test at the Nevada Test Site as part of the Joint Verification Experiment

1989 — The Laboratory Data Communications Center at TA-3 is dedicated

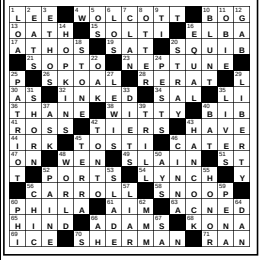
1990 — The Laboratory, Florida State University and the University of Florida are selected to establish and operate the National High Magnetic Field Laboratory

1995 — The Los Alamos Meson Physics Facility auditorium is renamed in honor of Louis Rosen, Lab senior fellow emeritus and founder of the facility

Syndicated materials

Removed by request of the syndicate

July solution



spotlight

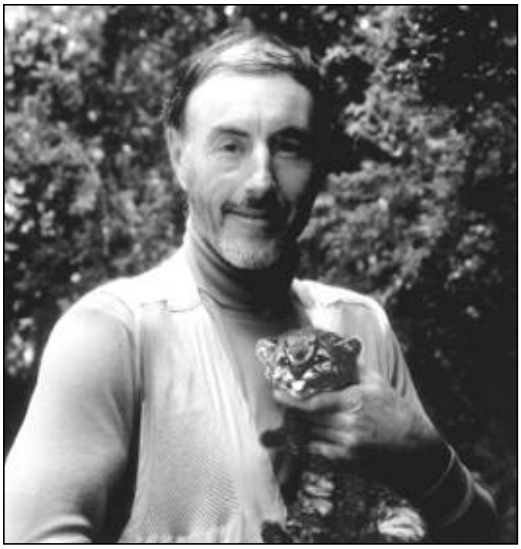
To catch — and study — a "thief"

by Ternel N. Martinez

It is a small, rare cat that most people don't even know exists. Found in only two parts of the world, until recently it had never been captured alive, let alone extensively studied.

You cannot find the cat in any zoo, wildlife park or preserve anywhere in the world, although a few museums have specimens dating back to the 1920s and 1930s. Worst of all, it is in danger of becoming extinct, one of many victims of a dwindling South American temperate forest in which it dwells.

For landscape ecologist Jim Sanderson of Scientific Computing (CIC-19), studying and trying to save the elusive, endangered guigna (pronounced GWEEN-ya) is so important that he is willing to take months off at a time from the Lab without pay, spend tens of thousands of dollars of his own money and travel halfway around the world to learn more about the furry little critter that weighs no more than five pounds.



Jim Sanderson of Scientific Computing (CIC-19) holds one of the guignas he caught for studying while on his second trip to Chile. This female cat is tranquilized, thus the reason for her tongue sticking out. *Photo courtesy of Sanderson*

Under an arrangement with his group leader, Sanderson works half-time at the Lab; in return, he can take leave without pay to pursue his ecological research interests.

"Most ecological studies take place on one square meter plots, but in order to truly understand how species persist we have to study them at the scale of the landscape (10 kilometers or more) under the organizing principles of landscape ecology," he said. Sanderson defines ecology simply as the study of the harmony among living things in their environments.

Sanderson first became interested in ecology in 1990; since that time, he has taken all the ecology courses that the University of New Mexico has to offer. He's even written a book on ecology that currently is used by seven universities nationwide. His wife, Joan Morrison, holds a doctoral degree in ecology from the University of Florida.

Sanderson joined Morrison at UF in 1996 as an ecology student, only to end up teaching the classes about three weeks later. It was during this time that the guigna first piqued his interest. "One day, a professor said a researcher on an island in Chile thought he saw a wild, small, spotted cat there. Another professor responded, 'That can only be the guigna,' " Sanderson recalled.

Sanderson and colleague Mel Sundquist were scheduled to fly together to Chile in November that year to try to capture the guigna and study it seriously for the first time ever. But Sundquist had to cancel at the last moment because of his ailing wife. Sanderson went anyway but had to go without any monetary support, for National Geographic turned down his grant proposal. "National Geographic tends to reject projects it thinks have a low probability of success," he explained. Morrison also went with him, though she went to study another form of wildlife — and with a grant from National Geographic.

"We spent two weeks on Chiloe Island, Chile, living in a tent on property owned by a local man," he said. He set up Tomahawk traps, designed to capture animals without injuring them, in various locations on the property and patiently waited. The first nine days produced nothing but rain, but Sanderson, who had never done anything like this before, got lucky on day 10.

"I went out that day to see if anything had been caught in the traps, and I noticed movement in one of them. As I got closer, I noticed the markings on the animal in the trap, and I immediately knew that I caught a guigna." He went back to camp but didn't say anything at all about the catch to Morrison.

"I sat down and had breakfast with Joan. She said she was going to photograph the local people. I said she should stay and help me with the guigna. She doubted I had one and said, 'You didn't catch one.' I didn't respond. It was then that she knew that I had.

"She jumped from the table and said, 'Let's get down there and get it!' I said, 'Relax, let me finish breakfast!' " Even the landowner, who had lived there for years, had never seen one before, he added.

Unfortunately for Sanderson, he had no needles or other means to anesthetize the creature, nor did he have a radio collar to place on it for tracking purposes. So he studied the guigna for about 12 hours, then let it go.

"You can't keep an animal like that in a cage much longer than that," he explained. "It will begin to bang its body against the cage in fear and frustration and possibly injure itself."

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Reflections
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