LOS ALAMOS NATIONAL LABORATORY
CURRENTS

October 2008

2007 Distinguished Performance Award recipients selected

Wellnitz Team works out of the box, wins award

Los Alamos
NATIONAL LABORATORY
EST. 1943

Improved execution of work key to Lab's future

Each year, every part of the Laboratory gears up in some way to determine budget possibilities for the coming year. Obtaining sufficient funds is important to every organization within the Lab. However, once the budget numbers are determined, do we work as diligently on the equally important task of maximizing the efficiency of the work executed?

In August, seven Laboratory employees became Lean Six Sigma Black Belts. These individuals' full-time jobs are to help the Lab find the optimum way to execute the work we do—whether in the science, weapons, or operations organizations. Through objective process mapping and the gathering of good metrics, we often learn that we have the ability to make or influence significant changes. Recently, a process improvement project, or PIP, was conducted on the purchase-order process. It was found that approximately 30 percent of the purchase requests had incomplete or inaccurate paperwork. By examining what was missing or inaccurate, it was determined we could provide better, easier instructions and eliminate unnecessary forms. As a result, a new tool called "procurement navigator" is being developed that will help ensure requestors know what is required and how to get the right forms. While this seems like a simple fix, without the process mapping and gathering of metrics, people from all organizations were assuming the problems were outside their area.

Sandra Valdez

Since June 2006, the Lean Six Sigma organization has trained more than 250 champions, 280 Yellow Belts, 20 Green Belts, and seven Black Belts. Some of the improvements they have worked on include reducing the cost of hydro shots, cycle time for the initiation of Work for Others projects, cost of salvage operations, and improving the procurement and management of safety class items.

You can check out the Lean Six Sigma orientation training at *http:/int.lanl.gov/orgs/adbs/lss* to see how this new organization can have a positive effect on the Lab and your organization. You might just get inspired to join a PIP team!

—Doris Heim, associate director of Business Services

About the cover: Wellnitz Team members, from left to right, Sheila Armstrong, Marie Harper, Carolyn Mills, Carl Gilbert, and Joyce Martinez take time out from their work for a good laugh. Their efforts to consolidate nearly a thousand boxes of classified material earned them a Small Team Distinguished Performance Award. See page 3 for the start of Distinguished Performers coverage. Photo by LeRoy N. Sanchez

2007 Distinguished Performance Award winners selected

Seven individuals, six small teams, and nine large teams are recipients of 2007 Distinguished Performance Awards. The annual awards recognize individuals and small and large teams for job performance above and beyond what normally is expected.

Individuals or small teams who receive Distinguished Performance Awards have made an outstanding and unique contribution that had a positive impact on the Laboratory's programmatic efforts or status in the scientific community, required unusual creativity or dedication of the individual or team, and resulted from a level of performance substantially beyond what normally would be expected.

Large team award recipients

- performed scientific, engineering, technical, administrative, and/or management activities at a level far above normal job assignments;
- completed a project that brought distinction to the Laboratory by resolving a problem that has broad impact and/or resulted in the Lab becoming the recognized expert in the field;
- worked on a project that involved original and innovative thinking, approaches, and results; and
- exhibited (by each member of the team) an exemplary level of skill, teamwork, and dedication well beyond normal exceptions that resulted in the successful completion of the project.

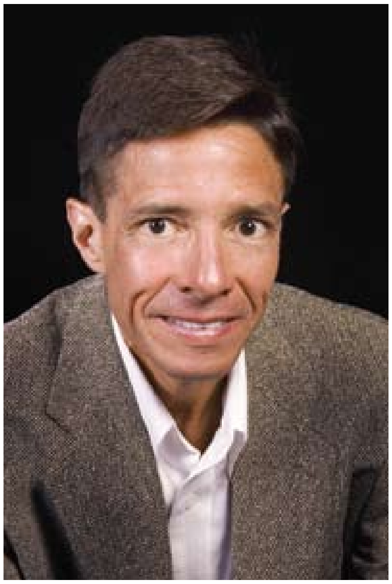
individuals

Alejandro (Alex) Enriquez

Alex Enriquez of Pu-238 Science and Technology (PMT-5) led the effort to clear waste from Room 201B of Technical Area 55's PF-4 and recover the room for programmatic operations. The waste was material from a glovebox line. It was contaminated with Pu-238 and had been accumulating in slip-lid containers in 201B for eight years.

Disposal of Room 201B's contents under previous processes potentially would have required the use of 3,200 55-gallon drums. To develop a more efficient process, Enriquez did extensive research into residue generation, disposal processes, waste-packaging configurations, and final disposition at WIPP, then discussed the problem with personnel from around the Laboratory. In the end, he initiated new but compliant processes that cleared the room and sent 278 drums to TA-54, an order of magnitude fewer drums than originally estimated. His work released 201B from potential-airborne-radioactivity controls that had been in place there.

Enriquez's innovative cleanup and de-inventory process resulted in a safer work environment for PMT-5 employees and greater efficiency in disposing of Pu-238 residue.

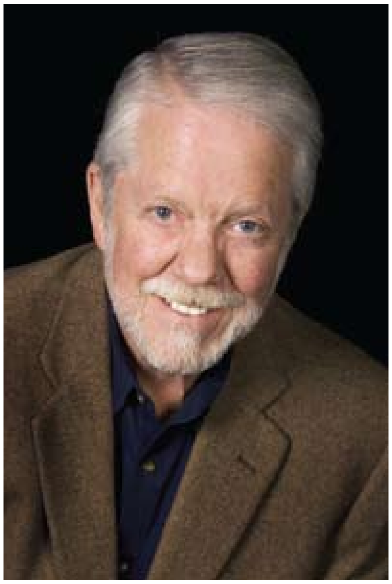


Miles Baron

Miles Baron of X-2 has attained national recognition as an expert in a highly classified national security area that has international ramifications.

While serving in an ongoing capacity as an advisor to stakeholders at the highest level, he has produced seminal analyses that have reinforced the Laboratory's preeminence in an intensely specialized field with far-reaching impact.

Baron's skills, persistence, attention to detail, and ability to translate technical information for policymakers have been unique in Department of Energy laboratory contributions to the United States' national security establishment.



James Nesmith

As coordinator of the foreign nationals program, James Nesmith of the Science and Technology Base Program Office enables the Laboratory to sustain and nurture the vital contributions that foreign nationals make to Los Alamos science and missions.

Nesmith has created an environment in which foreign experts at the Laboratory can achieve maximum success and productivity within the security needs of the workplace. Nesmith has helped solve visa problems, ensure appropriate cyber access, clarify Laboratory policies affecting foreign nationals, and enable principal investigators from other countries to continue their work here, in accordance with all security and legal requirements, while awaiting permanent-resident status. He also streamlined foreign nationals' access to classes at the University of New Mexico, Los Alamos, even establishing onsite courses in English as a second language.

Nesmith's efforts allow Los Alamos to remain an active participant in the global science and technology community. That participation strengthens the Laboratory's expertise in many fields and helps attract the best U.S. talent to Los Alamos.

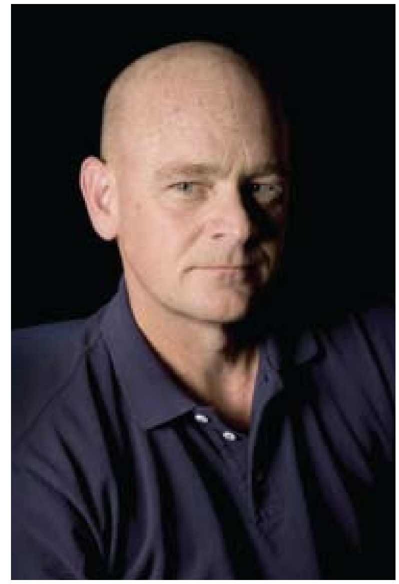
Jaroslaw (Jarek) Majewski

Jarek Majewski of the Lujan Center wants to answer a big question in biomembrane physics: "How do proteins—in particular, biotoxins and pharmaceuticals—reach a cell's interior through the cell's outer membrane?" Answering that question required collecting information from the membranes' lipid layers while they were submerged in liquid—and doing so without damaging the delicate layers.

Majewski developed new techniques in neutron and X-ray reflectometry and grazing-incidence X-ray scattering to study the mechanism by which the cholera biotoxin breaches the cell membrane. His results are breathtakingly detailed profiles of both the toxin and its effects on the cell's membrane. He is now working to solve the riddle of other toxins, including the botulinum neurotoxin, which can induce botulism.

Majewski's new techniques enable researchers to study model biological membranes in realistic aqueous environments. And his work on SPEAR, the neutron reflectometer at the Lujan Center, has brought prominence to Los Alamos.

Ronald Poulson

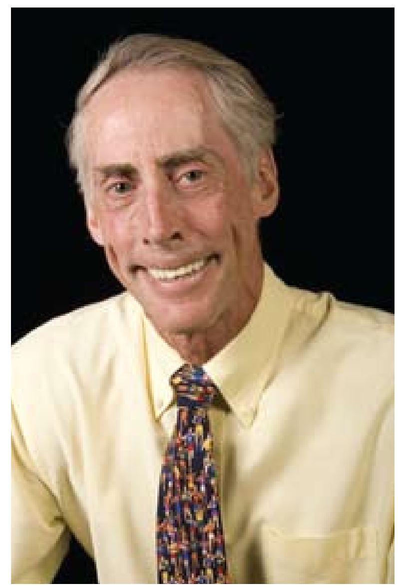


Ronald Poulson of Weapons Test Design Drafting provided exemplary support as both lead design technician and lead assembly engineer for two hydrodynamic test assemblies—some of the first to undergo confined testing at DARHT. Both tests were for an external customer and were the focus of high-level attention. Conducting such tests efficiently for external customers forms a large part of the Laboratory's reputation in the weapons-testing arena and also in more general technology.

Poulson originally was assigned to support Experimental Device Engineering and Assembly by handling the detailed design tasks for each test assembly, but shifts in both programmatic needs and personnel availability eventually required him to substitute as lead assembly engineer as well. In his double position, he facilitated accurate and timely test assembly construction and helped meet the technical challenges presented by the tests' confinement and positioning requirements.

Poulson's work earned the customer's confidence and resulted in exceptional test results.

Gary Wall



Gary Wall of X-4 was the leader for physics certification of the W88 warhead containing the newly manufactured pit from TA-55.

His work involved designing and integrating relevant experiments as well as planning and executing activities that supported new hydrodynamic and nuclear model baselines for the W88. He guided execution of the certification plan, employing extensive interaction with the manufacturing and engineering communities, and directed the preparations for effective peer review, both internally and with Lawrence Livermore National Laboratory.

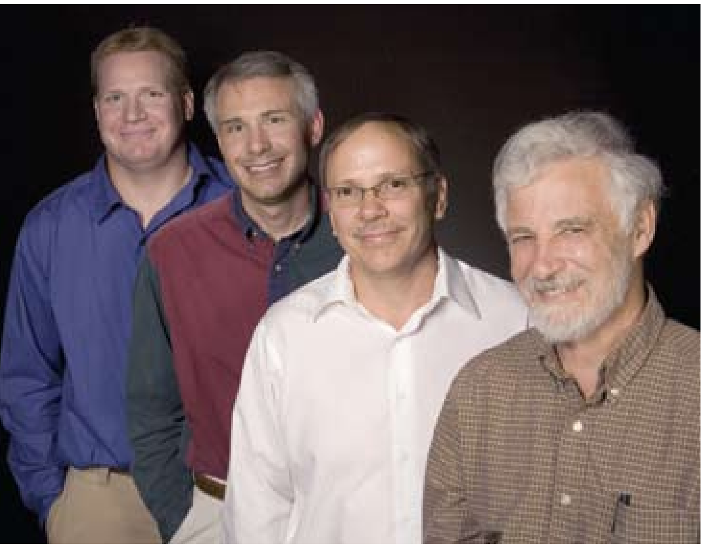
The positive impact of Wall's accomplishment on the Laboratory's programmatic efforts is immeasurable. By guiding the effort across many scientific, engineering, diagnostic, and managerial boundaries, he brought the process to a successful conclusion, adding significantly to the Laboratory's recognition as an institution that delivers on commitments to the stockpile.

Clay Macomber

Clay Macomber of Materials Chemistry pursues research interests involving the study of reaction mechanisms and degradation pathways of solid-state materials.

Through his work, he has been successful in using diffuse reflectance to identify a link between the optical properties of materials and their decomposition kinetics. The materials chemistry team has been able to apply his observations to the establishment of a similar correlation for a material of interest to the weapons program. Such a correlation has been elusive to researchers concerned with establishing the production variables of this material for many years.

The extension of Macomber's work to materials production will allow for an optical diagnostic of a material's quality before the material is subjected to further processing. The result is a significant savings of both time and money.



Ejecta Source Team

When a strong pressure wave from the interior of a solid or fluid body strikes the surface, the surface may break up, sending particles—"ejecta"—into the surrounding medium. The characterization of ejecta, including their quantity, distribution, state (solid or liquid), and shape, is vital for validating ejecta models for integration in hydrodynamic codes.

The Ejecta Source Team developed simple methods for measuring the formation of ejecta, which occurs in tenths of microseconds, by using off-the-shelf piezoelectric probes whose accuracy and precision they confirmed through X-ray radiography and experimentation.

The team's study produced a unique high-fidelity dataset for tin and revealed the occurrence of new physical phenomena. The results are providing the basis for advances in modeling and have established Los Alamos as the world leader in ejecta measurements and technology.

Team members are, from left to right, Jeremy Payton, Russell Olson, and William Buttler of Neutron Science and Technology (P-23) and James Hammerberg of Solid Mechanics, Equation of State, and Material Properties. Not shown are Michael Zellner of P-23 and Paulo Rigg of Shock and Detonation Physics.

Gloveport Retrofit Installation Team

This team designed an improved gloveport for existing PF-4 gloveboxes at TA-55. Working with a vendor, team members built the new design and installed it at TA-55. The change dramatically reduces the risk of contamination when worn-out gloves are replaced and makes replacement simpler and more efficient.

Changing a glove will no longer require workers to shut down operations and don respirators, because the new gloveport's innovative ring design significantly reduces residual contamination. The gloveport also is easy enough to use that it cuts glove-replacement time to less than two minutes and reduces the expense of the task to one-eighth its current cost. The new design provides additional savings because it can be installed without any cutting, drilling, or welding and without the need for specialized parts or training.

Team members are, front row left to right, Anthony Valdez of Pit Manufacturing (WCM-1), David Rael of System Engineering, and Toby Vigil of Program Management and Production Planning. Back row left to right are Vincent Griego of Health Physics Operations, Dean Martinez of WCM-1, and Michael Cournoyer of TA-55 Operations.

Nuclear Device Data and Science Team

The Nevada Test Site's underground nuclear testing program produced two tests with a successful version of a diagnostic known as a pinhole experiment (PINEX). This team has reanalyzed one of those tests, COALORA, and captured images of its primary in action. Such real-time imaging is critical for validating advanced simulation and computing models in support of stockpile stewardship.

The team began its task with an incomplete dataset. To overcome this deficit, team members sought out papers on every aspect of the time-resolved PINEX camera calibration and timing electronics. They also used other diagnostics to calibrate and crosscheck PINEX results. Their diligent work resulted in a successful movie that the Applied Physics Division has used in discussions with a committee from the Strategic Advisory Group Stockpile Assessment Team.

Team members are, bottom row from left to right, Roddy Walton and Anemarie DeYoung of Neutron Science and Technology (P-23); middle row from left to right, Thomas Gorman of X-2 and Robert Hilko of National Security Technologies, LLC (NSTec); and top row from left to right are Chad Olinger of P-23, and Douglas Johnson of NSTec.

Topmast Optimization Team

The Laboratory's legacy radiation hydrodynamics and burn code for assessing the primary yield of nuclear weapons has been limited by its inability to run on more than one central processing unit. The Topmast Optimization Team rewrote the code's half-million lines to give it parallel capability.

The complexity of this task was greatly increased by the need to complete it during a time when the code was being intensively used in the W76 Life-Extension Program and in the certification of new pits manufactured at TA-55. Team members accommodated continued use of the code by rewriting it incrementally over a full year.

The newly parallel code has enabled Los Alamos to perform its first major sensitivity studies involving thousands of primary implosion and yield simulations, studies that are supporting the effort to quantify margins and uncertainties as a part of weapons assessments.

Team members are, from left to right, Britton Girard, Ted Cochran, and Robert Robey, all of Computational Analysis and Simulation.

Wellnitz Team

The Applied Physics Division's Wellnitz Team in February 2007 began moving the equivalent of 1,000 boxes of classified material from four vault-type rooms (VTR), including the Administration Building's Wellnitz Center. The material, which supports weapons design work, was to be consolidated at a single secure location. The team simultaneously negotiated plans to share space in Information Resource Management Division's facility in the National Security Sciences Building and planned for, procured, and supervised installation of 2,000 linear feet of shelving by L-cleared and uncleared contractors in what was already an active classified VTR complex.

The work required flawless attention to security and safety, as well as adherence to a nonnegotiable September 30, 2007, deadline. With the cooperation of staff and management from numerous internal and external organizations, the team finished a week early without a single safety or security incident and without unduly interrupting service to the design community.

Team members are, bottom row from left to right, Joyce Martinez and Sheila Armstrong of Applied Physics (X) Division and, top row from left to right, Marie Harper, Carl Gilbert, and Carolyn Mills of X Division. Not pictured is Jackson Carter, also of X Division.

National Security Assessment Team

This team performed outstanding assessments on issues of high national importance. While the nature of the team's work prohibits substantial elaboration, it is appropriate to note that the team members have applied extraordinary critical analysis and penetrating insight to their assessments, resulting in findings that have earned a number of accolades from national stakeholders at the highest levels.

Team members are, from left to right, Miles Baron of X-2, Thomas Kunkle of Geophysics, Stephen Becker of X-2, and R. Allen Riley of International Research, Analysis, and Technical Development.

Advanced Single Photon Imager Research and Engineering Team

The Advanced Single Photon Imager Research and Engineering (ASPIRE) Team, under the sponsorship of the National Nuclear Security Administration, developed and demonstrated systems for imaging scenes under extreme low-light conditions. These imaging systems are for scientific and national security applications.

Composed of personnel from multiple Laboratory divisions and groups, the team miniaturized the technology, made it rugged enough for field use, and delivered it in a customer-friendly package. The team also prepared the technology for deployment on a greatly accelerated schedule to address high-priority national problems.

At the same time, the team prepared a dedicated system for the Air Force Research Laboratory and delivered it for a joint demonstration of emerging capabilities in space situational awareness.

The team members' skill in system development and integration, advanced capability development, and field deployment brought great credit to Los Alamos.

Detonator Powder Aging Team

A comprehensive scientific understanding of the explosive used in weapon detonators is needed for making predictive lifetime performance assessments. The Detonator Powder Aging Team evaluated powders currently used in weapon detonators and developed approaches for making lifetime performance predictions.

The team's efforts, led by Detonator Technology, involved artificially aging powder and detonator samples, performing chemical and physical analyses, and testing for detonation performance. Team members also did exhaustive reviews of past work because all the powders in the current stockpile were processed more than 20 years ago. Their work has produced a scientifically defensible conceptual model of detonator powder aging and has improved the Laboratory's fundamental understanding of explosive powder characteristics as related to detonator performance.

The work of this team has contributed significantly to stockpile stewardship and has generated knowledge that will be critically important in the processing of new powders for detonators currently in production at Los Alamos.

National Technical Nuclear Forensics (Attribution) Simulation Team

This team established a simulation code capability for determining the design technology, materials, and possibly even the source of any nuclear weapon used against the United States or its allies. Various agencies, especially the Defense Threat Reduction Agency, NNSA, and the Department of Homeland Security, have needed a solution to this inverse problem in order to establish a full operational capability to perform nuclear forensics.

Team members, representing eight Laboratory divisions, surmounted substantial scientific challenges. They completed first-ever measurements of americium cross sections, which play an important role in determining the properties of a plutonium-based device. In addition, they made significant advances in simulation codes for addressing nuclear devices whose designs likely reflect a far lower level of technology than that found in our own weapons.

The capabilities this team established performed outstandingly well in a blind exercise in February, proving that Los Alamos has the lead expertise in nuclear forensics.

Pit Manufacturing Quality Acceptance Team

More than 800 people participated in meeting the Level 1 milestones for the Pit Manufacturing and Certification campaigns to deliver a diamond-stamped pit to Pantex and to build and accept 10 pits. The efforts of the Quality Acceptance Team, a subteam of the Pit Manufacturing Team, stand out with exceptional clarity.

This team improved the process of reviewing, correcting, and accepting the quality paperwork and accepting the newly manufactured pits into the stockpile. The improvements reduced the quality acceptance time from three months to less than one month. By the end of 2007, quality acceptance was never the cause of a production delay, and that efficiency contributed significantly to the unprecedented production rate of seven pits built in nine weeks.

The team's work has resulted in a series of lessons learned and best practices that have been incorporated into the pit-manufacturing product flow stream and that will revolutionize and improve the quality and capacity of pit manufacturing at the Laboratory.

Radiography Team

The Radiography Team planned and performed three successful dynamic plutonium experiments using proton radiography (pRad) at the Los Alamos Neutron Science Center pRad facility, collecting 37 radiographs of each dynamic experiment.

Such experiments must meet stringent safety requirements. To meet those requirements and gain NNSA work approval, team members designed the tests with extensive and robust engineering controls. In addition, two confirmatory shots were performed with surrogate material in advance of the experiments, and an extensive management self-assessment was conducted to ensure the safety of workers and the public.

The experiments brought a new experimental capability to LANSCE's pRad facility and provided important data for the nuclear weapons program. The fact that such data were delivered and the experiments were performed safely and securely is a testament to this team's expertise and to the skill, care, and cooperation of many Laboratory divisions.

Roadrunner System Integration and Technical Assessment Team

This team completed both Phase 1, integration of the base system (71 teraflops per second), and Phase 2, technical assessment of the final system (a petaflop per second), for the Laboratory's new Roadrunner high-performance computer.

Phase 1 more than doubled the Laboratory's classified computing resources for nuclear weapons applications. To complete it, the team deployed key network and input/output capabilities in the Metropolis Center and installed and tested the new production software stack required by Los Alamos applications.

For Phase 2, team members assessed the feasibility of Roadrunner's innovative hybrid processor architecture in which accelerators are used to increase application performance in lieu of adding more computational nodes. Because the full system would not be in place for the assessment, the team used system prototypes and performance models to gauge the project's success. The results were positive and lead to the Laboratory's commitment to procure Phase 3—the final Roadrunner system.

Superconducting Quantum Interference Device Team

With more than 20 publications, numerous invited talks, and a pair of patent applications, members of the Superconducting Quantum Interference Device (SQUID) Team have established themselves as world leaders in the brand-new field of ultra-low-field magnetic resonance imaging (ULF-MRI). In 2007, the team developed medical and national security applications for this technology.

During the year, the SQUID Team reported the first-ever ULF-MRI image of a living human brain—a significant milestone in the field of functional brain studies. The team then adapted the brain-imaging technology to the detection of liquid explosives, completing the work in less than six months. The resultant hardware can be used to distinguish between benign and potentially dangerous liquids in airline passengers' carry-on luggage. Prototype systems soon will be tested alongside X-ray equipment in airports around the country.

This team's accomplishments have brought significant new funding to the Laboratory and drawn high praise from the scientific community.

W76-1 Physics Certification Team

Because the W76 remains one of the critical nuclear weapons in the U.S. stockpile, the W76 Life-Extension Program was initiated in the late 1990s. Last year, members of the W76-1 Physics Certification Team met important milestones in the physics certification of the W76-1. Their work was the culmination of a carefully planned series of activities and hydrotest experiments carried out over several years.

To complete certification, team members used the nuclear test database in order to develop a new physics baseline model. They developed a methodology for quantifying the margins and uncertainties (QMU) in the physics-based assessments—an accomplishment that has long been hoped for and discussed. The team documented this work thoroughly and presented it to numerous internal and external review bodies.

This team has demonstrated the Laboratory's resolve to use QMU as an integral part of this and all future certification efforts.

W88 MAR Physics Certification Team

In 2007, Los Alamos produced the United States' first diamond-stamped (approved for war-reserve) pit to be built since the closing of Rocky Flats in 1989. This team accomplished the important goal of assessing the physics impact of the Los Alamos pit on the W88 warhead, a requirement for approval of the major assembly release of the W88 containing the new pit.

To understand the performance of the Laboratory-built pit, the team designed experiments and conducted them over several years. The experiments were incredibly difficult, and delays often required team members to modify their plans. But with dedication and innovative thinking, the team met its numerous milestones while under constant review. The work culminated in 2007 with the analysis of all the experimental results and the incorporation of those results into the physics-based assessments.

This team's high level of professionalism has cast the Laboratory in the best possible light.

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Records Management/Media Services and Operations

To see photos of the large teams, go to
http://www.lanl.gov/news/currents/2008/oct/performers.shtml

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