Nevada National Security Site

ONE VOICE

Winter 2016

A Publication for the
Nevada Enterprise (NvE) Complex

65th Anniversary Edition

NEVADA NATIONAL SECURITY SITE 65 YEAR ANNIVERSARY 1950 - 2015

This "Survival Town" house, some 7,500 feet from a 29-kiloton nuclear detonation, remained essentially intact. Survival Town consisted of houses, office buildings, fallout shelters, power systems, communications equipment, a radio broadcasting station, and trailer homes. The town was built for a Civil Defense exercise and to test items not previously subjected to a nuclear blast. The test, called Apple II, was fired on May 5, 1955. See p.6 for more on "Apple II."

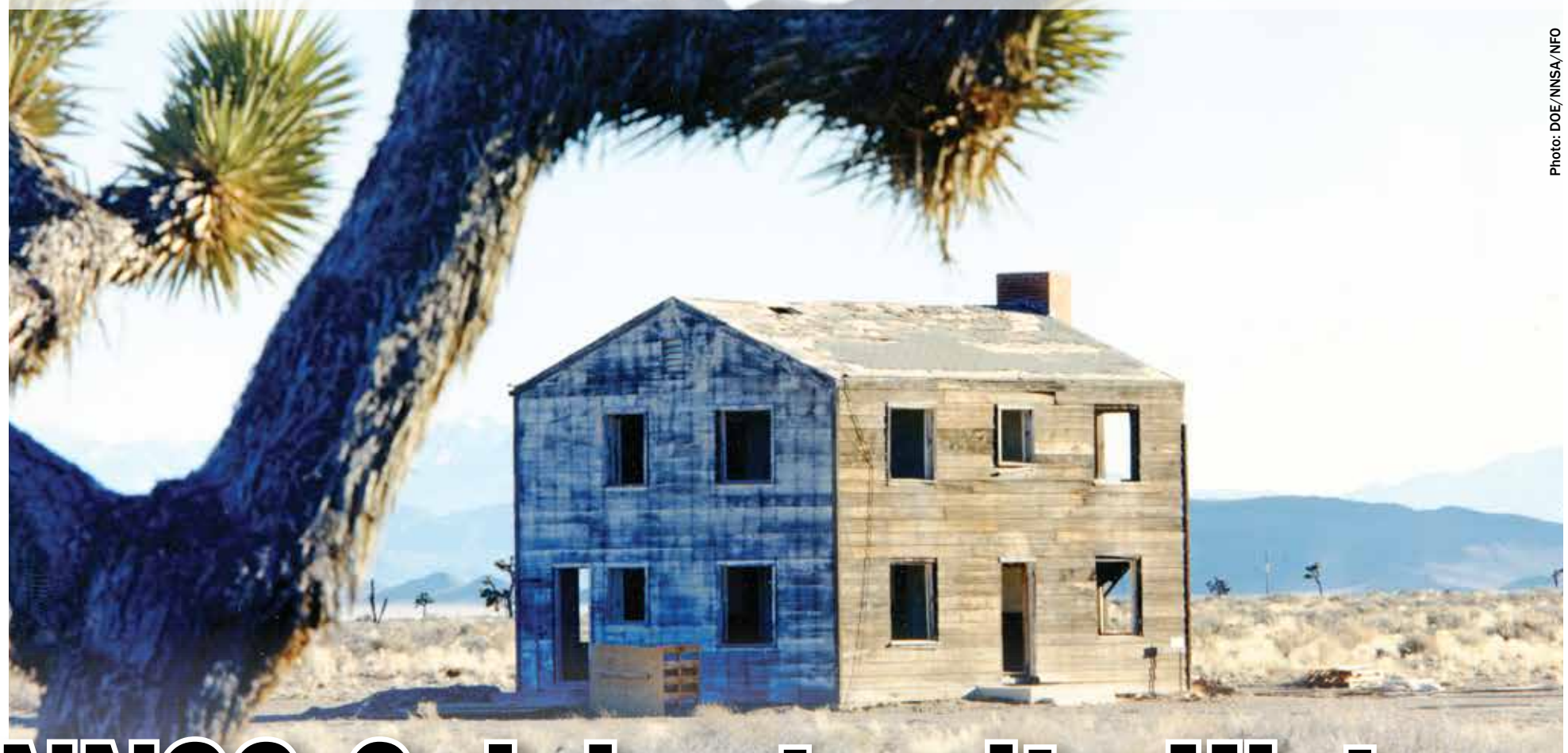


Photo: DOE/NNSA/NFO

NNSS Celebrates its History

"The release of atomic energy has not created a new problem. It has merely made more urgent the necessity of solving an existing one." – Albert Einstein

At a Sept. 26, 2015 Reynolds Electrical and Engineering Co. (REECo) reunion, held at the National Atomic Testing Museum (NATM) in Las Vegas, Nev., current and former employees reminisced about "back in the day" at the Nevada National Security Site (NNSS), then known as the Nevada Test Site (NTS). To them, their work was more of a mission: maintaining world peace and national strength through the Site's nuclear weapons testing programs.

"Back in the day" is a common refrain, spoken with affection and a bit of wistfulness.

Back in the day, says NNSS alumnus Ernie Williams in a video at the reunion, "There was a 'can do' attitude. Everybody wanted to contribute. . . They wanted to do something for the United States of America, and they were proud to do it."

In interviews with *OneVoice*, other alumni still marvel over the camaraderie: Back in the day, everybody – the federal agencies, the craft, the national laboratories, the contractors – committed themselves to supporting 928 nuclear tests and the auxiliary processes and projects, before and after detonations. No request or duty was too great. The feeling of being part of something important proudly remains with them to this day.

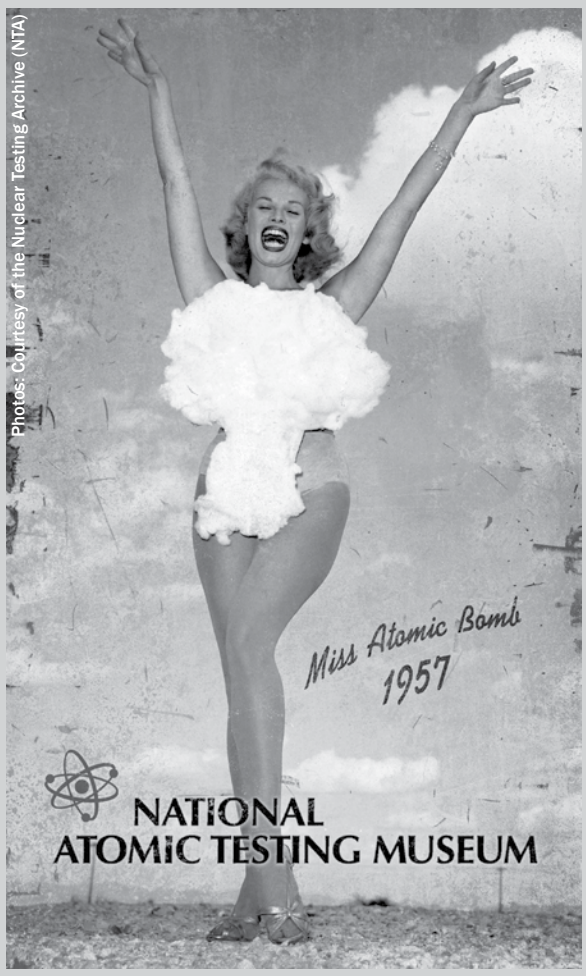
Site alumnus and National Security Technologies (NSTec) employee Elizabeth Kirkwood put it another way: "After being in a post-event accident in 1984 that ended my career as a radiation monitor, I was interviewed by the press on how I felt about being injured. I said that I had two nephews, and that if working at the Site and being injured kept them out of having to go to war, I was more than willing to have made the sacrifice. Nuclear weapons are the ultimate 'big stick,' and our work made sure the world knew we could wield it."

OneVoice dedicates this 65th Anniversary issue to the courageous men and women, and the nuclear projects that changed the course of national – and global – defense history. Not all of the important projects and programs can be listed here, the accomplishments are many. This commemorative issue illustrates what we accomplished "back in the day" and some of those who made it possible.

SPECIAL SOUVENIR EDITION

Las Vegas: Having a Blast!

Many Las Vegas showgirls during the 1950s modeled as Miss Atomic Blast or Miss Atomic Bomb. But Copa Room showgirl Lee Merlin, posing here in a cotton mushroom-cloud bikini, is deemed the last and most iconic Miss Atomic Bomb. This photo coincided with Operation Plumbbob.



Photos: Courtesy of the Nuclear Testing Archive (NTA)

Besides gambling and the allure of Bugsy Siegel and the Mob, Las Vegas was also famous as the epicenter of American atomic power. City residents and visitors felt the ground shake, heard their windows rattle (and sometimes shatter), and saw the mushroom clouds and brilliant blasts in the night sky. In 1962, tests were moved from the air to underground, due to the Limited Test Ban Treaty signed in Moscow on Aug. 5, 1963. This montage photo (before PhotoShop) imagines downtown Las Vegas during the testing years.

Photo: NNSS Archive

How did they Create those Test Names?

From the beginning of the Atomic Age, starting with Trinity – the world's first atomic test – code names were assigned to nuclear tests. Wartime secrecy made this necessary for military operations. Similarly, the actual nuclear weapon or device was classified, as well as anything that remotely described it. That made it necessary for scientists and test planners to assign the tests' innocuous code words or nicknames.

Early tests used the military phonetic alphabet (Able, Baker, Charlie, etc.), which preceded the more commonly known codes today (Alpha, Bravo, Charlie, Delta, etc.). With more tests taking place, more imaginative names were used. Female names first appeared in 1953 with Operation Upshot-Knothole: Annie, Nancy, Ruth, Dixie, etc. Later, tests appeared to be named after rivers, mountains, famous scientists, small mammals, New Mexico counties and towns, fish, birds, vehicles, cocktails, automobiles, trees, cheeses, wines, fabrics, tools, nautical terms, colors and so forth.

Although the list of names or the kinds of topics that were selected by the Los Alamos and Livermore test organizations may seem whimsical, there was a formal procedure by which the labs submitted code names.

Even nuclear project names that seemed "safe" sometimes faced objections, such as golfing terms – being that there were avid golfers on Capitol Hill. Associating the pleasure of golf with nuclear weapons was frowned upon.

After in-house screenings for inappropriate or previously used or rejected names, the new names were submitted to the DOE's Office of Military Applications in Washington, D.C. There, further screening and coordination with the DOE and other government agencies took place. Ultimately, an approved, and perhaps modified, list was returned to the labs. The names were then available for the labs' use.

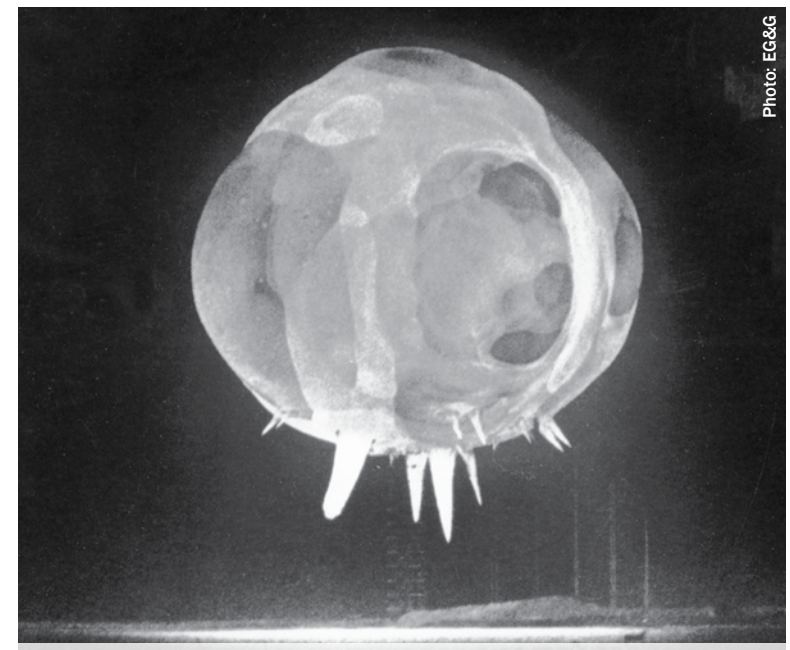


Photo: EG&G

A test from Operation Tumbler-Snapper. Shot by a Rapatronic camera built by EG&G, this photo shows the early stage of a nuclear fireball.

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National Nuclear Security Administration

How the NNSS Emerged and Evolved

As the NNSS celebrates 65 years of serving the nation's national security interests, it is important to look back on the origins of one of the most unique sites in the National Nuclear Security Administration (NNSA) complex.

The U.S. nuclear arms race began with the Manhattan Project in 1941. Before then, the threat of nuclear weapons being developed elsewhere arose during World War II in Europe. The ascendancy of fascism, particularly warnings from scientists fleeing Nazi Germany, aroused fears of the Germans designing their own nuclear weapons program. Hence began a determined effort by the U.S. and Great Britain to build their own devices.

From this came the Manhattan Project, whose weapons development was located at Los Alamos Laboratory in New Mexico. Uranium enrichment was done at the Clinton Engineer Works in Oak Ridge, Tenn. Plutonium in nuclear reactors was produced at Hanford Engineer Works in Hanford, Wash. In Alamogordo, N.M., "Trinity" launched the official beginning of atmospheric nuclear testing on July 16, 1945. Expanding further, the U.S. conducted nuclear tests in the Bikini and Enewetak Atolls in the Pacific Ocean, from June 1946 through 1948. However, such tests in the Pacific became costly, time-consuming and logistically difficult. Because of the communist insurgency in Korea – and the emerging Cold War with the Soviet Union – the U.S. federal government had to review better options for testing on the continent.

The Armed Forces Special Weapons Project conducted a top-secret feasibility study, code-named Nutmeg, to identify the best location for a test site. Conclusion: the arid Southwest. The federal Atomic Energy Commission (AEC) reviewed a list of five site possibilities, and selected what later became the Nevada Proving Grounds, predecessor to the NTS. The AEC made the final selection because the Site was already under government control, was large and remote, had little annual rainfall as well as low population density, and would be easy to protect against trespassers.

On Dec. 18, 1950, President Truman signed an order establishing the Nevada Proving Grounds as the nation's on-continent nuclear weapons testing area. After its approval, the first atmospheric test shot, called "Able," was conducted Jan. 27, 1951. Part of the Operation Ranger series, "Able" was a one-kiloton device dropped from an Air Force plane at Frenchman Flat, detonating 1,060 feet above surface.

The Operation Ranger series consisted of five detonations ranging from one to 22 kilotons. (All five devices were dropped from B-50 bombers that flew out of Kirtland Air Force Base in Albuquerque, N.M.). "Able" was the fourth atomic device to be air-dropped (after Operation Crossroads' "Able" in the Pacific.) The first two were combat drops over Japan in 1945: Hiroshima on Aug. 5 and Nagasaki on Aug. 9.

Following the Ranger Series, the AEC initiated plans to expand the Site's facilities. Construction began on utility and operational structures, including communications, a control point and additional accommodations. Mercury was established as the Site's base camp. It was turned into a tiny city of as many as 10,000 people in the heyday of nuclear testing. The Desert Rock airstrip was built to accommodate air travel.

As a safety measure, the AEC eventually decided to move the testing area further from Mercury, from Frenchman Flat to Yucca Flat. Here, 12 areas were developed for air drops, tower, surface, tunnel and balloon tests. A total of 100 atmospheric tests and 828 underground tests were conducted. This continued until a 1992 moratorium effectively ended the nuclear testing program in the United States.

Photo: Courtesy of NTA

Operation Crossroads' "Baker" on the Bikini Atoll July 25, 1946.

History of . . .

The Nevada Operations Office (NVOO)

The Nevada Proving Grounds was first administered by the AEC Albuquerque Operations Office. Tests were conducted in series. Employees were sent to Nevada and housed at Camp Mercury. When the tests were completed, they returned to Albuquerque. As testing became more frequent during the 1960s, the AEC created the Nevada Operations Office (NVOO). The office officially opened on March 6, 1962, and has administered the NNSS since then, today as the Nevada Field Office (NFO).

Testing Agencies

After the development and use of the atomic bomb in 1945, the U.S. created the AEC in 1947 as the agency for controlling nuclear materials and developing nuclear weapons. There were five AEC commissioners and a relatively small number of employees at its headquarters and field offices.

In 1975, the AEC was replaced with two agencies: the Energy Research and Development Administration (ERDA) and the Nuclear Regulatory Commission (NRC). ERDA administered the nuclear weapons program and carried out energy research and development programs. The NRC regulated civilian nuclear materials and licensed nuclear power plants. There were approximately 8,000 ERDA employees, including the NVOO staff.

ERDA was abolished on Oct. 1, 1977, and the U.S. Department of Energy (DOE) was created to take over ERDA's functions plus energy functions from other federal agencies. Stronger emphasis was placed on energy conservation and alternative energy sources, such as solar, geothermal and wind power.

"News Nob" Famous Vantage Point for Newsmen

In the 1950s, the atomic testing program was both feared and revered by the general public. The broadcasts and stories of newsmen who visited and witnessed tests at the NNSS kept the fascination alive.

A craggy knoll of rock just across from the Control Point (CP)-1, "News Nob" has its own place in NNSS history. On April 22, 1952, it was established as a good point for news reporters, photographers and cameramen to watch and film the air drop and detonation of "Charlie," a 31-kiloton atmospheric test at Yucca Flat, part of Operation Tumbler-Snapper.

The original sign naming the rocky outcrop "News Nob" was a weather-beaten board with a door knob attached from an old outdoor privy. The name "News Nob" was painted in yellow. Later the board was replaced with a more conventional sign, which still stands today. Although the main area is cordoned off, visitors can still see benches where the reporters sat.

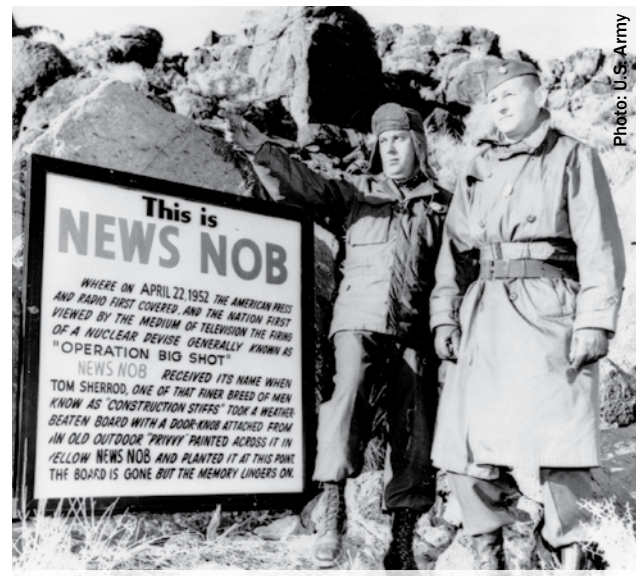


Photo: U.S. Army

Two soldiers look toward Yucca Flat from News Nob.


Photo: REECo

What the press saw from News Nob. Newsmen averted their eyes while shutters remained open to capture the tremendous power of a nuclear explosion at Yucca Flat.

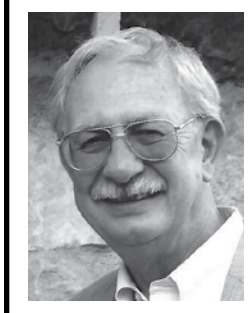
Reporters witnessing shots from the vantage point included such famous national newsmen as Bob Considine from the *New York Times* and Walter Cronkite of "CBS News," who had broadcasted from this spot. Since then, hundreds of reporters, photographers and cameramen worldwide have visited "News Nob" and other sites during their tours.

While no records exist on the number of journalists who have visited the NNSS, it would not be exaggerating to say that during the atmospheric testing days, it was one of the most photographed and heavily reported areas in the world.

CHRIS WEST

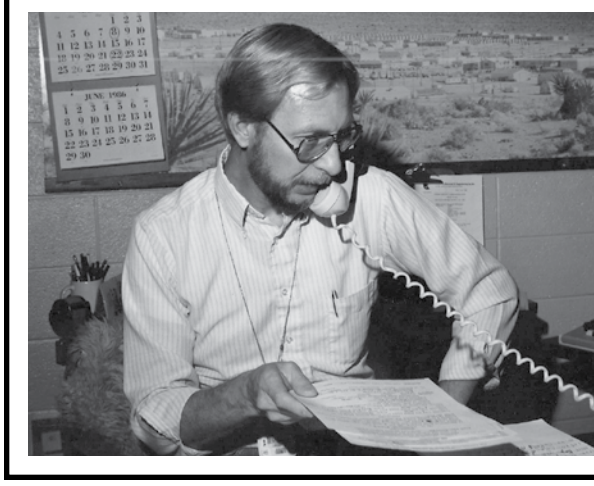
(1970 – 1972; 1981 – 1994)

Titles: From Junior Public Information Officer to Director of External Affairs to Communications Manager
Worked for: AEC Nevada Operations Office; NVOO; DOE



From his vantage point in Public Affairs, Chris says his department "helped put out numerous news media fires during my career." These included a Park Service aircraft that crashed in 1970 into Lake Mead, killing an AEC commissioner, his aide, and a REECo contractor; the infamous Baneberry detonation at the Site, one month after the plane crash; the crash and burning of a DOE helicopter that killed an EG&G pilot and co-pilot, along with three security guards on board during a routine nighttime patrol of the boundaries of the Site; the crash of a Soviet MIG fighter aircraft at the Site that was used in simulated war games on the Nellis Air Force Range ("the local news media were alerted to 'a possible nuclear accident,' and our phones lit up like crazy," says Chris) and other incidences.

And then there was the 1988 Joint Verification Experiment (JVE), in which the DOE hosted a team of Soviet scientists at the Site to observe and monitor the Kearsarge underground nuclear test. "Once again, the intense news media and public interest kept the DOE Public Affairs team hopping for several weeks," says Chris.



Acronyms in This Issue

AEC	Atomic Energy Commission	JVE	Joint Verification Experiment	NNSA	National Nuclear Security Administration
				NNSS	Nevada National Security Site
CP-1	Control Point One	LANL	Los Alamos National Laboratory	NRC	Nuclear Regulatory Commission
		LAO	Los Alamos Operations	NRDS	Nuclear Rocket Development Station
DNA	Defense Nuclear Agency (later the Defense Threat Reduction Agency)	LLNL	Lawrence Livermore National Laboratory	NSTec	National Security Technologies
		LO	Livermore Operations	NTA	Nuclear Testing Archive
DoD	Department of Defense			NTS	Nevada Test Site
DOE	Department of Energy	MAD	Maintenance Assembly/Disassembly building	NVOO	Nevada Operations Office
EG&G	Edgerton, Germeshausen, and Grier, Inc.			REECo	Reynolds Electrical and Engineering Co.
EM	Environmental Management	NERVA	Nuclear Engine for Rocket Vehicle Application	RSL	Remote Sensing Laboratory
FCDA	Federal Civil Defense Administration	NEST	Nuclear Emergency Support Team		
FFACO	Federal Facility Agreement and Consent Order	NFO	Nevada Field Office		

Gateway to the NNSS: Camp Desert Rock and the Desert Rock Airstrip

Beginning in 1951, thousands of military personnel from all four U.S. military services received orders to serve with the U.S. Army's Atomic Maneuver Battalion working at Camp Desert Rock at the NNSS, where the Desert Rock Airstrip is now located. The 7,500-foot runway serves aircraft needing to access the NNSS.

It is difficult to imagine that in the 1950s, the Site hosted a bustling military camp full of young soldiers, marines, sailors and airmen who witnessed the heat and blast of the ultimate "doomsday" weapon - the atomic bomb.


Photo: U.S. Army

The military camp was activated in the fall of 1951 for the Buster-Jangle Series conducted on Yucca Flat. Thousands of troop observers from all parts of the country were deployed to Camp Desert Rock to witness the atomic detonations. After the explosions, some were marched or bused even closer to ground zero to see the effects of these explosions on military equipment before returning to Camp Desert Rock.

The task of establishing Camp Desert Rock was assigned to the 231st Engineer Combat Battalion, who arrived in Las Vegas on Sept. 14, 1951, from Fort Lewis, Wash. They would eventually construct a camp full of 100 semi-permanent buildings and more than 500 tents to house the 6,000 troops of the U.S. Sixth Army and Presidio of San Francisco, Calif.

Photo: U.S. Army

A soldier stands next to the camp sign.

Military officials declared the maneuvers at the NNSS invaluable for training and orienting the troops to use essential personnel and equipment protection measures. The exercises also provided experience with nuclear weapons and ground forces under simulated atomic combat conditions.

Martha DeMarre: One Finger on the Pulse of NNSS History

If there is anything you need to know about the history of nuclear testing or the NNSS, Martha DeMarre is the first person you'll want to call.

As manager of the Nuclear Testing Archive (NTA) for NSTec, Martha manages more than 386,000 historical documents associated with nuclear testing and has 37 years' experience in her career.

Born in Wisconsin, Martha began her secondary education at Stony Brook University of New York. She finished her education with a degree in biology and minor in cell-physiology at San Diego State University in California.

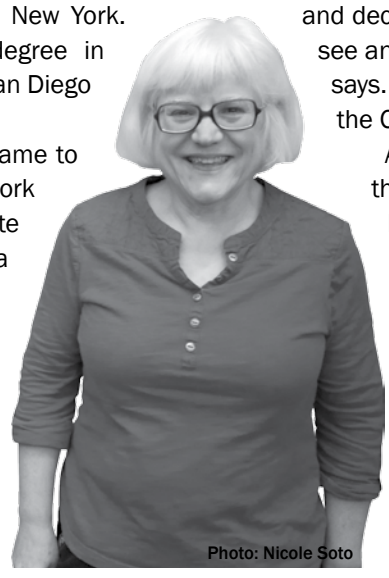


Photo: Nicole Soto

While in graduate school, Martha came to Nevada in 1978 for the summer to work at the NNSS. "I fell in love with the Site and all the work there. It was basically a scientific Disneyland," she says.

After returning to school in the fall, she returned to the Site in the spring of 1979 to work for a new project called the Coordination Information Center, later known as the NTA. DeMarre has been the NTA manager since 1989, leading a small staff that provides information to the public and interested parties regarding the history of testing.

"I'm very proud that we provide information that, in the past, people had to wait a long time and submit a request to get. Here, they can just call and get the information very rapidly. They can also do their own searches on [the DOE's] OpenNet, a database of hundreds of thousands references and documents, and decide which documents they really want to see and find the information for them," Martha says. All of NTA's documents are available on the OpenNet system.

Along with documents associated with the U.S. nuclear testing program, she also helps NTA provide exposure reports for past and current employees as well as veterans who participated in the testing. The NTA has reports dating back to 1945.

Martha says she values the idea of openness that her job entails. "With government open records, we take that concept to heart when we work very closely with the public and interested parties to make sure they get exactly what they requested," she says.

Besides her lengthy tenure with the Site and the NTA, Martha recalls "back in the day."

"Early on in NTA history, we were responsible for not only collecting documents associated with nuclear testing but also with soil samplings in the western United States," she says. She and her staff visited various towns along remote desert locations to collect soil samples. She was able to visit areas she would not have otherwise.

When asked about how all her work will continue in the future, Martha says, "The collection itself has been given a permanent designation by the national archives, so the collection will live on."

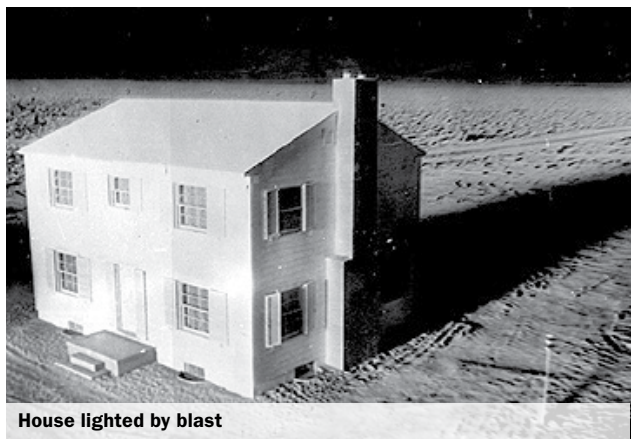
As for finding a replacement for her when she finally decides to retire, Martha says that everybody on her small staff does a specific part of the job.

Reflecting on her time at the Site, "I have a unique situation where I grew up with the love of history and love of science. This is where both come together in this one place. It's a very rare occurrence to have those two things together," she says.

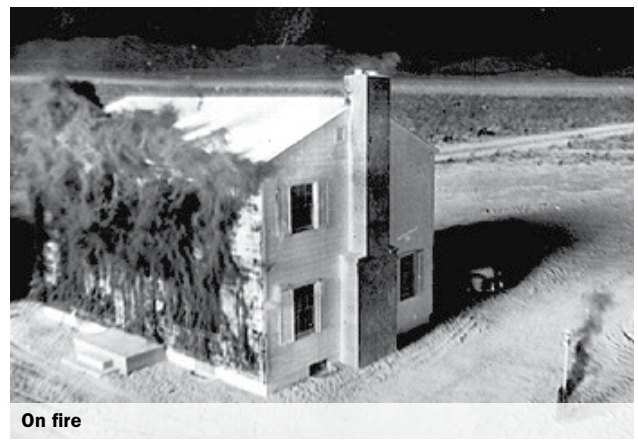
Atomic Bomb Destroys Typical American Neighborhood

May we never see the day when the world reads this headline. However, beginning in 1953, scientists set up such a neighborhood to evaluate the effectiveness of a series of nuclear tests.

Operation Upshot-Knothole: "Annie"



House lighted by blast



On fire

Photos: EG&G

House disintegrates and blows up.

No test series ever conducted at the NNSS was perhaps more famous than the "Operation Upshot-Knothole" tests conducted from 1953-1955 – in part because it was televised. On March 17, 1953, in Area 3, a 16-kiloton shot called "Annie" demolished a two-frame, two-story house that was 3,500 feet from ground zero. The first story disintegrated, and the badly damaged second story crashed into the remains of the first story. The second house, further away at 7,500 feet from ground zero, was badly damaged inside; windows and doors were broken, and exterior walls were slightly damaged.

Operation Teapot: "Apple II"

Photo: LANL

These mannequins, depicting a typical 1950s American family, were placed in simulated shelters, located in one of the houses built in Yucca Flat for the "Apple II" test. The FCDA's Civil Effect Test Group assessed the possible impacts of nuclear detonations on civilian populations.

Then on May 5, 1955, a 29-kiloton device named "Apple II" (one of the Operation Teapot series) was detonated from a 500-foot tower on Yucca Flat.

Both "Annie" and "Apple II" were part of an extensive series of televised civil effects tests conducted by the Federal Civil Defense Administration (FCDA). They were designed to evaluate the effects of nuclear detonations on civilian communities and to test the emergency response capabilities of civil defense organizations.

Along with the houses and mannequins, the FCDA constructed "a typical American community" complete with utility stations, automobiles, furniture and appliances. The houses were constructed of different materials with varied exteriors, and were heavily instrumented. Fresh food was flown in from San Francisco and Chicago and placed with the mannequins in kitchens and dining rooms.

Today, only the shells of two houses remain, one of brick and one wood frame building. All other structures were destroyed by the explosive force of the test. They are popular stops on the NNSS tours.

Photo: FCDA

Apple II house.

Operation Plumbbob: The Site's Most Comprehensive Program

Conducted from May 28 to Oct. 7, 1957, Operation Plumbbob, which included five safety experiments, was the longest and most comprehensive series of nuclear tests on the continental U.S. The purpose of Plumbbob was to ensure that no nuclear reaction would occur if the high explosive components of the device were accidentally detonated during storage or transport. Conducted by the U.S. military, its 29 nuclear tests included improving tactical weapons design, conducting bio-medical experiments, safety testing, and component and design testing for thermonuclear systems to be detonated in future operations.

All sorts of detonation strategies were used – blimps, towers, an underground shaft and tunnels, and a high-altitude rocket. Here are some examples.

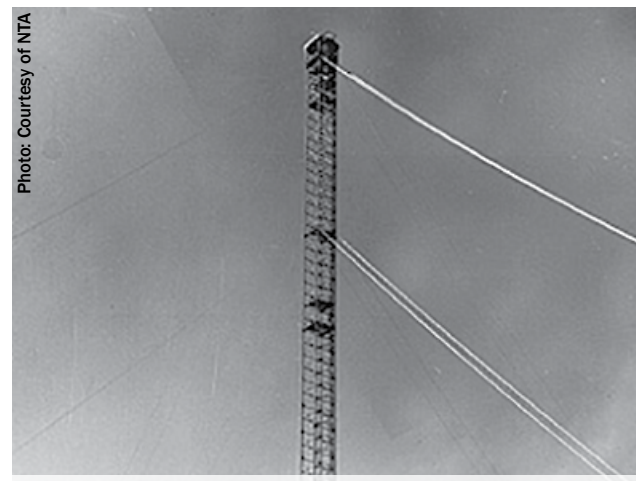


Photo: Courtesy of NTA

The 44-kiloton test, code-named "Smoky," was fired from this 700-foot tower.


Photo: REECo

Balloons were used as test platforms at the Site during the 1950s. The first use of a balloon was "Lassen," a 0.5-ton test on June 5, 1957. These tests were useful as devices could be detonated above ground at varying altitudes based on the desired results. This determined the feasibility of using balloons as captive detonation platforms.


Photo: Courtesy of NTA

The shockwave from Plumbbob's "Stokes" collapsed this U.S. Navy blimp, in temporary free flight approximately five miles from ground zero. The tail, or after-section of the blimp, is shown with the Stokes cloud in the background. On ground to the left are remains of the blimp's forward section. The unmanned ship was used in military effect experiments.

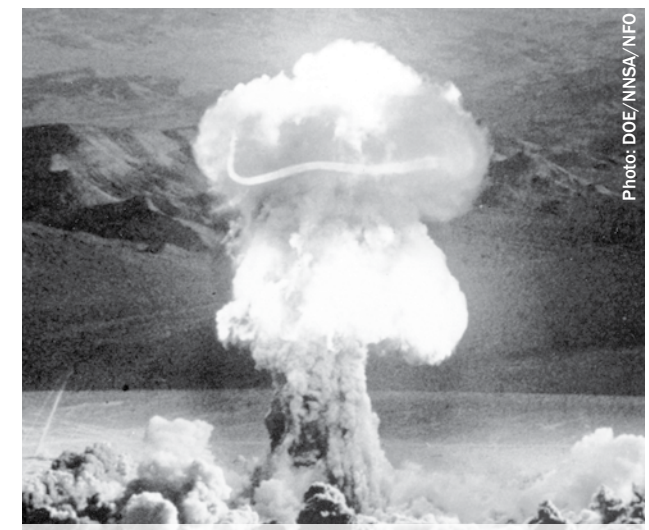


Photo: DOE/NNSA/NFO

"Priscilla," a 37-kiloton test, detonated from a balloon 700 feet above Frenchman Flat. "Priscilla" did considerable damage to – or completely destroyed – the structures built there, including aluminum and reinforced concrete domes, a bridge and a bank vault.

Frenchman Flat

Between Jan. 27, 1951 and March 25, 1968, 14 atmospheric tests and five underground tests were detonated at Frenchman Flat. The 123-square-mile dry lake bed is one of three major closed desert valley basins at the NNSS, the others being Yucca Flats and Jackass Flats.

From 1953 to 1958, reinforced structures were exposed to nuclear blasts. Among the items included in the tests were French- and German-designed shelters, a Mosler safe, a railroad bridge, Butler buildings (hangers), a man-made pine tree forest planted in concrete blocks, railroad rolling stock, tanks and other items of military equipment.

Since 1982, more than 100,000 visitors have toured Frenchman Flat to view the historic structures and twisted ruins which stand as a stark testimonial to the awesome power of the atom.

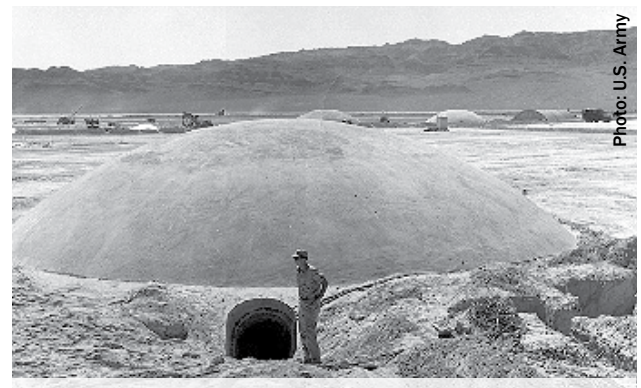


Photo: U.S. Army

Before: The FCDA constructed three 50-feet diameter domes on Frenchman Flat. The domes ranged from six inches to two feet.

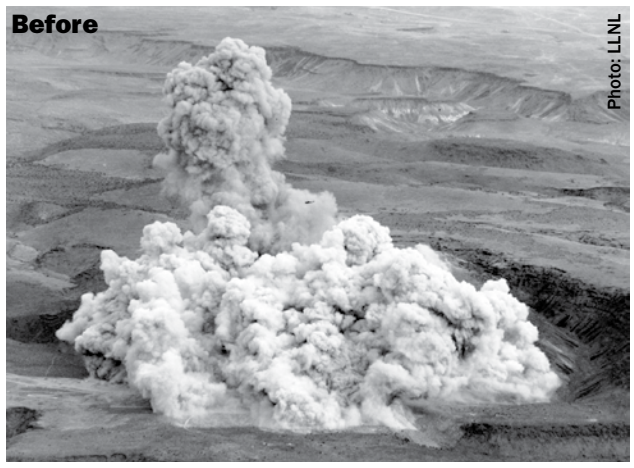

Photo: Office of External Affairs/NV

After: The twisted remains of the domes' concrete and rebar are the only parts remaining – a testament to the destructive power of the "Priscilla" test.

"Firsts" and Other Significant Tests

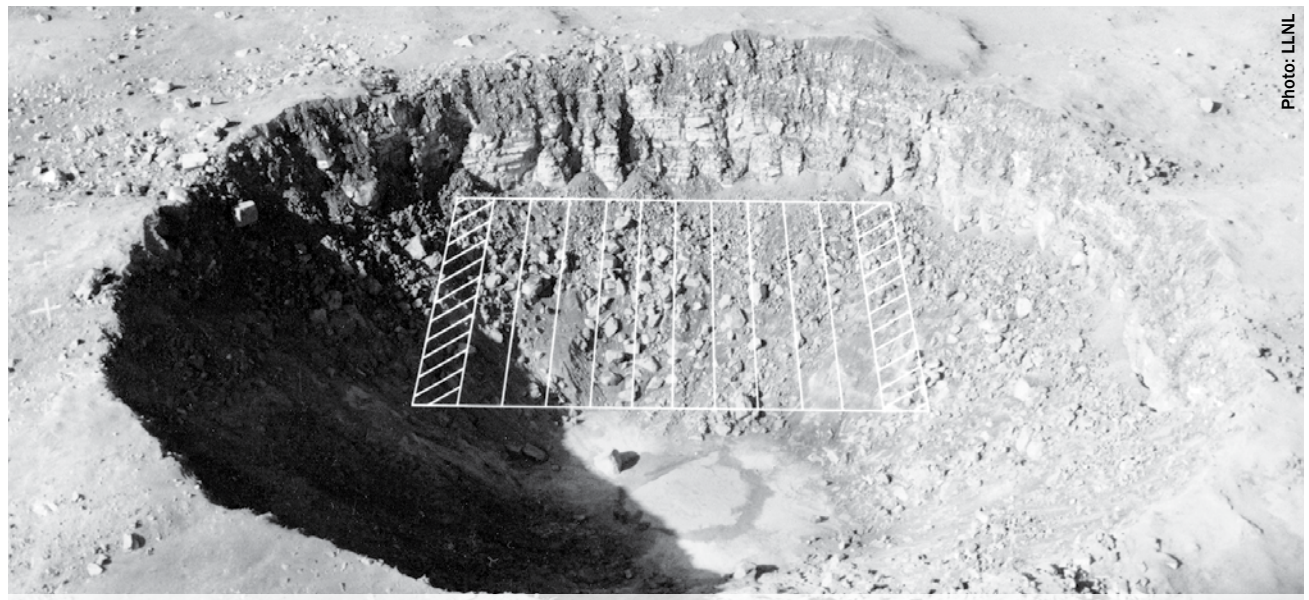
Plowshare Program – Designed for Peaceful Purposes

The AEC conducted the nuclear excavation experiment "Sedan" on July 6, 1962. The detonation was part of the Plowshare Program to develop peaceful uses for nuclear explosives. Sedan was the second in the Plowshare series, following "Gnome" (detonated Dec. 10, 1961 near Carlsbad, N.M.). Sedan was a 104-kiloton nuclear device detonated 635 feet underground. The purpose was to develop the technology to use nuclear energy for earth-moving projects. Sedan displaced about 12 million tons of earth, creating a crater 1,280 feet in diameter and 320 feet deep.



"Buggy" was the first nuclear row-charge experiment in the Plowshare Program. The experiment on March 12, 1968, consisted of simultaneous detonation of five 1.1-kiloton charges.

Sedan Crater



The results of "Schooner" show its massive size in comparison to a football field. Conducted in isolated Area 20 on Dec. 8, 1963, "Schooner" was designed to study the effects and phenomenology of cratering, or excavation, in hard rock. The results created a crater 852 feet in diameter and 208 feet deep.

Artillery Guns

Operation Upshot-Knothole: A 280-mm cannon fires a 15-kiloton nuclear shell on Frenchman Flat. The test was "Grable" on May 25, 1953, the only time a nuclear artillery shell was ever fired. It was witnessed by many members of Congress.

Largest Atmospheric Test

The largest atmospheric test was the 74-kiloton "Hood," fired in 1957 at Yucca Flat from a balloon at an altitude of 1,500 feet.

MX Missile Tests

The NNSS was selected for several Air Force Peacekeeper (MX) research and testing experiments from 1978 to 1982. The projects required the construction of numerous towers, roads, tunnels and other equipment (see graphic, right). The first of five MX launches was conducted in January 1982 in front of 60 distinguished guests. A 71-foot-long, 92-inch diameter, 195,000-pound missile, without propellants, was thrust more than 300 feet into the air and down into a large pit.

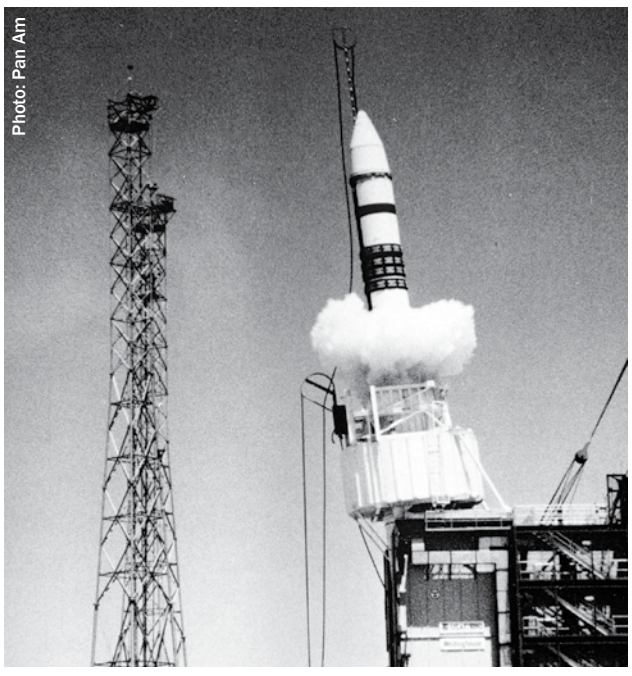


Photo: Pan Am

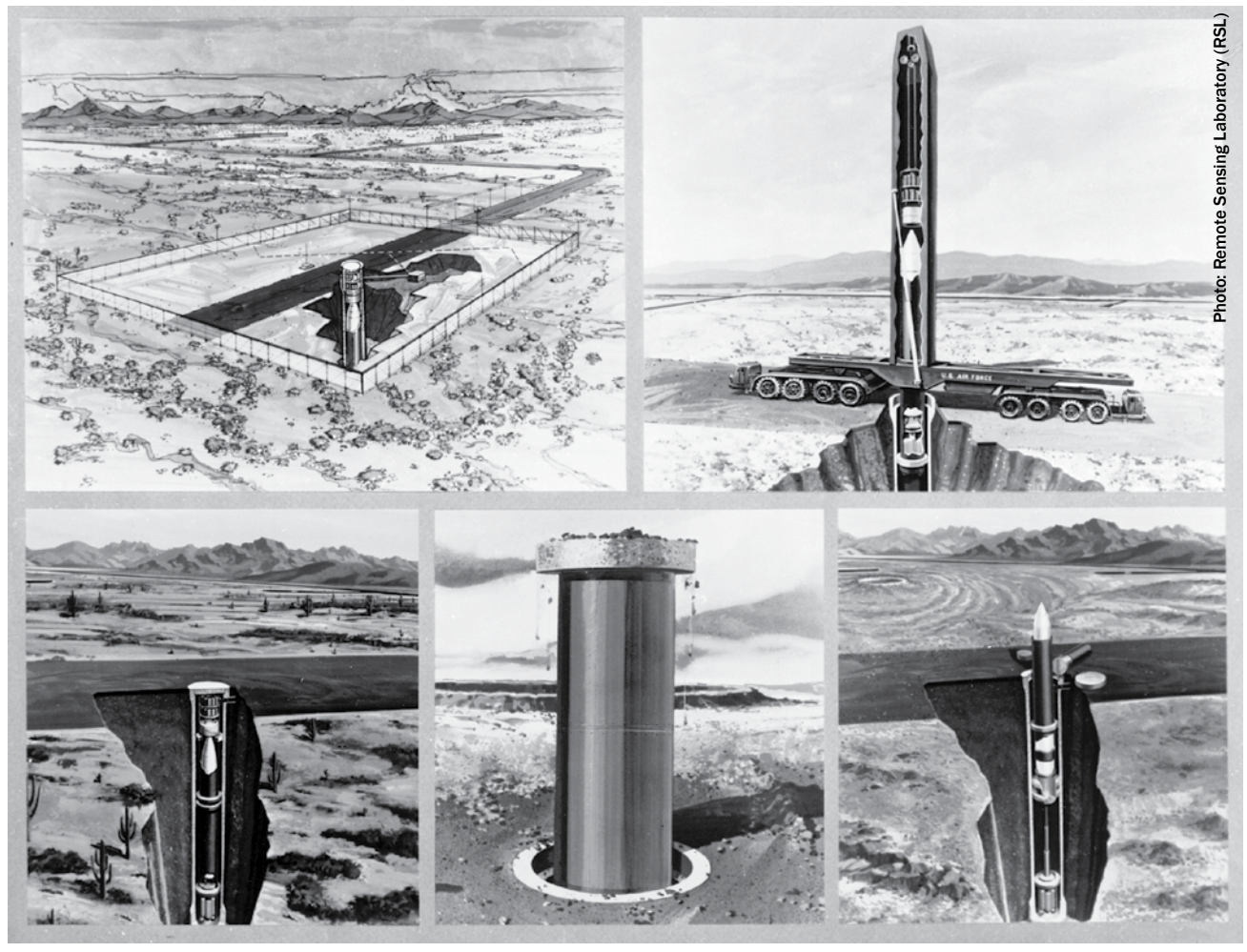


Photo: Remote Sensing Laboratory (RSL)

First and Last Underground Tests

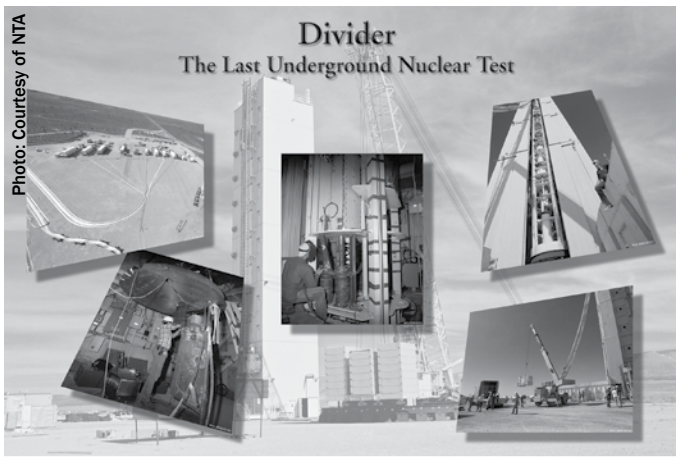


Photo: Courtesy of NTA

This collage illustrates the close of the underground testing era; the last test, "Divider," was conducted Sept. 23, 1992.

Last Atmospheric Test


Photo: Courtesy of NTA

"Little Feller I" conducted July 17, 1962 in Area 18.

The "Baneberry" Controversy


Photo: LLNL

On Dec. 19, 1970, the "Baneberry" underground nuclear test unexpectedly released radioactivity into the atmosphere. "Baneberry," with a yield of 10 kilotons, was buried about 900 feet beneath the surface at Yucca Flat. The venting resulted in establishing present-day containment practices and significant changes to test procedures, which prevented any further venting through the life of underground testing at the Site.

Nuclear Rocket Development Program: Its Future was in the Stars

As scientists currently look to nuclear energy as an option to send a manned mission to the far reaches of Mars, the NNSS actually saw progress in the concept as early as 1958.

The idea to use atomic energy to propel a rocket for interplanetary travel originated in 1906 when American space pioneer Robert Goddard, a college sophomore, wrote a paper on the use of atomic energy. The concept moved from theory to reality in the mid-1950s when the United States launched a nuclear rocket program called Project Rover.

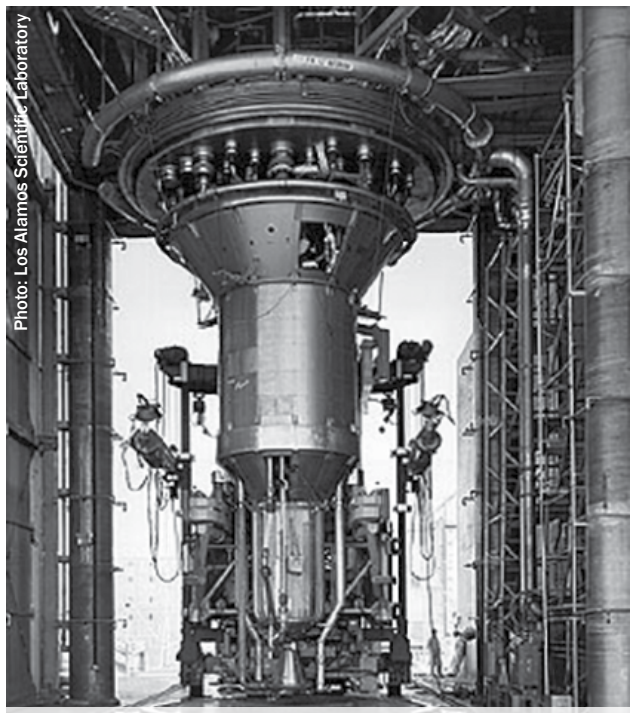


Photo: Los Alamos Scientific Laboratory

Close-up view of an engine and reactor in Engine Test Stand-1 at the Nuclear Rocket Development Station. The two technicians on the right provide scale.

A nuclear reactor and test engines were located in the southwest corner of the NNSS. The AEC and NASA Space Nuclear Propulsion Office jointly administered the test area, later called the Nuclear Rocket Development Station (NRDS) in Area 25.

More than $140 million was spent between 1958 to 1971 on facility construction and equipment. NRDS consisted of three test stands: A, C and ETS-1 (Engine Test Stand-1). The complex also included R-MAD (Reactor Maintenance, Assembly and Disassembly), E-MAD (Engine Maintenance, Assembly and Disassembly), a control point/technical operations complex, an administrative area and a radioactive material storage area.

The three test cell areas were connected by road and railroad to the R-MAD and E-MAD buildings. Typically, a reactor or engine was assembled in one of these buildings, then transported to a test cell by the Jackass and Western Railroad.

Project Rover employed a workforce of 1,800 representing government and industry. A total of 13 research reactors and six NERVA (Nuclear Engine for Rocket Vehicle Application) reactors/nuclear engines were assembled, disassembled and tested at the NRDS. The project gained so much momentum that President Kennedy paid a visit to the Site on Dec. 8, 1962, to see it.

The Rover Program proved that a nuclear reactor can be used to heat liquid hydrogen for spacecraft propulsion. The nuclear reactor used in the Rover Program was a hydrogen-cooled, solid-core reactor employing enriched uranium-235 as nuclear fuel. Research reactors developed to demonstrate the basics of nuclear rocket reactor technology were known as the Kiwi, Phoebus and Pewee Series. The reactors were designed to study high-temperature fuels and long-life fuel elements. The Rover Program also included NERVA.

In 1963, the in-flight test program was cancelled. Based on the test results, designs were begun for a nuclear rocket using a high-power, high-thrust NERVA engine and a low-power, low-thrust, small engine. In 1969, however, the Saturn V launch vehicle program was cancelled as a result of a decision to abandon human exploration of Mars that had been planned as a follow-on to the Apollo lunar landings.

The decision eventually resulted in the termination of the Rover Program in 1973. The Rover Program developed to the point of in-flight engine development and testing without any technical barriers, resulting in the successful test of a nuclear rocket.

Much of the Rover Program is still relevant today, given the advances in computers and materials technologies, and the quest by researchers to again find ways to transport humans across space.

DICK MINGUS

(1957 – 1993)

Titles: From Security Guard to Security Sergeant to Field Operations Coordinator
Worked for: Federal Services, Inc.; Wackenhut Services, Inc.; LLNL

Besides his security duties, Dick had the privilege of escorting the White House press from President Kennedy's administration during the president's visit to the Site. He also assisted in protecting the president. "Dealing with the White House press was a really big authority. I couldn't have asked for anything better," he says.

Dick details his day with them: "I went to Indian Springs to pick up the White House press from Air Force One. We all boarded the bus back to the Site, for NRDS (Nuclear Rocket Development Station) in Area 25. When I got there, President Kennedy was already in the MAD (Maintenance Assembly/ Disassembly) building. I had the authority to go into the classified area and take those people where they needed to go. Two trailers were set up with phones so the White House press could report back to their office with news about the president's visit.

"My assignment was to assist the security force for the president's protection until he got into the presidential convoy, about three to four vehicles. Wherever the president was, we followed him right along. When we were finished with that group, we returned to the helicopter pad that would take the president back to Air Force One. I was invited to accompany the press corps and the president to go to California – that was his next stop – but I declined because I had to work. I don't know why they invited me – maybe as a way to thank me. I didn't have authority in California. But if I had to do it over again, I would have surrendered my gun and my uniform and gone with them to California."

Photo: LANL

Dick Mingus (right) in his security officer uniform watches as President Kennedy exits the MAD building.

Experimental Farm Helped DOE Test Livestock and Crops


Photo: Johnson Controls

"Big Sam" was the most famous of the Herefords beef cattle kept at the EPA farm. In this photo, a scientist takes samples from Big Sam's stomach through a "fistula."

For 15 years, the U.S. Environmental Protection Agency (EPA) managed a unique, 36-acre experimental farm for the DOE and its predecessor agencies.

Operations at the farm in Area 15 began in 1964 when the EPA was contracted to conduct research to determine if radioactive materials (radionuclides) found in the environment were being transported to humans. At the time, a major concern was the transport of radioiodine through the soil-forage-cow-milk food chain.

Construction began when the land was cleared of desert growth, a 5,400-foot water well was rehabilitated, a one-million-gallon reservoir was built, and the first crops were planted, mainly alfalfa. During the next two years, dairy facilities were added, consisting of several large open paddocks, individual shaded stalls, and a combination milking barn/main laboratory building.

During the farm's existence, extensive plant and soil studies evaluated the uptake of pollutants in locally grown vegetables and in forage grown as feed for the dairy herd of 25 to 30 Holstein cows. Scientists also evaluated horses, pigs, goats and chickens.

Researchers with the EPA's laboratory in Las Vegas performed experiments on the cows and their milk to determine how quickly radionuclides disappeared from the milk, and the proportion of radioactivity ingested or injected which showed up in the milk or in certain animal tissues. The resulting information was used to develop reliable human exposure/dose assessment models which would predict the potential hazard to humans. The next step was to develop countermeasures which could reduce the quantity of radionuclides entering the human food chain.

In addition, scientists gained more insight into the complex behavior of radioactive materials, such as tritium, plutonium and other pollutants found in the environment, and their effect on plants and animals.


Photo: REECo

Ken Case, aka the "Atomic Cowboy," was a REECo radiological safety monitor. Formerly a wrangler in Montana, he wrangled the herd at the EPA farm. In the early 1960s, his job title was changed to herdsman. He left REECo in 1964. His responsibility was transferred to the Public Health Service Southwest Radiological Health Laboratory, which studied the herd for many years. In this photo, Ken is holding the "AEC Brand" which branded the cattle.

When the farm closed in 1981, most of the steers and dairy cows were transferred to the University of Nevada, Reno, and the horses to the Nevada Department of Fish and Game.

Today, nothing remains of the farm, except for the cleared 16-acre site that was used to grow crops. These crops were harvested as green chop or as hay for the livestock during the April to October growing season.


Photo: Courtesy of NTA

A worker measures radioactivity on bales of hay at the Site.

Profiles of Site Workers: Then and Now

During the REECo reunion at the NATM, these three NNSS veterans – Richard Wyman, Al Macintosh and Ernie Williams – shared on video what it was like working at the Site "back in the day," and their impressions now.

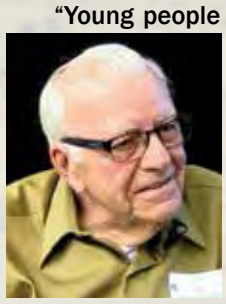
Other Site workers – of yesterday and today – told *OneVoice* about their experiences and memories when the Site thrived during its peak. The years in parenthesis denote their employment at the Site.

Richard Wyman
(1961 – 1969)

Richard, who worked at the Site during the Cuban Missile Crisis Oct. 16-28, 1962, mentioned that the U.S. began underground testing because the Russians were testing atmospherically. "I feel it was important to generate [weapons] to defend against atomic warfare. Better to do it there [at the Site] than in a war."

Al Macintosh
(1964 – 1995)

"Young people don't understand what the Cold War was about. One of the things that would bring them back to reality is, if they were close enough to a blast and received some of the radiation, their cell phones would be worthless. No communication. All of their vehicles would not run. There would be no means of communication.



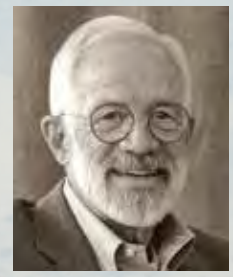
"I think we played a very large part in winning the Cold War because of the sheer magnitude of our work and the weapons we had. We were at that time the largest producer of nuclear weapons than anybody in the free world."

Ernie Williams
(1955 – Present)

Ernie believes that the Russians were concerned about the U.S.' role in winning the Cold War. "When Khrushchev went to Cuba, and I talked to his son Sergei, he said, "My dad told me, 'You don't challenge the United States because you'll never win.'

"The kids today have no idea how much we helped prevent World War III. Even some of the adults in their 50s have no idea. To me that's shocking. I believe the Site played 40 percent success of our winning the Cold War. That's my gut feeling."

John Hopkins
(1968 – 1989)
Titles: From Experimental Physicist to Los Alamos Weapons Program Leader
Worked for: Los Alamos Scientific Laboratory; LANL



Of all projects he worked on at the Site, John says the most significant one was the Los Alamos shot, Rickey. "A Pahute Mesa shot was a very important weapons program experiment because it used advanced nuclear weapons technology and new cutting-edge diagnostics. Rickey [a test in the Crosstie Operation series] had a yield in the range of 20 to 200 kilotons and was fired on June 15, 1968. It impressed me because it was very important and complicated, and, as expected, it worked beautifully."

Elizabeth Kirkwood
(1982 – 1989 and 1990 – Present)
Titles: From Radiation Monitor to Senior Administrative Specialist
Worked for: REECo; Bechtel Nevada; NSTec (current)

During the era of atmospheric and underground testing, Elizabeth was responsible for enforcing radiation safety measures and environmental monitoring at various work sites. As an environmental analyst, she supported litigation against DOE from former Site employees. Her stint as an Environmental Safety and Health training coordinator was short-lived: When she was pregnant, her morning sickness worsened by riding the bus to the Site. "REECo found a technical writing job for me to do back in town and I ended up staying at the new job," she says.

Elizabeth Kirkwood (left) signing tunnel workers into a "hot" zone.

Elizabeth harkens back to her first job, though, as being her most important because it was intense. "Radiation safety was considered a big deal during the testing period, so there were lots of high-importance jobs to do. But helping remove the potentially contaminated experiments from a line-of-site pipe in N Tunnel after a nuclear test is one job I remember distinctly. I was informed by a security guard to be careful what I did with my hands – if I had a device that flashed a green light, he had orders to shoot me! I never knew if he was serious or not, but he said it in such a dead-pan way I wasn't taking any chances."

Cirilo "Carlos" Gonzales
(1979 – Present)
Titles: From Radiation Safety Technician to Waste Management Specialist to Senior Scientist
Worked for: REECo; Bechtel Nevada; NSTec (current)

Carlos began in Radioactive Material Control at the Site providing radiological support to LLNL, then helped support the nuclear testing program. Thereafter, his expertise took him to radioactive waste management, where he inspected and received radiological waste shipments at the Area 5 Radioactive Waste Management Site. His experience expanded into oversight of the Site's lagoons and landfills, then as Environmental, Safety & Health support at the Defense Threat Reduction Agency's site characterization projects. Today, Carlos manages a permitted hazardous waste storage facility at the NNSS.

One lasting memory of his work at the Site included his first underground nuclear test and being part of the flight crew. "The first experience was scary yet exciting: watching the desert surface rise up, seeing the wave of displaced air coming at me, feeling the wind from that, watching the bouncing wave of the desert floor coming at me, then buckling my knees to keep from falling as the earth shook all around me. As part of the flight crew, I rode helicopters that flew over and around various 'ground zero' locations before and after the tests, surveying the air for radiation that may have vented from the tests."

Chuck Costa
(1962 – Present)
Titles: From Radiation Specialist to Off-Site Safety Advisor to the DOE Test Controller
Worked for: U.S. Public Health Service; U.S. Environmental Protection Agency; LANL; NSTec

Chuck says that the most important project he worked on during his time at the Site was the subcritical experiment, Krakatau. He was the Los Alamos test director for the United Kingdom/LANL experiment, where he "was

responsible for the multi-million dollar test and for taking it from cradle to grave." He worked with an event team from the UK and LANL to assure that the experiment was a major success.

One of Chuck's many lasting memories pertains to the controversial Baneberry underground test conducted in December 1970. He was the off-site field coordinator in CP-1. Baneberry was supposed to be a contained underground nuclear test, however, dynamic venting, or the uncontrolled release of radioactive material, unexpectedly released into the atmosphere through a fissure a few hundred feet away from the Baneberry emplacement hole. "This massive prompt dynamic venting lasted for the most part until the hole collapsed. At the time, I was excited to watch it in action. The off-site team had worked through the Christmas holidays during this test."

Jay H. Norman
(1973 – 2008)
Titles: From Test Division Leader and Test Program Manager to Field Office Manager
Worked for: LANL; NVOO; NNSA

During his 35 years with atomic testing programs at the Site, Jay has held significant positions that contributed to the success of our national security, including NNSS deputy manager.

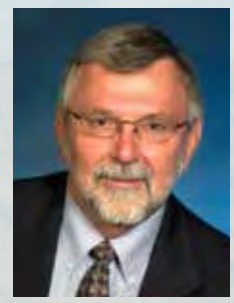
Of all his positions, Jay says his most satisfying responsibility involved coordinating with the DOE/NNSA, the national labs, the NVOO and the field organizations in test planning and logistics, as well as participating in 70 tests. "The overarching thing at the NNSS that was both fascinating and exciting was bringing the labs together in the testing work. The underground tests provided focus for the entire complex by recording and analyzing data used for stockpile certification which was a critical component of our national security posture."

Ronald Cosimi
(1965 – 1998)
Titles: From Field Test Engineer to Deputy Group Leader to Test Director
Worked for: Los Alamos Scientific Laboratory; LANL

Ron's first experience at the Site was to design and field the equipment and racks used in the underground nuclear test program from 1965 to 1988. During those years, he participated in more than 60 events at Los Alamos, N.M. and at the Site. Later for LANL, Ron was responsible for conducting nuclear tests and other experiments at the Site. After the end of underground nuclear testing, he initiated the subcritical experiment program at the Site in 1992 (the subcritical experiments themselves did not start until 1995).

Ron says that the most important project he worked on was the Junction test in Area 19. "I was the test director for this underground test, and the USSR was onsite to monitor the test as permitted by the Threshold Test Ban Treaty. Working with the Russian scientists was an experience that could not have been predicted five years earlier. Many preconceived notions about their program and society were utterly destroyed, and I viewed the exchange as the first steps in bringing together former antagonists."

Bob Kuckuck
(1963 – 1991)
Titles: From Experimental Physicist to DOE Science Advisor
Worked for: LLNL; DOE



Bob recalls the 1980s during the height of the Cold War, when President Ronald Reagan announced the Strategic Defense Initiative ("Star Wars"). This envisioned a nuclear bomb-pumped-X-ray laser that LLNL was attempting to develop that would destroy Russian intercontinental ballistic missiles in space. "Our activities at that time became considerably more intense and pressure-laden. Those tests stand out as some of our most incredible scientific achievements at the NTS. Each test that we fielded included underground X-ray measurement laboratories that were superior to most university physics departments. Those efforts were strongly focused on 'winning' the Cold War," he says.

John Gamby
(1980 – Present)
Titles: From Firefighter to Deputy Fire Chief
Worked for: REECo; Bechtel Nevada; NSTec (current)

John says that, while he was the fire prevention captain during the underground testing days, his job was to install specialized portable Halon fire extinguishing systems in shot towers, diagnostic trailers and tunnels to protect the experiment equipment.

However, after the testing program concluded in September 1992, John says he got "an eerie feeling driving over CP Hill at night, not seeing the lights from the shot towers and drill rigs. I had a variety of emotions. However, I was ready to take the next step in transitioning into the new mission for the Site."

Bruce W. Church
(1969 – 1995)
Titles: From Health Physicist to Assistant Manager for Environment, Safety, Security & Health
Worked for: U.S. Public Health Service; DOE/NVOO

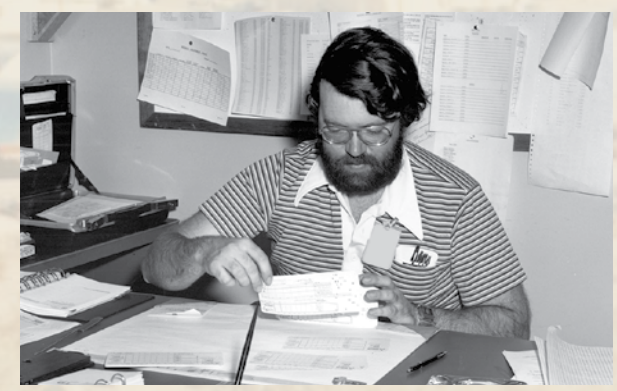
After 50 years in the radiological health field, particularly in environmental safety and low-level waste programs, Bruce has witnessed much patriotism for – and antagonism against – our drive for national security using nuclear weapons.

Bruce says that the most important work he did for the Site was "defending the DOE/NVOO against the accusations that the testing and low-level waste management activities were harming the offsite public. The defense of the NVOO involved preparing for and appearing as a witness in front of Congress, appearing at media events and before the public, defending the DOE and Nevada in lawsuits and instituting programs/projects to investigate and inform the public of Site's programs to protect the public." This has prompted him to continue trying to dissuade the general population against fearing radiation, a difficult task he continues to realize.

Nelson Cochrane
(1969 – Present)
Titles: Several managerial positions
Worked for: EG&G; Lockheed Martin; NSTec (current)

Nelson says he was impressed by three important projects he worked on at the Site: the underground nuclear weapons tests ("the experiments' complexities, coordinating them and the teamwork involved," he says), developing one of the oscilloscopes used in recording data, and the HOLOG [holographic] subcritical experiment.

With the oscilloscope, "I was project manager on developing and building the last oscilloscope designed and developed to use in data recording during underground tests. This was the first new oscilloscope that had been designed in 15 years and it incorporated digital technology." Nelson was also a project manager for LLNL's first subcritical experiment, called HOLOG. "It's unique because we had never done an experiment like that, so we were designing and working very closely with the labs and construction in U1a on realizing its design. We weren't measuring nuclear properties, but material properties, such as, how does material change form under extreme temperature (millions of degrees of centigrade) and pressure (millions of pounds)?"



He noted that not everyone was cut out for working at the Site. "We were very careful in hiring people. We really wanted to ensure that people would enjoy this work. A lot of people have worked here for many years because of the excitement and wide variety of the work. The amount of trust placed in us was impressive."

NNSS Veteran Contributed to the Evolution of Modern-Day Cellular Communications

For 65 years, innovation has been a part of our Nevada Enterprise culture. Today, more than 6 billion people use a technology born from the innovation of one former NNSS employee: Charles A. Gladden. Cellular technology – allowing our signals to move with us without interruption as we go about our daily lives – sprung from Nuclear Emergency Support Team (NEST) communication challenges. Gladden, a retired EG&G RSL and NEST communications guru, solved those challenges, kicking off the evolution of cellular communications.


Photo: Dona Merritt

Charles A. Gladden, retired in 1996 after contributing to the NNSS for 25 years.

Most people today focus on the device in their hand. But the real "magic" is how your voice and data can travel tens, hundreds, even thousands of miles on an isolated signal. Today, many of us may take this technology for granted, not realizing that this is possible because Gladden had the idea in the late 1970s to introduce microprocessors into the design of repeater towers.

Translated into layman's terms, this is how Gladden's original design works: microprocessors (computerized brains) hand off frequencies between radios and radio-relay stations, such as the cellular towers we see around town today. This allows for an automatic change in frequency to avoid interference (no overlapping calls) and maintain an open signal (you and the person you called remain on the line) – all of which occurs seamlessly without notice.

Gladden, along with the support of Martin H. Parelman, patented the design in US 4152647, *Rapidly Deployable Emergency Communication System*. The patent was granted in May 1979 without any challenges, just after it was put to practical use during the Three Mile Island emergency response. It was during this response that Gladden's system provided the reactor and the Nuclear Regulatory Commission's critical communication and data links after a farmer ran a backhoe through the local land line.

Gladden and Parelman's patent has since been referenced by 47 U.S. patents (60 world-wide), including the digital cellular system in use today.

By his own admission, Gladden wasn't seeking to facilitate the way mankind communicates across the world. He was focused on adapting emergency communications efficiently and quickly – an important task considering the urgency of NEST missions. While only one dollar was paid to Gladden for his patent assigned to the U.S. government, he smiles when talking about how his work has evolved. And Gladden views the achievement in the same unassuming manner that underlies his successful approach to work. "Like most things in life, developing the technology was made possible by a dream and faith it could be accomplished," he says.

Contributing to Gladden's development of the communications system was the experience and knowledge he acquired in the military and supporting underground nuclear testing. After serving nine years in the U.S. Army as a radar technician, he joined EG&G in 1965 at the NNSS. His communications expertise eventually led him to join RSL, where he contributed extensively to the DOE and other missions until his retirement in 1996.

Like many Cold War Heroes, Charles Gladden's contributions continue to impact our lives today.

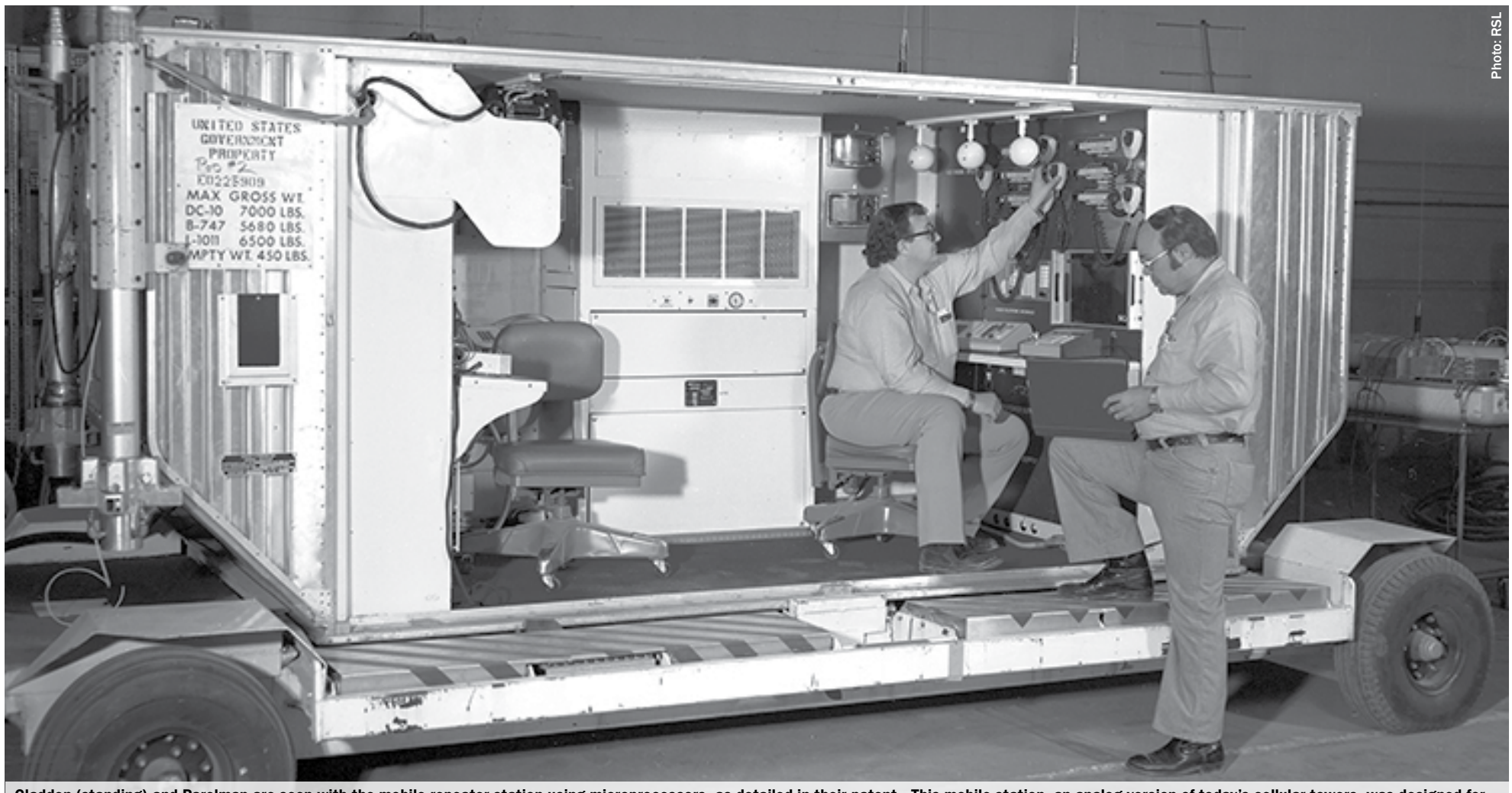


Photo: RSL

Gladden (standing) and Parelman are seen with the mobile repeater station using microprocessors, as detailed in their patent. This mobile station, an analog version of today's cellular towers, was designed for NEST deployment via aircraft (circa 1980).

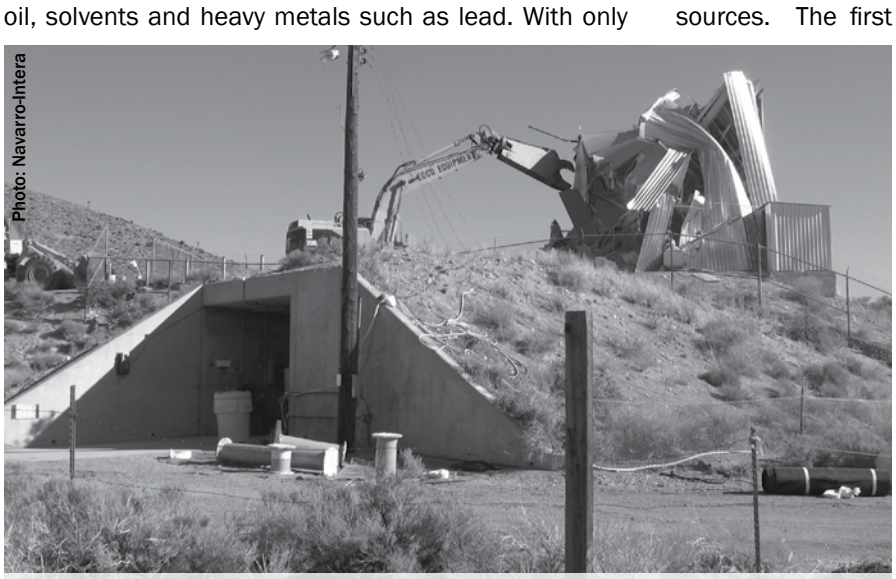
Environmental Management: Past, Present and Future

For more than two decades, the Environmental Management (EM) Program has made it a top priority to safely, effectively and responsibly complete environmental cleanup, planning and monitoring at the NNSS.

Aerial photo of low-level waste disposal cells at the Area 3 Radioactive Waste Management Site, circa 1998.

Created by the DOE in 1989, the EM Program was tasked to characterize, and in some cases remove, contaminated surface and shallow subsurface soil and facilities at the NNSS. To do this, EM staff worked closely with the State of Nevada to develop cleanup and closure approaches for more than 2,000 contaminated sites identified in the Federal Facility Agreement and Consent Order (FFACO), a legally binding agreement. The FFACO governs the process for identifying, characterizing and providing corrective actions for these sites, which includes buildings, drains and sumps, septic tanks and soil, where contaminants included radioactive materials, oil, solvents and heavy metals such as lead. With only 35 contaminated surface sites remaining, these EM Program achievements are a testament to a successful and transparent working relationship with Nevada.

In addition to surface contamination, the FFACO also provides for the characterization of NNSS groundwater to explore the nature and extent of contamination caused by 828 underground nuclear tests conducted from 1951 to 1992. Though the EM Program was not formally established until 1989, efforts have been ongoing since the 1970s to better understand the complex subsurface environment and radionuclide migration under the NNSS. The drilling and sampling of wells, analysis of samples, data interpretation, development of three-dimensional computer models to represent the subsurface, and continued monitoring of wells are all being conducted to develop a long-term monitoring program for the protection of offsite public water sources. The first major milestone toward achieving this goal is the Frenchman Flat closure plan, which is anticipated to be approved by the State of Nevada in early 2016.



Decontamination and decommissioning activities at the Super Kukla Facility where hydraulic shears were used to demolish the High Bay, circa 2007.

EM Program accomplishments also extend to the safe and responsible management of low-level radioactive waste. Since 1961, the NNSS radioactive waste disposal facilities have played a vital role in the cleanup of the DOE Complex across the country – providing a remote, secure and safe solution for the permanent disposal of low-level/mixed low-level and classified waste.

Following strict requirements in collaboration with the State of Nevada Division of Environmental Protection and the U.S. Department of Transportation, more than 46 million cubic feet of radioactive waste has been safely transported and permanently disposed to date. This disposed volume of waste is approximately equal to filling a football field 80 stories high.

While the historic nuclear research and testing between 1951 and 1992 gets the spotlight, the EM Program has been, and continues to be, a very important chapter in the history of the NNSS.

JOE JOHNSTON

(1986 – Present)

Titles: From Radiation Control Technician to Strategic Initiatives Manager
Worked for: REECo; Raytheon Services Nevada; Bechtel Nevada; Shaw Environmental & Infrastructure, Inc.; Battelle Memorial Institute/ Stoller-Navarro Joint Venture; Navarro-Intera, LLC; Navarro Research and Engineering, Inc. (current)

When it comes to environmental management, particularly the radioactivity associated with nuclear tests, Joe Johnston is an expert. He can tell you about the extensive environmental impact statements (EIS) he contributed to, for both the NNSS and national-level waste management programmatic EIS. The national-level EIS resulted in designating the NNSS as a regional disposal location for low-level radioactive waste. Disposal capabilities at the Site "have become critical national assets" for low-level, mixed and classified waste/material disposals. He can regale you with stories on how interacting with high-level people from various organizations were "somewhat intimidating" when he first started working at the Site.

Joe can also tell you that supporting underground nuclear tests was something he will never forget. "At times the various jobs I had were boring, terrifying, brutally hot, severely cold, and just plain enjoyable." Probably his most memorable assignment, though, was flying in the Aerial Reconnaissance Team (ART) helicopters that supported nuclear tests. "To witness the surface shockwave from an underground nuclear detonation was unforgettable. The pilots on the ART were an exceptional group of people. I am honored to have known and worked with this team," he says.

1957 and Beyond: Nuclear Testing Moves Underground at the NNSS

Atmospheric testing ceased for good at the NNSS in 1963. Nuclear testing moved underground as a result of the Limited Test Ban Treaty, signed by President Kennedy in Moscow on Aug. 5, 1963. Moving nuclear testing underground, however, proved to have significant challenges.

Between 1957 and 1992, 828 underground nuclear tests were conducted in specially drilled vertical holes, vertical shafts and horizontal tunnels at the Site. Most vertical shaft tests assisted in the development of new weapon systems. Horizontal tunnel tests occurred to evaluate the effects (radiation, ground shock) of various weapons on military hardware and systems.

When "big hole" drilling began, the biggest problem was the length of time it took to drill into the desert floor. A 36-inch diameter hole at a depth of 1,000 feet could take up to 60 days to complete due to a slow penetration rate, porous terrain and the need for straight line-of-sight holes.

The holes needed to accommodate underground test packages that ranged from six feet to 12 feet in diameter, larger than any of the holes previously drilled at the Site. Contractors worked with the drilling industry to design new equipment and employ different techniques for drilling large diameter holes faster and more efficiently.

On Aug. 10, 1957, "Saturn," a low-yield safety experiment, was detonated in C-tunnel. Following "Saturn," tests were conducted in 16 different tunnels in Rainier Mesa at the Site. The first underground tests of nuclear explosives designed to be contained were the Pascal-A and Pascal-B tests, part of the Operation Plumbbob series also conducted in 1957.

Underground testing often left visible evidence on the surface in the form of subsidence craters, in varying dimensions. Subsidence craters are depressions on the surface that occur when the roof of the blast cavity collapses into the void left by the explosion. The size of the subsidence crater depends on the yield of the device, the depth of emplacement, and the geological characteristics of the surrounding soil. Today, there are numerous craters across the NNSS visible to the eye, including the oft-visited Sedan Crater.

On average, 12 underground tests per year were conducted. Shaft tests were the most common (representing more than 90 percent of all tests conducted) and primarily occurred on Yucca Flat or Pahute Mesa. The nation's underground testing program concluded on Sept. 23, 1992, with the last test, Divider.

SHERYL PFEUFFER

(1975 – Present)

Titles: From Monitor to Manager
Employers: Environmental Protection Agency; REECo; Bechtel Nevada; NSTec (current)

Sheryl oversaw the day-to-day activities for dosimetry (measuring absorbed radiation doses), prepared bioassay, air and water samples for radiological counting; collected environmental air and water samples for radiological counting, repackaged transuranic material received at the Site in the '80s from LLNL in California; and buried mixed- and low-level waste. Today, Sheryl is facility manager of the Big Explosives Experimental Facility in Area 4, Baker in Area 27, Explosives Ordnance Disposal Unit in Area 11, Source Physics Experiments in Area 15 and X-Tunnel in Area 25.

Three projects she was involved in impressed her the most: working as a team with the Russians and the British during the JVE in the 1980s; recreating radiation absorbed doses from old film badges and data to help the Energy Secretary make decisions on past practices of nuclear testing and human experiments; and for Homeland Security, helping to create better equipment, such as chemical detectors and cell phone blockers to protect our troops overseas.

BOB BERGLIN

(1976 – 1984)

Title: Engineer
Worked for: EG&G LANL

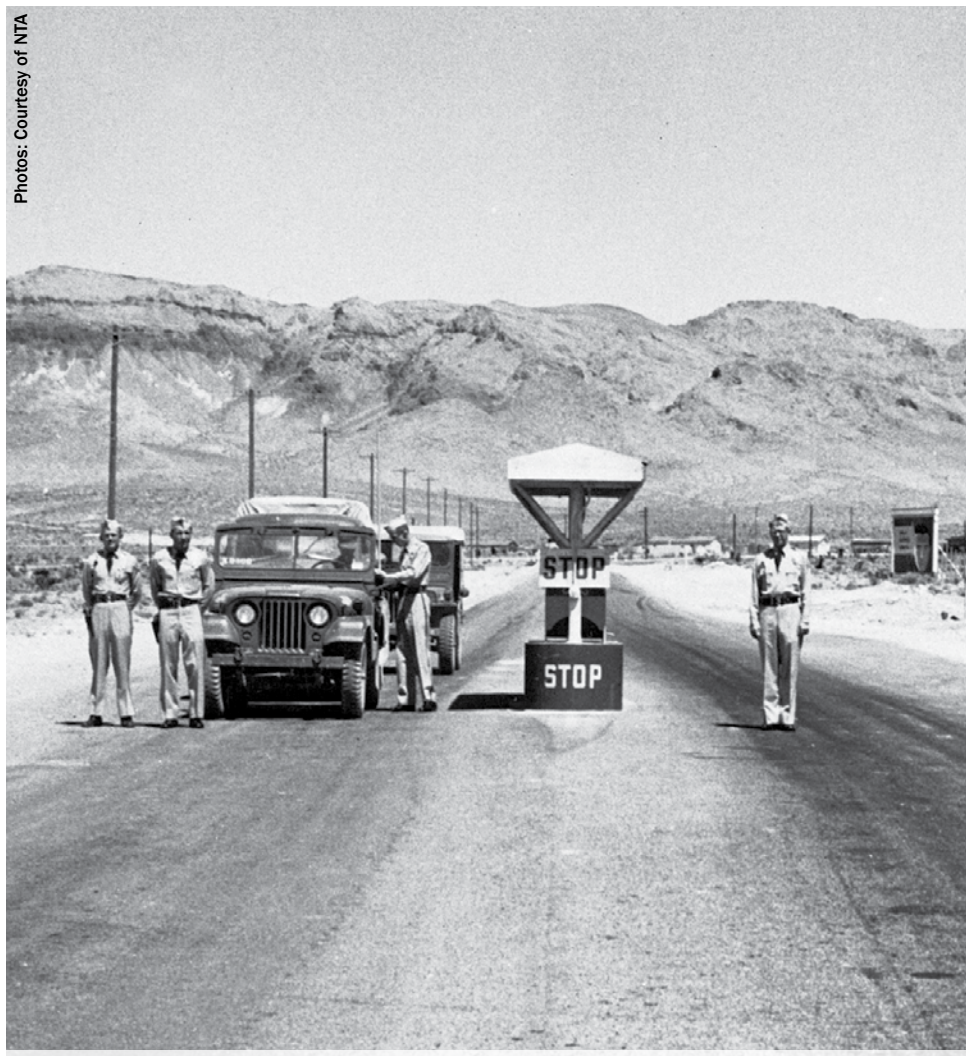
Bob says he participated in about 50 tests, including Transom (1978), "which failed to detonate," and Midas Myth (1984) "which unexpectedly subsided, or cratered, injuring several people." He says he was also peripherally involved in the CORRTEX project, which measured the explosive yield (kilo-tonnage) of the tests. "CORRTEX was mentioned in a nationally-televised speech by President Ronald Reagan – he offered it to the Soviets as a technology suitable for treaty verification." CORRTEX, which stands for Continuous Reflectometry for Radius versus Time Experiment, was an electronic method of measuring the length of a cable as it burns up in the fireball created by an explosion.

"In those days, underground worker training for non-miners consisted of someone telling you to take a flashlight with you into the tunnel, and not to step in any puddles, because they might be several feet deep. Holes were drilled into the tunnel floor to collect water seeping in from natural springs in the area," says Bob.

The Evolution of Mercury Gate 100

The science and technology of nuclear testing are not the only things that evolve – so did Gate 100, the guard station that all must pass and leave through in Mercury. In its earliest days in the 1950s, Gate 100 began as Gate 1, with no air-conditioning in the guard shack but perhaps a metal floor fan to keep the guards cool during those hot days and nights.

Photos: Courtesy of NTA

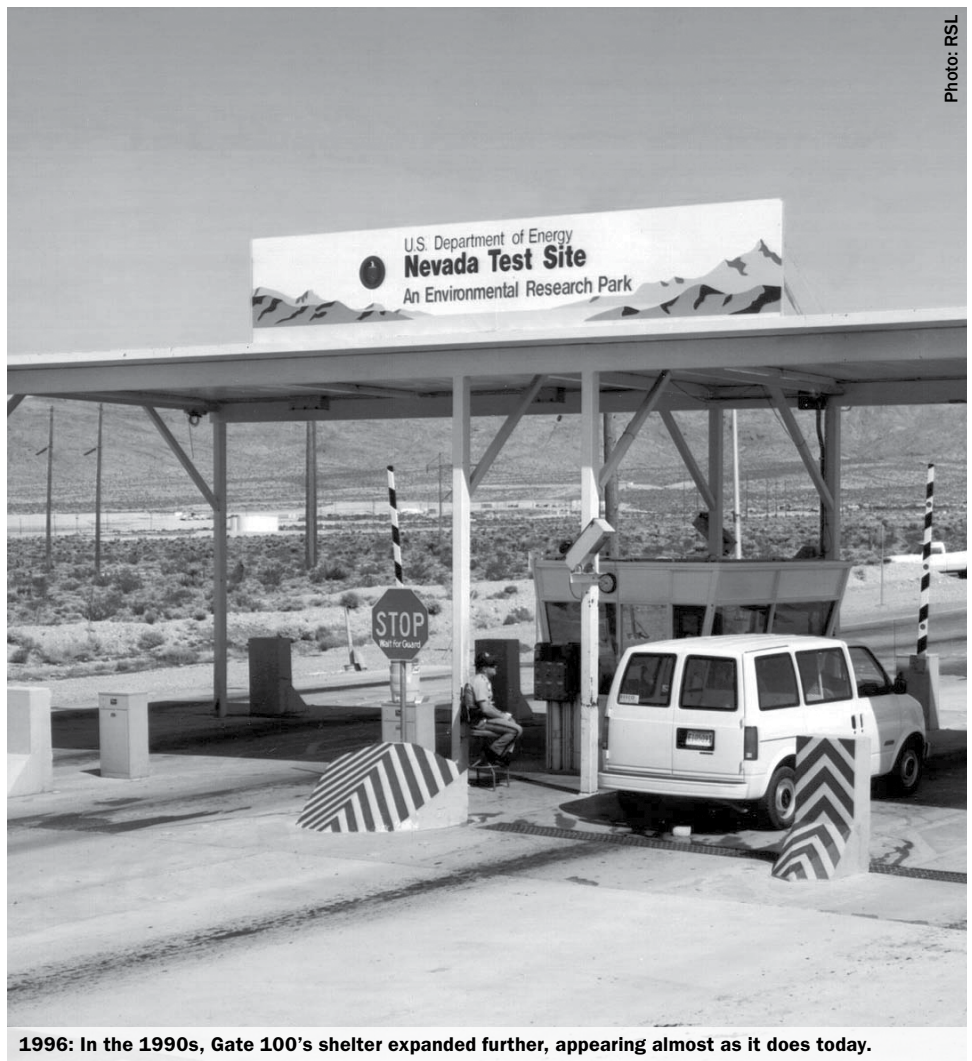


1953: Security guards stationed themselves at the entrance to the Nevada Proving Grounds. Then, as today, guards checked passes of incoming and outgoing personnel. They also had the authority to search any vehicle.

1963: This guard shack replaced the old open shelter, giving the security officers a bit more shade from the strong sun.

1964: Gate 1 becomes Gate 100, with a new, larger guard shack.

Photo: RSL



1996: In the 1990s, Gate 100's shelter expanded further, appearing almost as it does today.

"Kearsarge" and the JVE

On Aug. 17, 1988, on an isolated plateau on the Site's northwest Pahute Mesa, a nuclear bomb of 100 to 150 kilotons called "Kearsarge" was detonated underground. Thirty miles away at a control center, anxious American and Soviet scientists watched on a monitor the bomb's effect, lifting the desert floor about 15 feet. The results were phoned in: The instruments the Soviets were using to collect the experiment's data worked; the data was successfully recorded.

This "Kearsarge" test – named after a mountain pass between Nevada and California – marked the first phase of the JVE that the U.S. and the Soviet Union conducted together. Another such experiment followed one month later, at the Semipalatinsk Test Site in what is now the Republic of Kazakhstan. This JVE was the result of a U.S.-Soviet agreement to conduct the two underground nuclear explosion experiments, then measure the explosions' yields and to discuss their results. Its purpose paved the way toward American-Soviet efforts to pursue and adhere to arms control, particularly with nuclear testing.

Photo: Pan Am

As a symbol of international good faith and cooperation, the Soviet Union flag is raised to the top of the emplacement tower to be flown beside the U.S. flag for the "Kearsarge" test on Pahute Mesa.

Protesting for Peace

The nuclear testing program generated much publicity during its 65-year history. Much of the publicity has not been kind to the thousands of Site workers.

Numerous anti-nuclear activists have vented their anger at the DOE and its predecessors for decades. While their message to stop nuclear testing for the sake of peace has not changed over the years, the delivery of that message and their attire has.

Says Chris West, a former public affairs official at the Site, "Reporters weren't the only group interested in the nuclear weapons testing program in the '80s and '90s. Large groups of anti-nuclear protesters, sometimes numbering in the thousands, frequently gathered near the entrance to the [NNSS]." Chris recalls the protestor in the photo. "He was marching up Mercury Highway toward the guard post at the entrance, carrying a Soviet flag. An [NNSS] worker carrying a U.S. flag came out of Mercury to confront him. There were angry words between the two, but no blows were exchanged."

Photo: Pan Am

GENE HUNT

(1981 – Present)

Titles: From Field Engineer to Section Manager to Nevada Operations Manager
Worked for: EG&G; Bechtel Nevada; NSTec (current)

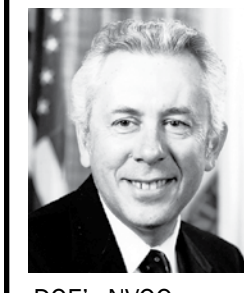
Gene began his career at the Site as a diagnostic field engineer supporting LANL's prompt diagnostic, Reaction History, which measured the time history of the nuclear device's gamma and neutron output. This was one of the primary methods used for validating their models of device performance.

One of the highlights of Gene's Site experiences was working with the Soviets for the JVE. "In the initial JVE, I was the prompt diagnostic manager measuring the Reaction History measurement. Following the JVE, I managed the diagnostic team that fielded the CORRTEX Verification System used to measure the yield of nuclear weapons tests to verify compliance with the Threshold Test Ban Treaty between the U.S. and the Soviet Union. This effort consisted of evaluating the performance spectrum of the Soviet recording equipment used on the U.S.'s underground experiments, preparing verification diagnostic teams for both U.S. and Russian experiments that lasted up to 1993," he says.

NICK AQUILLINA

(1962 – 1994)

Titles: From Clerk to NVOO Manager
Worked for: REECo; DOE



Nick says that "A uniqueness of the Site was the opportunity to climb the ladder for many employees." He did just that: After joining REECo in 1962, Nick's career progressed from a clerk to budget officer in four years. In 1987, he was named the DOE's NVOO manager.

An important and very significant project that Nick was involved in was the JVE, which included a trip to the Soviet Test Site near Semipalatinsk. This experiment not only contributed to the end of the Cold War, it also brought scientists, engineers and support personnel together from the U.S. and the Soviet Union. "It opened many opportunities for future interactions between the two nations," says Nick.

Other significant projects he supported included the Pahute Mesa development, working closely with the British on many important events; supporting the activities at Amchitka, an Aleutian Island in Alaska's southwest tail; developing the Nuclear Emergency Support Team; working with Nellis Air Force Base in the locating and construction of RSL, and the after-effects of the controversial Baneberry underground experiment.

Mercury, Nevada: The Hub of the Testing Era at the NNSS

Photo: Courtesy of NTA

By the mid-1950s, Mercury had a U.S. Postal Service location, changing it from Base Camp Mercury to the officially designated Mercury, Nye County, Nev. Here, Nevada Senators Howard Cannon (left) and Alan Bible perform a dedication Oct. 22, 1964.

Mercury, a town 65 miles northwest of Las Vegas, is the gateway to the NNSS. The AEC built Mercury into a thriving area containing many of the facilities, services and amenities that other small U.S. towns had, only without public access.

During the 1960s, the addition of the Plowshare Program and the NRDS – activities involving the use of nuclear energy for peaceful purposes – led to establishing the NNSS as a year-round test site. The results of this increasing activity were evident in Mercury.

With $15 million in construction funding approved, new facilities for both business and recreation sprang up across the town. A communications building; health, medicine and safety building; engineering and administrative building; maintenance shop; motor pool and repair shop; warehouses; and two new dormitories were among the new permanent structures added to the landscape. The Desert Rock Air Strip was completed to accommodate President Kennedy's tour of the NRDS in 1963, and remains active to this day.

Says Ron Cosimi, "When there was time to relax, test crewmembers did so with the same exuberance they demonstrated on the job. I think all who spent time at the Site will remember the raucous poker games in the dorms, the wild softball games, the exploring of the nearby canyons and mountains, the beer drinking at the bowling alley, the long nights at the Mercury Steak House, and the innumerable pranks. You could say we were a family."

Adds Sheryl Pfeuffer, "Working hard also means playing hard. We came together not only to work for the betterment of our country but also played together in the softball and flag football games. As they used to say about the RadSafe group that I had worked in, 'We worked hard during worktime but we also played hard off hours'."

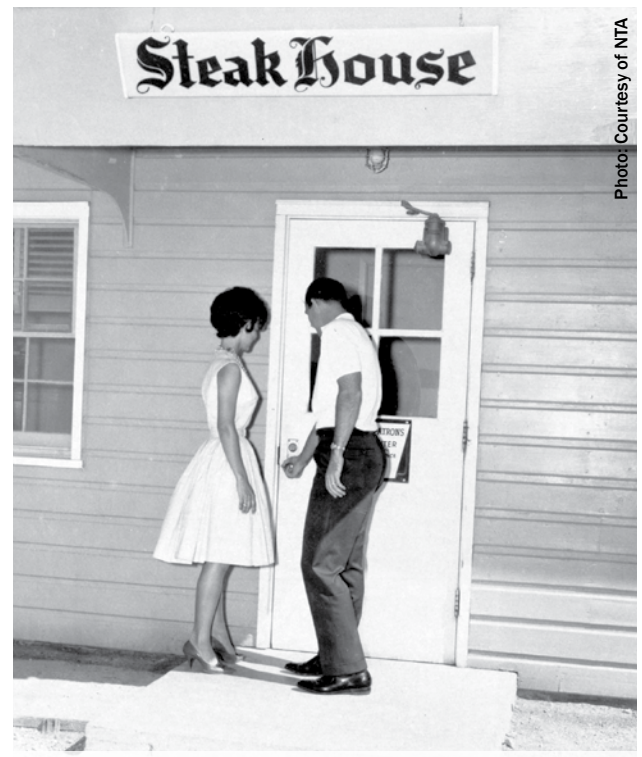


Photo: Courtesy of NTA

The Steak House "back in the day."

Other services available to workers living at the Site included check cashing, laundry and dry cleaning, a trailer park, lending library, barbershop, service station, busing, housing and a Western Union location. A health center offered classes for women, and a hobby shop provided space for leisure pursuits.

Continued on page 20

Photo: Courtesy of NTA

One of the larger, most anticipated construction projects was the Mercury Cafeteria and Steak House. Upon its completion, the new cafeteria had a total seating capacity of 800. The Steak House provided a more elegant dining experience.

Mercury, Nevada

Continued from page 19

Nick Aquillina says he will always remember "the wonderful social life and activities in Mercury in the early 1960s, including the many trips to L.A. for football and baseball games, during one of which I met my wife, Freda. We've been married for over 52 years."

Test Site workers found many ways to enjoy their down-time while staying in Mercury. Like so many others, Bob Berglin remembers the leisure times. "After working many long, hard days together, one would think that people would have had their fill of each other. However, many of us spent leisure time together as well, having barbecues and playing on the same softball teams. I remember a group of us getting together one time to spend an entire weekend making Chinese food from scratch. The recipes came from CY Tom (a current NSTec employee)."

Says Bob Kuckuck, "We had the luxury of always working on something that was extremely important, with well-defined objectives, clear roles and responsibilities, a firm timeline, and a clear measurement of success or failure at its conclusion. We all lived together at a remote location during the height of the project. We worked hard all day and relaxed together in the evening. The camaraderie was extraordinary."

In the absence of atmospheric and underground nuclear testing today, the amount of workers present at the Site is a fraction of what it used to be, eliminating the need for most of those recreational facilities. Today, many of the facilities used during testing have been demolished. Others are finding new purposes to support the NNSS's changing role in national security.

Photo: REECo


Photo: Courtesy of NTA


Photo: REECo

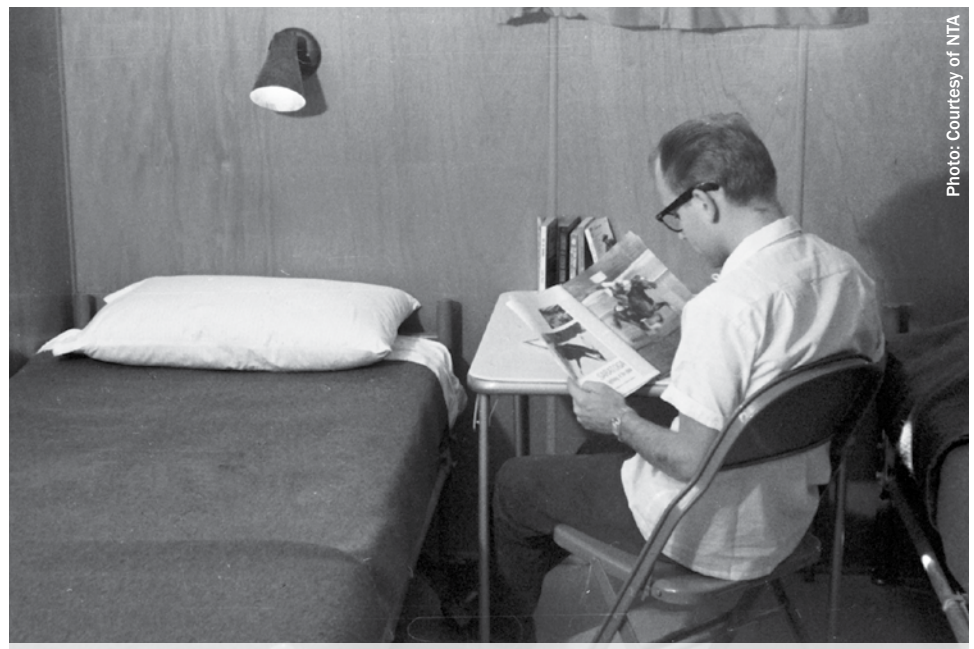
After a long shift, Site workers could relax at a variety of new recreation facilities, including a movie theater (established in a Quonset hut), an eight-lane bowling alley with a full-service snack bar, an Olympic-size swimming pool with bathroom and shower facilities, and a recreation hall for badminton, ping pong, square dancing classes and bridge tournaments.


Photo: REECo


Photo: REECo

Sports were also a popular pastime in Mercury. In addition to newly established bowling leagues, workers enjoyed basketball, softball, volleyball, golf, tennis and archery.

Just like today, employees boarded buses at the main bus parking lot in Mercury. Other buses picked up passengers at the NRDS, at on-site camps and other pickup points. The AEC leased 65 buses which transported more than 1,900 passengers daily to and from the Site.



During the boom years of the 1960s, increased activity in Mercury called for permanent facilities and amenities year-round, such as dormitories like this one. “My understanding was, there was a women’s dom and a men’s dom from very early on,” says Martha DeMarre.

A worker employed by the Olympia Commissary Co. in 1955 emerges from a trailer home she shared with two other women employees in Mercury. “There were official housing trailers when I first worked at the Site in 1978. They were two-person trailers with a bathroom between the two bedrooms,” Martha DeMarre recalls.

For the faithful, a new 3,700-square-foot chapel opened to accommodate Sunday worshippers of all faiths, with priests and chaplains officiating. It included a sanctuary, nave, chaplain’s offices and mechanical equipment rooms.

At Guard Station 270

Posing at Guard Station 270 (now deactivated), these men worked for EG&G LANL support at the NNSS in the 1980s, possibly 1983 (l-r): Nelson Cochrane, Don Walker, Bob Berglin, Robert L. “Smitty” Smith, and Raymond “Crazy Michael” O’Connor. Says Bob Berglin, “We were turning up for a bicycle tour in northern Baja that we participated in a few weeks later.”

JOHNNY MARCUS

(1968 – 2015)

Titles: From Head Service Attendant to Head Kitchen Steward
Worked for: REECo; Bechtel Nevada; NSTec

For 47 years, Johnny helped feed and serve thousands of workers at the Site. His favorite dish to prepare was chicken. As head kitchen steward, “I kept the guys working” at the Mercury cafeteria, he says. “I got along with everybody.”

Johnny’s jobs were not always in Mercury. His biggest impression was working in Area 12. Located in what is known as the forward area, Area 12 is almost in the northernmost section of the Site. In other words, “that’s 200 miles a day” Johnny traveled from home to work and back.

Control Point One

Control Point One, or more commonly referred to as CP-1, contained expensive and complex electronic equipment for the actual timing and firing of nuclear test shots, and for recording their results. Located in Area 6, CP-1 is in the saddle of Yucca Pass that connects Frenchman Flat with Yucca Flat. During testing, scientists could observe both areas from the hills near CP-1.

SAVANNAH MILLS

(1974 – Present)

Titles: Clerk, Administrative Staff
Worked for: EG&G; REECo; Bechtel Nevada; NSTec (current)

Savannah began working at the Site for EG&G in the LLNL Control Room in Area 6's CP-9 (located behind CP-1). She left for another employer, returned to the Site in 1976 to briefly work for REECo in an Area 2 trailer, then returned to the LLNL Control Room. That was where the test director counted down the launch of underground experiments. "When there were delays caused by malfunctioning equipment or bad weather, I stayed overnight at CP-9, sometimes at the dorm in Mercury. It was exciting to watch the testing groups working and then waiting for the BOOM (which we couldn't hear) and the results of the experiment. We would watch the screen exhibit the magnitude of the experiment. All of the technicians, engineers and other Lab personnel worked really well together for the success of the missions."

One of her lasting memories is when she worked at the Spill Test Facility in Area 5 for about a year. "This was my first experience in escorting foreign nationals," she says. All in all, she reminisces about "the wonderful people I have worked with in these different locations. I know I was blessed to have been hired at EG&G."

Afterword

Nuclear weapons have been the cornerstone of U.S. national defense policy. That policy has been supported by every president since Truman and has had the backing of Congress since 1945. Nevertheless, arms control and reduction – both conventional and nuclear – are desirable because any imbalance in strengths can lead to war.

In 1992, President George H. W. Bush instituted a moratorium on nuclear testing. In the absence of nuclear testing, the DOE/NNSA, civilian steward of our nation's nuclear weapons complex, established the Stockpile Stewardship Program. Stockpile stewardship certifies the safety and reliability of the nation's nuclear stockpile without underground nuclear testing. Test data from new experiments and improved, state-of-the-art computer modeling help address the stockpile's reliability. This allows scientists to improve their understanding of the dynamic properties of aging nuclear materials.

A suite of enhanced capabilities and facilities across the nuclear weapons enterprise have been developed to fill in the knowledge gaps and provide data relevant to stockpile concerns. These capabilities include:

- Subcritical experiments that obtain technical information about the U.S. nuclear weapons stockpile.
- The Joint Actinide Shock Physics Experimental Research two-stage gas gun experiments generate high-shock pressures, temperatures and strain rates that simulate those of a nuclear weapon.
- The Big Explosives Experimental Facility provides data through conventional high-explosive experiments, in support of the Stockpile Stewardship Program.

President Bush had directed the DOE to maintain a test readiness program should nuclear weapons testing become necessary. Overall readiness is supported by experimental programs conducted at the Site.

Today's advancement of nuclear weapons technology continues to maintain the U.S.'s "peace through strength."

Become a "Friend Of the National Atomic Testing Museum" Today!

Membership levels begin at only $50. Fill out a membership application and become a partner in our mission to increase knowledge and preserve the history of the Nevada National Security Site. Your support creates new programs, maintains exhibits and helps to make the National Atomic Testing Museum experience more relevant.

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ONE VOICE

Winter 2016

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Nevada National Security Site

65th Anniversary Edition

Clark County Commission Presents Proclamation to NNSS

On Tuesday, Jan. 5, 2016, the Clark County Commission presented the NNSS with a special proclamation honoring the Site's 65th anniversary. NFO Public Affairs Specialist Kelly Snyder (pictured center holding the proclamation) accepted it on behalf of the NNSS. The commissioners are (l-r): Chris Giunchigliani, Marilyn Kirkpatrick, Larry Brown, Steve Sisolak, Susan Brager, Mary Beth Scow and Lawrence Weekly. The proclamation (pictured below) reads:

WHEREAS, after the Allied victory in World War II, United States President Harry Truman approved the use of a large swath of land 65 miles northwest of Las Vegas for testing nuclear weapons. Originally called the Nevada Proving Grounds, this enormous outdoor test range would become known as the Nevada Test Site, and is presently called the Nevada National Security Site; and

WHEREAS, on January 27, 1951, the government detonated its first atomic device on the site, resulting in a tremendous explosion, the flash of which was seen as far away as San Francisco; and

WHEREAS, between 1951 and 1992, 928 documented atmospheric and underground nuclear tests occurred at the Test Site. A three-year moratorium on nuclear testing occurred between 1958 and 1961. On August 5, 1963, the United States, Russia and the United Kingdom ratified the Partial Test Ban Treaty (PTBT) prohibiting further atmospheric tests. The last atmospheric test occurred at the Test Site on July 17, 1962; and

WHEREAS, the last underground nuclear test took place on September 23, 1992, after a moratorium beginning in October 1992 temporarily ended all nuclear testing; and

WHEREAS, the Nevada National Security Site continues to provide the skills and venues for experiments involving nuclear stockpile stewardship, training for emergency responders, experimentation and testing involving the war on terror, experiments to limit the threat of global nuclear proliferation and more; and

WHEREAS, the Department of Energy, the Department of Defense, employees, contractors and others associated with the Nevada National Security Site have contributed to the economic and cultural growth and diversity of the Las Vegas Valley and Clark County, employing thousands of local residents over the years.

NOW, THEREFORE, WE, the Clark County Board of Commissioners, do hereby recognize and proudly support THE NEVADA NATIONAL SECURITY SITE on the occasion of its 65th anniversary and call on all those living in the Las Vegas Valley and Clark County to join us in celebrating this noteworthy occasion.

The NNSS also received proclamations from the State of Nevada, Nye County and the City of North Las Vegas.

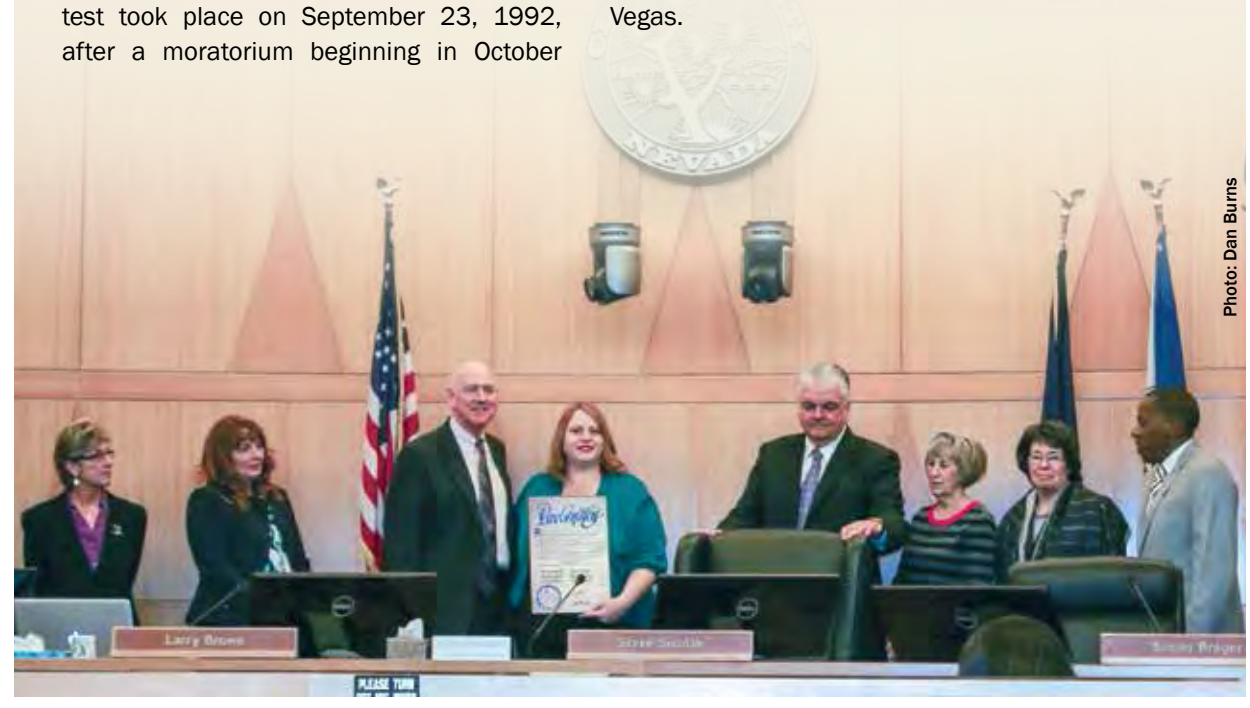

Photo: Dan Burns

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