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In honor of AIHA's 75th anniversary in 2014, *The Synergist* presents AIHA@75, a column devoted to the people, ideas, and events that shaped the industrial hygiene profession. Send feedback and suggestions for future columns to synergist@aiha.org.

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A Laboratory's Rich Legacy

BY ED RUTKOWSKI

When the first scientists arrived in March 1943, the place known as "site Y" bore few traces of its former owners. For years a boarding school dedicated to academics and physical fitness had resided there, on the edge of the Santa Fe National Forest in north-central New Mexico, but now the U.S. Army was taking control of the school's property for a very different purpose: the construction of the first atomic bomb. By 1945 the civilian and military personnel at site Y numbered in the thousands. What they did there, and why they did it, altered world history and are still topics of discussion and debate.

The weapons that ended World War II did not bring an end to site Y. Renamed Los Alamos Scientific Laboratory in 1947 after the nearby town encompassing New Mexico's Pajarito Plateau and White Rock Canyon, the laboratory assumed a new mission: to conduct research essential to the security of the United States during the Cold War while protecting the health and safety of workers and the community.

DISCOVERIES AND BREAKTHROUGHS

The laboratory's dedication to that mission has led to discoveries in seemingly every area of basic and applied physical, computational, theoretical, and biological science. Over the years, researchers affiliated with the laboratory have created machines that sound like they belong in a science fiction novel—a computer that performs more than one quadrillion operations per second, a laser that directs the energy of a million light bulbs on pinhead-sized targets. The laboratory led the mapping of the human genome. Devices and instruments developed

at Los Alamos are on board NASA's Cassini spacecraft and the Mars rover Curiosity, and figure prominently in the study of diseases such as cancer and AIDS.

These are the projects that make headlines and capture imaginations. Less widely known is the crucial role researchers at Los Alamos have played in the history of industrial hygiene. The industrial hygiene group at the laboratory—now known as Los Alamos National Laboratory, or LANL—has contributed many breakthroughs in industrial hygiene practice. Here are a few of the most notable developments:

Sampling. Harry Schulte, who led the industrial hygiene group at Los Alamos from 1948 through 1974, and his deputy, Ed Hyatt, helped develop the concept of respirable dust sampling in exposure assessment. Together with other key figures in AIHA history such as Morton Lippmann and Ted Hatch, Schulte and Hyatt made important contributions to size-selective sampling.

Respirators. Hyatt was the first editor of AIHA's *Respiratory Protective Devices Manual*, published in 1963. He developed the concept of the protection factor for respirators, which describes the level of protection a respirator is expected to provide. Much of Hyatt's work informed OSHA's requirements for respiratory protection programs. His 1976 report "Respirator Protection Factors," based on research Hyatt conducted at Los Alamos in the early 1970s, is cited so frequently in OSHA's 2006 Final Rule on Assigned Protection Factors that it's referred to simply as the "Hyatt Study." The ANSI Z88 subcommittee for respirator protection also derived its protection factors from Hyatt's work.

Aerosols and exposure limits. Harry Ettinger, who succeeded Schulte as industrial hygiene group leader at Los Alamos, is the author or coauthor of dozens of studies in aerosol technology, among other topics. In 1987, at the request of the assistant secretary of labor for OSHA, John Pendergrass, Ettinger took a leave of absence from Los Alamos and spent two years in Washington, D.C., leading an effort to update OSHA's permissible exposure limits (PELs). The final rule, published in 1989, revised 212 existing PELs and established 164 new ones. However, the rule was vacated in 1992 by the 11th Circuit Court of Appeals, which held that OSHA had not demonstrated that the new limits were necessary or feasi-

ble. The court's decision returned the PELs to their original 1971 values, where they remain.

Sorption. LANL's Gerry Wood developed charcoal sorption criteria and analytical techniques that led to the development of respirator cartridge change criteria, adopted by NIOSH and many respirator manufacturers.

Researchers at other institutions in the national laboratories program—such as Newell Bolton of Oak Ridge, Don McPhee of Argonne, and Jim Johnson of Lawrence Livermore—also made significant contributions in these and other areas of industrial hygiene practice. What sets LANL apart is the number of its staff who served in leadership roles in AIHA and other organizations.

No fewer than five individuals who worked at Los Alamos—Schulte, Ettinger, Evan Campbell, Fred Toca, and Michael Brandt—have been president of AIHA. Schulte and Ettinger are both recipients of AIHA's Cummings Award, which is among AIHA's highest honors and is given annually for outstanding contributions to the knowledge and practice of industrial hygiene. Schulte was also president of the Academy of Industrial Hygiene, and Campbell was influential in the creation of AIHA's Laboratory Quality Assurance Program, the forerunner of today's AIHA Laboratory Accreditation Programs, LLC.

FROM RESEARCH TO PRACTICE

Today, the industrial hygiene function at LANL is part of a broader environmental sciences organization. Michael Brandt, the current associate director of environmental safety and health at LANL, is responsible for a 700-person operation with an annual budget of more than \$150 million. In addition to industrial hygiene, he oversees radioactive and hazardous waste management, occupational safety, emergency response, health physics, occupational medicine, and environmental protection sciences, as well as non-traditional areas such as cultural and historical preservation.

Such a wide range of activities places LANL within a broader trend: the blending of core IH activities at many workplaces with environmental health and safety programs. Of course, most workplaces don't have a linear particle accelerator on site.

Environmental scientists at LANL regularly collect samples from plants and animals to assess the potential chemical and radiological dose to those species. From this assessment, researchers can use modeling to determine the potential dose to humans. The data from these samples—more than 13 million have been collected over the years—is freely available to the public. LANL also has relationships with local manufacturers to collaboratively develop real-time monitoring equipment and health-physics instruments for assessing exposure to radionuclides in the workplace.

"Here's the most important contribution of our current scientific work," Brandt says. "Our research and development enables and informs cutting-edge practices that are implemented in the field. So there's always been this strong link between our research here at the laboratory and protecting workers. And we demonstrate that we are protecting our workers and the health of the public through radiological and chemical dose assessments done by our research scientists."

RICH LEGACY

Seventy-one years ago this month, on federally appropriated property that once held a small school dedicated to the health of young boys, scientists gathered at Los Alamos to initiate a project that would change the course of history. Today's scientists and researchers at LANL still perform their national security mission, but they do it safely, while protecting the health of workers and the surrounding community.

According to Brandt, LANL staff are always mindful of the laboratory's legacy. "We have a rich history in enabling the national security mission for the United States, as well as ensuring the safety of the nuclear stockpile," he says. "What I hear from staff is that the technical challenges at the laboratory are quite rewarding professionally, because in one forty-four square-mile location, we do very dangerous work safely. And my staff takes tremendous pride in that." ⑤

RESOURCES

The Synergist[®] thanks Harry Ettinger and Michael Brandt for discussing their work at Los Alamos National Laboratory. Much of the information in this article comes from those discussions. Other sources of information on LANL include the following:

- "Top 10 Things You Didn't Know About Los Alamos

National Laboratory." U.S. Department of Energy, <http://bit.ly/lanl-10things>.

- "Our History." Los Alamos National Laboratory, <http://bit.ly/lanlhistory>.
- Los Alamos National Laboratory Environmental Reports, 2011 and 2012.