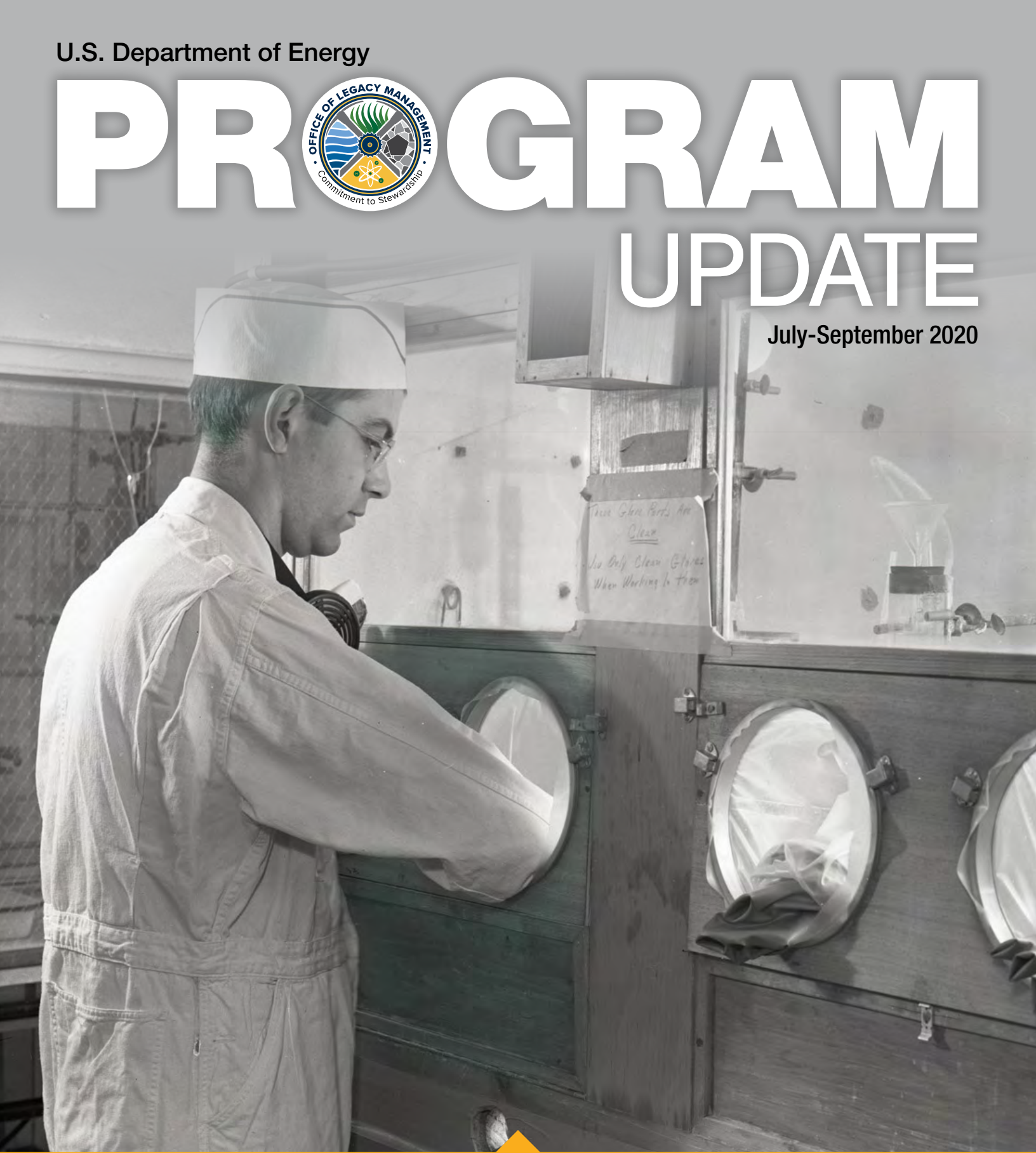
U.S. Department of Energy

PROGRAM UPDATE

July-September 2020



DOE Historian Joins LM

Duck and Cover Dayton! 75 Years into the Nuclear Age

Preserving the Legacy of the Manhattan Project

Director's Corner

In my last column, I remarked on how much had changed in our professional and personal lives since the start of the COVID-19 pandemic. Hard to believe it has been more than six months since we invoked our Continuity of Operations plan.

While some of these changes continue to test our resolve and patience, I'm proud to say that six months into the pandemic, we've adapted to "the new abnormal" and continue to deliver on the LM mission in the office and the field. We've been able to conduct field inspections and other critical site activities this summer, thanks to strong teamwork and ingenuity. We've prepared a robust plan for staff to eventually return to the office and field safely. We also have a plan to reopen our interpretive and visitors centers when appropriate, under guidance from the Centers for Disease Control and Prevention, and state and local orders. We remain steadfast in our number-one priority — protecting the health and safety of our staff, partners, and stakeholders.

You'll find that this issue of *Program Update* is dedicated to the theme of history, an apt subject as it serves to remind us that we have faced, and overcome, challenges in the past. This summer has been an especially reflective time for LM. In July we observed the 75th anniversary of the Trinity test and the dawn of the Atomic Age, followed in August by the anniversaries of the Hiroshima and Nagasaki bombings. As the son of a history teacher, the significance of this anniversary, and the link to our current mission is not lost on me.

LM traces its origins to those tumultuous years. In these pages, you'll read about the collaborative effort behind the Manhattan Project National Historical Park, which commemorates the massive national mobilization effort to produce a deployable atomic weapon during World War II [page 6]. You'll also learn about the fascinating history of the K-25 building in Oak Ridge, Tennessee, which secretly produced uranium for the world's first nuclear weapon [page 4]. The recent opening of the K-25 History Center is part of a multi-project agreement to preserve and share the building's historical significance. And be sure to read the interview with DOE Historian Eric Boyle, who recently joined LM, to gain more perspective on why history provides an important viewpoint for DOE and other federal agencies [page 8].

In addition to learning more about LM's history in this issue, you'll also find updates on important work and interesting news. On the science and technology front, we're employing lasers and drones to track change at LM sites. Our collaborative partnerships continue to thrive, with the National Nuclear Security Administration paying a visit to our calibration pads at the Grand Junction, Colorado, airport and our Formerly Utilized Sites Remedial Action Program team working closely with the U.S. Army Corps of Engineers. In procurement, we recently won an award for sustainable purchasing of electronics equipment. We even manage to squeeze in some adventure — a small team of Defense-Related Uranium Mines staff got to ride the spectacular Durango & Silverton Narrow Gauge Railroad to access a very remote mine in the San Juan National Forest of southwest Colorado.

We can expect more changes before my next column in December, and I can't predict where we'll be in our COVID-19 recovery plan. We might even add another remediated site to our environmental long-term stewardship mission. Regardless, we will continue to deliver on our mission of protecting human health and the environment. Enjoy your last days of summer, and as always, be safe, take care of each other, and execute the mission.

Warm Regards,

Carmelo

Carmelo Melendez

Welcome to the July-September 2020 issue of the U.S. Department of Energy (DOE) Office of Legacy Management (LM) Program Update. This publication is designed to provide a status of activities within LM. Please direct all comments and inquiries to ***LM-ProgramUpdate@lm.doe.gov****.*

LM Goals

Goal 1
Protect human health and the environment.

Goal 2
Preserve, protect, and share records and information.

Goal 3
Safeguard former contractor workers' retirement benefits.

Goal 4
Sustainably manage and optimize the use of land and assets.

Goal 5
Sustain management excellence.

Goal 6
Engage the public, governments, and interested parties.

Inside this Update:

This issue of Program Update is dedicated to the LM History program. Along with the normal articles detailing LM program activities and achievements, we have included stories highlighting the Office's historical resources, programs, and initiatives. You can find articles about the History program on pages 4-17.

Cover: Polonium purification glove box work at Runnymede Playhouse in Oakwood, Ohio, 1945.

GOAL 6

Preserving the Lasting Legacies of the Manhattan Project

Seventy-five years ago, the calamity of World War II came to an end. The legacies of that war, and its earthshaking ending, still reverberate today.

Nearly five years ago, a national park unlike any other was created to commemorate the massive, national mobilization effort to produce a deployable atomic weapon during World War II, and to explore the complicated legacies of that effort, including the use of two atomic bombs on Hiroshima and Nagasaki, Japan, in August 1945.

A tour of the X-10 Graphite Reactor in Oak Ridge, Tennessee. Built during the Manhattan Project, the Graphite Reactor was the world's first continuously operated nuclear reactor, which produced microgram quantities of plutonium used in developing a nuclear weapon.

In a 2015 ceremony, the secretaries of the Interior and Energy signed an agreement, defining each agency's roles in managing the new Manhattan Project National Historical Park (MAPR) at three historic Manhattan Project sites at Oak Ridge, Tennessee; Los Alamos, New Mexico; and Hanford, Washington.

The creation of the park itself represented the culmination of decades of preservation and advocacy work. By the mid-1990s, DOE had developed a list of eight Manhattan Project properties that were designated as "Signature Facilities" because of their central role in the development of the atomic bomb.

In 2001, the Advisory Council on Historic Preservation convened a panel of distinguished historic preservation experts who visited the Signature Facilities, evaluated their historical significance, and developed recommendations and preservation options. In its final report to the Secretary of Energy, the panel unanimously agreed with DOE that the Signature Facilities are of extraordinary historical significance and recommended "the formal establishment of these historic properties as a collective unit administered for preservation, commemoration, and public interpretation in cooperation with the National Park Service."

A tour docent shows fourth graders a piece of graphite at the B Reactor National Historic Landmark at Hanford, Washington. B Reactor was the first large-scale nuclear reactor ever built and produced plutonium used in weapons development during and after the Manhattan Project.

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Preserving the Lasting Legacies of the Manhattan Project

A tour at the Pajarito Site (TA-18) Pond Cabin in Los Alamos, New Mexico. Italian physicist and Nobel laureate Emilio Segrè used the cabin to conduct plutonium chemistry research as part of the development of the first atomic bomb.

In 2004, Congress passed the "Manhattan Project National Historical Park Study Act," which mandated a study of the sites at Oak Ridge, Los Alamos, Hanford, and their surrounding communities, "to assess the national significance, suitability, and feasibility of designating one or more sites within the study area as a unit of the National Park System."

In 2011, NPS and DOE recommended establishment of a park that included all three sites. Ultimately, the 2015 National Defense Authorization Act included authorization of the new park.

The facilities in the national park are preserved, maintained, and operated by their DOE mission owners (including the Office of Environmental Management, National Nuclear Security Administration, Office of Science, and Office of Nuclear Energy), which are responsible for implementing the commitments in the agreement between NPS and DOE. Since November 2016, LM has provided support and coordination among the three DOE park sites.

"National Parks are created in perpetuity," explained Tracy Atkins, LM's program manager for the park. "LM's mission is to fulfill the Department of Energy's post-closure responsibilities and ensure the future protection of human health and the environment. This mission is also long-standing. We have a lot of experience to share in welcoming the public into our sites. Further, LM is responsible for providing DOE programs for long-term surveillance and maintenance, records management and property management, land use planning, and community assistance. Many of these roles fit well within the MAPR framework and the DOE responsibilities for facility maintenance, safety, security, and public access for MAPR."

LM has provided funding for several MAPR preservation and maintenance projects and is sharing its expertise with public access (both physical and virtual). LM also works closely with NPS on park-wide issues, such as planning, policy, and shared messaging, and works to advance the park mission at DOE Headquarters.

This work is all part of the effort to promote greater understanding of the historical significance of the Manhattan Project, which ushered in the nuclear age, and represents one of the most transformational endeavors in human history. As Atkins notes, "The Manhattan Project is the genesis of the Department of Energy, so it is an honor for the DOE coordination for MAPR to be housed within LM." ❖

DOE Historian Joins LM

Eric Boyle is a historian for the DOE Office of Legacy Management.

In April 2020, U.S. Department of Energy (DOE) Historian Eric Boyle transferred to the Office of Legacy Management (LM) from the Office of the Executive Secretariat, so that he could capitalize on LM's history and archives resources. We caught up with Boyle to learn more about his role as a historian and the skills and experience he brings to LM.

The DOE Historian role covers history, preservation, and archives. Tell us more about your work.

As a historian, I do a lot of different things. I provide historical information, both to staff across the DOE complex as well as to outside agencies. I work with a wide range of people who are interested in DOE history for various reasons — researchers, scholars, scientists, biographers, experts in nuclear proliferation and security, and students working on history projects. I also work with a lot of public officials at both state and local agencies.

As part of the historic preservation element of my role, I help develop and facilitate DOE-wide historic preservation planning. I'm involved in facilitating the Department's compliance with the National Historic Preservation Act.

J. Robert Oppenheimer at Los Alamos during work on the Manhattan Project in 1945.

Lastly, with regards to archives, I manage more than 6,000 cubic feet of archives and reference materials in Germantown, Maryland. I use these records to answer questions, conduct research, and facilitate declassification of historical records.

You've been in this position for four years. What was your career path to DOE?

The path was a winding road. When I was in graduate school studying history, my plan was to become a history professor. I was unaware of other career options at that time, and I didn't even know that federal agencies have historians on staff. I came to Washington, D.C., for a postdoctoral fellowship at the National Institutes of Health, as my background is in the history of science, technology and medicine. Later, I got a job at the National Museum of Health and Medicine as an archivist.

But I missed working as a historian — and then the DOE job came up. In many ways, it was the perfect position for me. DOE was looking for someone who not only had a background in the history of science and technology, but also archives experience — that was me. I was really happy that I got the position, and it's been all that I hoped it would be.

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DOE Historian Joins LM

Why do you think it's important for a government agency such as DOE to have a historian on staff?

I teach at the University of Maryland, and what I tell my students on the first day of class is that the value of history is that it provides you with an opportunity to step outside your own world to understand the world that people lived in, in the past in a way that is empathic and instructive. And that allows you to think about and evaluate your own world.

The perspective that a historian can provide is particularly helpful for understanding the complexity of the world you live in now, and for a federal agency, the complexity of the federal landscape of which you are a part. You can't really understand where an organization is without understanding where it's come from and how it has developed and evolved over time. There are lessons to be learned from an agency's history — challenges and successes. Having that perspective can be incredibly valuable for the organization.

When the Department's original history program was set up in the late 1950s for the U.S. Atomic Energy Commission [DOE predecessor agency], what they wanted was a trained historian to write the history of the Manhattan Project. Because the Manhattan Project was such a monumental effort and period in history, they wanted to be sure that story was captured by someone with training, perspective, and tools for writing about history.

How do you see yourself applying your skill set within LM?

The main thing that I'd like people to know is that I'm here, I'm a resource, and I'm happy to help. LM has the benefit of already having a historian on staff, Padraic Benson. The work he's done has provided the baseline for work that I'll continue to facilitate. My primary role is to support ongoing efforts that are already in place. That said, I think there's a lot of opportunity to develop and create additional historical projects throughout the DOE complex, and I'd definitely like to be part of exploring some ideas for bringing those projects to fruition. I also have an extensive background in education. I've taught at four universities and developed a wide range of online educational materials that are used by several federal agencies.

What do you consider the most interesting event or time in DOE's history?

For me, the period that's the most fascinating is the origin. The Manhattan Project itself is such a fascinating story and time, with all sorts of amazing characters and monumental challenges faced, discoveries made, and things built. The sheer size of the project and diversity of people involved, and the spirit that motivated those people, is hard to match in terms of appeal and draw.

The Manhattan Project is a significant part of what I do as a historian. I answer a lot of questions related to the project, and I'm involved with the Joint Park Management Team for the Manhattan Project National Historical Park. My office was intimately involved in the effort to stand up the park, which was a monumental effort that took years of work. I think the Manhattan Project will continue to serve as a source of endless learning opportunities for me, and that's always been one of the things I love most about history. ❖

The K-25 production facility in Oak Ridge, Tennessee, produced enriched uranium for atomic bombs using the gaseous diffusion method as part of the Manhattan Project. When it was built in 1944, the four-story K-25 Gaseous Diffusion Plant was the world's largest building.

DOE History Resources

The U.S. Department of Energy (DOE) maintains and makes accessible to the general public a wide variety of historical resources, including published and online histories, as well as a historical timeline of DOE and its predecessor agencies (www.energy.gov/lm/doe-history/historical-resources).

DOE is the descendent of several predecessor agencies, including the U.S. Army Corps of Engineers Manhattan Project and the U.S. Atomic Energy Commission (AEC). The three-volume *A History of the United States Atomic Energy Commission* documents the history of the Manhattan Project effort to develop the atomic bomb during World War II and the early years of the AEC.

- *The New World, 1939-1946*, the first major published history of the Manhattan Project based on classified sources, details the origins, policies, and processes of the project.
- *Atomic Shield, 1947-1952*, details startup, development, and policies of AEC, as well as major issues like the expansion of the nuclear weapons complex, development of thermonuclear weapons, and beginnings of programs for peaceful uses of nuclear energy.
- *Atoms for Peace and War, 1953-1961*, covers atomic energy activities during the Eisenhower administration, including the expansion of the nuclear arsenal, nuclear weapons testing, and negotiations to end testing.

DOE has developed and made available to the public a wide range of in-print, online, and in-person Manhattan Project historical resources. These include histories, websites, reports and document collections, and exhibits and tours. Our most popular historical publication, *The Manhattan Project: Making of the Atomic Bomb*, provides a short history of the origins and development of the American atomic bomb program during World War II, and includes numerous images related to this effort.

Additionally, in July 2013, the Department launched The Manhattan Project: Resources, a web-based collaboration between the DOE History Program and the Office of Classification. The site is designed to disseminate information and documentation on the Manhattan Project to a broad audience, including scholars, students, and the general public.

The DOE History Program supports and provides information related to national laboratories and field sites, as well as exhibits, museums, and historic facilities across the country that are dedicated to displaying and interpreting the history of the Department and its scientific and technological missions and accomplishments.

DOE also maintains an extensive collection of photographs that document the history of the Department and its predecessor agencies (www.energy.gov/management/historical-photographs). Many of these images are available on the DOE Flickr page (www.flickr.com/photos/departmentofenergy/). ❖

GOAL 6

LM Recognizes National Navajo Code Talkers Day

The family of Samuel Billison stand with the Navajo Code Talker G.I. Joe on display at LM's Atomic Legacy Cabin in Grand Junction, Colorado.

National Navajo Code Talkers Day, which occurs on August 14, formally recognizes the unique World War II contributions of Native American soldiers who served as elite cryptographers, encoding and transmitting messages using a complex Navajo language-based code that was never broken by Japanese forces in the Pacific.

Established by President Ronald Reagan, National Navajo Code Talkers Day honors the World War II Navajo Code Talkers and recognizes original Native American Code Talkers who served the U.S. Army during World War I, including Choctaw, Comanche, Hopi, and Cherokee veterans.

Samuel Billison was one of the most well-known Navajo Code Talkers. He enlisted in the United States Marine Corps in 1943 and served as a Code Talker in the Pacific Theater. In 1945, Billison served on the front lines at the Battle of Iwo Jima. His unit transmitted more than 800 coded messages in an essential 48-hour engagement for control of the strategically imperative island. Billison received a Congressional Silver Medal for his bravery in battle.

Billison later served as president of the Navajo Code Talkers Association.

Billison was often sought as a source for books and movies, and his voice was used for the Hasbro Navajo Code Talker G.I. Joe action figure released in the 1990s. He recorded common code words in Navajo and English for the toy, which is now a collector's item.

Billison served as a consultant for the 2002 Hollywood film, "Windtalkers," for which he worked closely with actor Nicolas Cage.

At home, Billison served on the Navajo Nation Council and worked for the Bureau of Indian Affairs to reorganize the Navajo education system. He was an educator, principal, and sports coach.

As a middle school basketball coach at St. Michael's Indian School near Window Rock, Arizona, Billison left a substantial impression on Bill Frazier, a site manager with the U.S. Department of Energy Office of Legacy Management (LM).

Frazier remembers Billison as quiet and humble, never speaking openly about his military service.

"So, I was most impressed when I heard him talk on television about his time during the war," Frazier said. "I am proud of his fortitude and will to live — he is an inspiration to us as people. I'm proud to have known him."

Billison's legacy as a Navajo Code Talker is featured as part of the exhibits at the LM Atomic Legacy Cabin in Grand Junction, Colorado. Billison's Navajo Code Talker G.I. Joe action figure is also on display at the cabin.

Members of the Billison family attended the ribbon-cutting ceremony for the new interpretive center on June 6, 2019, and brought a newer action figure and a framed photo of Billison to LM. The newer action figure is used as part of the cabin's interpretive programming, allowing students to hear Billison's voice as it might have sounded decades ago at the Battle of Iwo Jima.

Billison died November 17, 2004. ❖

GOALS 1 & 4

Riding the Rails to Abandoned Uranium Mines

Some abandoned mines are hard to reach. Take, for example, the Elk Park Mine, located near Molas Pass in the San Juan National Forest of southwestern Colorado. The mine is not accessible by vehicle and requires a 6-mile hike on the Colorado Trail from the nearest trailhead.

Visiting the mine presented quite a challenge to the U.S. Department of Energy (DOE) Office of Legacy Management (LM) Defense-Related Uranium Mines (DRUM) Program. The DRUM Program verifies and validates the condition of abandoned uranium mines, such as the Elk Park Mine, which once provided uranium ore for defense-related activities on behalf of the U.S. Atomic Energy Commission (AEC), a predecessor agency to DOE. Field teams with the DRUM Program visit abandoned mine sites to collect location and condition data on features such as adits, shafts, and waste rock piles. They also perform radiological (gamma) walkover surveys and conduct soil and water sampling, if applicable. Following their visits, the teams develop mine-specific reports.

The DRUM field team en route to the Elk Park Mine in Colorado's San Juan National Forest.

DRUM field team members say that one of the biggest challenges of the job is the logistics of accessing the sites, many of which are in remote locations. Not only do four team members need to access each mine site, but they each carry considerable work-related gear. Although most sites can be accessed through combined use of a four-wheel-drive truck, a utility terrain vehicle, and a short hike — others prove to be more challenging.

Initially, visiting the Elk Park Mine presented significant challenges to the DRUM team. Given the terrain, a 6-mile hike is just far enough that it would have been difficult to reach the site, accurately conduct all the verification and validation work, and return to vehicles during daylight hours.

Fortunately, the DRUM Program maintains working relationships with various land management agencies, including the U.S. Forest Service (USFS). USFS staff provided insights about the area, how best to access the mine, and even visited the mine along with staff from the Colorado Division of Reclamation, Mining, and Safety to ensure accuracy.

As it happens, the Elk Park Mine is only about a mile from the Elk Park stop on the Durango & Silverton Narrow Gauge Railroad, from which the mine takes its name. The train travels along the Animas River between Durango and Silverton, a scenic trip of just over 45 miles each direction. The DRUM team wondered if it could take the train and access the site with a short hike from the train stop. Unfortunately, the train schedule would only allow the team three hours between drop off and pick up at the Elk Park stop, which likely would not be enough time to access the site, complete the work, and return to catch the train back.

A view from the Durango & Silverton Narrow Gauge Railroad.

Weighing all options, Field Team Lead Ian Shafer proposed combining the two options by hiking 6 miles from Molas Lake to the site early in the morning, completing the work, then hiking down to the Elk Park train stop to catch the train. This ended up being the most viable option, so Shafer and his team members — David Ruggles, John Westenhoff, and Kiana Ziola — put together a plan to complete the trip in August 2019. They coordinated with additional DRUM team members who picked up their vehicles at Molas Lake, then met the team when they disembarked the train in Durango. The plan came together without any problems.

Although the plan was unconventional, the team, with input and support from the local USFS staff, was able to complete its essential work of assessing potential risks to human health and the environment.

Learn more about the San Juan National Forest and the LM DRUM Program. ❖

DRUM Verification and Validation

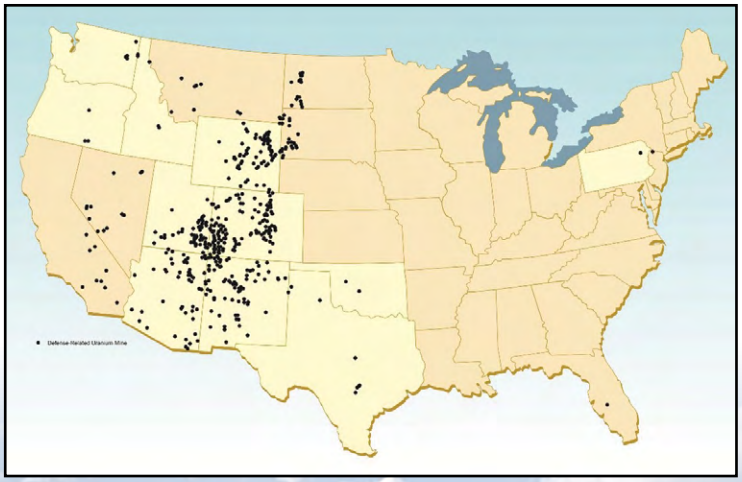
The U.S. Department of Energy (DOE) Defense-Related Uranium Mines (DRUM) program is a partnership between DOE, federal land management agencies, state abandoned mine lands (AML) programs, and tribal governments to verify and validate the condition of a unique set of abandoned uranium mines. These mines provided uranium ore to the U.S. Atomic Energy Commission (AEC) for defense-related activities.

Most mines are located on public land and are abandoned. Initiated in 2017, DRUM Campaign 1 focuses on approximately 2,500 legacy mines located on public land and administered by federal and state agencies. Campaign 2 is scheduled to commence fieldwork in 2023 and will assess DRUM sites on tribal land. Campaign 3 will address DRUM sites on private property and is scheduled to begin fieldwork in 2024. The DOE Office of Legacy Management implements the program by conducting verification and validation (V&V) activities, including:

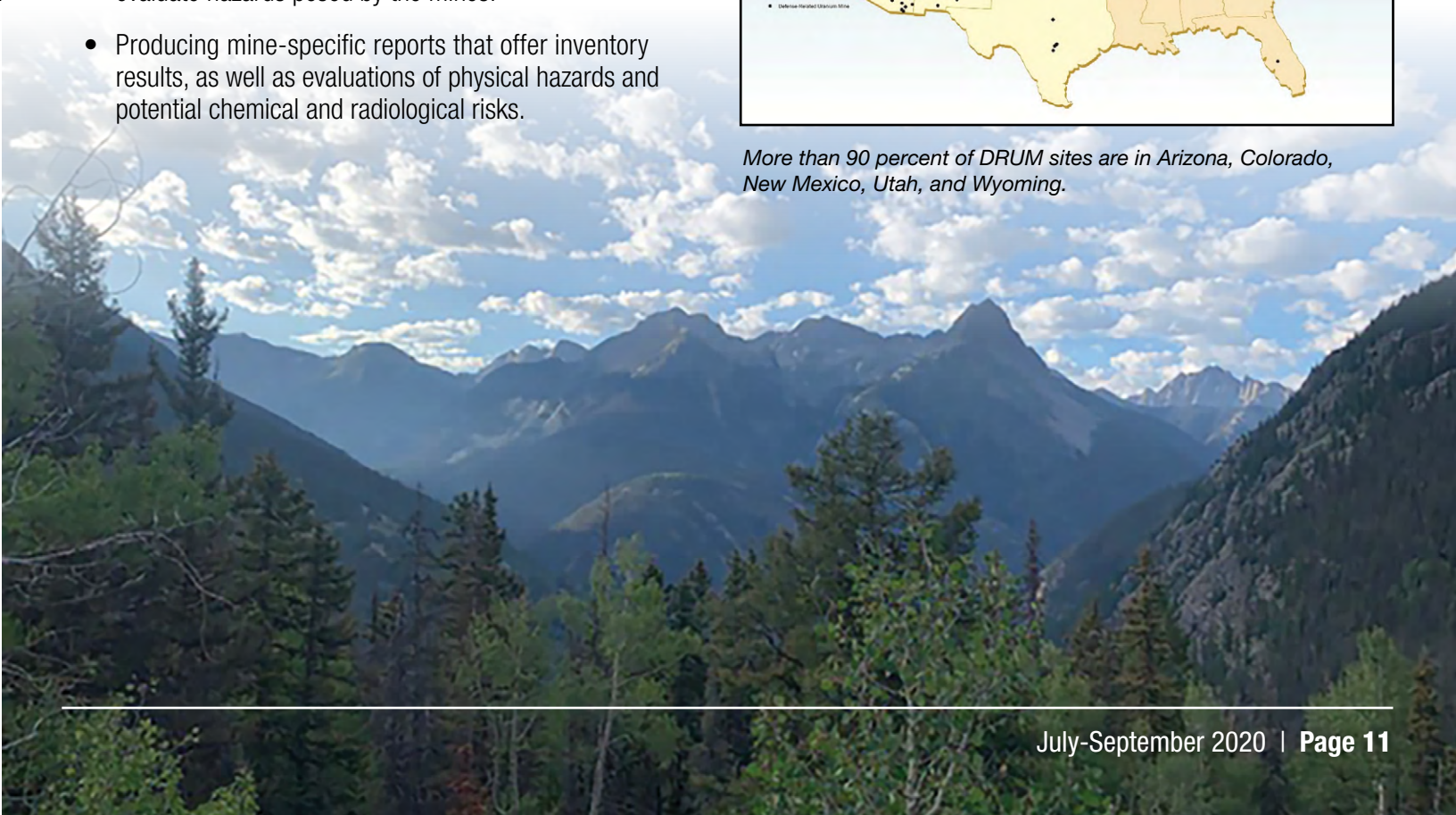
- Exchanging information with other federal and state agencies to improve the quality of mine-specific data.
- Performing field inventories to document the condition of mines.
- Conducting gamma surveys, soil sampling, and water sampling (as applicable), and other lines of evidence to evaluate hazards posed by the mines.
- Producing mine-specific reports that offer inventory results, as well as evaluations of physical hazards and potential chemical and radiological risks.

Ultimately, these V&V activities will result in preliminary risk screening to assess whether the mines pose potential risks to human health and the environment. This information will be shared with the Bureau of Land Management, U.S. Forest Service, and state and tribal governments to help them make decisions about how to address mines that pose the greatest risks.

The 2013 National Defense Authorization Act mandated the Secretary of Energy conduct a review and prepare a report on abandoned uranium mines that provided ore for defense-related activities. DOE finalized the report in 2014, documenting 4,225 DRUM sites across the nation. For more information, please visit the Report to Congress web page at https://energy.gov/lm/defense-related-uranium-mines-report-congress. ❖



More than 90 percent of DRUM sites are in Arizona, Colorado, New Mexico, Utah, and Wyoming.



GOAL 6

Duck and Cover Dayton! 75 Years into the Nuclear Age

The following article was written for the fall 2020 issue of Dayton History's quarterly publication, The Heritage*, by Mandy R. Askins, the site and project manager for the Mound Cold War Discovery Center, located at the former U.S. Department of Energy Mound Laboratory in Miamisburg, Ohio. Dayton History is a nonprofit organization that operates several historical sites throughout Montgomery County, Ohio. The article was written in recognition of the 75th anniversary of the Trinity Test, and the role of the Dayton community in the Manhattan Project. Below, the article appears in* Program Update *with permission from Mandy Askins and Dayton History.*

The only known color photograph of the Trinity test, which took place on July 16, 1945, in southern New Mexico. (Courtesy of Los Alamos National Laboratory)

Obelisk marking the site of the Trinity test, the first detonation of a nuclear device, on July 16, 1945. The site is in a remote desert region of southern New Mexico, in what is now the White Sands Missile Range.

Bursts of bright, awe-inspiring light followed by the roar of a tremendous explosion and intense waves of heat.

A mushroom-shaped cloud appeared over the remote Jornada del Muerto desert in southern New Mexico 75 years ago in the early morning hours of July 16, 1945. Towering at over 7 miles in height and felt more than 100 miles away, the Trinity test, the world's first atomic detonation, left a crater around 5 feet deep and 30 feet wide. The nuclear device used at Trinity, nicknamed Gadget, produced the energy equivalent of more than 22 kilotons of TNT. Observers of the test noted that the sky was illuminated brighter than daytime, with colors that changed from purple to green and finally to white. The blast wave knocked some observers to the ground. An previously unimaginable scientific achievement, the Trinity test brought the world into the Nuclear Age with a bang.

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Duck and Cover Dayton! 75 Years into the Nuclear Age

Dr. J. Robert Oppenheimer, a Manhattan Project scientist who worked as the director of Los Alamos Laboratory and who was often called the father of the atomic bomb, later recalled:

> *"We knew the world would not be the same, a few people laughed, a few people cried. Most people were silent. I remembered the line from the Hindu scripture, the Bhagavad Gita — Vishnu is trying to persuade the Prince that he should do his duty and, to impress him, takes on his multi-armed form and says, "Now I am become Death, the destroyer of worlds." I suppose we all thought that one way or another."*

That brief instant in the New Mexico desert, the Manhattan Project scientists and employees sighed with relief after years of dedicated work. Their bravery, ingenuity, and hard work came to fruition. The scientific achievement was undoubtedly impressive, but what would a weapon of that magnitude mean for the world?

Meanwhile, in Dayton, employees of the Manhattan Project's ultra-secretive Dayton Project had been covertly working on purifying the polonium-210 needed for the atomic bomb's initiators. The work was spread out around the city, in such places as the unsuspecting suburb of Oakwood, a warehouse downtown, and an old theological seminary. The Dayton Project began small, but personnel grew from an initial staff of 46 to more than 300 by 1946. Because of the absolute secrecy surrounding the Manhattan Project, scientists and other staff were hired without knowing what they would be working on.

An atomic bomb has three main components: an explosive, a nuclear fuel source, and an initiator. The initiator was the only way to safely kick-start the fission chain reaction of the bomb, and plenty of polonium was needed, both during and after World War II. Dayton's role was vital to the success of the first atomic bombs and subsequent initiator research and development that later continued at Mound Laboratory, the nation's first permanent U.S. Atomic Energy Commission facility built after the war.

With Japan's aggressive attempts to continue the war in the Pacific, President Harry S. Truman made the decision to decisively end World War II by deploying this new weapon.

Polonium purification glove box work at Runnymede Playhouse in Oakwood, Ohio, 1945.

On August 6, 1945, a uranium gun-type bomb known as "Little Boy" was dropped on Hiroshima, Japan. Three days later, a plutonium implosion-type bomb known as "Fat Man" was dropped on Nagasaki. Soon after, on August 15, Japan announced its surrender. On September 2, 1945, with a formal signing, World War II officially ended.

Most Manhattan Project secrets weren't declassified until the mid-1980s, leaving Dayton as a forgotten contributor for far too long. History now shows us just how critical the Dayton Project's work was to the overall achievements in creating the world's first atomic bombs.

To learn more about Dayton's role in the Manhattan Project and beyond, please visit the Mound Cold War Discovery Center. The center is open Wednesday to Sunday from 10 a.m. to 4 p.m. Additions to the exhibit have been installed and more are soon to come. ❖

Preserving the Historical Legacy

Glenn T. Seaborg visits the chemistry laboratory in Gilman Hall at the University of California, Berkeley, where he and colleagues discovered plutonium in 1941. (Photo taken in 1962.)

Physicist Glen T. Seaborg was one of the key figures of the Manhattan Project. Working at the University of California, Berkeley, and the University of Chicago, Seaborg and his colleagues were the first to isolate plutonium, an achievement that allowed measurement of the element's atomic weight. This important breakthrough changed the world. Plutonium would eventually provide the fissionable material used in the world's first nuclear explosion as well as in the bomb dropped on Nagasaki, Japan.

Two laboratories where Seaborg worked on plutonium are listed on the National Register of Historic Places (NRHP) — Room 307 in Gilman Hall at the University of California and Room 405 of the George Herbert Jones Laboratory at the University of Chicago. The two labs are also associated with sites in the U.S. Department of Energy (DOE) Office of Legacy Management (LM) portfolio — the Berkeley, California, Site and the Chicago South, Illinois, Site.

Authorized by the National Historic Preservation Act of 1966, the NRHP is the official list of the nation's historic places worthy of preservation, and part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect America's historic and archeological resources.

Seaborg's labs are not the only LM sites with associated NRHP listings. The Atomic Legacy Cabin, an interpretive center located at LM's Grand Junction, Colorado, office was once the epicenter of the nationwide search for uranium, which started with the Manhattan Project and later escalated during the Cold War. The original log cabin located on the Grand Junction site later became the base of operations for the U.S. Atomic Energy Commission Colorado Raw Materials Office, which was the regional epicenter of uranium mining and processing that characterized the arms race between the U.S. and the Soviet Union during the Cold War. The Grand Junction Office was listed on the NRHP in 2016.

The original log cabin (1945) located at LM's Grand Junction, Colorado, Site was the base of operations for a regional epicenter of uranium mining and processing during the Manhattan Project and later during the Cold War. The restored cabin now serves as an LM interpretive center named the Atomic Legacy Cabin.

The decommissioned Boiling Nuclear Superheater (BONUS) reactor, located northwest of Rincón, Puerto Rico, was developed as a prototype nuclear power plant to investigate the technical and economic feasibility of the integral boiling-superheating concept. The BONUS facility was the eighth nuclear power plant constructed in the world, the first in Latin America, and one of only two boiling-water superheater reactors ever developed in the United States. The reactor operated from 1964 to 1968. After decommissioning and decontamination, a museum was established on the first floor of the facility, preserving many of the features as they were during the operational phase. The Puerto Rico Electric

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Preserving the Historical Legacy

The decommissioned BONUS reactor facility is located on the westernmost coastal point of Puerto Rico in the municipality of Rincón.

The Rocky Flats Plant was located at the base of the Rocky Mountains, northwest of Denver, Colorado. (1995)

Power Authority (PREPA) owns the land, buildings, and other improvements, and LM and PREPA both have responsibilities for long-term surveillance and maintenance of the site. The BONUS reactor facility was listed with the NRHP in 2007.

Northwest of Denver, Colorado, the former Rocky Flats Plant played a key role in the development of the U.S. nuclear arsenal during the Cold War. From 1952 to 1994, the plant's primary mission was producing nuclear and nonnuclear weapons components for the U.S. nuclear arsenal. The key component produced was the plutonium pit, or "trigger." Most of the triggers in the U.S. nuclear weapons stockpile were manufactured at the former Rocky Flats Plant. In 2005, DOE completed cleanup of chemical and radiological contamination in production buildings and limited areas across the site after nearly 50 years of production activities. The Rocky Flats Plant was added to the NRHP in 1997.

"Having associated listings on the National Register is a reminder of just how significant LM sites were to U.S. history," said LM Program Analyst Padraic Benson. "It's quite an honor."

LM also carries out DOE responsibilities for the Manhattan Project National Historical Park (MAPR), a collaborative partnership by the U.S. National Park Service (NPS) and DOE to preserve, interpret, and facilitate access to key historic resources associated with the Manhattan Project.

Established in 2015, MAPR incorporates three of the most significant Manhattan Project sites, each of which played an essential role: Oak Ridge, Tennessee; Los Alamos, New Mexico; and Hanford, Washington. Dozens of buildings and structures at these sites are on the NRHP, including the B Reactor at Hanford, which is now a National Historic Landmark (NHL); the Los Alamos Scientific Laboratory; and multiple buildings from the "secret city" that served the Manhattan Project in Oak Ridge, Tennessee, including the X-10 Graphite Reactor (also an NHL.)

"The Manhattan Project represents one of the most important stories of the 20th century, as well as the beginning of the Department of Energy," said DOE MAPR Program Manager Tracy Atkins. I am proud to engage with the MAPR communities to preserve and protect the physical reminders of this important story." ❖

GOAL 1

Collaboration Through Calibration: NNSA and LM Team Up for National Security

National security is a term that is commonly associated with our military and intelligence communities, but it's also a priority of the U.S. Department of Energy (DOE) and two of the agency's programs: the National Nuclear Security Administration (NNSA) and Office of Legacy Management (LM).

On June 22, representatives from NNSA and LM worked together to not only further U.S. national security interests, but also to ensure the continued protection of human health and the environment.

LM manages a unique facility in Grand Junction, Colorado, that has radiometric calibration pads to standardize radiation survey equipment. Such equipment includes the NNSA's Aerial Measuring System (AMS). This technology is commonly used to conduct radiation assessments via helicopter or airplane. In recent years, the Nuclear Emergency Support Team (NEST) deployed this technology in support of national security efforts, such as conducting low-altitude flyovers of facilities used for major public events, such as the Super Bowl, to gather baseline information of naturally occurring radiation. Such information can then be leveraged by NEST to detect the existence of hazardous materials, such as a "dirty bomb," or to catalog where radiation levels are normally elevated and of no concern. This is one component of NNSA's expansive counterterrorism and counterproliferation efforts.

Certifying that this technology provides actionable and defensible data requires proper calibration — and this is where LM enters the picture.

LM manages five calibration facilities throughout the United States, one of which is located at the Grand Junction Regional Airport (GJT) and is specifically designed for aircraft-mounted radiation sensor systems. This site houses five 30-foot-by-40-foot concrete pads containing known concentrations of potassium, uranium, and thorium minerals, which contain small amounts of naturally occurring radioactive material.

In addition to the airport calibration pads, LM also manages calibration facilities at the Grand Junction office site, as well as at sites in Grants, New Mexico; Casper, Wyoming; and George West, Texas. These facilities are located in regions where uranium-mining activity occurred in the past and continue to support the mining industry, although at a much lower activity level than years past. The facilities were also used to calibrate radiation sensors used during mill tailings remediation efforts. In addition to calibration pads, borehole models are available to calibrate downhole geophysical well-logging equipment.

A significant amount of preparation takes place prior to any calibration. Days before the visit, LM and LM Strategic Partner (LMSP) staff must thoroughly clean the pads, using an industrial

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NNSA aircraft taxi to the portion of the Grand Junction Regional Airport runway dedicated to calibration pads.

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Collaboration Through Calibration: NNSA and LM Team Up for National Security

vacuum to remove all small debris, such as rock chips or discarded bolts, that may damage the turbines of visiting aircraft. A follow-up inspection also occurs on the day of the calibration event.

"Weather can also impact our use of the calibration pads. For example, wind can impact or disrupt calibration, so sudden gusts may delay the use of the facilities," said David Traub, LMSP senior geologist and project lead. "Fortunately, it was a gorgeous day when NNSA visited."

With all the proper conditions met and preparation protocols followed, a pair of Beechcraft extended-range models — each operated with a combined crew of NNSA technical and flight staff — were approved to touch down at GJT and taxi to the portion of the runway dedicated to calibration pads. The aircraft came from different NNSA sites — Nevada National Security Site locations at Andrews Air Force Base in Washington, D.C., and Nellis Air Force Base in southern Nevada — allowing for a rapid regional response, if necessary.

"I always love learning more about the details and nuances of the many mission areas we have in our portfolio, and this event was a fantastic example of how we support others with the calibration pads," said Paul Kerl, Uranium Mill Tailings Radiation Control Act and Nevada Offsites supervisor for LM and office manager for the Grand Junction Field Support Center. "In this case, calibrating equipment and instrumentation associated with the AMS were essential to screening national security with our NNSA partners."

NNSA aircraft parked on the Grand Junction Regional Airport calibration pads.

NNSA staff pose beside aircraft outfitted with radiation sensor systems at the Grand Junction Regional Airport in Colorado.

The June 22 calibration event represents the continuation of a vibrant partnership between NNSA and LM. This specific event sparked several follow-up conversations between the agencies about other potential collaborations in the future. ❖

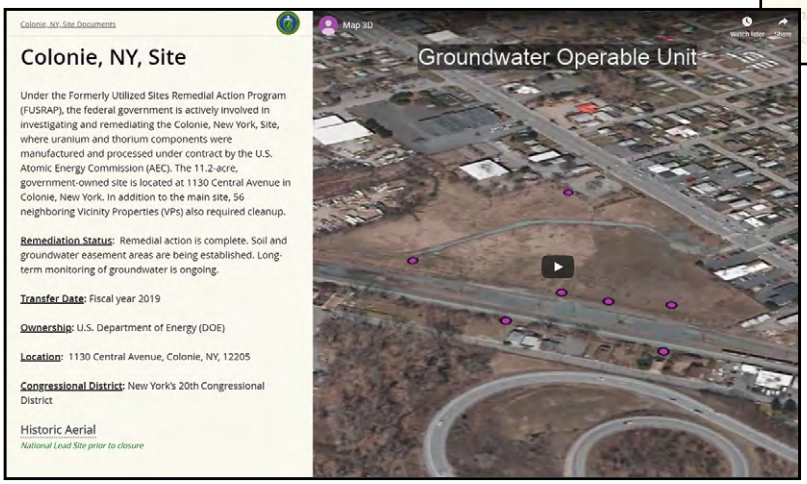
GOAL 6

Colonie Story Map Spotlighted at Federal GIS Conference

Industry leaders in mapping and geographic information systems recently recognized the U.S. Department of Energy (DOE) Office of Legacy Management (LM) for innovative use of geospatial tools in communication with stakeholders about the history and current management of LM sites.

Esri, the company that builds ArcGIS, the world's leading mapping and spatial analytics software, highlighted the innovative "story map" that the Geospatial Team in the LM Environmental and Spatial Data Management Program built for the Colonie, New York, Site. Esri CEO Jack Dangermond included images from the Colonie story map in his plenary session for the Esri Federal GIS Conference in February.

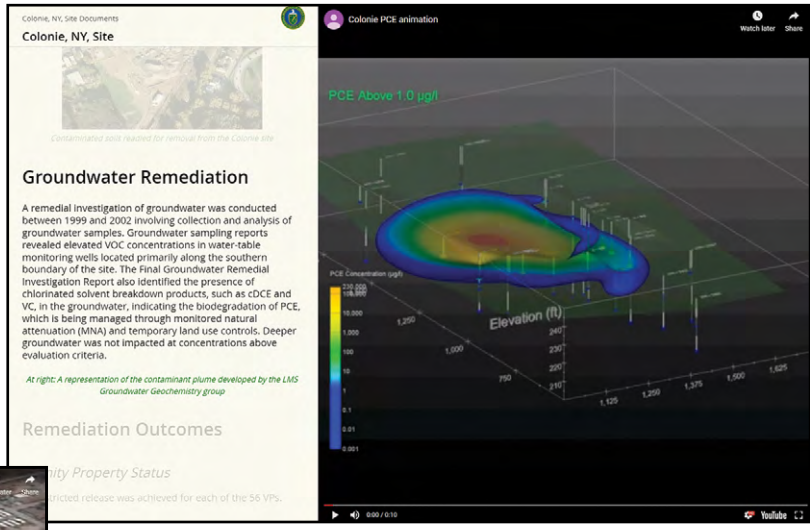
Story maps are interactive tools that combine maps with text, images, and multimedia content to convey a narrative about a topic, such as the history of an LM site or project. They are an effective medium for conveying information to nontechnical audiences in an organized and visually rich, web-based environment.



The Colonie story map combines maps with text, images, and multimedia content to explain the history and management of the site.

"Story maps provide stakeholders with accessible insights into the legacy of a site that are only available currently by digging through information found in documents on the site webpage and the Geospatial Environmental Mapping System [GEMS]," explained Josh Linard, technical data manager for LM. "The story map lets stakeholders interact with the data and understand why the data is important."

Linard said the recognition at the Esri conference validated the hard work the Geospatial Team has put into the story map project.



The Colonie story map includes an animation of groundwater plume contamination at the site.

The conference also provided opportunities to learn about other tools Esri has to offer, which could be useful as the Geospatial Team expands their work to further support LM. The Geospatial Team is exploring the ArcGIS Operations Dashboard and Hub in collaboration with the Formerly Utilized Sites Remedial Action Program to see what those tools might offer. The Geospatial Team is also keen to explore the integration of Esri products with the Asset Management Team's Archibus software. This integration can inform real-time decisions related to asset and facilities management and response to health and safety concerns.

Linard said, "Everyone wins. Stakeholders get intuitive, transparent, and engaging access to their data, LM programs get more efficient workflows, and the Geospatial Team gets to geek out with different ways to explore data." ❖

GOAL 5

LM Receives EPEAT Purchaser Award for Advancement of Sustainability

For the sixth consecutive year, the Green Electronics Council awarded its Electronic Product Environmental Assessment Tool (EPEAT) Purchaser Award to the U.S. Department of Energy Office of Legacy Management (LM). LM was awarded the highest rating of five stars.

The EPEAT Purchaser Award recognizes organizations for excellence in sustainable procurement of electronic equipment. LM successfully implemented a policy for environmentally preferable procurement of electronic equipment, including vendor contract specifications requiring that all equipment (computers, monitors, copiers, etc.) achieve bronze registration or better in the EPEAT system. Manufacturers register products in EPEAT based on a device's ability to meet certain required and optional criteria that address the full product lifecycle, from design and production to energy use and recycling. Bronze-rated products meet all the required criteria in their categories.

The award was given during a virtual ceremony on July 29, 2020.

"Receiving the EPEAT award means so much to the Office of Legacy Management, as we strive for sustainable procurement to purchase goods and services that reduce the impact on our environment," said LM Public Participation Specialist Shawn Montgomery. "By continually improving our sustainable procurement program, LM promotes positive environmental impacts through our work."

Be Environmentally Conscious

LM is continually seeking opportunities to protect the environment and conserve natural resources. One simple step we can take toward improving environmental consciousness is to distribute the *Program Update* newsletter by email instead of sending a printed copy.

Please send your email address and your first and last names to LM-ProgramUpdate@lm.doe.gov so that we can update our database.

Thank you for your assistance.

GOAL 6

Former DOE Intern Presents at Arizona/NASA Space Grant Symposium

Alyssa Renteria (front center) is pictured here with Clarence Brown, director of the Mentorship for Environmental Scholars Program, and peers at a STEM diversity conference in Honolulu.

Alyssa Renteria was a 2019 summer intern with the U.S. Department of Energy (DOE) Office of Legacy Management (LM). A junior at the University of Hawai'i, Manoa, she is studying global environmental science. Alyssa was chosen to present at the Arizona/NASA Space Grant Symposium held on April 18, 2020. Below, Alyssa shares her experience with the presentation and how her LM internship has influenced her career path.

You were recently one of the student presenters for the Arizona/NASA Space Grant Symposium. Can you tell us how you were chosen as a presenter?

> Angelita Denny, my internship mentor at LM, presented at the 2002 Arizona/NASA Space Grant Symposium. She was contacted by the Space Grant manager about collaborating on a project, and I was asked to speak. [Angelita Denny, LM site lead, oversees summer interns through the Mentorship for Environmental Scholars Program, known as MES].

This year the presentations were done entirely online over Zoom. Did you make special accommodations and adjustments for an online-only presentation? What did you like about being online? What did you dislike?

> Presenting online was a unique experience and I was appreciative of only having to focus on how I would deliver my presentation through speech. It kept me from being flustered by presenting in person. However, I did miss the natural dialogue, which is hard to capture online.

What was your presentation about? Did it involve any of the work you did while interning with the Office of Legacy Management last summer?

> My presentation was about the project I did during my internship with LM, which focused on the purposes and criteria of spatial interpolation methods.

What is spatial interpolation?

> Spatial interpolation is the prediction of unknown values using sample data points.

What practical knowledge did you learn from your internship that you were able to apply to your studies? Did any of it apply to your presentation?

> Over the course of the internship I learned how to define my target audience, which helped me create my presentation.

Did your internship change your outlook on your future career path?

> My LM internship opened my eyes to the various careers within the agency and allowed me to have a better understanding of the LM mission. Most importantly, it taught me that there isn't one clear-cut path to where I want to be in life.

You have two more years before the completion of your undergraduate degree. Do you have plans after graduation?

> After graduation, I plan on pursuing a master's degree in environmental engineering. ❖

Math and Stats Drive Surveys of Abandoned Uranium Mine Risk

For the U.S. Department of Energy Office of Legacy Management (LM) Defense-Related Uranium Mines (DRUM) team, math and statistics are at the core of protecting human health and the environment.

LM Strategic Partner Senior Technical Advisor Clay Carpenter said the DRUM mission revolves around collecting data and determining what data analysis and statistics are needed to assess the risk that abandoned uranium mines pose to the public and how to mitigate those risks.

"There are really two aspects to the risks associated with the mines. There's the openings — the physical hazards — and then there's the human health portion, which is associated with the waste rock materials," said Carpenter.

The waste rock materials that remain from past uranium mining are often elevated in different constituents of concern, including arsenic and radium-226, according to Carpenter. DRUM makes risk assessments related to human health based on very conservative assumptions with regards to those who might encounter the mines. Since these mines are on public land, the DRUM team makes these assessments with outdoor recreationists in mind.

Physical threats relate to the hazards posed by the characteristics of the mine itself. Unstable ground, fall risk, and collapsing rock all make abandoned uranium mines especially dangerous. When categorizing mines, DRUM staff rate these physical dangers on a scale that considers how dangerous a mine or feature is, and how likely members of the public would be to encounter the mine or feature.

A mine or mine feature that isn't particularly dangerous may have a higher risk rating if it's in an area where people spend a lot of time. Likewise, a more dangerous mine may have a lower risk rating if it's extremely remote and rarely visited.

"We try to keep the math pretty simple when it comes to rating the physical hazards," said Carpenter. "It's easy to get into all the data and lose sight of what our purpose is."

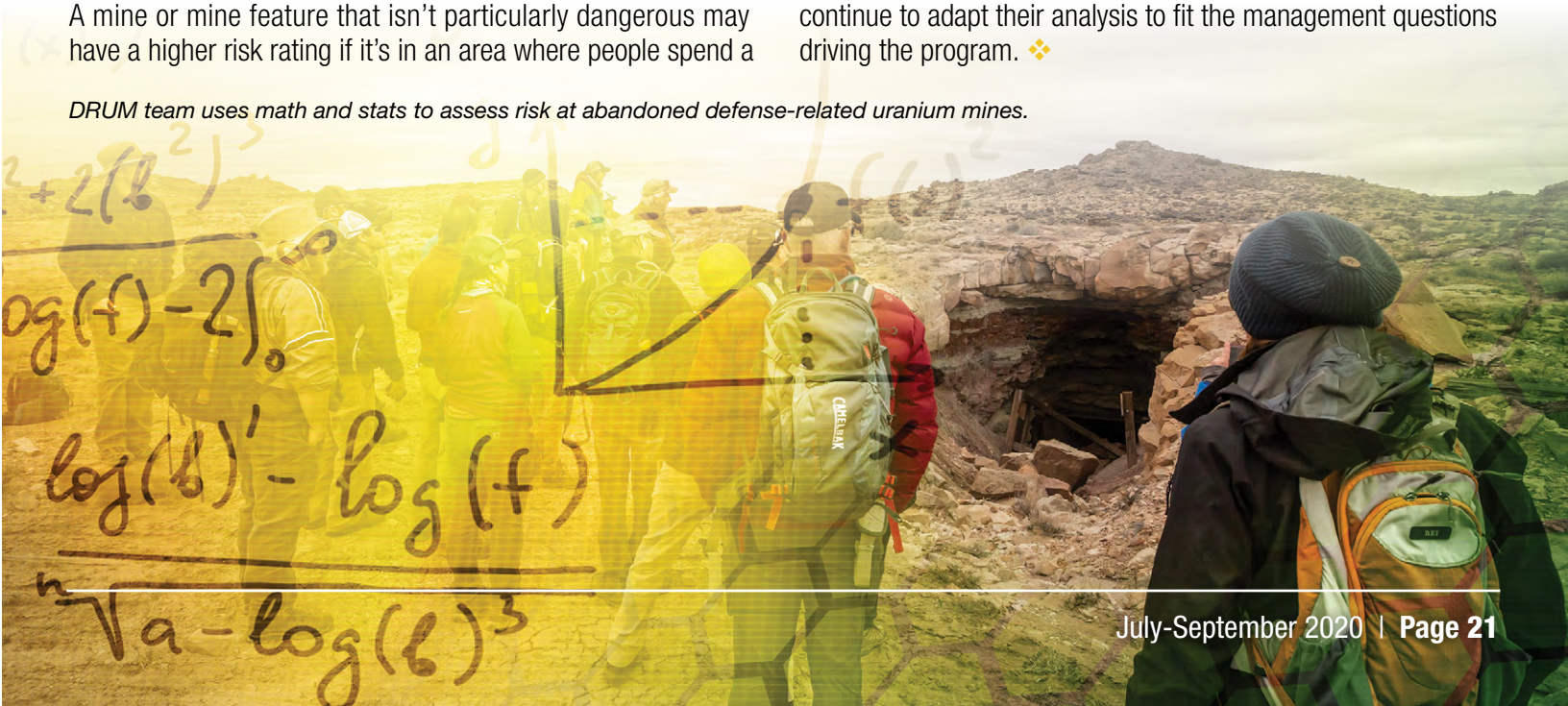
With nearly 4,000 abandoned uranium mines for assessment, keeping the math simple is important, though not always possible.

For example, the team used linear regression analysis to see whether they could extract even more information from data they had previously collected during their many spatial surveys of gamma radiation. Linear regression allows analysis of the relation between two variables (data sets) to see if they correlate with each other.

Because radium-226 emits the relatively greatest gamma radiation activity of the uranium decay chain, the DRUM team assumed higher gamma radiation readings would generally mean higher activity concentrations of radium-226, suggesting gamma radiation levels could serve as a surrogate for radium-226 concentrations. However, since DRUM field sampling protocols were not designed to specifically assess this correlation, there were too many variables to confirm the relationship. They also found an increase or decrease in gamma radiation readings did not typically result in a corresponding increase or decrease in radium-226 concentrations.

This was an important finding, as it confirmed that they would need to evaluate data on radium-226 independent of data collected on gamma readings. Carpenter said the team will continue to adapt their analysis to fit the management questions driving the program. ❖

DRUM team uses math and stats to assess risk at abandoned defense-related uranium mines.



GOALS 1 & 4

LM Employs Lasers and Drones to Track Change

In June 2020, archaeologists uncovered the world's oldest and largest Mayan monument hidden in the tropical rainforests of Mexico. More than 5,000 miles away, just outside of England's Stonehenge site, scientists found what may be the largest prehistoric structure in Great Britain. Discovery of these ancient wonders was enabled by light detection and ranging (lidar), a laser mapping tool that allows experts to see through the rainforest's thick canopy of tall trees and deeper still through layers of earth to trace the structures buried beneath.

When it comes to tracking changes at remediated U.S. nuclear sites, the measurement strategy is not all that different from that of archaeological projects. In fact, experts at the U.S. Department of Energy Office of Legacy Management (LM) utilize this same lidar technology to ensure sites are protective of human health and the environment, employing it via drones — or unmanned aerial systems (UAS) — for ease of use.

Lidar works by projecting a laser and recording the time it takes to bounce back to the source from the target. The time logged then determines the distance from one point to the other. To measure elevation, lidar can be projected from a raised object with a known position, like a UAS. Before the use of UAS, LM had to conduct ground-based surveys or hire a pilot and a plane and coordinate with the Federal Aviation Administration to authorize the flight, which was often expensive.

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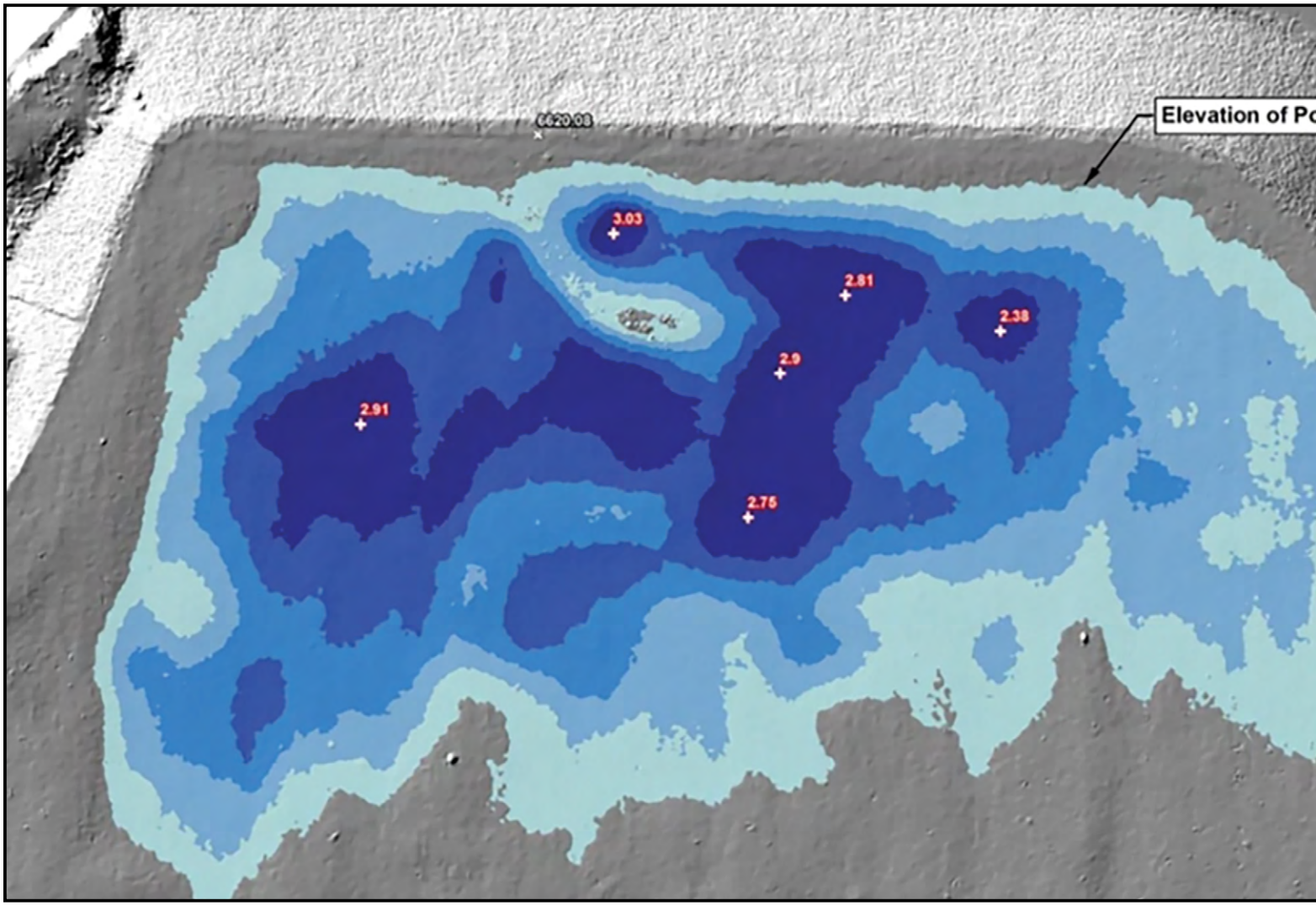

This figure shows elevation changes determined from lidar data collected at LM's Bluewater site in New Mexico. Understanding the rate of these changes can inform LM's long-term surveillance and monitoring decisions.

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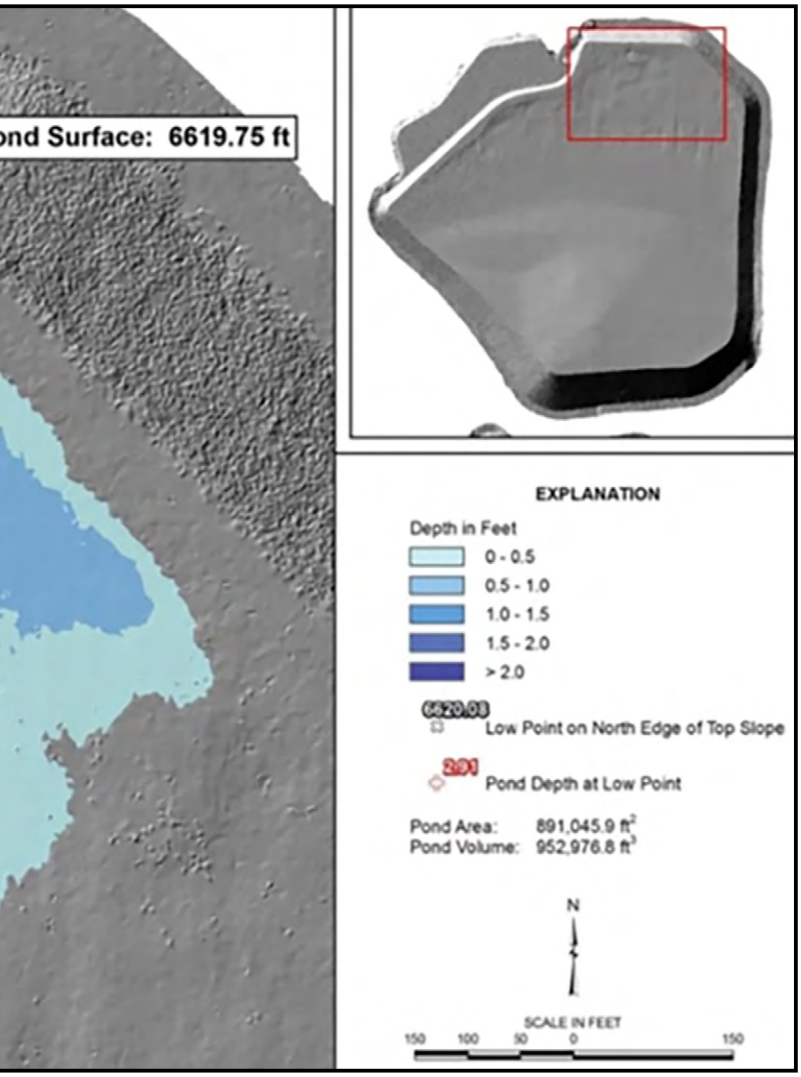
LM Employs Lasers and Drones to Track Change

"It would take thousands of dollars flying lidar by plane to achieve the accuracy that you can get flying lidar via UAS — and even then, you still might not reach that level of precision," said Josh Linard, a technical data manager for LM who oversees the use of lidar. "Without an aerial unit, you would have to go out with a handheld GPS and take a measurement, then take a step, then take a measurement, then take a step — essentially surveying every couple of centimeters — to collect elevation data that would match the accuracy of an airborne lidar survey. Fortunately, we can now fly lidar with a UAS in a matter of hours and collect this really high-quality information with far fewer hurdles."

For most of the LM sites where lidar is used, the objective is to establish a baseline understanding of the area's elevation and detect indications of a sites' settlement into their natural environment. LM will then survey these sites as necessary and compare the new measurements to the original data to identify any shifts and inform long-term site management strategies.



At some sites, such as the Bluewater, New Mexico, Disposal Site, a former uranium processing site located about 80 miles west of Albuquerque, LM has conducted more frequent surveys in response to changing site conditions. In 1998, one year after site transfer, the Bluewater site team noticed a depression starting on the surface of the site's disposal cell (a protective storage unit encapsulating contaminated materials cleaned up from the site). The team continued to visually inspect the site annually and observed the depression increasing in extent and depth. In 2012 they conducted a lidar survey to determine the depth and extent of the depression. A follow-up lidar survey was conducted in 2016 to measure changes, with another one planned for 2021. In addition to showing changes in the depressions and their rate of growth, the lidar surveys have provided vital information to aid in maintenance of the disposal cell.

In addition to improving change detection and data collection, UAS lidar surveys also have the potential to make LM's site evaluation process faster, cheaper, and — most importantly — safer, reducing the risk LM employees face when traversing rough site surfaces.

"Right now, we do annual inspections at a lot of the disposal cells, like the one at Bluewater, and these inspections require site teams to walk on uneven ground," Linard said. "While it isn't common for people to slip, trip, or fall, we still want to make sure all LM workers do their jobs in the safest way possible, and the new lidar UAS flights help with that goal."

While technology is always evolving, Linard believes lidar will play an increasing role in LM site management.

"For LM, nothing has been as vetted or is as trusted as lidar," Linard said. "That's why we continue to rely on it as a key tool in helping inform our plans for protecting human health and the environment." ❖

Collective Expertise, Enduring Partnership Continue to Advance FUSRAP

John Busse is the chief of the Environmental Support Branch within the USACE Headquarters Environmental Division.

The U.S. Army Corps of Engineers (USACE) and the U.S. Department of Energy (DOE) Office of Legacy Management (LM) have been working together for more than two decades to advance the Formerly Utilized Sites Remedial Action Program (FUSRAP), cleaning up sites with contamination resulting from the nation's early atomic energy and weapons programs.

Through this longstanding partnership, USACE and LM continue to make progress in their collective efforts to remediate sites that can then be restored for beneficial reuse within local communities across the country.

"Our goal is to safely and efficiently clean up FUSRAP sites to ensure protection of human health and the environment," said John Busse, the chief of the Environmental Support Branch within the USACE Headquarters Environmental Division. "Once our cleanup efforts are complete, we then transfer the sites back to LM for long-term management and stewardship."

Busse oversees the execution of approximately $1 billion annually in environmental service work.

In addition to the work his team performs under FUSRAP, Busse oversees the decommissioning of U.S. Army deactivated nuclear power plants, supports environmental work for all branches of the military, and assists the U.S. Environmental Protection Agency (EPA) in cleaning up some of the nation's most contaminated sites under the EPA Superfund Program. The team also supports a wide array of agencies not associated with the U.S. Department of Defense under the Interagency and International Support – Environmental (IIS-E) Program.

Under the IIS-E program, USACE works with the DOE Office of Environmental Management to dismantle and dispose of previously decommissioned nuclear reactors, such as a three-megawatt research reactor at the Lawrence Livermore National Laboratory in California. Additionally, USACE is providing ongoing technical support to LM for construction of the Weldon Spring Site Interpretive Center in Missouri.

"Under the IIS-E program, our assistance is customized to meet the needs of our federal partners. Our support can vary from only providing highly specific technical advice to complete program

Nicki Fatherly is the manager of the National FUSRAP Program.

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Collective Expertise, Enduring Partnership Continue to Advance FUSRAP

management," explained Busse. "We're able to leverage our technical and contracting competencies across the entire USACE enterprise for our federal partners' initiatives and quickly pull together multi-disciplinary teams with a wide variety of capabilities."

USACE consists of a headquarters office, geographic divisions, supported by district offices, as well as centers, labs, and active components. In total, six districts from three divisions are working on 21 active FUSRAP sites across eight states.

Busse is very familiar with working on FUSRAP at the district level. Prior to working at USACE Headquarters, he served in several roles including project engineer and manager and program manager for more than eight years at the USACE Buffalo District.

"It's so rewarding to be able to witness first-hand 20-plus years of progress within FUSRAP, going back to my days as a private consultant," said Busse. "Increasing the efficiency and timeliness of recent site closeouts, like the Colonie site in New York, is a direct result of strengthening the existing partnership we have with LM. Together, our collective expertise will continue to streamline the site closeout and transfer process."

Ensuring a common operating picture is critical in executing FUSRAP. This is accomplished through interagency work groups for each of the 21 active FUSRAP sites.

"Regular communication and meeting together annually help ensure that we have everyone in the room when we are discussing these projects," said FUSRAP National Program Manager Nicki Fatherly, with the USACE Headquarters Environmental Division. "Using interagency work groups to tackle difficult issues enables constructive dialogue between us, which improves the site transfer process."

Fatherly has been providing national-level programmatic leadership for FUSRAP for nine years. In her position, she champions this program at the USACE Headquarters level. She develops and defends national program budget development and oversees program execution performance metrics in close coordination with USACE divisions and districts. She is also the primary point of contact for LM Headquarters staff.

"As we are completing cleanup efforts on FUSRAP sites and transferring them back to LM, there is also ongoing, concurrent coordination to assist LM in identifying and facilitating beneficial reuse for these properties where possible," said Fatherly. "So, while we continue to make progress, there is also more work to be done, and together we will continue to accomplish the mission." ❖

Attendees of the St. Louis Area FUSRAP Tour at the St. Louis Airport Site in Missouri in May 2019.

FUSRAP Adapts: Annual Tour Goes Virtual

Instead of piling into vans and hitting the road, more than 30 attendees from the U.S. Army Corps of Engineers (USACE, the Corps) and U.S. Department of Energy (DOE) Office of Legacy Management (LM) logged into WebEx on June 9-11 for a virtual exploration of USACE North Atlantic Division (NAD) Formerly Utilized Sites Remedial Action Program (FUSRAP) sites.

FUSRAP was established in 1974 to identify and cleanup sites that supported the Manhattan Project during World War II and the U.S. Atomic Energy Commission during the Cold War. In 1997, Congress transferred management of FUSRAP to the U.S. Army Corps of Engineers. USACE is responsible for remediating FUSRAP sites before transferring them to LM for long-term stewardship.

The annual tours strengthen the partnership between LM and USACE by helping to identify new opportunities to leverage each other's strengths. Information sharing and collaboration ensure an efficient and cost-effective process for transferring sites between the two organizations.

The decision to go virtual this year was an easy one.

"There's no doubt that meeting face to face on location is extremely valuable for gaining firsthand knowledge of sites," said LM FUSRAP Site Manager Darina Castillo. "However, due to COVID-19, meeting online was the best way to protect the health of our staff and our FUSRAP communities."

"It was the right thing to do," agreed Comprehensive Environmental Response, Compensation, and Liability Act/Resource Conservation and Recovery Act/FUSRAP Team Lead Gwen Hooten. "Our core mission is to protect human health and the environment, and, in this case, that meant minimizing travel exposure through use of top-notch virtual technology."

Leadership from both organizations attended this year's tour, including LM Director Carmelo Melendez, USACE FUSRAP National Program Manager Nicki Fatherly, and USACE NAD Program Manager Justin Gottesman. LM FUSRAP site managers Darina Castillo and Cliff Carpenter led discussions on the previous year's collaborations, site transition lessons learned, and life cycle budget assumptions for each site.

USACE Project Manager Jim Moore kicked off the virtual tour with a discussion of the Maywood, New Jersey, Site, which is currently in a construction phase. Excavation of contaminated soil continues per the Record of Decision (ROD), with less than 20,000 cubic yards of accessible soil in need of disposal.

USACE Project Manager Helen Edge gave a walking video tour of the Middlesex North, New Jersey, Site (Middlesex Municipal Landfill). The site is on schedule to produce a final Proposed Plan (PP) and ROD, which will determine the necessary remedial action for the site. Edge also presented on the Middlesex South, New Jersey, Site (Middlesex Sampling Plant). The main site soil is being remediated, and the remediation alternatives will be presented to the public in the PP later this summer.

Edge covered the Hicksville, New York, Site (Sylvania-Corning) as well. USACE is working to finalize the Remediation Investigation Report and is prepared to proceed to the Feasibility Study. Once a remedy has been decided, the transfer date will be determined.

The FUSRAP team virtually visited the Deepwater, New Jersey, Site (DuPont Chambers Works) in the USACE Philadelphia District. The site consists of a 700-acre chemical plant where DuPont began uranium operations in 1942. An estimated

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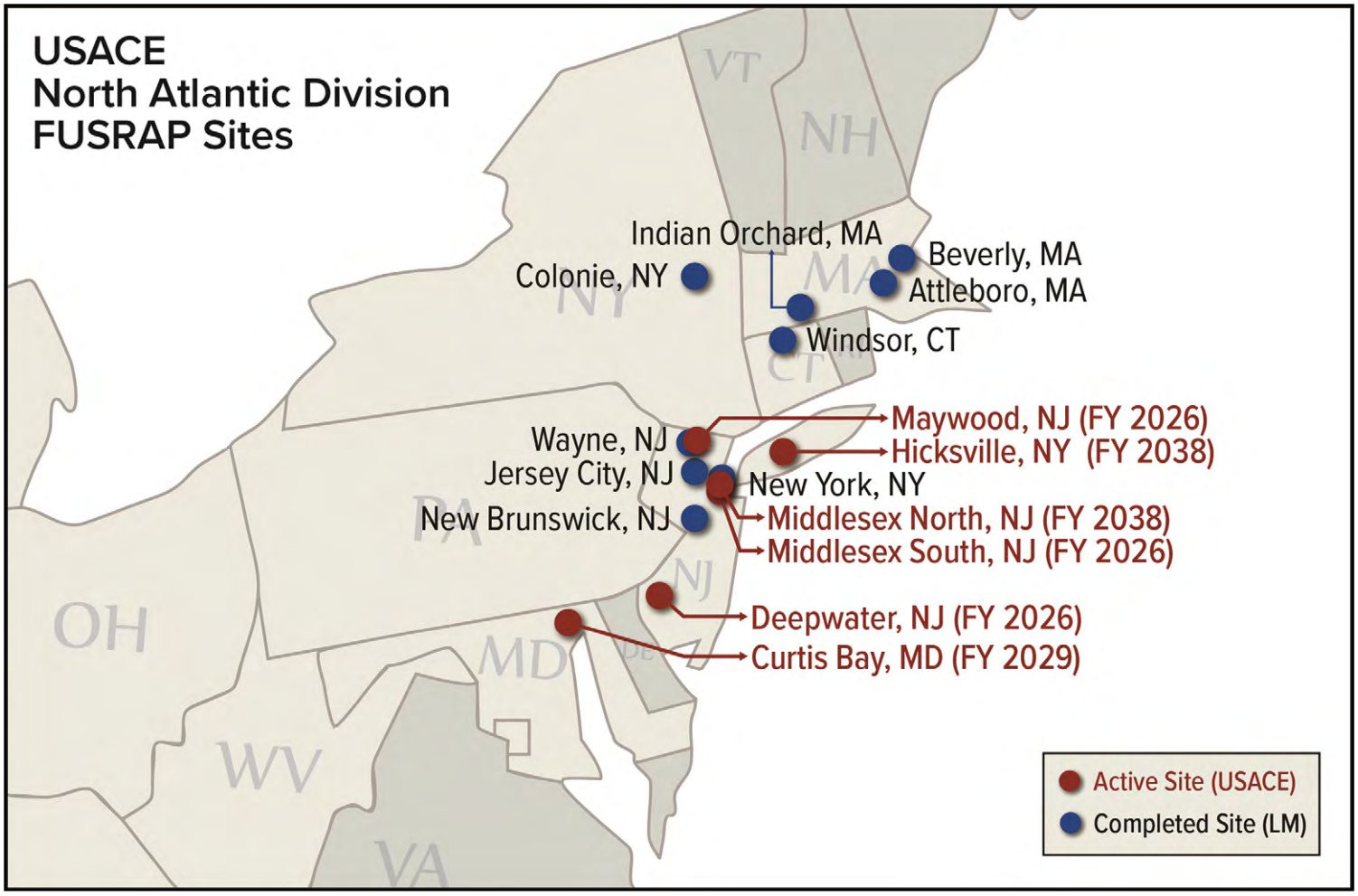
FUSRAP Adapts: Annual Tour Goes Virtual

50,000 cubic yards of contaminated material is on-site, requiring extensive coordination with the landowner and an on-site treatment plant. The USACE site team is utilizing dense environmental and spatial data, involving extensive modeling and visualization to show the site's life cycle, monitor change over time, and improve decision-making at the site. This early investment in technology ensures that remediation is being performed in a cost-efficient manner.

USACE Project Manager Ivanna Goldsberry wrapped up the virtual tour with the Baltimore District's Curtis Bay, Maryland, Site (W.R. Grace). W.R. Grace conducted thorium-processing operations of monazite sands at the facility in the late 1950s under contract with the U.S. Atomic Energy Commission. Remediation activities are continuing, and collaboration with the property owner will be pivotal when the site transfers to LM.

Over the three days of virtual tours of the NAD FUSRAP sites, USACE and LM demonstrated the importance of strong communication and close collaboration for mission success.

"Even in the virtual environment, we can all agree that these opportunities are invaluable to both of our organizations," said Darina Castillo. "The videos and presentation materials that the Corps shared gave us better understanding of the sites and allows for better transition planning and long-term stewardship." ❖



GOALS 1 & 4

LM Conducts First Groundwater Sampling at Colonie Site

In July, the U.S. Department of Energy (DOE) Office of Legacy Management (LM) conducted its first groundwater sampling event at the Colonie, New York, Site — the 100th site added to the LM program. The Colonie site is a 11.2-acre, vacant property near Albany. Colonie transferred to LM for long-term stewardship last fall.

A worker repairs a damaged monitoring well.

A worker samples groundwater using 'low-flow' sampling protocols.

During this redevelopment of a well using a surge block, the purged water was filtered through activated carbon.

"When we received the remediated site from our partners at the U.S. Army Corps of Engineers [USACE] last year, it was a major milestone for LM, taking on our 100th site," said LM Site Manager Darina Castillo. "But for me, performing groundwater monitoring and site inspection makes it feel like Colonie is really part of the LM family now."

To reduce interstate travel because of COVID-19 and to support the regional economy, LM selected local subcontractors, Envirospec Engineering based in Albany, to conduct the groundwater sampling.

While retaining stewardship responsibilities, LM hopes to sell the Colonie site or transfer the property to another government agency, local authority, community organization, or private party that can realize the site's potential for future redevelopment as a benefit to the community.

The site was previously owned and operated as a foundry by National Lead Industries (NL) from 1937 to 1984. In 1958, NL began producing items manufactured from uranium and thorium under licenses issued by the U.S. Atomic Energy Commission (AEC) and the state of New York. The AEC contract was terminated in 1968, and the plant began a new era of production with the fabrication of shielding components, aircraft counterweights, and artillery projectiles from depleted uranium.

The New York State Supreme Court shut down the NL plant in 1984, and Congress assigned the authority to clean up the site to DOE. DOE performed cleanup work under the Formerly Utilized Sites Remedial Action Program (FUSRAP) from 1984 to 1997. In 1997, Congress transferred cleanup actions under FUSRAP to USACE. Between 1999 and 2014, USACE completed a large-scale soil removal action at the site and adjacent properties, initiated the groundwater monitoring program, and investigated uranium dust contamination.

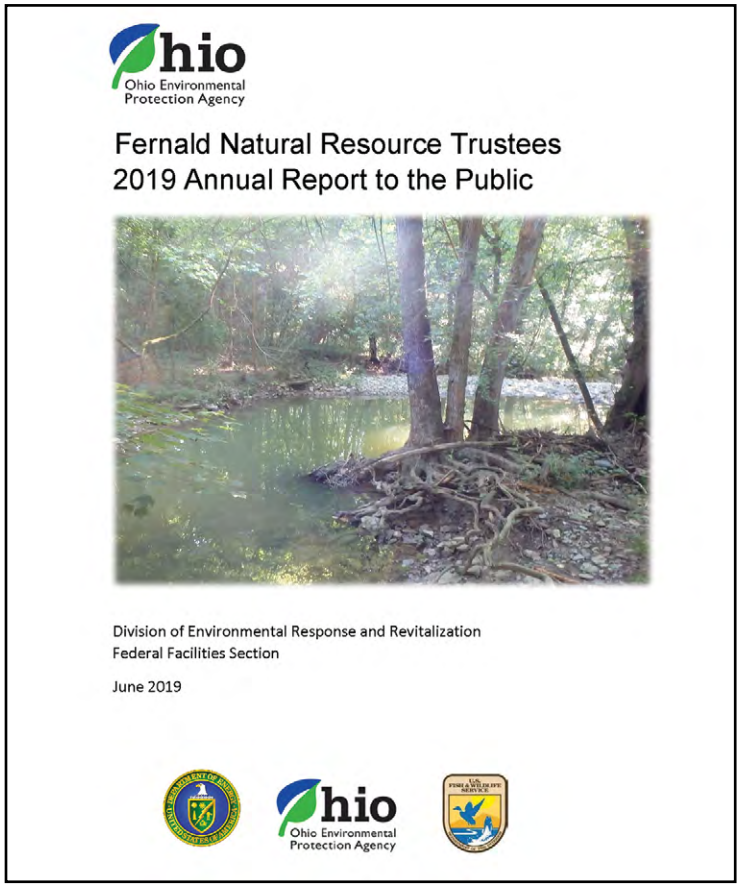
LM's long-term maintenance responsibilities at the site include annual inspections of environmental easement areas, groundwater monitoring, managing site records, conducting long-term periodic reviews, and responding to stakeholder inquiries.

Results from Colonie's first groundwater sampling event will be published on the Colonie, NY, Site webpage.

To learn more about the history of LM's 100th site, view the Colonie, NY, Site story map. ❖

Report Highlights Conservation in Paddys Run Watershed Near Fernald Preserve

In June, the Fernald Natural Resource Trustees issued the 2019 Annual Report summarizing progress in protecting lands within the Paddys Run watershed through conservation easements, as part of the Paddys Run Conservation Project (PRCP).

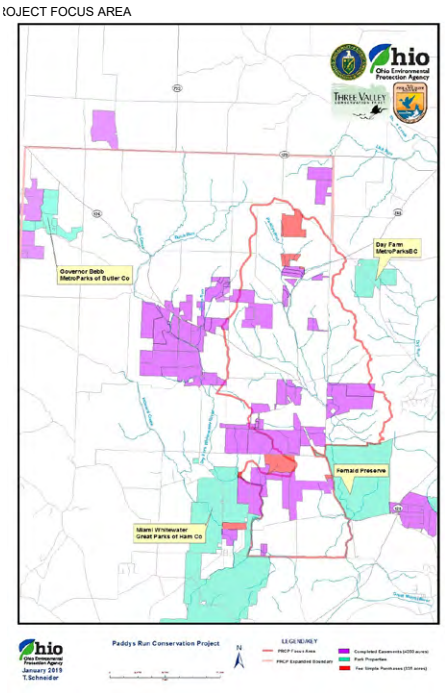


The 2019 Fernald Natural Resource Trustees report details successes of the extensive and ongoing Paddys Run Conservation Project (courtesy of Ohio EPA).

The PRCP was established following the 2008 settlement of a $206 million natural resource damage claim by the state of Ohio as partial compensation for damages to the Great Miami Aquifer from DOE's former uranium processing facility. The facility was located at what is now the Fernald Preserve, Ohio, Site. A $13.75 million settlement fund was created as part of the settlement, and these funds are being used to implement the PRCP.

The Fernald Natural Resource Trustees include the U.S. Department of Energy Office of Legacy Management (LM), the Ohio Environmental Protection Agency (Ohio EPA), and the U.S. Fish and Wildlife Service.

The Natural Resource Trustees partner with a local land conservation organization, Three Valley Conservation Trust, to manage the PRCP. Through 2019, 4,687 acres have been protected via conservation easements. In addition, more than 125 acres of land were converted into the Salamander Run Preserve. The preserve is managed by Metroparks of Butler County, Ohio, and provides excellent public birding and wildlife viewing within its protected forests, grasslands, and wetlands.



Left: Map showing completed conservation easements within the Paddys Run Conservation Project area (courtesy of Ohio EPA). Right: New populations of the state-endangered cave salamander have been recorded near LM's Fernald Preserve site in Ohio.

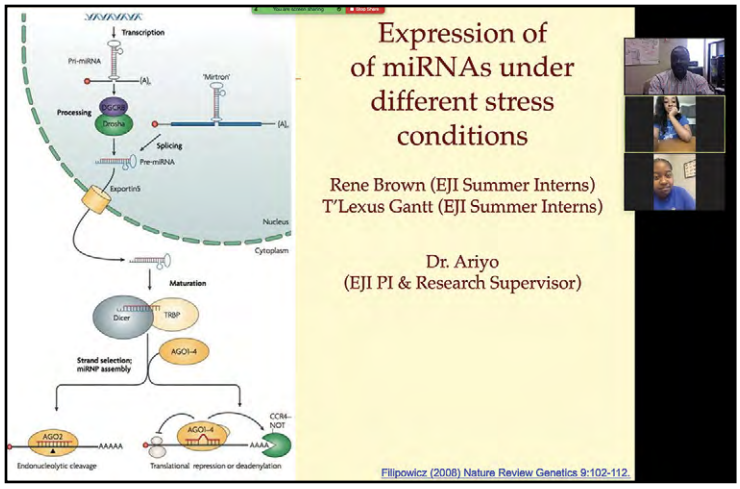
The settlement fund has also been used to conduct reptile and amphibian surveys within PRCP-protected properties in the Paddys Run watershed. The surveys have recorded several new populations of the state-endangered cave salamander near the Fernald Preserve site.

Several additional properties are under consideration for inclusion in the PRCP in 2020, and reptile and amphibian surveys will continue on the protected properties.

The 2019 Annual Report also includes coverage of the Fernald Preserve's receipt of the U.S. EPA's second annual "National Federal Facility Excellence in Site Reuse" award for the National Priorities List category in July of 2019.

The 2019 Annual Report is available here: https://epa.ohio.gov/Portals/30/ffs/docs/doe/fernald/2019NRTAnnualReportFINAL.pdf. ❖

Environmental Justice Activities



Dr. Ariyo mentoring summer interns via Zoom.

Left: Originally from Jamaica, AUEJI summer intern Rene Brown is a junior biology student at Allen University. Right: AUEJI summer intern T'Lexus Gantt is also a junior biology student at Allen University.

Allen University Environmental Justice Institute Summer Research Goes Virtual

Allen University Environmental Justice Institute (AUEJI) embarked on virtual summer research engagement via Zoom due to the ongoing pandemic. Two AUEJI interns were given the opportunity to conduct research on expression of microRNAs in corn under environmental stress conditions from drought and salinity.

AUEJI is a community-sustainable resource center for rural and economically challenged minorities and low-income populations around the U.S. Department of Energy (DOE) Savannah River Site in Aiken, as well as other communities in South Carolina.

T'Lexus Gantt and Rene Brown, both junior biology students at Allen University, were mentored virtually from July to September, due to the ongoing COVID-19 pandemic, by AUEJI principal investigator, Dr. Oluwole Ariyo.

Gantt worked on biogenesis of microRNAs in corn under saline conditions. Brown worked on biogenesis of microRNAs in corn under drought conditions. Data on different microRNAs that were expressed in the model plant, Arabidopsis were generated using a bioinformatic approach.

"It's an eye opener that different microRNAs can be produced under different stress conditions to enable plants to withstand or tolerate stress conditions in the environment," said Gantt.

Student interns will continue their work during the academic session under the mentorship of Dr. Ariyo. These student interns will then serve as mentors to other students in spring of 2021. ❖

Mentorship for Environmental Scholars Program Staying Relevant During Changing Times

The current public health crisis has impacted the education system and its students in ways we have never experienced. Yet, the Mentorship for Environmental Scholars (MES) Program has been able to respond quickly to these changes and take advantage of a unique opportunity to maintain its relevance and expand the program.

The MES Program is a collaborative effort between Pre-College University (PCU) and DOE to increase minority awareness and participation in the environmental sciences disciplines. The MES Program consists of 10-week paid summer internships at one of several participating DOE and national laboratories.

After realizing that summer internships would be greatly affected by the current pandemic, PCU reached out to participating laboratories and sites and arranged virtual experiences for its 15 newly awarded scholars. To complement the virtual research experience, PCU launched an online academy where scholars completed one soft-skills course per week on topics such as resume and cover letter writing, networking, and financial literacy. Scholars also participated in a session that provided an in-depth look at the history of each MES host laboratory.

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Environmental Justice Activities

The result was a new program model that allowed scholars to maximize their summer experience with the DOE while focusing on research and professional development.

This year's MES internship program was special for several reasons. Most notable was the inclusion of students from St. Augustine's University, University of Arkansas at Pine Bluff, Clark Atlanta University, North Carolina (NC) Central University, and Chicago State University, all schools participating for the first time in the program.

Additionally, because of their research experience, two students expressed a desire to continue their research and eventually seek employment with DOE. Leveraging their desire and PCU's "Goal One" of ushering identified undergraduates through the pipeline towards full-time DOE employment, these students will participate in MES's first Academic Year Internship Program. Sierra Generette (NC Agricultural and Technical State University) and Justice Wright (NC A&T), along with graduate student and former MES intern Ki'Ana Speights (American University), will spend 10 weeks this fall developing content for the Environmental Justice Outreach Program, as it transitions to a virtual format. The Academic Year Internship Program will undoubtedly extend the reach of the MES Program and provide greater exposure for its scholars.

Overall, PCU has been steadfast and resourceful in achieving the stated outcomes of the MES Program. The program leadership has successfully created a sustainable model that maintains the program's relevance and cultivates its growth alongside its scholars as they adapt to their new virtual reality. ❖

Teaching Radiation, Energy and Technology Workshop Celebrates 25th Anniversary

DOE Environmental Justice Program Manager Melinda Downing provided opening remarks virtually for the 25th anniversary of the Teaching Radiation, Energy and Technology (TREAT) workshop held in Aiken, South Carolina, August 5-7, 2020.

Each year this workshop is conducted in a hands-on, interactive format that instructs teachers, students, and members of the community about the basics of radiation.

This year presented a challenge due to COVID-19; however, the workshop was conducted in compliance with the Centers for Disease Control and Prevention and the University of South Carolina-Aiken's guidelines for safety during the COVID-19 pandemic. In order to comply with social distancing, participants were capped at 20. Normally, the course would have 25-30 teachers and 10 students/interns participating. This year, a total of 20 teachers participated.

The TREAT workshops are a unique opportunity to partner with the local community and work collaboratively. This year's local community speakers included: Michael Budney, DOE manager of the Savannah River Site (SRS); Kenneth Sajwan, project director for Savannah State University; Sandra Jordan, chancellor of the University of South Carolina-Aiken; and Lessie Price, councilwoman for the city of Aiken. Also attending were representatives from the Superfund and Emergency Management Division, U.S. Environmental Protection Agency, South Carolina Department of Health and Environmental Control,

Right to left: Ki'Ana Speights, a student at American University and a former MES intern, will spend 10 weeks this fall developing content for the Environmental Justice Outreach Program (EJOP) as part of the Academic Year Internship Program. Sierra Generette, a student at North Carolina A&T, is joining the first class of interns in the MES Academic Year Internship Program. Justice Wright, a student at North Carolina A&T, will be one of the first participants in the MES Academic Year Internship Program.

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Environmental Justice Activities

Nuclear Workforce Initiative Program SRS Community Reuse Organization, Radiological Protection Training Savannah River Nuclear Solutions, U.S. Forest Service, and the Imani Group, Inc.

DOE recognized the significance of having meaningful engagement during this difficult time as well as the critical need to continue this crucial learning experience that affords the SRS community an opportunity to be a part of the decision-making process at the site and to better understand the environmental decisions that could potentially impact their community. The TREAT workshop continues to be a significant educational outreach opportunity.

The fall TREAT workshop will be hosted by the city of Aiken October 7-9 at the Lessie B. Price Senior & Youth Center. ❖

TREAT Workshop participants. Standing in last row: Kenneth Sajwan, project director for the Savannah State University; Delisa Carrico, public affairs specialist for the Savannah River Site; and Reverend Brendolyn Jenkins Boseman, executive director of the Imani Group.

GOAL 5

New Employee Bios

Chuck Denton

Chuck Denton has joined the U.S. Department of Energy Office of Legacy Management Defense-Related Uranium Mines (DRUM) Team.

Chuck has 25 years of federal service, including the U.S. Navy. He previously worked for the Bureau of Land Management, U.S. Forest Service, and the National Park Service (NPS). He has project and program management experience, as well as supervision and management experience. He most recently served as the program manager for the NPS Pacific Region Abandoned Mine Lands Program.

Chuck graduated from the University of Nebraska and the University of Nevada, Reno. He earned a Master of Science in hydrology.

Nicole Olin

Nicole Olin has joined the U.S. Department of Energy (DOE) Office of Legacy Management (LM) Asset Management Team and will be supporting environmental planning and National Environmental Policy Act document management activities.

Nicole has over 15 years of environmental site characterization, remediation, waste management, and compliance experience as a DOE contractor supporting the Nevada National Security Site and LM. Nicole has a Bachelor of Science in geoscience from the University of Pittsburgh and a Master of Science in geology from the University of Nevada Las Vegas.

She enjoys spending time exploring the Colorado mountains with her husband and dogs, as well as hiking, cycling, and traveling.

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New Employee Bios

Mike Rozycki

Mike Rozycki is the newest member of the U.S. Department of Energy (DOE) Office of Legacy Management (LM) Archives and Information Management Team.

Mike was born in Fairfax County, Virginia, and graduated from Strayer University with a Bachelor of Science degree in computer networking. He later continued studies at West Virginia University, earning a master's degree in software engineering. He also obtained a chief information security officer certificate from Carnegie Melon University.

Mike's federal career started with his position as the Cybersecurity program manager and supervisor at DOE's National Energy Technology Laboratory (NETL). He also served as the authorizing official's designated representative and technical contracting officer's representative for nearly two years before coming to LM as an IT specialist. Mike's prior experience includes time as a contractor for both NETL and LM and more than a decade in telecommunications working as a project/program manager for Sprint, Nextel, Verizon, and cable and wireless.

Mary Young

Mary Young has joined the U.S. Department of Energy Office of Legacy Management (LM) as a physical scientist with the Uranium Mine Team in the Defense-Related Uranium Mines (DRUM) Program.

Mary was born in Arkansas, raised in Tennessee, and moved to Colorado as a young adult. She graduated from Colorado Mesa University with a Bachelor of Science degree in biology, with an ecology concentration. She is currently working toward a master's degree in natural resource stewardship/ecological restoration through Colorado State University.

The assignment with the Uranium Mine Team is her first federal position, but she is very familiar with the DRUM Program. She started as a field team ecologist for the LM Strategic Partner, Navarro Research and Engineering, Inc., with the kickoff of the DRUM Program in 2017. Her previous leadership and management skills quickly elevated her to the position of a field team lead, where she honed her project management, planning, organization, and communications skills. ❖

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