ANNUAL 2022

THE VAULT

NATIONAL SECURITY THEN & NOW

Los Alamos
NATIONAL LABORATORY

LETTER FROM THE NSRC DIRECTOR

FAILURE IS NOT AN OPTION

In my office at Los Alamos National Laboratory, a sign hangs on the wall behind my desk. I've displayed versions of this sign in countless workspaces in many locations throughout my career, which includes nearly 30 years in the U.S. Air Force. Its words have always rung true.

This sign says: "Failure Is Not An Option."

The origin of that quote is in some dispute. It had been attributed to Gene Kranz, the mission director of the Apollo 13 moon landing mission, until he denied it. Regardless, I adopted this as my mantra more than two decades ago when I was a commander of a combat unit, preparing to deploy at the beginning of Operation IRAQI FREEDOM. I've used it as one of my guiding principles in every subsequent job.

At Los Alamos, I continue to use that mantra to guide the work of the National Security Research Center, the Lab's classified library and curator of unclassified legacy materials.

The past few years have been a time of unprecedented growth for the NSRC. We've increased our staff by over 50 percent, stood up new digitizing labs, significantly expanded our collections, produced historical documentaries, and even started writing historical nonfiction books. We've also pioneered the use of artificial intelligence machine learning technologies to help index and catalog our digital collections. This technology is now being evaluated for use at other national labs.

We work closely with our customers at the Lab and across the Nuclear Security Enterprise to find the material they need to support their critical mission work. Our customers have told us the information housed in the NSRC's collections has saved the National Nuclear Security Administration hundreds of millions of dollars in its charge to ensure the U.S. maintains a safe, secure, and reliable nuclear stockpile.

Additionally, the NSRC has forged new partnerships with organizations inside the Lab's Weapons Program, our sister labs and sites, offices inside the NNSA, and organizations within the Department of Defense. Each partnership was built to enhance the work conducted within the Nuclear Security Enterprise for the benefit of our nation.

Needless to say, the NSRC staff were critical to every one of these successes and each of them, wittingly or unwittingly, lived up to the mantra "Failure Is Not An Option."

This new edition of *The Vault* is another example of our staff's relentless drive to produce high-quality products. This is the third year we developed this annual magazine. Each volume of *The Vault* is a labor of love. We do it because we see this as part of our job as stewards of the Lab's history — and because failure in this critical role is not an option.

I truly hope you enjoy reading this magazine as much as we enjoyed producing it for you.

Rizwan Ali
Director National Security Research Center

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Father-son Nobel Prize-winning physicists

Niels and Aage Bohr worked together during Lab's first years

By Ellen McGehee, Historian, National Security Research Center

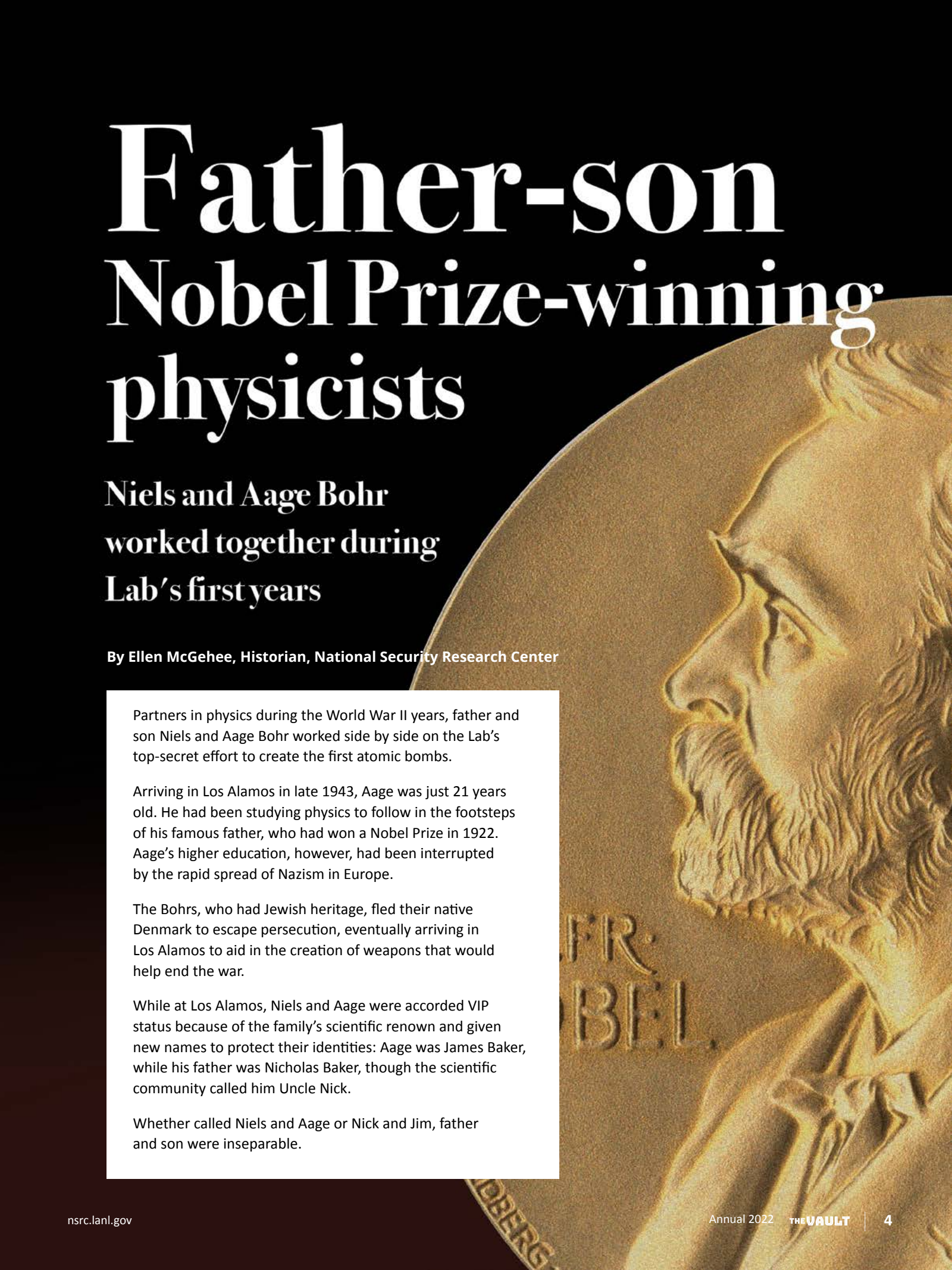
Partners in physics during the World War II years, father and son Niels and Aage Bohr worked side by side on the Lab's top-secret effort to create the first atomic bombs.

Arriving in Los Alamos in late 1943, Aage was just 21 years old. He had been studying physics to follow in the footsteps of his famous father, who had won a Nobel Prize in 1922. Aage's higher education, however, had been interrupted by the rapid spread of Nazism in Europe.

The Bohrs, who had Jewish heritage, fled their native Denmark to escape persecution, eventually arriving in Los Alamos to aid in the creation of weapons that would help end the war.

While at Los Alamos, Niels and Aage were accorded VIP status because of the family's scientific renown and given new names to protect their identities: Aage was James Baker, while his father was Nicholas Baker, though the scientific community called him Uncle Nick.

Whether called Niels and Aage or Nick and Jim, father and son were inseparable.



Co-workers, companions, confidantes

Lab Director J. Robert Oppenheimer noted in 1964, the son was his father's "companion, his confidante."

Aage later described his role: "I was acting as his [Niels's] assistant and secretary and had the opportunity daily to share in his work and thoughts."

The son often served as an intermediary between his father and other scientific staff, even during social occasions. Physicist Hugh Richards described how Niels liked to tell jokes at dinner and Aage would save their table guests the awkwardness of not understanding his father's heavy accent.

"Fortunately, Aage always laughed at his father's jokes so even when we missed the point, we got along OK by cueing our laughter to Aage's," Richards said.

Physicist Enrico Fermi's wife, Laura, wrote in her memoir, "When he [Niels] walked about town, he did not seem to care where he was going. He let himself be led by his young son, a physicist like himself, who never left his side."

According to records from the Army Corps of Engineers, the Bohrs' assigned security detachment observed:

"Both the father and son appear to be extremely absent-minded individuals, engrossed in themselves, and go about paying little attention to any external influences. As they did a great deal of walking, this Agent had occasion to spend considerable time behind them and observe that it was rare when either of them paid much attention to stop lights or signs, but proceeded on their way much the same as if they were walking in the woods."

It was during these regular walks that Aage perhaps played his most important service to the Lab and its wartime mission – helping his father work through the complexities of the development of the atomic bomb.

Scientist Joseph Hirschfelder noted in his memoir, "Each day they would take a long walk during which they would discuss some very difficult physics problem."

Father-son verify weapons' success

One of the biggest challenges faced by the Laboratory in its quest for deliverable weapons designs was the development of a proven initiator device, which is located inside the weapon and helps trigger the nuclear reaction.

Scientist Charles Critchfield recalled in his memoir both the crisis and urgency in the development of the plutonium bomb. Oppenheimer "got very worried that we weren't going to be able to do an implosion device because the initiator might not work. ... He'd lost I don't know how many pounds."

After two days of intense review, Niels and Aage determined the initiator would indeed work.

They were correct. First, at the Trinity test on July 16, 1945, when the bomb's successful detonation marked the dawn of the Atomic Age, and then weeks later in combat when Fat Man was released above Nagasaki, Japan, on August 9, 1945.

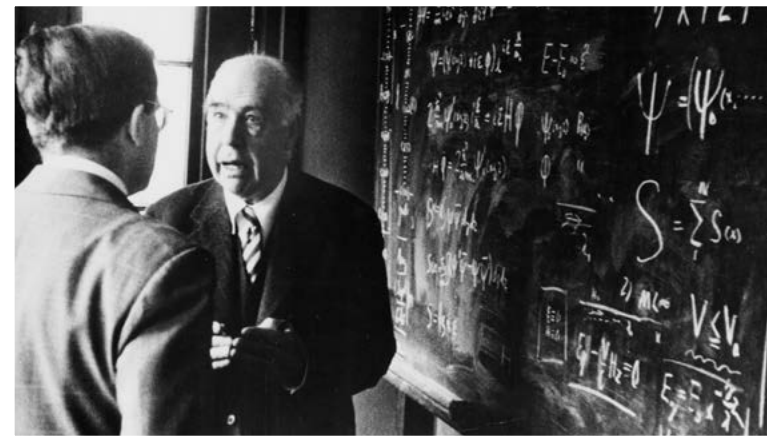
Family legacy

After World War II ended in the summer of 1945, Aage returned to Denmark, where he completed his Ph.D. and would spend most of his career. In the early 1960s, after a stint as a university professor, he took over the directorship of the Niels Bohr Institute, founded by his father for scientific research. From 1975 to 1981, he was the director of the Nordic Institute for Theoretical Atomic Physics.

Among his many accolades, Aage was awarded the Nobel Prize in Physics in 1975. It was 53 years after his father received the same honor. Niels, however, had died in 1962 and did not see his son bestowed the prize.

They are one of four father-and-son sets to receive the physics prize since it was first awarded in 1901.

Aage died in 2009 at the age of 87.



^ ***Physicists Aage Bohr, left (both photos), and his father Niels Bohr were described as inseparable. Each won a Nobel Prize 53 years apart. (Images courtesy AIP Emilio Segrè Visual Archives).***

College-Bound Cowboys

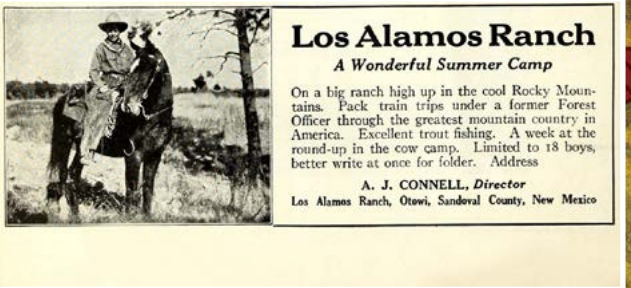
BEFORE THE LAB, LOS ALAMOS WAS HOME TO AN ELITE, RUGGED BOARDING SCHOOL

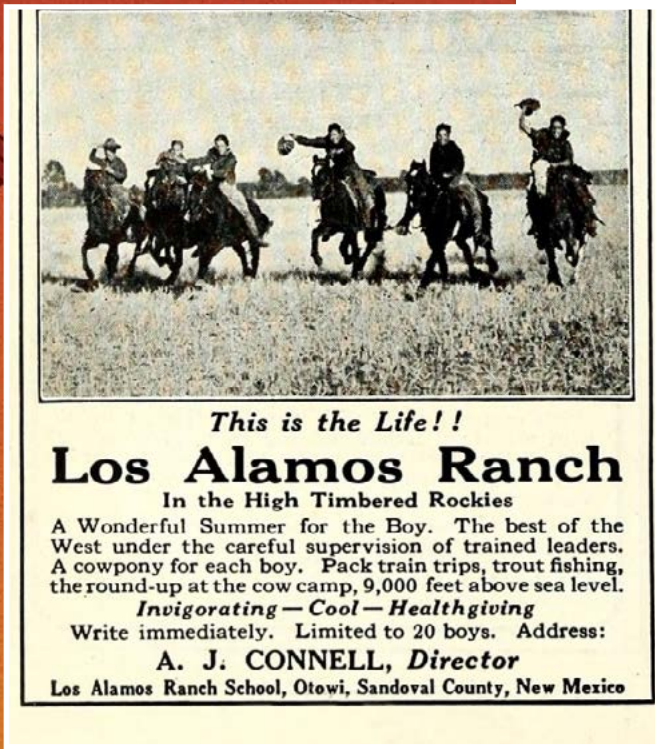
By Patty Templeton, Archivist, National Security Research Center

Go West, young man! Escape the city life that is making you soft and learn self reliance from the western U.S. of A. – or so advertised the ranch school movement in America from roughly 1900-1960.

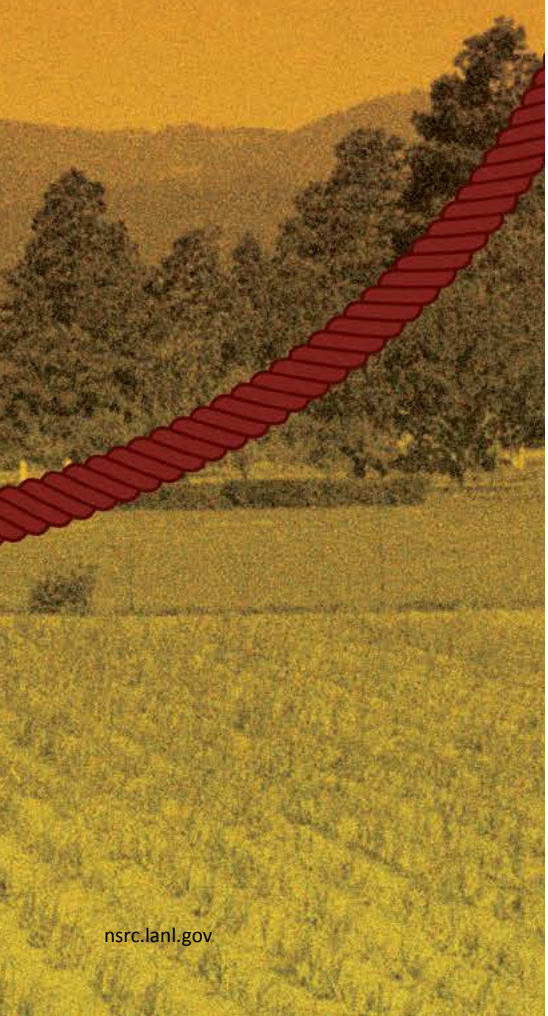
This educational movement included Los Alamos. Before being developed into the wartime Lab to create the first atomic weapons, the mesa was home to one of the most prominent and pricey ranch schools in America.

The Los Alamos Ranch School (LARS), founded in 1917 by Ashley Pond II, integrated Boy Scouts training into a college preparatory curriculum. Classes fortified the mind while rigorous outdoor activity strengthened the body in a setting made mythic to many Americans by Western movies, dime novels, pioneer journals, and tourism advertising.





^ *An educational movement that began in the early 1900s promised elite, pricey ranch schools would educate young men while introducing them to the rigors absent from their city lives.*



"Western ranch schools became a valued resource for the education of the elite because in the American mind, the West lacked the hindrances of inherited privilege and other cultural and social restraints that inhibited youth from becoming 'self-made.' Its rugged environment forced adolescents to prove themselves, and cowboys and ranchers served as role models of self-made individuals," according to *Prep School Cowboys*.

A DAY IN THE LIFE

At LARS, class sizes were small, usually three to four students, with yearly enrollment never exceeding 48 boys, ages 12 to 18.

The curriculum emphasized hands-on work, bodily health, and community stewardship. Students wore uniforms that mirrored Boy Scout apparel: khaki shorts, a khaki or wool flannel shirt, a Stetson hat, and a bandana. A typical weekday schedule was:

- 6:30 a.m. wake and drink a glass of water
- 15 minutes of exercise in the yard
- breakfast then room inspection
- 7:45 a.m. - 12:55 p.m. college preparatory classes
- 1 p.m. lunch followed by a short rest period
- afternoon recreation, including sports, trail rides, Scouting activities, and community work
- 6 p.m. supper, followed by a half-hour of listening to a professor read and study time
- 8:15 p.m. bedtime for younger boys
- 9 p.m. lights out for older boys

Professors had freedom to teach however they wanted so long as the frequently tested boys excelled. In *Los Alamos The Ranch School Years 1917-1943*, one student recalled how they played craps "using assigned algebra problems and Latin lines as currency, and luck determined whether our daily assignment was to be longer or shorter."

Saturdays contained all-day (sometimes overnight) trail rides and Sundays had a Scouting meeting.

Students shared a room for dressing, studying, and personal storage. Students and non-married professors slept year-round on an outdoor, screened porch of a building named the Big House. Heavy canvas shades kept out snow.

LACK OF WOMEN AT LARS

Girls were barred admission and just two female faculty members were hired for a short time. The only females at LARS were a small group of professors' wives, ranchers' wives, their daughters, an occasional matron, and the school nurse.

According to *Los Alamos the Ranch School Years 1917-1943*, the school "tolerated faculty wives," but viewed them as "distracting." The women the school administration "liked best were those who didn't 'butt in' but who stayed in the background, invisible but available when called upon to help or to teach boys the finer social skills."

PRICEY TUITION

In 1920, LARS cost $1,800. By 1928, tuition increased to $2,400, which is the 2022 equivalent of more than $39,000. Students were mostly from wealthy families, including owners of large corporations, like Colgate and Hilton.

Tuition didn't include student spending at the Trading Post. *Los Alamos the Ranch School Years 1917-1943* recounted a parent angry about a $600 bill. They were given "a detailed

analysis, explaining that the required leather coat, helmet, boots, and Stetson hat should last for two years, and the bedroll, blankets, quilt, and sweater for three years. In part, [the director] said, the bill was greater than average because the boy bought, with parental permission, English riding boots and a .22 rifle."

NOTABLE ALUMNI

Famous alumni include John Crosby, the founder of the Santa Fe Opera; Roy Chapin, CEO of American Motors; John Shedd Reed, president of the Atchison, Topeka, and Santa Fe Railway; and author Gore Vidal.

For many students, LARS was "a strange and adventurous new world that would fill [us] with the keenest and most delightful memories of a lifetime," former student Earl Kieselhorst said of his 1919 summer.

Others, like future writer William S. Burroughs, hated it. *Los Alamos The Ranch School Years 1917-1943*, noted that he "chafed under the school discipline and several times was in trouble for use of drugs and alcohol."

Student Stirling Colgate was about 17 years old in the school's final days when he recognized two visitors as nuclear scientist Ernest Lawrence and theoretical physicist J. Robert Oppenheimer, even though they used assumed names.

In *American Prometheus*, Colgate recalled, "Those two characters showed up, Mr. Smith and Mr. Jones, one wearing a porkpie hat and the other a normal hat, and these two guys went around as if they owned the place."

Colgate would later attain his doctorate in nuclear physics from Cornell University, work on the hydrogen bomb, and return to Los Alamos to study supernovae at the Lab.

SCHOOL'S OUT FOREVER

In support of the Manhattan Project, which was the U.S. government's top-secret effort to create the world's first atomic bombs, the Army wanted to buy LARS.

The school hoped to negotiate a long-term lease so it could continue after the war. According to *Los Alamos The Ranch School Years 1917-1943*, acting headmaster, Fermor Church, said, "We rebuffed all advances ... until a letter from the Secretary of War left us no choice."

After haggling, the school accepted $440,000 (the 2022 equivalent of more than $7.2 million), based on the Army Corps of Engineers' appraisal. This included over 700 acres, all buildings, 60 horses, two tractors, two trucks, 50 saddles, 800 cords of firewood, 25 tons of coal, and the 1,600-book library, according to *The Making of the Atomic Bomb*.

In January 1943, the Los Alamos Ranch School awarded diplomas to its last four graduates, including Colgate. In February, construction of Lab facilities and the secret city began.

LOS ALAMOS RANCH SCHOOL

EQUIPMENT LIST

PART 1 UNIFORM ITEMS (Obtainable here only.)

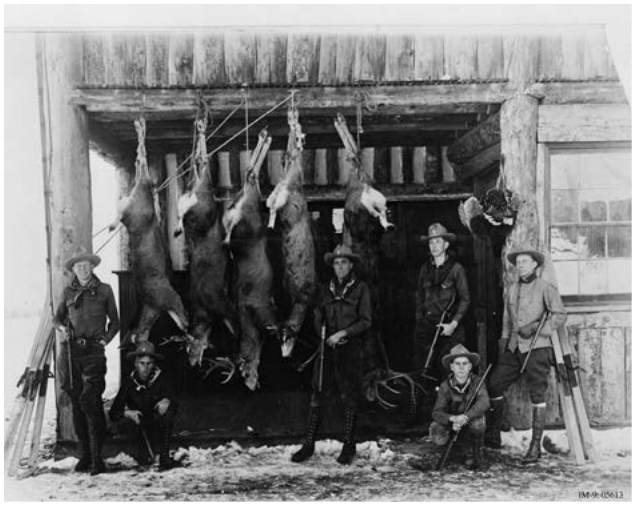
14 pair wool socks
4 suits summer underwear *
5 Wool shirts
2 cotton gabardine shirts
4 pair wool shorts
6 pair cotton gabardine shorts
4 black ties, wool
2 cotton Scout bandanas
3 silk bandanas, large *
1 Stetson hat
1 Pendleton jacket
1 pair brown leather shoes, ankle height
2 pair brown leather shoes, oxford height
1 pair "chaps" *
1 saddle slicker
1 each Scout cooking kit, canteen
1 each Scout whistle, matchsafe, knife, camp axe
1 pair saddle bags
1 bedroll with camp mattress *

PART 2

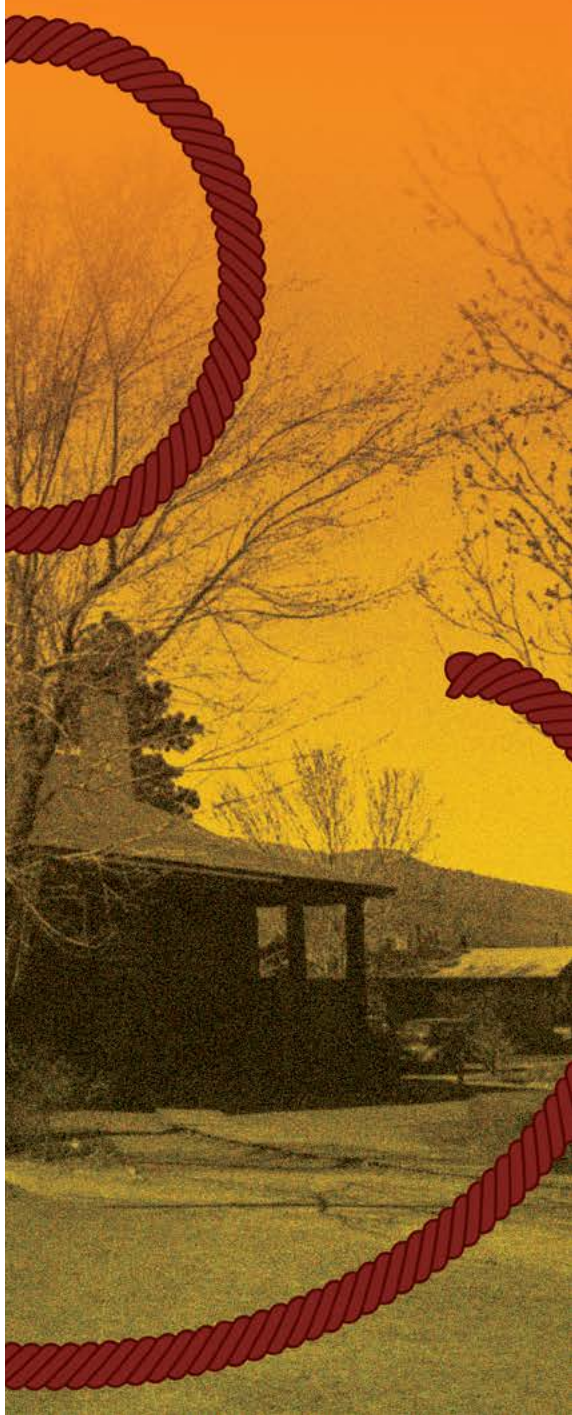
24 white handkerchiefs
4 suits pajamas, flannel preferred
1 belt, brown leather
1 pair leather riding gloves
1 pair woolen gloves
1 warm bathrobe
1 pair slippers or moccasins
1 pair tennis shoes, heelless, soft rubber soles
2 good quality heavy wool blankets
1 wool quilt
2 laundry bags
1 gross woven name tapes for marking clothing
(to be mailed to the School by September 1st)

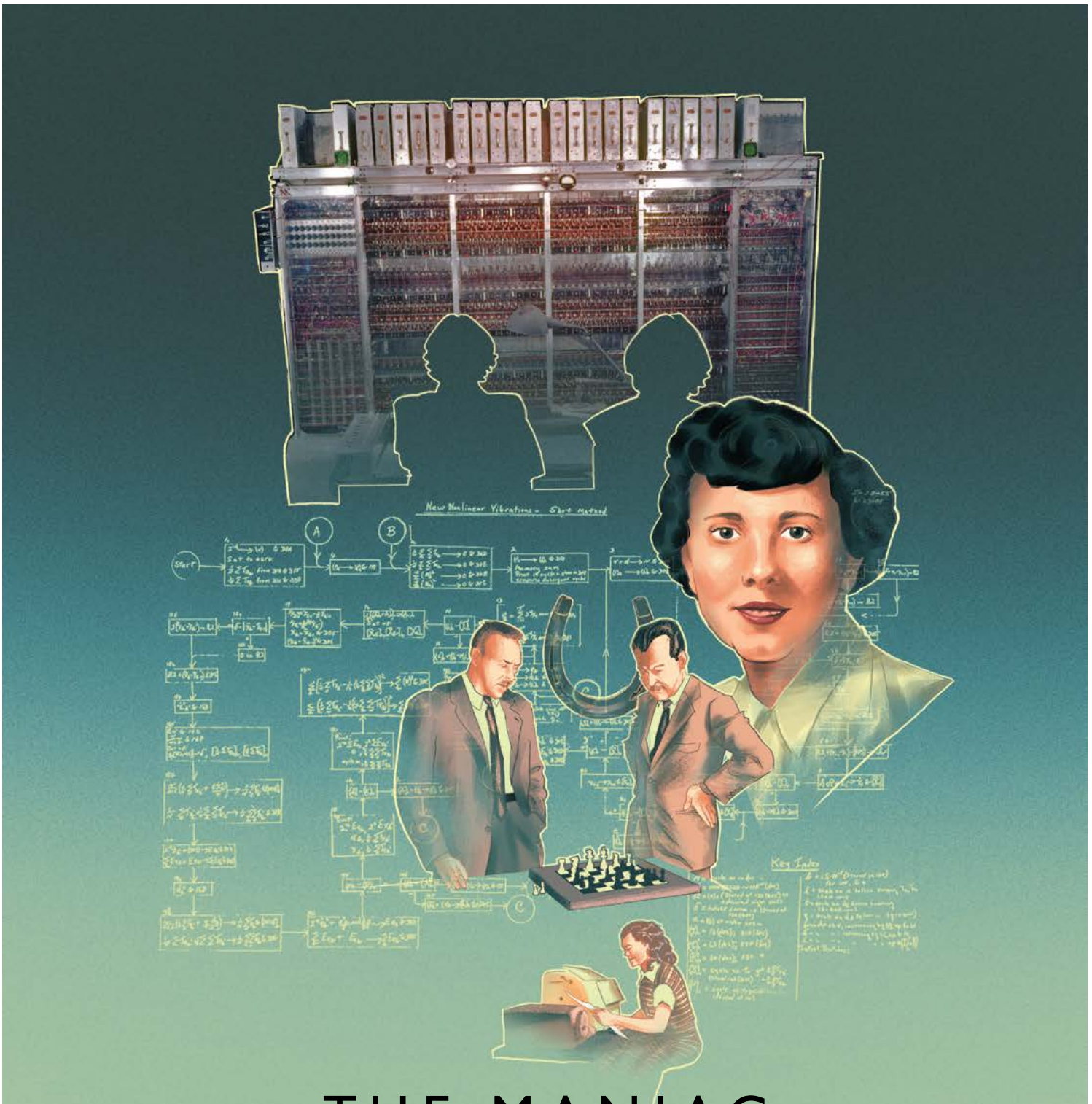
* Boys may bring to the School items marked * that they already have, and may use them if suitable, but new purchases should be made only here.

^ *This equipment list was for students who attended the Los Alamos Ranch School in the early 1900s. Before being developed into a wartime lab to create atomic weapons, the mesa was home to an all-boys boarding school. (Image from the Los Alamos Historical Society.)*



^ *Los Alamos Ranch School students after a hunting trip on the more than 700 acres of school grounds. (Photo from the Los Alamos Historical Society.)*





THE MANIAC

THE DAWN OF LOS ALAMOS COMPUTING 70 YEARS AGO

nsrc.lanl.gov

In March 1952, Los Alamos completed its first electronic computer, the MANIAC (Mathematical Analyzer, Numerical Integrator, and Computer). Its 3,000 vacuum tubes made the MANIAC nearly 300 times faster than the mechanical calculators it replaced. The MANIAC's first programmers were women who had worked as human computers. The MANIAC broke new ground in weapons science, genetics, chaos theory, musicology, and even computerized chess, pioneering the Lab's continuing legacy of computing innovation. A horseshoe was hung next to the computer for good luck.

NATIONAL SECURITY RESEARCH CENTER
LOS ALAMOS NATIONAL LABORATORY

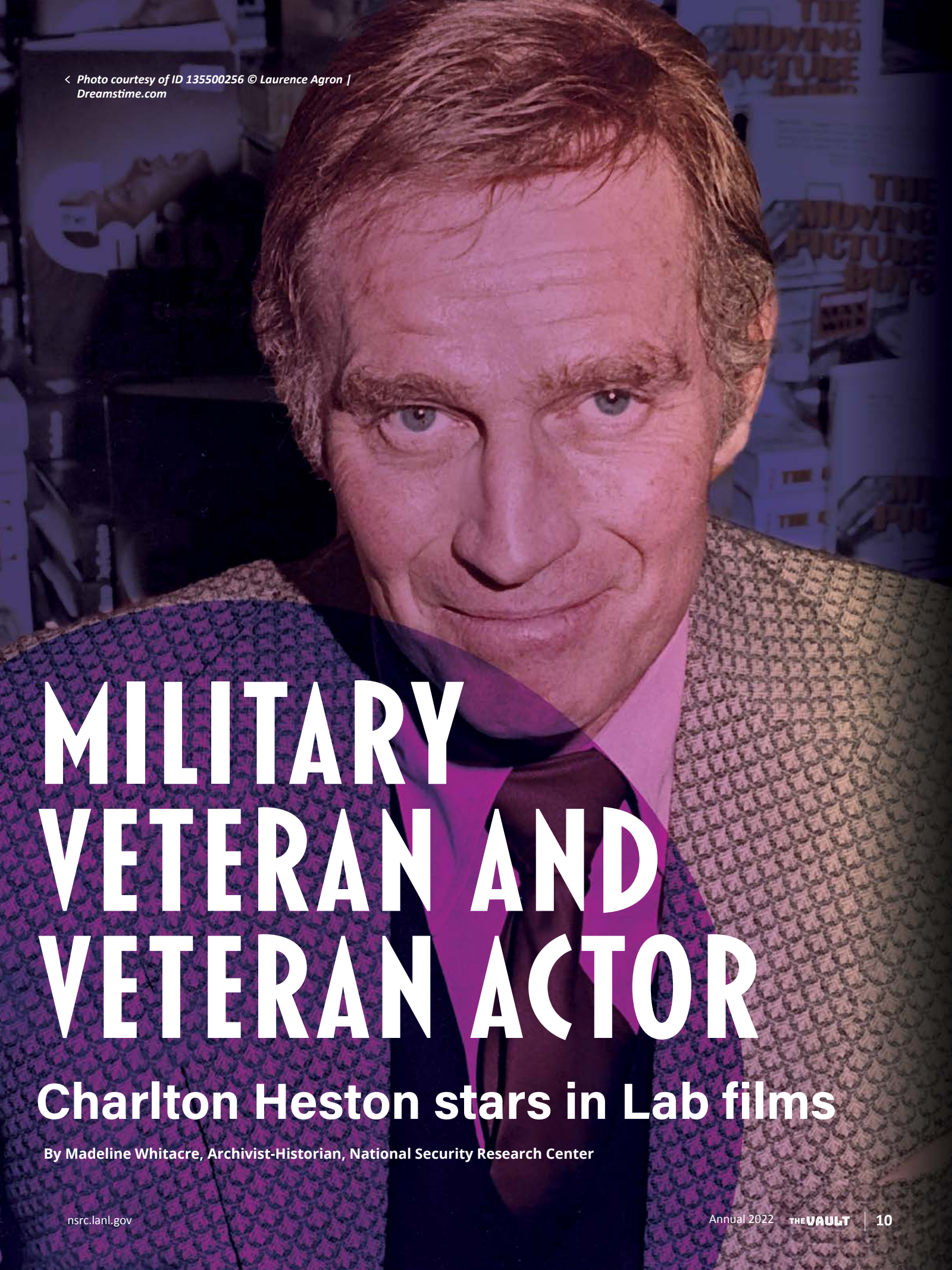


Photo courtesy of ID 135500256 © Laurence Agron | Dreamstime.com

MILITARY VETERAN AND VETERAN ACTOR

Charlton Heston stars in Lab films

By Madeline Whitacre, Archivist-Historian, National Security Research Center

^ *Photo courtesy of Photo 163539864 / Charlton © Marie Elena Sager | Dreamstime.com*

Charlton Heston was one of the greats of American film, appearing in nearly 100 movies beginning in the 1950s. He was most well-known for his roles as Moses in Cecil B. DeMille's *The Ten Commandments* and as the title character in *Ben-Hur*, for which he won an Academy Award.

Heston also starred in a few films for much smaller audiences, such as *Trust, But Verify* (1989) and *Project White Horse* (1984). Heston provided the narration for these once-classified Lab films, which focus on national security and are related to the Los Alamos mission.

Hollywood star's gig at the Lab

In the early 1980s, the head of the Lab's film group, Charles Barnett, was disappointed in the quality of narration in recent Lab films. One of Barnett's colleagues jokingly suggested that they should get Heston to narrate. Luckily, Barnett was an old friend of Heston's and, to Barnett's surprise, Heston agreed on the condition that he not be paid for his narration work. So, in 1983, Heston was granted a security clearance.

Trust, But Verify, Project White Horse, and *The Flavius Factor* are part of collections in the National Security Research Center.

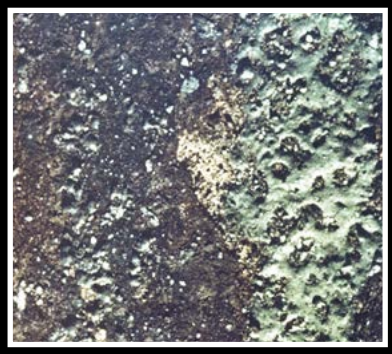
^ *Charlton Heston (center) was a Lab badge holder and also was granted a Q clearance to be able to narrate films for the Lab. (Photo courtesy of Walt Wolff.)*

Watch them here:

http://bit.ly/39C0Y2Y

World War II service

On one of Heston's trips to Los Alamos he was given a piece of trinitite – a glassy substance formed as heat from the 1945 Trinity test fused the desert sand. Recalling this in a speech, Heston said, "I took it home and gave it to my son … because it occurred to me that it was, in a very real sense, his birthstone."



^ *Trinitite is a glassy substance that formed as heat from the 1945 Trinity test fused the sand in the New Mexico desert.*

Before becoming an actor, Staff Sgt. Heston was a gunner in what was called the Army Air Forces during World War II. Heston was stationed in the Pacific and was set to take part in Operation Coronet – the planned invasion of Japan. However, the deployment of the Los Alamos-designed atomic weapons helped bring an end to the war and Operation Coronet never happened. Had Coronet taken place, Heston realized he may have been one of the many inevitable casualties.

Because of this, Heston considered trinitite his son's birthstone – without the Los Alamos advent of the atomic weapons, one of which was proven during the Trinity test, Heston may have died and his son may never have been born.

History of military partnership

Los Alamos has fostered an enduring partnership with the U.S. military that began with the Lab's inception in 1943. General Leslie Groves was the leader of the Manhattan Project, which was the government effort to create the first atomic bombs and help end the war. The then-secret Lab in Los Alamos was staffed by military members who helped develop two types of nuclear weapons in just 27 months.

^ *Charlton Heston (center) was a World War II veteran and felt a connection to the Lab because of its creation of the atomic weapons that led, in part, to Japan's surrender.*

Betty Perkins

Historian amassed one-of-a-kind weapons reports after testing ban; information is vital to today's work

By Andrew Gordon, Weapons Librarian, National Security Research Center

Today's nuclear weapons research builds upon the work of the past, often on the shoulders of the giants of nuclear document preservation in the absence of weapons testing. One of these giants was a historian named Betty Perkins.

Before her retirement in 2016 and death in 2019, Perkins held numerous roles at LANL, but she is best known for her pioneering work in the Weapons Program where she generated classified reports on nuclear weapons design and development.

Over many years, she meticulously researched and recorded the histories of a number of critical efforts in Los Alamos's nuclear weapons program, culminating in 13 reports comprising more than 7,200 pages.

"The Lab's National Security Research Center houses, maintains, and makes the reports accessible to weapons scientists and engineers," said Chris C'de Baca (pictured lower right), the Group Leader who manages the NSRC. "Betty Perkins's reports are vital to today's national security research, and in particular the Lab's stockpile stewardship, which assures the world that we have safe, secure, and reliable nuclear weapons."

Who was Betty Perkins?

An environmental scientist turned historian, Perkins worked in the Los Alamos Weapons Program for the last 25 years of her career. She was a Texas native, but spent most of her childhood in Santa Fe. Perkins attended the College of Wooster in Ohio and the Harvard Radcliffe Institute, earning a master's degree in physics. While working at Los Alamos, she met her husband Roger, who was a physicist. The couple were married for more than 50 years and had three daughters.

Meanwhile, Perkins was forming her legacy at the Lab.

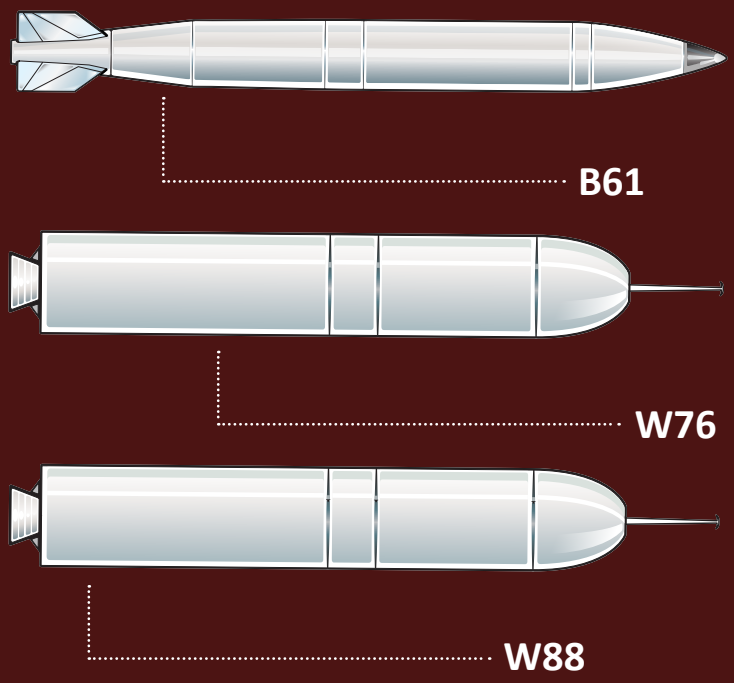
After the end of nuclear testing in the 1990s, the Lab decided to formally document the history of nuclear testing.

"Perkins took on the project with a conscientious fervor that would prove vital to today's researchers and their national security work," said Riz Ali, director of the NSRC. "The reports have formed a foundation for the Lab's nuclear weapons documentation, and have been expanded over the years."

What's inside?

Perkins's reports are compendiums of weapons research knowledge. They include handbooks on modern primaries, safety and surety, and the design and development of the Laboratory's stockpile weapons systems, such as the W76, the W88, and the B61.

Perkins's work has proved as invaluable today as when she first compiled this documentation, say those who rely on it.



The Betty Perkins reports include handbooks on fission weapons components that initiate reactions, ensure safety and surety, and safeguard the design and development of the Lab's stockpile weapons systems, such as the W76, the W88, and the B61. These classified records are part of the collections in the Lab's National Security Research Center.

"Her multi-point safety report is an important reference for my staff," said Erik Shores, Safety and Surety (XTD-SS) Group Leader. "My researchers are often overwhelmed when looking for documents on one-point or multi-point safety, as there are thousands of references. Perkins neatly summarized the topics into something that is much more approachable and easier to understand. Her attention to detail and liberal use of footnotes make these guides invaluable to us."

The Lab's National Security Research Center houses tens of millions of documents that include the development of the underlying science, engineering, and production of nuclear weapons.

CHICAGO PILE-1

PAVED THE WAY FOR NUCLEAR SCIENCE AND A LAB IN LOS ALAMOS

By Brye Steeves, Communications Specialist, National Security Research Center

Eighty years ago on a bitter-cold December day in 1942, scientists gathered at an abandoned squash court at the University of Chicago where they would ultimately enable a secret lab in Los Alamos to change the world.

Enrico Fermi oversaw the Chicago Pile-1 experiment that created the world's first self-sustaining nuclear reactor. This led to the creation of the atomic bomb at the Los Alamos Lab, where Fermi continued his work.
nsrc.lanl.gov

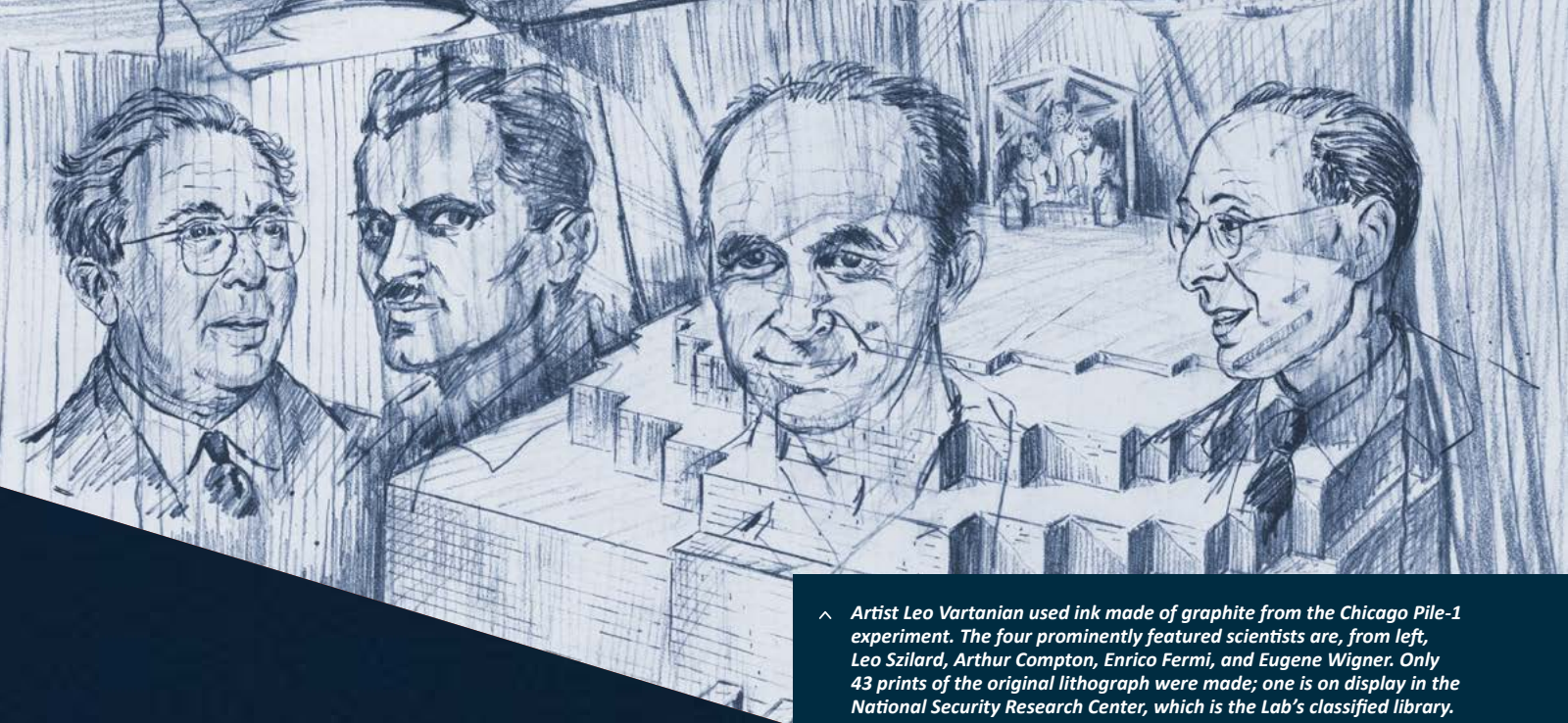
The group, led by Italian physicist and Nobel laureate Enrico Fermi, stacked graphite bricks, piling 57 layers that totaled more than 770,000 pounds. Later named Chicago Pile-1, their goal was to create the world's first self-sustaining, controlled nuclear chain reaction.

Inside the approximately 20-foot-tall pile were smaller blocks of uranium and control rods that, when removed, would cause the reaction to go critical – meaning it would create a nuclear chain reaction. It was roughly $1 million worth of materials, equivalent to nearly $16 million today, and reinforced the concept that a nuclear chain reaction would allow the weaponization of the atom.

"Its success would be the crucial proof needed to know it would be possible to create an atomic bomb," said LANL Historian Roger Meade. "This was the precursor to the Lab we have today."

BUT NO EEYORE

Fermi watched alongside his team – all men and just one woman, 23-year-old physicist Leona Marshall – from a balcony. They were monitoring the experiment on instruments named after fictional children's storybook characters: Pooh, Piglet,



Artist Leo Vartanian used ink made of graphite from the Chicago Pile-1 experiment. The four prominently featured scientists are, from left, Leo Szilard, Arthur Compton, Enrico Fermi, and Eugene Wigner. Only 43 prints of the original lithograph were made; one is on display in the National Security Research Center, which is the Lab's classified library.

and Tigger, according to the Department of Energy.

Around 3:30 p.m., rods were removed. One was controlled from a balcony, one was an emergency safety rod, and another would be withdrawn to cause criticality.

"Although Fermi was confident that he could control his experiment," Meade said, "he nonetheless stationed three graduate students, known as the suicide squad, on top of the reactor to pour buckets of a cadmium solution over the experiment if the safety mechanism failed. The cadmium (a chemical element) solution would soak up neutrons and quash the fission process."

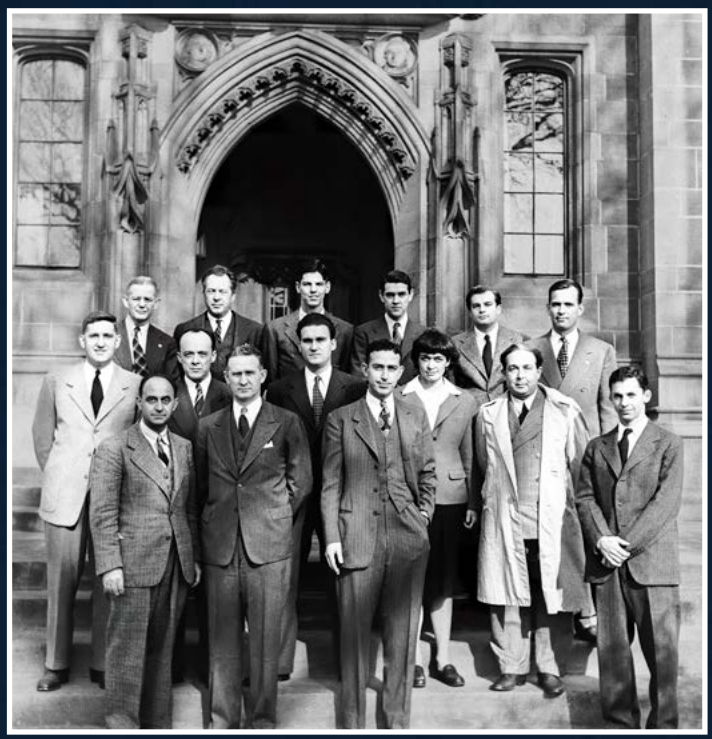
Luckily for the students, the reactor worked as planned. As the final rod came out, Fermi reportedly said, "This is going to do it. Now it will become self-sustaining."

He was right.

ON TO LOS ALAMOS

A coded message, "The Italian navigator has just landed in the new world," notified government officials of the experiment's success and the team celebrated with paper cups of Chianti, an Italian red wine. Members of the team signed the label on the wine bottle, which ended up being the only written record of attendees, according to the Department of Energy.

Many of the 43 scientists from the Chicago Pile-1 team, including Fermi, would go on to work for the Manhattan Project's secret wartime lab in Los Alamos. There, the results of the experiment were used to develop the world's first nuclear explosive devices. First, during the Trinity test in July 1945, followed by the two atomic bombs that were released weeks later in combat against Japan. World War II ended shortly thereafter.



Members of the Chicago Pile-1 team met on the experiment's fourth anniversary in 1946. Future Los Alamos Director Harold Agnew is on the far left of the middle row; the experiment's only female physicist Leona Marshall is to the right of center; Nobel Laureate Enrico Fermi is on the far left of the first row.

MARIA GOEPPERT MAYER

1963 NOBEL LAUREATE PAVED PATH FOR FEMALE SCIENTISTS; ADVISED NEXT GENERATIONS TO 'CARRY ON'

By Hadley Hershey, Archivist, National Security Research Center

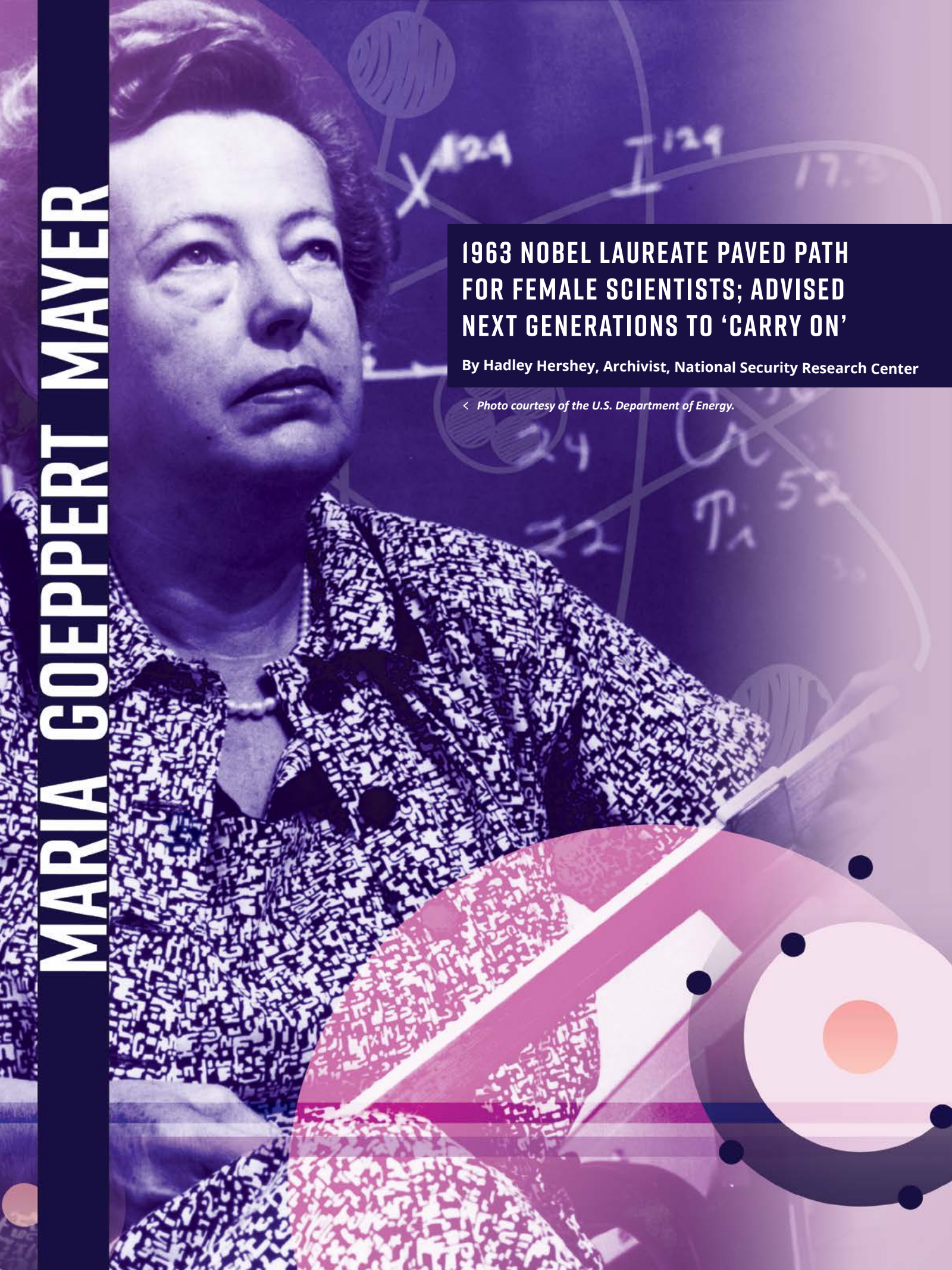


Photo courtesy of the U.S. Department of Energy.

From an early age it was expected that Maria Goeppert Mayer would continue the Goeppert family tradition of working in academia.

Her father was a sixth-generation professor and she was to be the seventh. To him, his daughter's gender was irrelevant, but rules at universities regarding the wife of a fellow academic would soon complicate the Goeppert family's succession plan.

Universities' nepotism regulations, meant to discourage supervisors from hiring relatives, denied employment to wives of professors and would haunt Goeppert Mayer throughout her career.

For many years, each time her husband was offered a professorship, Goeppert Mayer was denied a similar position at the same university despite her formidable qualifications. Instead, she held volunteer positions, allowing the universities to benefit from her incredible scientific abilities without having to pay her a salary.

"BECOME FULLY EDUCATED WOMEN AND PROMOTE THE UNDERSTANDING OF SCIENCE IN ANY WAY YOU CAN."

– MARIA GOEPPERT MAYER

She described her unpaid work as "just for the fun of doing physics." These efforts ultimately made significant contributions to the fields of nuclear physics, physical chemistry, mathematics, and earned her global recognition.

Near the end of her career, in 1963, she shared half of the Nobel Prize in Physics for her work on the nuclear shell model, which is the basis for understanding nuclear structure.

Goeppert Mayer was just the second woman to be awarded the prize in physics and it would be 55 years before the third.

Among her great achievements, Goeppert Mayer contributed to the Los Alamos Laboratory's efforts to create a nuclear weapon and help end World War II, ushering the world into the Atomic Age.

EARLY YEARS

Goeppert Mayer was born on June 28, 1906 in Kattowitz, Germany (now Katowice, Poland), the only child of Friedrich Goeppert and Maria Wolff. In 1910, Friedrich became a professor of pediatrics at Göttingen University, and moved the family from Kattowitz to Göttingen.

Goeppert Mayer attended public and private schools and entered Göttingen University in the fall of 1924. She began her studies in mathematics. At the request of Max Born, a family friend and professor of theoretical physics, she joined his quantum mechanics seminar. It was during this seminar that she discovered she preferred theoretical physics to mathematics, so she changed her course of study and became Born's doctoral student.

In 1928, Goeppert Mayer met Joseph Mayer, an American chemist on fellowship at Göttingen University. Joe arrived at the home Goeppert Mayer shared with her mother to inquire about renting a room. Because of the financial strain caused by Friedrich Goeppert's sudden death the year before, the family was renting rooms to students.

Joe and Maria were married January 18, 1930. In March, Goeppert Mayer received her Ph.D., and soon after Joe accepted a position in the chemistry department at Johns Hopkins University. The couple left Germany for Baltimore.

Because of the nepotism regulations, Goeppert Mayer was not offered a paid position at the university. Instead, she was a volunteer associate in the physics department

MARIA

GOEPPERT

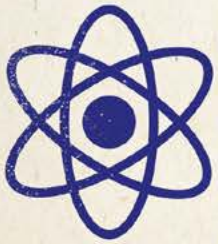
MAYER

1906–1972

LOS ALAMOS CONTRIBUTIONS

Supervised project on photochemical method for uranium isotope separation at SAM Laboratories, 1943.
Supervised Opacity Project at SAM Laboratories, 1944.
Worked with physicist Edward Teller on the Opacity Project at Los Alamos, 1945.

NOBEL PRIZE: PHYSICS, 1963



Developed the nuclear shell model, which describes the structure of the nucleus.

until 1939, when the couple moved to Columbia University in New York. Nepotism rules would again keep Goeppert Mayer from a paid position there. At the request of Harold Urey, professor of chemistry, she was a volunteer lecturer in the chemistry department.

It wasn't until 1941 that Goeppert Mayer was offered her first paid job: a substitute position at Sarah Lawrence College. She taught mathematics that first year, and in June 1942 she was reappointed to the science faculty. During the '42-'43 academic year, Goeppert Mayer taught four courses: two in mathematics, one in physics, and one in physical chemistry. She was also still a volunteer chemistry lecturer at Columbia.

LOS ALAMOS WORK

In September 1943, Urey, now the director of the Substitute Alloy Materials (SAM) Laboratories at Columbia, needed an expert in spectral analysis to lead a team researching the photochemical method for uranium isotope separation. Urey was familiar with Goeppert Mayer's earlier work and knew she was the right person for the job. He wrote to the president of Sarah Lawrence College, requesting a one-year leave of absence for Goeppert Mayer to return to Columbia full time for "an important war project."

^ *Little Boy was a uranium, gun-type weapon and the first atomic bomb to be used in combat. Maria Goeppert Mayer's wartime research focused on aspects of uranium that would affect weapons development.*

The SAM Laboratories were conducting research for the Manhattan Project, which was the U.S.-led effort to create the world's first atomic weapons. The focus of the wartime research at Columbia was looking into the uranium isotope separation processes required to produce the weapons-grade uranium desperately needed by the scientists at the clandestine Los Alamos Laboratory.

Urey's request was granted, and Goeppert Mayer returned to Columbia full time. Goeppert Mayer supervised a team at the SAM Laboratories that was researching the photochemical method for uranium isotope separation. This work involved analyzing the spectra of uranium-235 and uranium-238.

Within a few months, the photochemical method was deemed impractical and was abandoned. Goeppert Mayer was moved to the team researching gaseous diffusion. Gaseous diffusion and electromagnetic separation were deemed more practical, given the time constraints of producing a weapon before the Nazis had their own.

Meanwhile, in late May of 1944, Los Alamos Laboratory Director J. Robert Oppenheimer and physicist Edward Teller needed a group that could undertake opacity calculations, which dealt with the properties of radiation at high temperatures. Oppenheimer asked General Leslie Groves, leader of the secret wartime creation of the atomic bomb known as the Manhattan Project, to allow the work to take place at the SAM Laboratories at Columbia. When it came to deciding who should lead the Opacity Project, Goeppert Mayer was an obvious choice. She was already involved with the Manhattan Project efforts and was a skilled mathematician and theorist, the head of a team of researchers, and an expert in spectral analysis.

With Groves's approval, Goeppert Mayer was hired as a consultant for Los Alamos. Teller would oversee the project from Los Alamos, as his frequent travels to New York for other Manhattan Project business would allow him to meet with Goeppert Mayer at Columbia without raising suspicions.

At the SAM Laboratories, Goeppert Mayer enlisted the help of two of her graduate students and the three began work on the opacity calculations and were in regular communication with Teller. On May 21, 1945, Goeppert Mayer arrived in Los Alamos to continue the opacity calculations with Teller. While not directly beneficial to the development of the fission weapons at Los Alamos during the war, the calculations were later applied to the development of the hydrogen bomb.

POST-WORLD WAR II

In 1946, Goeppert Mayer and her husband moved to Chicago. Joe was appointed professor in the chemistry department at the Institute for Nuclear Studies at the University of Chicago. Despite her work for the Manhattan Project, Goeppert Mayer was once again denied a paid position and worked for free as a professor of physics at the institute.

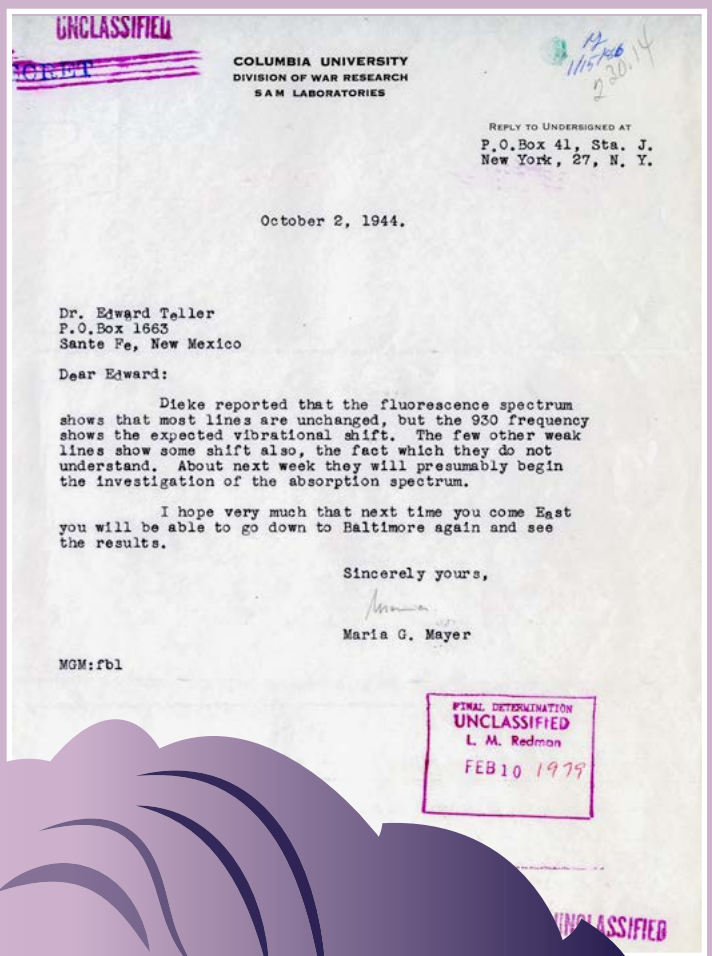
In July, Goeppert Mayer was offered the position of senior physicist at the newly formed Argonne National Laboratory in Chicago. She continued her unpaid professorship at the University of Chicago, while working part time at Argonne. It was at Argonne that Goeppert Mayer would develop the nuclear shell model that would later earn her the Nobel Prize.

Goeppert Mayer was working on a project with Teller to determine the origin of elements. They were looking at isotope abundances when Goeppert Mayer observed patterns. She noticed that nuclei with 2, 8, 20, 28, 50, 82, or 126 protons or neutrons were stable (known as the magic numbers). She recognized the importance of these numbers

and speculated they could help describe the structure of the nucleus, and perhaps nuclei had a shell structure similar to the electron shell structure in atoms. Goeppert Mayer was not the first to notice this phenomenon, which was studied in the 1930s, so she reviewed the earlier research and continued to study the data.

By 1948, she had the data, but not the theoretical explanation for the shell structure of nuclei. She presented her data in a paper "On Closed Shells in Nuclei," published in the *Physical Review* journal that same year. Early the next year, during one of many discussions of shell structure with physicist Enrico Fermi, he remarked, "Is there any indication of spin-orbit coupling?" This was the breakthrough Goeppert Mayer needed. She now had her theoretical explanation for shell structure, and the spin-orbit-coupling shell model of nuclei was presented in the February 4, 1949 issue of the *Physical Review*. Around this same time J. Hans D. Jensen, a German physicist, came to the same conclusions as Goeppert Mayer. The two met in 1951 and started a collaboration that culminated in 1955 with the publication of their book, *Elementary Theory of Nuclear Shell Structure*.

In 1960, Goeppert Mayer accepted a full professorship in physics at the University of California at San Diego. It was a paid position.



UNCLASSIFIED

SECRET

COLUMBIA UNIVERSITY
DIVISION OF WAR RESEARCH
SAM LABORATORIES

REPLY TO UNDERSIGNED AT
P.O.Box 41, Sta. J.
New York, 27, N. Y.

October 2, 1944.

Dr. Edward Teller
P.O.Box 1663
Sante Fe, New Mexico

Dear Edward:

Dieke reported that the fluorescence spectrum shows that most lines are unchanged, but the 930 frequency shows the expected vibrational shift. The few other weak lines show some shift also, the fact which they do not understand. About next week they will presumably begin the investigation of the absorption spectrum.

I hope very much that next time you come East you will be able to go down to Baltimore again and see the results.

Sincerely yours,

Maria G. Mayer

MGM:fbl

FINAL DETERMINATION
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FINAL CONTRIBUTIONS

Soon after arriving in San Diego, Maria had a stroke at the age of 53, which would affect her health for the remainder of her life. However, she continued to teach and contribute to the field of physics.

In 1963, Goeppert Mayer was awarded the Nobel Prize in Physics alongside Jensen. The other half of the prize that year was awarded to Eugene Paul Wigner for unrelated work.

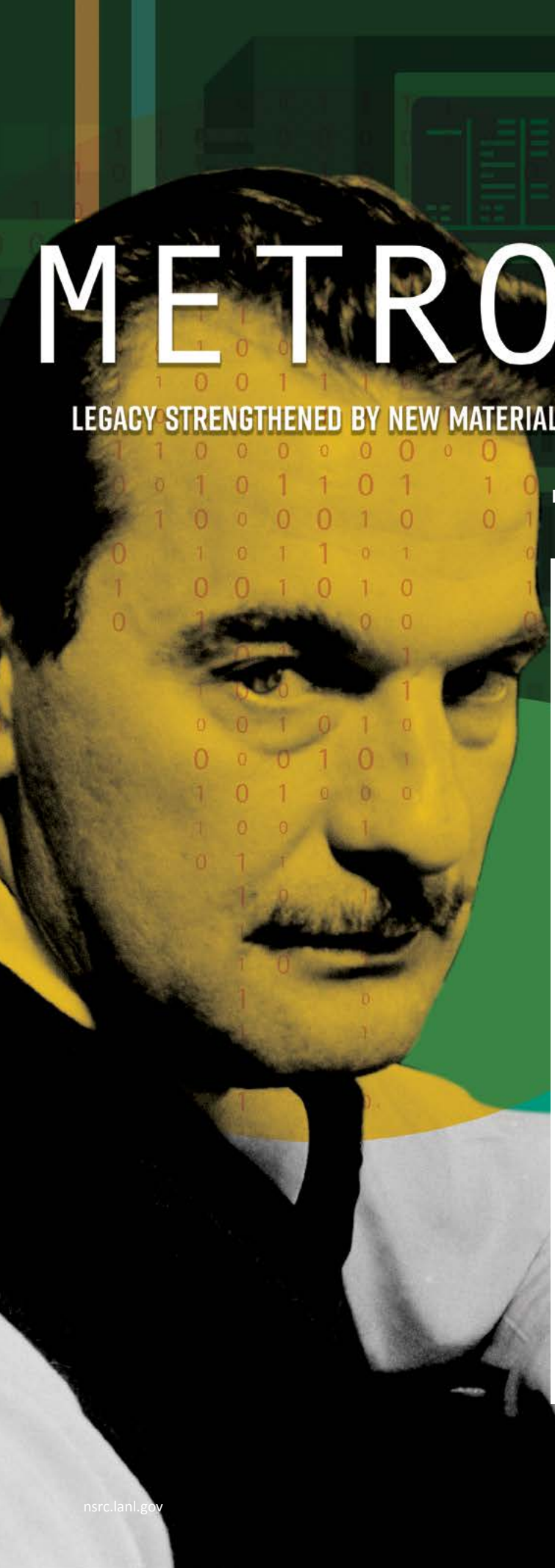
Goeppert Mayer died on February 20, 1972, after suffering from a heart attack and spending weeks in a coma. She was survived by her husband, daughter, and son.

According to the *Scientific American*, before her death Goeppert Mayer told a group of high school girls, "Become fully educated women and promote the understanding of science in any way you can. Our country needs your help. My generation has played its part. It is up to you to carry on."

METROPOLIS

LEGACY STRENGTHENED BY NEW MATERIALS DONATED TO CLASSIFIED LIBRARY COLLECTIONS

By Nicholas Lewis, Historian, National Security Research Center



In 1976, famed physicist Nicholas Constantine Metropolis noted that "from the very beginning of the Los Alamos project, it was inevitable that the Laboratory would suffer total immersion in computing," using his characteristic humor to succinctly summarize the prominent place of computing in Los Alamos's mission and history.

Metropolis (pictured left and far right) himself played no small role in that, exemplified by the Lab's supercomputing center, a postdoctoral fellowship, and the world-famous algorithm that carries his name. And just recently, 22 years after his death, the Lab's National Security Research Center received a significant donation of materials to add to its collections.

"Much like the Lab's computing center that bears his name, it is a fitting tribute to his significance to the Lab," said Danny Alcazar, an NSRC archivist who accessioned the recently donated materials. "Housed and actively being used in the NSRC, it is a resource to researchers seeking answers about the Lab's evolving mission."

Metropolis's vast collection of papers, artifacts, and personal relics acquired over his long career make up today's Metropolis Collections.

THE ROAD TO LOS ALAMOS

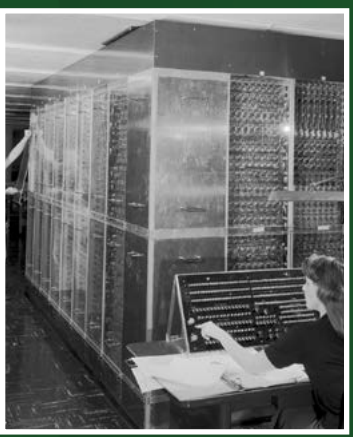
In the 1940s, its mission-driven need for advanced numerical simulations related to weapons development drove Los Alamos to become a leader in computing. Beginning with human computers and IBM punched-card accounting machines, the Lab transitioned to new electronic

computers through the 1950s, with Los Alamos pioneering many of the computer-simulation technologies and methods still used today. Metropolis, known for his stylish bolo ties and wit, was an advocate and guiding force for that pioneering effort.

Born in Chicago in 1915 to a Greek-American family, Metropolis earned his doctorate in physics in 1941 from the University of Chicago. There, he worked alongside would-be Los Alamos physicists Enrico Fermi and Edward Teller and was recruited by J. Robert Oppenheimer to join the secret wartime effort to create the world's first atomic bombs.

After helping to assemble and operate the IBM punched-card machines needed for the wartime implosion weapon's design, Metropolis aided in writing the first large program for the ENIAC, the first electronic, general-purpose computer.

"Naturally, we were mesmerized by the prospects," Metropolis recalled about the advancing field of electronic computing, which became his career-long obsession. In the following years, Metropolis played a vital role in developing the groundbreaking Monte Carlo method of simulation, and led the team that constructed the Lab's first electronic computer, the MANIAC, followed by the MANIAC II.



"Nick seamlessly combined his physics insights with mathematical elegance to make his great contributions," a colleague later said.

Earning a multitude of awards and founding a computational-physics scholarship in his name, Metropolis became a senior Lab fellow in 1981, and the first recipient of the emeritus title at Los Alamos in 1987.

During retirement, Metropolis enthralled staff with stories, such as winning $10 from Lab mathematician John von Neumann in a poker game and claiming he dated artist Georgia O'Keeffe, who was nearly 30 years older.

METROPOLIS COLLECTIONS AT A GLANCE

Metropolis's legacy includes 211 boxes of documents, photos, artifacts, audio tapes, and videos in the NSRC. The collections include his high school diploma and notes from his college physics courses, though the majority of the materials focus on Metropolis's life and work from World War II through the early 1990s. Some highlights from the collections include:

- Correspondence with "Johnnie" von Neumann over the MANIAC and New Mexican food.
- The groundbreaking development of the Monte Carlo method.
- Invaluable audio tapes of talks given by computing pioneers.
- Metropolis's Rolodex, containing hundreds of phone numbers and personal details, including those of physicists Hans Bethe and Richard Feynman.

"These rich materials provide insights into the development of computing technologies and methods that supported the Lab's mission through the Cold War, and highlight the people whose choices and hard work made those developments happen," said NSRC Director Riz Ali. "Plus, they're fascinating snapshots of the Lab's illustrious history."

THE LAB'S NEW ADDITION

Jim Louck, the physicist and longtime friend who managed the now-closed Metropolis Foundation that promoted the study of mathematics and computational science, collected papers and personal effects from Metropolis's final years. Louck gave them to Helen Boorman, a distant relative of Metropolis and current LANL employee. Boorman realized their historical value and donated them to the NSRC.

Now accessioned into the NSRC collections, the donation includes his last LANL badge, video lectures, an unpublished memoir, and transcribed talks, including from his memorial service.

Louck also collected internal Lab correspondence detailing the decision in 2002 to name Los Alamos's cutting-edge supercomputing facility the Nicholas C. Metropolis Center for Modeling and Simulation, which today contains the Lab's most powerful computer systems — a fitting tribute to name the key center for mission-critical stockpile stewardship simulations after someone so directly involved with inventing and preserving the Lab's computing and simulation legacy.

FIRST COMMUTERS

LAB'S FIRST DRIVERS FACED THEIR OWN COMMUTING CHALLENGES DECADES AGO

By Noel Gundestrup, Archivist, National Security Research Center

As long as the Los Alamos Lab has existed, workers have snaked through tight mountain roads to get to their jobs. And, back in the early 1940s, drivers faced even more challenges.

In the Lab's earliest years, drivers worried about getting stuck in the mud, navigating intense switchbacks, or making sure important equipment, such as a disassembled power plant, didn't fall off the back of the truck that was hauling it. Creative solutions could go a long way to get out of a jam.

As many of us return onsite and get reacquainted with commuting following a work-from-home posture during COVID pandemic restrictions, we're looking back at how transportation has changed since the Manhattan Project, which was the U.S. government's top-secret effort to create atomic bombs to help end World War II.

POWER PLANT FALLS OFF THE HILL

Elmo Morgan, who was the coordinator for the construction of the Los Alamos Lab in the early 1940s, needed to meet the growing demand for electricity with an additional source of power.

As such, an out-of-state generating power plant was disassembled, placed on a truck, and taken on its journey up the hill. Early on, the roads were primitive with severe switchbacks. During a turn, the load tipped and the power plant fell off the truck and down the hill, cracking the head of the cylinder block.

In an oral history interview, Morgan described what happened next:

"We're now in winter and Los Alamos is around 7,000 feet in elevation. It was on the slope and there was snow on the ground. One of the workers erected a tent on this steep slope to cover the damaged head of the cylinder block so they could weld it. They didn't dare move it, for fear it would crack even more — maybe break in two. We got it back up to the road and on the trucks, there to its final site."

ROUGH ROADS

Lt. Edward Wilder Jr. came to the Lab to work with explosives during the Manhattan Project. Many of the streets were unpaved and frequently muddy—the facilities and the town were hastily constructed after Los Alamos was chosen as the location for the secret lab.

In the book *Manhattan District History, Non Scientific Aspects of Los Alamos Project Y, 1942 through 1946*, Wilder recounted the time when Manhattan Project leader General Leslie Groves went for a drive with George Kistiakowsky, who was head of the Explosives Division and wasn't happy with the state of roads.

"Most of the roads were gravel, some very rough. Once when General Groves visited Los Alamos, Kistiakowsky took him to S Site (where explosives work was done) in a jeep that had the springs made inoperative by wooden blocks under them. As a result of that trip, the roads over which HE [high explosives] was moved were improved."

OMEGA BRIDGE (LOS ALAMOS CANYON BRIDGE)

After the wartime mission ended with the detonation of the Fat Man and Little Boy weapons over Japan, the Lab's national security mission would continue and the development of more permanent infrastructure began.

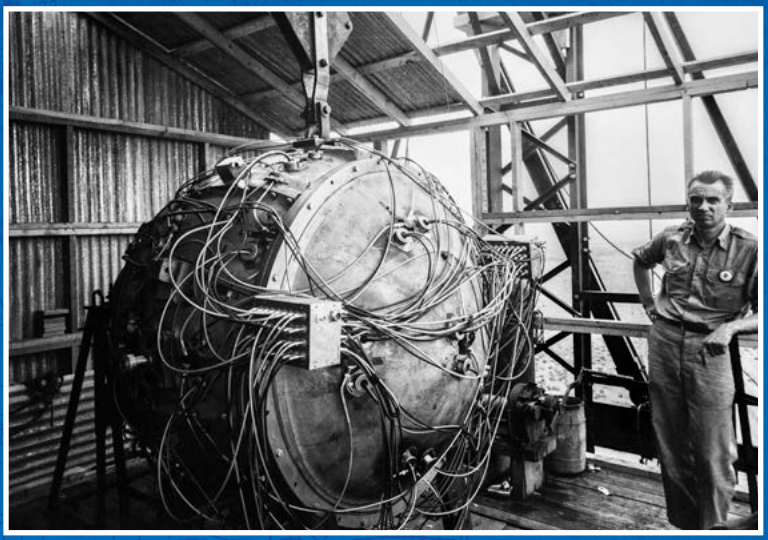
In the 1950s, the Lab's main technical area in downtown Los Alamos was relocated across a canyon to the mesa south of town. The four-lane steel-arch Omega Bridge was completed on August 20, 1951 to carry north- and south-bound traffic over the canyon between downtown Los Alamos and the Lab.

^ ***The Omega Bridge, also called the Los Alamos Canyon Bridge, during construction in the 1950s.***

GADGET and a gadget

How did the world's first atomic bomb get its name?

By Riz Ali, Director, and Alan Carr, Senior Historian, National Security Research Center



^ *The Gadget – the world's first atomic bomb – is an implosion-style plutonium weapon that was tested in the New Mexico desert on July 16, 1945.*

THE WORLD'S FIRST-EVER ATOMIC BOMB IS CALLED THE GADGET.

It was detonated in the New Mexico desert on July 16, 1945 during the Trinity test, verifying that an implosion-type plutonium bomb would be successful when released above Nagasaki just weeks later. That atomic bomb was called Fat Man and it was a weaponized version of The Gadget.

According to the longtime lore, the bulbous-looking Fat Man bomb's name was inspired by British Prime Minister Winston Churchill. After the Thin Man bomb, whose moniker was inspired by the U.S. President Franklin Roosevelt, didn't come to fruition, the gun-type uranium atomic bomb named Little Boy was developed. It was likely dubbed as such because it was smaller in size.

But how did The Gadget get its name? Was it a codename? Just a nickname? A tribute to being the first?

Many Los Alamos veterans, including historian Ellen McGehee, retired scientists Bill Archer and Glen McDuff, and staff of the National Security Research Center (NSRC) recently looked into the origins of The Gadget's name.

THE TERM "GADGET" WAS COMMONLY USED DURING THE 1940S TO DESCRIBE EXPERIMENTAL SCIENTIFIC AND ENGINEERING DEVICES.

As it turns out, Director J. Robert Oppenheimer suggested using the term as work began at the Laboratory.

THE GADGET VERSUS A GADGET

At the April 1943 Los Alamos Primer Conference, physicist Robert Serber used the word "bomb" as he began his now-famous lectures. According to Serber, this prompted Oppenheimer to take action: "After a couple of minutes Oppie sent (physicist) John Manley up to tell me not to use that word. Too many workmen around, Manley said. They were worried about security. I should use 'gadget' instead." The term "gadget" was commonly used during the 1940s to describe experimental scientific and engineering devices.

Because gadget is a generic term, it was applied to multiple weapons types during the war and not exclusively to the Trinity device. For instance, records in the NSRC refer to "the gun gadget" (Little Boy) and "the implosion gadget" (Fat Man). In most cases, though, the term applies to the imploding bomb.

By the summer of 1945, the concept became reality when the Trinity device was tested. At the time, the Trinity device was the only nuclear weapon in the world – quite literally The Gadget. As such, it would be accurate to refer to Manhattan Project-era weapons designs (including gun-type devices like Little Boy) and also implosion systems (like Fat Man) as gadgets, and the Trinity device as The Gadget.

Also noteworthy, the name Fat Man is used as a term for both a type of weapon as well as the specific weapon detonated above Nagasaki, Japan, on Aug. 9, 1945.

Edith Warner

Building Manhattan Project morale through homemade meals

By Patty Templeton, Archivist, National Security Research Center

In 27 months, Manhattan Project scientists created the world's first nuclear bombs. They had a six-day workweek and a goal of harnessing atomic power before Adolf Hitler did. Amidst this constant stress, one way they relaxed was to dine at Edith Warner's tea room.

During the war, Warner expanded her roadside business from a sleepy tourist soda stop into a full-service restaurant exclusively serving Los Alamos scientists. They drove halfway to Santa Fe and stopped at Otowi Crossing near a wood suspension bridge too rickety for Army trucks to cross.

Soon-to-be Lab Director J. Robert Oppenheimer met Warner in the summer of 1937. According to a published collection of her writing, *In the Shadow of Los Alamos*, Oppenheimer said, "We had tea and chocolate cake and talk; it was my first unforgettable meeting."

Years later, after the then-secret Lab was up and running, Oppenheimer convinced his boss, General Leslie Groves, to allow scientists to visit Warner's establishment for dinner, as long as it was closed to the public.

Booked months in advance

Throughout the war, Warner served dinner at $2 a head and didn't accept tips. She served five to six couples a night, sometimes having two seatings. No running water, no electricity, and a wood stove made for a 16-hour shift. According to her 1944 Christmas letter, Warner entertained five nights a week "until my arm rebelled and then my gallbladder," and then she scaled back service to three nights.

Warner had no phone. According to *In the Shadow of Los Alamos*, future Lab director Harold Agnew made in-person reservations, "a minute after midnight when Edith said she had a couple of openings and would give them on a first-come basis on a certain date. He said he wasn't the only one there at that hour with the same idea."

Oppenheimer had a standing weekly reservation. Other regulars included the Lab's top scientists Norris Bradbury, Phillip Morrison, Edward Teller, Stanislaw Ulam, Hans Bethe, Enrico Fermi, and Niels Bohr. All used pseudonyms to make their reservations.

Garden-fresh dining

Warner served garden-to-table dinners by firelight and allowed no alcohol in her home. A typical meal included boiled corn, five varieties of squash (she grew 10), ragout (seasoned meat stewed with vegetables; pronounced ra-goo), and chocolate cake with raspberries.

In *Standing by and Making Do*, Jean Bacher, Lab staff member and wife of physicist Robert Bacher, recalled, "The vegetables were from her own garden, and the bread was homemade, often from home-ground flour…Miss Warner's salads seemed like food for the gods." Twice a week, Warner sold surplus vegetables to women who lived in Los Alamos.

^ ***Edith Warner and Atilano "Tilano" Montoya, pictured here in 1948, were companions until her death in 1951. (Photo from the Palace of the Governors Photo Archives (NMHM/DCA), 047541.)***

A decades-long partnership

The tea room wasn't a solo venture. Atilano "Tilano" Montoya procured the well water, kept the woodstove fed, and assisted with anything else Warner needed.

Warner and Montoya never publicly shared if theirs was a platonic or romantic partnership. They met when she hired him circa 1928 to build an adobe fireplace. Within several years, Montoya became Warner's roommate.

They were an unusual pair. At the time, Warner was in her mid-30s and unmarried in the southwestern wilderness. She was the freight agent for the Los Alamos Ranch School that would became the site of the Lab.

For $25 a month, Warner secured shipments at the Denver and Rio Grande Western Railroad's Chili Line stop at Otowi Crossing. A tea room for tourists was her side business. It became crucial to Warner's income when the Chili Line stopped service in 1941.

Montoya, who was 20 years older than Warner, was a former governor of the nearby San Ildefonso Pueblo. In his younger years, he danced his way across London, Paris, Rome, and Berlin with Frank C. Bostock, a world-famous animal trainer, who had seen the dancers and invited them on his European tour. Montoya was also a carpenter and handyman, and known for his quiet kindness and storytelling.

Warner continued running her tea room through 1946 — after World War II ended in September 1945 and her most-famous diners had left Los Alamos.

"For many," wrote Warner in her 1947 Christmas letter, "the little house at the river was a landmark, for some an experience. For me it was two decades of living and learning. I had hoped to live out my life 'where the river makes noise.'" She would have stayed, but a two-lane modern bridge replaced the wood suspension bridge. There was more traffic, more noise, and steel where gardens and chickens used to be.

Across the river and into history

Warner and Montoya moved into a new home a mile across the river in Los Alamos Canyon. Tony Peña of San Ildefonso Pueblo organized the construction with the help of the Pueblo people and scientists from the Hill, such as physicists Philip Morrison and Nicholas Metropolis as well as second Lab director, Norris Bradbury, and his wife, Lois.

After Warner died of cancer in 1951, Niels Bohr, a Nobel Prize-winning physicist and a restaurant patron she deeply admired, wrote to her sister: "The memory of Edith Warner, a noble personality, and of the enchanting environment in which she lived, will always be cherished by everyone who met her."

^ ***Edith Warner's second home, built by friends from the Laboratory and San Ildefonso Pueblo. The bridge that encroached into her garden space and caused her and Tilano Montoya to move is behind the house on the left.***

Before Warner's eternal rest, she mail-ordered two years' worth of blue jeans from a Montgomery Ward catalog for Montoya. He died almost two years later.

› **Bake Edith Warner's famous chocolate cake! Recipe on Page 29.**

"WE HAD TEA AND CHOCOLATE CAKE AND TALK; IT WAS MY FIRST UNFORGETTABLE MEETING."

— J. ROBERT OPPENHEIMER OF MEETING EDITH WARNER

Edith Warner's Chocolate Cake

2 eggs, beaten
1 cup granulated sugar
2 1/3 cups flour, sifted three times
½ teaspoon salt
2 teaspoon baking powder
1 teaspoon vanilla
½ cup milk
1 ½ ounces baker's chocolate
4 tablespoons butter

Icing

3 heaping tablespoons cocoa
1 ½ cups powdered sugar
½ teaspoon vanilla
2 tablespoons melted butter
About 2 tablespoons coffee or milk

Sift sugar and cocoa together.
Beat all ingredients until smooth.

Preheat oven to 250°F. Grease and flour a 9-inch by 5-inch loaf pan. Mix eggs, sugar, and flour. Mix in milk gradually. Mix in salt, vanilla, and baking powder. Melt together baker's chocolate and butter. Beat all ingredients together until light.

Bake 1 hour total. First 15 minutes at 250°F. Next 15 minutes at 275°F. Remainder of time at 300°F.

Notes:
The recipe is slightly altered for clarity and the measurements are standardized. Baking times and temperatures are approximated. (Edith Warner didn't list oven temperatures or times and used a wood stove.) Increase cake moistness by decreasing baking powder to 1 teaspoon and increasing milk 1 tablespoon. When available, Edith Warner added raspberries.

Atomic Comics

By Kathryn Hoogendoorn, Archivist, National Security Research Center

Spiderman, Captain Atom, X-Men, Hulk, Firestorm, Fantastic Four. What do they all have in common? Atomic energy origins.

The Los Alamos advent of the atomic bomb that helped end World War II in 1945 fueled the imagination of comic book writers. The public's focus on emerging nuclear science made the idea of people-turned-super through radiation wildly popular in many aspects of pop culture.

"Comic books provided an outlet for imagination — a way of coping with a force that was, for most, incomprehensible," said Lab Historian Roger Meade. "Unlike music and movies, which dealt largely with angst, comic books celebrated atomic energy by creating superheroes. In this sense, the imagination and creativity of science and the Manhattan Project fostered the imagination and creativity of the human spirit."

Think about your favorite superheroes. Most of them have origins related to nuclear energy: Spiderman was bitten by a radioactive spider, the X-Men were a result of radiation exposure, the Hulk was created by a fictitious nuclear weapon, the Fantastic Four were created by flying through a radioactive space cloud, among other examples.

^ ***It has been suggested that Marvel comics creator Stan Lee's initial vision of Dr. Richards was based on first Lab Director J. Robert Oppenheimer, who became a celebrity scientist following the release of the secretly created atomic weapons above Japan in 1945.***

From fashion to movies to music, various aspects of pop culture were inspired by the dawn of the Atomic Age. However, pop culture also was used as an educational tool. Following World War II, both the government and private sector worked to educate the public about atomic energy and its valuable contributions. *Learn How Dagwood Splits the Atom!* (1949) is an example of how pop culture was used to explain scientific advancements. General Leslie Groves, who led the U.S. effort to create the atomic bombs, known as the Manhattan Project, was behind *Dagwood* and even wrote the foreword.

There seem to be four broad eras of nuclear science in comic books: American pride, duck and cover, American pride reborn, and deterrence. Each relates to public opinion and ongoing scientific developments.

American Pride

In 1945, the release of the atomic bombs above Japan helped end the world's deadliest war almost overnight. The highly secret creation of the weapons became one of the biggest headlines of the day and Americans were beginning to understand what had been going on in their own backyards.

The same year in the world of comic books, the fictitious Dr. Adam Mann accidentally drank a glass of water laced with uranium-235 and then stumbled into a high-voltage machine. His resulting powers included super strength, flight, and energy blasts from his right hand, where most of the nuclear power was concentrated. He wore a lead glove when he needed to conceal his powers, but otherwise fought communism and crime as Atomic Man. For six issues, Atomic Man encouraged the safe use of science and berated villains' use of scientific knowledge for evil.

A number of other heroes, including Atomic Thunderbolt, Atoman, and Atomic Bunny, used their atomic powers to fight villains and reinforce atomic science as a positive innovation. Even Superman had a run-in with an atomic explosion. In an October 1949 *Action 101* issue, Superman

is forced to take a pill that makes him insane, which is reversed when he accidentally flies into an atomic mushroom cloud.

Duck and Cover and American Pride Reborn

As the Cold War (1947-1989) endured, atomic energy in culture had taken on a new light. With the Soviets' first atomic bomb test in 1949, nuclear deterrence was emerging as a security strategy and comic books continued to use characters and plots as a means to educate the public about atomic science. The change in tone was marked, though. Atomic superheroes became grittier and more problem-plagued. This was, in part, due to a shift in atomic culture, which had been viewed in a positive manner, but now was being influenced by Cold War fears.

In 1961, the Fantastic Four were just a regular team of scientists exploring space until they were exposed to cosmic radiation that gave them super powers. 1962 saw the advent of Spiderman, The Incredible Hulk, and Doctor Solar: Man of Atom. The Hulk and Spiderman live on today in popular culture as two of the greatest comic book heroes, and both have maintained their nuclear origins through the years: Spiderman was bitten by a radioactive spider and given his spider-like powers. The Hulk's creation was the result of radiation exposure from a fictitious weapons test site in New Mexico. Meanwhile, Solar survived a nuclear plant mishap that turned him into The Man of Atom.

Nuclear Deterrence

Atomic science in pop culture continued to evolve as science and perceptions changed. The next large shift in the atomic comics genre occurred as nuclear deterrence principles began to emerge as a more prevalent security strategy. Again, comic book culture became enthralled with atomic energy and reignited the theme in story lines and origins.

The 1980s included a mix of fun stories like *Teenage Mutant Ninja Turtles* (1984), who became today's loveable reptiles through radiation exposure. The era also included cautionary tales like in *Watchmen* (1986), where superheroes live in a pre-World War II alternate history.

As the Cold War came to a close, comic book writers incorporated related themes. Most famously, the character Dr. Manhattan (a member of the Watchmen), came into being while working on a post-World War II project exploring the peacetime uses of atomic energy. The fictitious work was a direct reflection of efforts in nuclear science worldwide. Atomic themes are seen again at the end of the *Watchmen* graphic novel when one of the team members averts a bloody end to the Cold War.

Continued Adventure

As the public interprets advancements in atomic science, pop culture both enables and reflects this. The wonderful world of science will always draw readers and viewers with undivided attention as one adventure after another unfolds in comic books.

More Fantastic Tales:

- *X-Men*
- *Firestorm*
- *Superman and the Atomic Bomb*
- *Before the Watchmen*
- *Radioactive Man*
- *Dagwood Learns to Split the Atom*
- *Godzilla*
- *Atomic Man*
- *The Fantastic Four*
- *Red Star*
- *The Hulk*
- *Planet of the Apes*
- *Fallout*

Atomic Music

By Patty Templeton, Archivist, National Security Research Center

The American public realized the magnitude at which the atom's power could be harnessed following the detonation of Little Boy and Fat Man in August 1945. World War II ended weeks later, but the Atomic Age had just begun.

Society contextualized nuclear science through pop culture, including music, as a way of processing the era's immense technological progress.

From 1945 to the mid-1960s, a niche of songs, commonly referred to as "atomic tunes" or "atomic platters" (platter being another word for record), was a way to understand groundbreaking scientific advancements.

"Music gave expression to society's collective anxiety, fear, and hope in a very uncertain age," said Lab Historian Roger Meade. "Pop culture provided us with a better understanding of how we evolved as a society after World War II."

Here's a collection of ways in which science that originated at Los Alamos National Laboratory impacted Atomic Age music.

The Atomic Bomb

The world's first atomic bombs were secretly created by Lab scientists in just 27 months in a perceived race with Nazi Germany. The American public "reacted to the atomic bomb with a strange mixture of fear, fantasy, and frivolity. This reflected the uneven knowledge of what nuclear warfare actually entailed," according to Tim and Joanna Smolko in "Atomic Tunes."

^ *Los Cuatros was a band that played in Los Alamos during the Manhattan Project. The June 25, 1945* **Daily Bulletin** *announced the band's debut to Lab staff.*

Music genres viewed the atomic bomb through different lenses. Generally speaking, country music brought a patriotic viewpoint to atomic science and used atomic power as a metaphor for a higher power; folk music objected to nuclear weaponry and cautioned against atomic power; the blues emoted the Cold War frustrations of everyday folks; jazz used "atomic" as a synonym for "mind blowing" and steadily took a wary stance on nuclear technologies; and rock and roll emphasized irreverence and a dark humor.

Songs include:

- "**Atomic Cocktail**," Slim Gaillard (1945)
- "**Atomic Power**," Buchanan Brothers/Fred Kirby (1946)
- "**When They Found the Atomic Power**," Hawkshaw Hawkins (1947)
- "**You Hit Me like an Atomic Bomb**," Fay Simmons (1954)

Asked about atomic platters, retired Los Alamos weapons scientist Glen McDuff said, "I think people were seriously concerned about nuclear war and music was one thing that made them less fearful."

Uranium mining

After World War II ended, Lab scientists continued to create and act as stewards of the nuclear stockpile. Procurement of uranium was necessary and the Atomic Energy Commission (AEC) promoted mining uranium ore to build the nation's reserve. In 1949, the AEC published *Prospecting for Uranium* and songs shifted from Cold War concerns to commerce, such as:

- "**Uranium**," Commodores (1952)
- "**Uranium Fever**," Elton Britt (1955)
- "**Uranium Rock**," Warren Smith (1958)

The hydrogen bomb

Early Los Alamos scientists Edward Teller and Stanislaw Ulam designed the first hydrogen bomb, representing the second generation of nuclear weapons design following World War II. The hydrogen bomb was tested in 1952 and the weapon's yield was over 500 times that of Fat Man, the atomic bomb released above Nagasaki.

Songs about the H-bomb include:

- "**The Hydrogen Bomb**," Al Rogers and His Rocky Mountain Boys (1954)
- "**Thirteen Women (And Only One Man in Town)**," Bill Haley and His Comets (1954)
- "**B-Bomb Baby**," The Jewels (1956)
- "**Fifty Megatons**," Sonny Russell (1963)

Americans began their musicological engagement with nuclear weapons with trepidation and admiration, but according to Charles K. Wolfe in *Country Music Goes to War*, "As new and more powerful weapons systems were developed in the 1950s — weapons like the hydrogen bomb — the word 'atomic' began to lose its connotation of ultimacy. It began to appear less in country or pop songs."

The space race

Though Americans became accustomed to the idea of nuclear weapons by the mid-1950s, it didn't make the burgeoning Cold War between the United States and the Soviet Union any less disquieting.

One arm of the Cold War, the Space Race, focused on achieving superior spaceflight capabilities to buffer national security. In 1955, Los Alamos scientists began Project Rover, a nuclear rocket delivery system for a hydrogen bomb. Two years later, the Soviets announced the first successful satellite launch, Sputnik 1. Then, in 1961, President John F. Kennedy addressed a joint session of Congress with his "Moon Shot" speech, declaring that the United States would send an American to the moon. Two years later, Lab scientists launched Vela, a suite of satellites able to detect nuclear detonations.

When the American public and Lab scientists had their eyes on the sky, musicians wrote songs like:

- "**Satellite Baby,**" Skip Stanley (1957)
- "**Sputnik Baby,**" Roosevelt Sykes (1957)
- "**Sputniks and Mutniks**," Ray Anderson and the Homefolks (1958)
- "**Rocket to the Moon**," Sheldon Allman (1960)

A societal shift

As the 1960s advanced, the U.S. media focused on tensions related to civil rights, women's rights, what is today known as LGBTQ+ rights, and conflict in Southeast Asia that became the Vietnam War.

With the signing of the Partial Test Ban Treaty in 1963, nuclear weapons testing went underground. Atmospheric, underwater, and outer-space detonations were prohibited. During this societal and nuclear-testing shift, American popular music focused more on the rights of citizens, anti-war protests, and the counterculture and less on atomic power.

Atomic Movies

By Theresa Berger, Archivist, National Security Research Center

There is no denying the role of the Atomic Age in Hollywood. Nuclear science — and in some cases historical footage captured by Los Alamos researchers — has impacted science fiction cinema. In a 1991 study of nuclear-themed movies, cultural historian Mick Broderick identified over 800 feature-length films with atomic ties, and there have undoubtedly been more made since.

The universe of nuclear cinema includes everything from spy thrillers and superhero action to comedy and satire. Not surprisingly, science fiction has often been used to explore atomic subjects on the silver screen.

J. Robert Oppenheimer, the Lab's first director and "father of the atomic bomb," himself called our nuclear future "undiscovered country" — perhaps, in part, alluding to a new worldwide fascination with a novel and mysterious source of power.

"I believe to a greater or lesser sense, postwar motion picture films provided a means for society to explore that country that Oppenheimer spoke of," said Lab Historian Roger Meade. "Movies gave expression to society's collective anxiety, fear, and hope in a very uncertain age."

Los Alamos Metaphors

There are hundreds of paranormal films, creature features, science-fiction films, or thrillers often defined as low-budget or "B" movies that can trace at least some of their plot or production to atomic power. Examples include desert settings (including filming in New Mexico), government scientists as prominent characters, plots centered on radiation or nuclear testing, and references to the Manhattan Project, which was the top-secret creation of the first atomic devices that helped end World War II.

Some notable examples:

- George Romero's *Night of the Living Dead* franchise (1968 - present), in which reanimation of the dead is explained, in part, through radiation.
- Ishirō Honda's *GOJIRA* (1954), its U.S. release *Godzilla, King of Monsters* (1956), and the subsequent franchise, which has amassed more than 30 films. The longest running franchise in movie history, *Godzilla* has become the embodiment of atomic monster movies. Whether a peaceful underwater creature awakened by atomic testing in the Pacific, or a mutated dinosaur created from radiation in the Marshall Islands, this king of monsters would not exist without his atomic origins.

Real Services the Reel

Both big- and small-budget movies utilized stock footage of nuclear tests from U.S. government news reels and the Lab, which filmed the tests. This footage is part of the collections of the Lab's National Security Research Center.

For example, *Killers from Space* (1954), *Bride of the Monster* (1955), and even the 1998 *Godzilla* remake all use footage from either the 1946 Baker test or the 1952 Ivy Mike test. Author and professor Timothy Noël Peacock wryly suggests that Operation Crossroads, which was made up of two nuclear tests in the Pacific in 1946, is perhaps both the most expensive film shoot and the most expensive special effect in cinematic history.

The significance of these films, however, reaches far beyond plot. They symbolize the convergence of scientific advancement and an everyday medium for everyday people: movies.

As vehicles of popular culture inspired by the broader science and technology of the time,

postwar atomic psychotronics have secured their place as both a film genre and as representations of "nuclear" and "atomic" in the public vernacular. Today, nearly 80 years after the dawn of the Atomic Age, they are an important aspect of history — and they are still entertaining.

"Some of these are so bad, they're good," said Glen McDuff, a retired Los Alamos weapons scientist, who consults on Legendary Pictures' MonsterVerse franchise, which includes *Godzilla*, *King Kong*, and *Mothra*. "Who can't like a giant radioactive-breathing lizard?"

Reflecting on the impact of atomic science in film post-World War II, McDuff explained, "nuclear stuff was a big deal, a big seller" that capitalized on the public's interest in what was happening in Los Alamos and at other national facilities.

^ **Killers From Space *(1954) and* Godzilla, King of Monsters *(1956) are two popular atomic-creature features at the heart of nuclear cinema. The Lab and its earliest scientific advancements have been influential in the horror movie genre.***

Scientific Advancement Continues

Finally, as Dr. Medford, a character not unlike Oppenheimer, explains at the end of *Them!*: "When man entered the Atomic Age, he opened the door to a new world. What we may eventually find in that new world, nobody can predict."

Since then, Dr. Medford's real-life colleagues at Los Alamos have continued to serve at the forefront of scientific advancement. Achievements over the last 80 years include detection of the neutrino (an electrically neutral subatomic particle), development of the world's first supercomputers, pioneering research in biomedical imaging and space exploration, and more.

Atomic Movie Genre:

- *The Day the Earth Stood Still (1951)*
- *Them! (1954)*
- *Attack of the Crab Monsters (1957)*
- *The Beast of Yucca Flats (1961)*
- *Night of the Living Dead (1968)*
- *The Andromeda Strain (1970)*
- *The Fiend with the Atomic Brain (1972)*
- *The Hills Have Eyes (1977, 2006)*
- *Godzilla (1998, 2014)*

BABY TRINITY

PREGNANT PHYSICIST OBSERVES FIRST ATOMIC BOMB TEST, DAUGHTER BORN SHORTLY THEREAFTER

By Brye Steeves, Communications Specialist, National Security Research Center

Elizabeth "Diz" Graves and her daughter, Marilyn, in 1959. Marilyn was nicknamed "Trinity" because Elizabeth, a physicist, was seven months pregnant with her when she witnessed the Trinity test in 1945. A page of Elizabeth's observations from the test are pictured, right.

For Elizabeth "Diz" Graves, the summer months of 1945 were a symbolic intersection of her personal and professional lives.

As a physicist at the then-secret Lab in Los Alamos, Elizabeth participated in the Trinity test — the successful detonation of the world's first nuclear weapon, which took place in the remote New Mexico desert on July 16, 1945.

Her role was to observe the explosion that advanced science into the Atomic Age.

And, Elizabeth was seven months pregnant.

In a cabin approximately 35 miles east of the Trinity test site, the first-time-mother-to-be worked alongside her husband and fellow physicist, Alvin Graves.

They listened to scientist Sam Allison on the radio: "Three, two, one ….," saw the unmistakable success of The Gadget, and then monitored the fallout with survey meters.

Not long after, Elizabeth gave birth to Marilyn, who was affectionately nicknamed "Trinity."

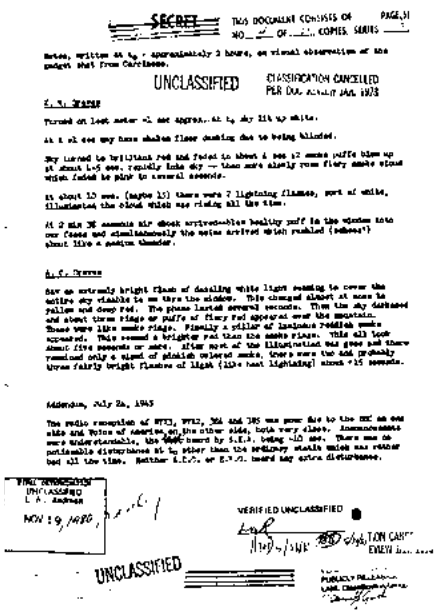
STARTING A CAREER IN SCIENCE

Elizabeth earned her Ph.D. in physics in 1940 from the University of Chicago, where she met and married Alvin. He was recruited to work for the Manhattan Project, the U.S. government's effort to create the atomic bombs and help end World War II, but Alvin would not accept the job unless Elizabeth was also offered a position, according to *Their Day in the Sun: Women of the Manhattan Project*.

"She's a better physicist than I am," Alvin had said, according to his obituary in *The New York Times*.

The couple arrived in Los Alamos in early 1943.

'MIGHT AS WELL GO TO THE LAB'


SECRET

UNCLASSIFIED

CLASSIFICATION CANCELLED

UNCLASSIFIED

Elizabeth was known to be smart, funny, hard working, and maternal.

"She was most outstanding in that she managed to combine successfully a career in physics and raising a family," a friend said in a 1972 article in the *Los Alamos Monitor.*

The Graves would stay at the Lab for their entire careers, with Elizabeth eventually becoming a Group Leader in experimental physics and Alvin ultimately leading the Field Testing Division for 17 years.

John Hopkins, who worked at the Lab as a nuclear physicist for 34 years and was the associate director responsible for the nuclear weapons program upon his retirement, remembers when Alvin preceded Elizabeth in death in 1965.

"Diz threw herself completely into research," Hopkins said. "When I commented about her long hours and dedication, she responded that when there was nothing at home she might as well go to the Lab."

Elizabeth died from cancer on January 6, 1972. She was 55.

After her death, her colleagues shared memories of Elizabeth, including from one of her pregnancies: She went into labor while conducting important experiments in her laboratory, according to the Atomic Heritage Foundation. Elizabeth was able to complete her work while also monitoring her contractions with a stopwatch.

THE TRINITY TEST

At around 5:30 a.m. on July 16, 1945, the world's first atomic device – nicknamed The Gadget (see photos above and below) – was detonated in the New Mexico desert, proving the feasibility of weaponizing energy from the atom. The successful explosion marked the beginning of the Atomic Age.

The power from The Gadget's detonation was equivalent to around 21,000 tons of TNT; its mushroom cloud grew to about 3,280 feet wide with a column of smoke to a height in excess of 40,000 feet.

The Gadget verified that an implosion-type plutonium bomb called Fat Man would be successful when released above Japan. Fat Man was the second of two atomic bombs to be used in combat. The plutonium implosion-type weapon was released above Nagasaki on August 9, 1945. Fat Man was 10,800 pounds, nearly 11 feet long, and 5 feet in diameter.

Little Boy was the first atomic bomb to be used in combat. The uranium gun-type weapon was released above Hiroshima on August 6, 1945. Little Boy was 9,700 pounds, 10 feet long, and just over 2 feet in diameter. It was not tested with a detonation; scientists knew it was a mathematical certainty that it would be successful in combat.

Plutonium & Poetry

By Patty Templeton, Archivist, National Security Research Center

The Lab's first director, J. Robert Oppenheimer, was a man of sonnets and scientific synthesis.

Oppenheimer's work at Los Alamos was defined not only by physics and administrative skill, but also by a life philosophy inspired, in part, by literature. The Trinity test, which took place July 16, 1945 in the New Mexico desert, epitomizes this.

^ *J. Robert Oppenheimer, left center, examines the aftermath of the Trinity test. Years later, Oppenheimer told General Leslie Groves, right center, that he may have been inspired to name the test after lines in a John Donne poem.*

Known as one of the greatest scientific achievements ever, the successful detonation of the world's first nuclear weapon marked the dawn of the Atomic Age. Created in just 27, albeit harrowing, months, Oppenheimer and his team at the Los Alamos Lab worked nonstop on this clandestine effort to help end World War II.

As he had done throughout his life, Oppenheimer continued to foster his love of literature during the Manhattan Project. Two of his influences were John Donne and the Hindu scripture *The Bhagavad-Gita*. Oppenheimer recalled both during the Trinity test.

John Donne and Trinity

Seventeenth-century poet John Donne was one of Oppenheimer's favorite writers and an inspiration during his brief time in Los Alamos.

In 1962, Manhattan Project leader General Leslie Groves wrote to Oppenheimer to ask about the origins of the name Trinity. According to a copy of the letter that is a part of the collections of the Lab's National Security Research Center, Oppenheimer said, "Why I chose the name is not clear, but I know what thoughts were in my mind. There is a poem of John Donne, written just before his death, which I know and love." Oppenheimer then quoted the sonnet "Hymn to God, My God, in My Sickness" about a man unafraid to die because he believed in resurrection.

Oppenheimer continued, "That still does not make a Trinity, but in another, better-known devotional poem Donne opens, 'Batter my heart, three person'd God.' Beyond this, I have no clues whatever."

"Batter my heart" expresses the paradox that by being chained to God, the narrator can be set free. A great force could enthrall the narrator to do greater good. Richard Rhodes, who wrote the book *The Making of the Atomic Bomb*, proposed that "the bomb for [physicist Niels] Bohr and Oppenheimer was a weapon of death that might also end war and redeem mankind."

Bhagavad-Gita and the Bomb

Oppenheimer's copy of *The Bhagavad-Gita*, translated by Arthur W. Ryder, is part of the collections at the Lab's Bradbury Science Museum in Los Alamos. Oppenheimer's handwritten initials appear in the upper right corner of the front endpapers. The book is just one of two of his personal items that the Lab owns and the other is his office chair when he served as Lab Director.

Oppenheimer wanted to read *The Bhagavad-Gita* in the original Sanskrit, which is the primary sacred language of Hinduism.

Oppenheimer the writer

Oppenheimer was a creative writer – and his own worst critic. While at Harvard and Cambridge, Oppenheimer wrote prose in imitation of Anton Chekhov and poetry in search of himself. In a 1924 letter to Herbert Smith, his high school English teacher, Oppenheimer said his writing wasn't "meant or fit for anyone's perusal."

The only poem of note published by Oppenheimer was "Crossing." It appeared in the summer of 1928 in the *Horn & Hound*, a student-founded quarterly journal published in the 1920s and '30s at Harvard University.

CROSSING

It was evening when we came to the river with a low moon over the desert that web had lost in the mountains, forgotten, what with the cold and the sweating and the ranges barring the sky. And when we found it again, in the dry hills down by the river, half withered, we had the hot winds against us.

There were two palms by the landing; the yuccas were flowering; there was a light on the far shore, and tamarisks. We waited a long time, in silence. Then we heard the oars creaking and afterwards, I remember, the boatman called to us. We did not look back at the mountains.

So, as a professor at Berkeley before his time at Los Alamos, he sat in on Sanskrit classes with Ryder, who had published an English translation of *The Bhagavad-Gita*.
It was a book Oppenheimer would gift to colleagues and friends for the rest of his life.

The Bhagavad-Gita expresses a life structured by action. One should detach from desired outcomes and work. The poetic Hindu text is a conversation between Prince Arjuna and the deity Lord Vishnu. Arjuna is anguished at the idea of slaying friends and cousins in war. Vishnu convinces Arjuna to disregard emotional attachments and fear of mistakes. To uphold dharma, the power that upholds the cosmos and society, Arjuna must do his duty, which is fight.

Preparing for the Trinity test, Oppenheimer's thoughts were on the success of the test and the impact of the bomb on his life and the world. Vannevar Bush, the director of the Office of Scientific Research and Development (OSRD) and chairman of the National Defense Research Committee (NDRC), said of Oppenheimer in his 1970 memoir, *Pieces of the Action*: "I simply record a poem, which [Oppenheimer] translated from the Sanscrit [sic], and which he recited to me two nights before [Trinity]:

> In battle, in forest, at the precipice in the mountains,
>
> On the dark great sea, in the midst of javelins and arrows,
>
> In sleep, in confusion, in the depths of shame,
>
> The good deeds a man has done before defend him."

As proposed by historian James A. Hijiya in "The 'Gita' of J. Robert Oppenheimer," Oppenheimer believed, "It was the duty of the scientists to build the bomb, but it was the duty of the statesman to decide whether or how to use it."

Though Oppenheimer never publicly ascribed to the Hindu faith, he regularly quoted *The Bhagavad-Gita*. Most notably, upon seeing the Trinity detonation, Oppenheimer was said to have recalled the line, "Now I am become Death, the destroyer of worlds." The quote, however, has been widely misinterpreted, according to historian Alex Wellerstein, who explains in his blog:

^ *J. Robert Oppenheimer speaks at a ceremony following the release of the Los Alamos-created atomic bombs in combat.*

> "Oppenheimer is not Krishna/Vishnu, not the terrible god, not the 'destroyer of worlds'— he is Arjuna, the human prince! He is the one who didn't really want to kill his brothers, his fellow people. But he has been enjoined to battle by something bigger than himself — physics, fission,

the atomic bomb, World War II, what have you — and only at the moment when it truly reveals its nature, the Trinity test, does he fully see why he, a man who hates war, is compelled to battle. It is the bomb that is here for destruction. Oppenheimer is merely the man who is witnessing it."

Finding meaning

Poetry was ever-present in Oppenheimer's letter writing and in his reactions to current events. We know that, according to the book *American Prometheus* by Kai Bird and Martin J. Sherwin, before the Trinity test, late at night in the base camp mess hall, Oppenheimer sipped coffee, rolled smokes, and read French poet Charles Baudelaire.

T.S. Eliot, a poet Oppenheimer admired and hosted later as the director of the Institute for Advanced Study, famously wrote:

"Do I dare

Disturb the universe?"

Oppenheimer surely did.

Oppenheimer's reading list

Want to step into the mind of J. Robert Oppenheimer? Try reading his favorite books. In 1963, Oppenheimer was asked by *The Christian Century* magazine what books shaped his "vocational attitude" and his "philosophy on life." This is Oppenheimer's (unranked) list:

- *Les Fleurs du Mal* (*The Flowers of Evil*) by Charles Baudelaire
- *The Waste Land* by T.S. Eliot
- *The Divine Comedy* by Dante Alighieri
- *The Bhagavad-Gita*
- *Śatakatraya* (*The Three Hundred Poems of Moral Values*) by Bhartrihari
- *Hamlet* by William Shakespeare
- *L'Éducation Sentimentale* (*Sentimental Education*) by Gustave Flaubert
- *The Collected Works of Bernhard Riemann* by Bernhard Riemann
- *Theaetetus* by Plato
- Michael Faraday's *Notebooks* (Alternately named *Faraday's Diary, Being the Various Philosophical Notes of Experimental Investigation made by Michael Faraday*)

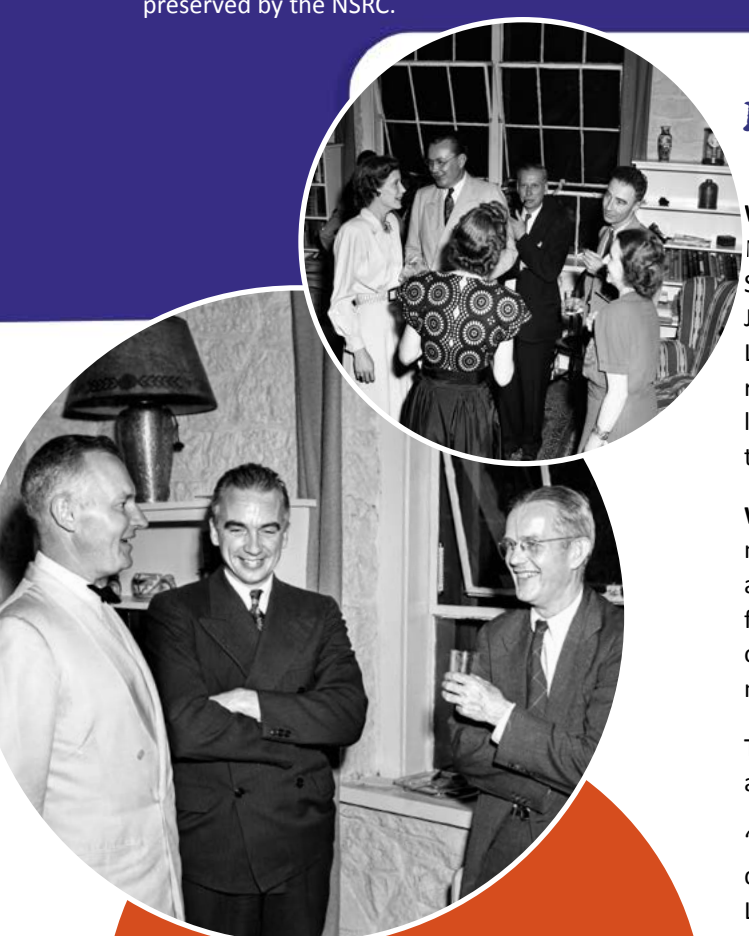
Voyage of Discoveries

By Octavio Ramos Jr., Communications Specialist, National Security Research Center

Films, records, photos, and nearly every other type of media in the Lab's National Security Research Center (NSRC) preserve materials from history's greatest scientific minds that researchers rely upon today in support of the Lab's national security mission.

Just think of these sample relics: A step-by-step manual on how to assemble a Fat Man atomic bomb. A patent application for the world's first nuclear weapons. Classified notebooks of Nobel laureates.

Fascinating finds are down every aisle and around every corner of the Laboratory's classified library. Too great in number to list in their entirety, here are just a few highlights of finds preserved by the NSRC.



^ *A smile on his face, Norris Bradbury (center), who played a principal role in conducting the first detonation of a nuclear device during the Trinity test and would go on to serve as the Laboratory's second director, socializes at the Oppenheimer House.*

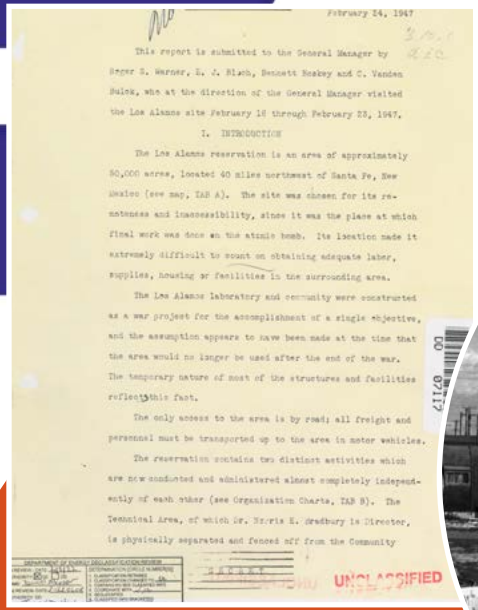
Photos: Partying like it's 1946

What is this? In the autumn of 2021, NSRC archivist John Moore received a request from the Los Alamos Historical Society, which is restoring the home of Director and Physicist J. Robert Oppenheimer on Bathtub Row. (A street in the Los Alamos townsite with homes that had bathtubs; these residences were reserved for the Laboratory's wartime leadership.) The Historical Society needed photographs to help recreate the home as it was during the 1940s.

Why is it important? The NSRC houses more than one million photographic negatives dating back to 1943, and after extensive research, Moore found negatives that featured the inside of the Oppenheimer House. "It dawned on me," Moore said, "that many of these photos likely had not been seen in nearly 75 years."

The photos capture the house's furniture and fixtures, as well as various people enjoying themselves at a party.

"In addition to working to deliver requested reports, documents, photos, films, and other media to internal Laboratory customer inquiries, the NSRC also provides materials to external customers such as the Los Alamos Historical Society," Moore said.



February 24, 1947

This report is submitted to the General Manager by Roger S. Warner, E. J. Black, Bennett Hookey and C. Vanden Bulck, who at the direction of the General Manager visited the Los Alamos site February 18 through February 23, 1947.

I. INTRODUCTION

The Los Alamos reservation is an area of approximately 50,000 acres, located 40 miles northwest of Santa Fe, New Mexico (see map, TAB A). The site was chosen for its remoteness and inaccessibility, since it was the place at which final work was done on the atomic bomb. Its location made it extremely difficult to count on obtaining adequate labor, supplies, housing or facilities in the surrounding area.

The Los Alamos laboratory and community were constructed as a war project for the accomplishment of a single objective, and the assumption appears to have been made at the time that the area would no longer be used after the end of the war. The temporary nature of most of the structures and facilities reflects this fact.

The only access to the area is by road; all freight and personnel must be transported up to the area in motor vehicles.

The reservation contains two distinct activities which are now conducted and administered almost completely independently of each other (see Organization Charts, TAB B). The Technical Area, of which Dr. Norris E. Bradbury is Director, is physically separated and fenced off from the Community

UNCLASSIFIED

A report about the living and working conditions in Los Alamos during the late 1940s is part of the collections in the NSRC. Its introductory page is shown here.

Records: Transition from war to peace

What is this? In a report prepared in 1947, an investigative team at the Atomic Energy Commission (AEC), which preceded the Department of Energy, chronicled the living and working conditions at the Laboratory during the late 1940s. Having assumed authority over the former sites of the Manhattan Engineer District on January 1, 1947, the AEC hoped to assess and address the greatest needs — and problems — faced by the government-owned Laboratory and townsite as they both evolved from wartime facilities to permanent AEC resources.

The report is part of the NSRC's Norris Bradbury Collection, named after the Laboratory's second director, who held the position when it was issued. This now-unclassified report describes issues, such as inadequate and substandard housing, as well as the strained relationship between Laboratory personnel and the University of California, which administered the Lab for the AEC. Charts break down housing and employment figures to supplement the text.

Why is it important? This report provides a detailed description of Los Alamos — the Laboratory, townsite, and community — as it existed following the end of World War II in 1945, including the clashes among groups brought about by the tangled management issues during the transition to the AEC. Because the AEC required an accurate accounting of the facilities under its auspices, the report provides researchers today with a candid look at the conditions of work and life on the hill in the immediate postwar period.

NSRC Historian Nicholas Lewis said, "The report's focus on Los Alamos's most significant problems makes it clear to researchers today how difficult that postwar transition was for the people and organizations involved."

This report provides unusually rich insights into the scale and scope of early postwar issues, how they impacted the operation and cohesion of the Laboratory and the townsite, and how the AEC sought to understand and address those issues.

Audio: From one luminary to another — Oppenheimer talks about Niels Bohr

What is this? In 1964, J. Robert Oppenheimer, the wartime Director of the Manhattan Project's Project Y (the codename for what became today's Los Alamos National Laboratory) returned to the Laboratory to speak about Danish physicist Niels Bohr. Luckily, the audio of this speech was recorded, including the roaring applause when Oppie (as he was affectionately known) took the stage. Introducing Oppenheimer was the Laboratory's director at the time, Norris E. Bradbury, who had worked with Oppenheimer at Los Alamos during World War II when it was secretly creating the atomic bomb.

Listen to this speech:

http://bit.ly/3yO7RJ5

Norris Bradbury (left) served as the Lab's second Director, succeeding J. Robert Oppenheimer (right). Both were physicists and both worked on the creation of the first atomic bombs.

Why is it important? When on stage or in an interview, J. Robert Oppenheimer often exhibited a serious demeanor.

"During this speech, Oppenheimer is more relaxed," said LANL Senior Historian Alan Carr. "He even turns audio technical problems into humorous asides. This speech gives us a quick glimpse at a less visible side of a complex man."

Oppenheimer's subject for this speech, Niels Bohr, enables Oppie to offer his own personal insights, blending historical facts with his own experiences to capture Bohr's specific contributions to the Manhattan Project, physics, and advancing world peace.

Winner of the 1922 Nobel Prize in Physics and considered one of the greatest luminaries in 20th-century physics, Bohr fled Nazi persecution in Europe and eventually made his way to the United States. He served as a consultant on the Manhattan Project, assuming the pseudonym Nicholas Baker so as not to draw suspicion to the top-secret science that was taking place in the mountains of northern New Mexico.

As Carr explained, Oppenheimer used dry humor, something he refrained from in the majority of his public appearances and interviews. Early in the speech, for example, Oppenheimer made quips about needing the help of "the audio wizards" so he could be heard.

In 1964, J. Robert Oppenheimer returned to Los Alamos to address a crowded Laboratory auditorium. Oppenheimer spoke about another luminary of the Manhattan Project, Nobel laureate Niels Bohr (above).

Race, culture, heritage

Manhattan Project Memories

He remembers selling the evening newspaper on the corner and always getting a tip (a nickel or a dime) from legendary physicist J. Robert Oppenheimer.

He remembers his mom trading cooking lessons for his English lessons from the scientists' wives.

He remembers being segregated from white children when cake was served at parties. He ate his slice outside.

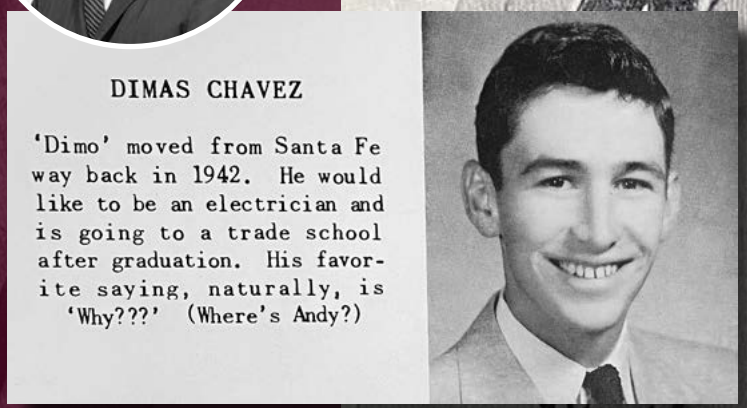
Dimas Chavez moved to Los Alamos as a child in 1942 when his father got a job as a heavy-duty operator in support of the wartime Lab's top-secret science known as the Manhattan Project.

Chavez too would go on to work for the Lab while he was earning his degree from Eastern New Mexico University. Later, he joined the CIA. Chavez is retired now and lives in Maryland.

Listen to his conversation with National Security Research Center Archivist-Historian Madeline Whitacre in which Chavez shares his memories of living in wartime Los Alamos and they discuss race, culture, and heritage.

Listen to the 15-minute podcast.

http://bit.ly/3lsx6ZC



DIMAS CHAVEZ

'Dimo' moved from Santa Fe way back in 1942. He would like to be an electrician and is going to a trade school after graduation. His favorite saying, naturally, is 'Why???' (Where's Andy?)

^ *Dimas Chavez grew up in Los Alamos after his father accepted a job at the wartime Lab. The photos, right, are from the Los Alamos High School yearbook.*

GUARDING SCIENCE

BEFORE AND AFTER WORLD WAR II

By Angie Piccolo, Archivist, National Security Research Center

Badges, checkpoints, security clearances, and a fence that completely surrounded the town. From Day 1 — and for nearly 80 years since then — security at the Lab has been paramount.

Security during World War II was important to maintaining the secrecy of the Manhattan Project, the government's wartime effort to create the atomic bomb. It started with choosing a clandestine location.

Physicist J. Robert Oppenheimer, the Lab's first director, and General Leslie Groves, head of the Manhattan Project, needed a secluded place to build the Lab. They ultimately decided on the mesa on top of Pajarito Plateau after considering several factors, including:

- The small number of inhabitants (a boys' boarding school and a few homesteaders);
- The area's regional isolation and distance from the coast and large cities;
- The easily protected nature of the location.

Lab facilities and the town itself were hastily constructed, though security to protect the top-secret work was never sacrificed.

SECURITY AND RESTRICTIONS

This badge photo of J. Robert Oppenheimer, the Lab's first director, shows Oppenheimer's white round button, which indicated he had the highest level of security clearance.

A nearly 10-foot-tall barbed wire fence was built to surround the Lab's technical areas and adjacent community, where Lab staff and their families lived. Military personnel guarded the entrances to the town 24-hours a day, seven days a week, checking gate passes and controlling who could enter the town.

Incoming mail and other official documents, such as driver's licenses, death certificates, and birth certificates all listed the address P.O. Box 1663 rather than a city name so as not to draw attention to the newly established community.

Restrictions were imposed on scientists and their families to closely monitor their comings and goings. For example, residents had to register travel plans and present their passes at the guarded entry gates in order to travel.

To gain access to the Lab's technical areas and classified knowledge, staff underwent extensive background checks and were assigned color-coded badges indicating their need-to-know and clearance level.

- White round buttons with blue passes (see Oppenheimer's badge photo above) indicated the highest level of clearance and were granted to the scientific and administrative staff and their secretaries.
- Round bronze metal buttons and white passes were assigned to steam-plant operators.
- White oblong buttons with letters and temporary passes were given to official visitors.

The strict security measures, however, were not completely foolproof. In a documentary interview, Richard Feynman, a Lab physicist, Nobel Prize winner, and notorious prankster, recalled: "There would be big holes in the outside fence that a man could walk through standing up and I used to enjoy going out through the gate and coming in through the fence hole and going out through the gate again and in through the fence hole until the poor sergeant at the gate would gradually realize this guy's come outta the place without going in once."

POST-WORLD WAR II

At the end of World War II, the Manhattan Project and the town of Los Alamos were no longer a secret — the two Lab-created atomic bombs had been deployed, helping end history's deadliest conflict on September 2, 1945.

In the months after the war, travel restrictions for residents were removed and access to the town was relaxed. Nonresidents were now allowed to enter the town, but only by invitation. Also, residents could now take photographs in town, although still not within any of the Lab's technical areas. Meanwhile, the Lab's main technical area moved to the south mesa where more space was available for new permanent buildings.

Meanwhile, security evolved in order to meet the changing needs of the Lab's nuclear scientific research. For example, the Atomic Energy Commission (AEC), which took over control of the Lab in 1947, retained the surrounding fence but replaced the military personnel with civilian guards to secure the entrance gates.

Even after the end of World War II in 1945, security remained paramount. Checkpoints, such as the one shown in this photo from 1951, remained and are still in place today.

COLD WAR YEARS

Guarded checkpoints and security clearances remained as scientific nuclear research and weapons development continued into the Cold War (1947-1989). Badges are still required in order to enter into certain areas today.

"There weren't dramatic changes in security clearance policies or badging after World War II except for cosmetic changes to the badges themselves," said Lab Historian Ellen McGehee, adding, "We still have classification categories based on the need-to-know and, then as now, people were vetted following a personnel security review process."

The AEC considered removing fences and gates surrounding the town in the early 1950s, but hesitated due to the ongoing development of the hydrogen bomb and the tense nature of the Cold War. Meanwhile, Los Alamos's sister laboratories in Oak Ridge, Tennessee, and Hanford, Washington, became more open in 1953, with a fence surrounding Oak Ridge coming down four years earlier in 1949.

Eventually, the government decided that it was too expensive to maintain the gates into Los Alamos, although some of the residents resisted, arguing for the "safety of children and grandmothers," according to the book *Inventing Los Alamos: The Growth of an Atomic Community* by Jon Hunner.

The fences, however, came down on February 18, 1957. The main guard station was replaced by a drive-in burger restaurant for a period of time. Los Alamos, a secret city for more than two years and a closed city for 15 years, was now open to the public.

^ ***After World War II ended in 1945, the Lab and Los Alamos were no longer a secret. However, security measures have remained through today, evolving to address the needs of the Lab's national security mission through its nearly 80-year history.***

Harold Agnew

Son donates never-before-seen photos and documents from Lab legend

By Alan Carr, Senior Historian, National Security Research Center

When I arrived at Los Alamos in 2003, the Laboratory's long-retired third director was still a very popular figure.

In fact, he enjoyed an honor typically reserved for only the most-adored pop stars and Brazilian footballers. He was known by just one name: Harold.

Harold Agnew was at the helm from 1970 – 1979, though his career here began when he was still just in his 20s. A scientist, Harold worked on the top-secret Los Alamos project to build the first atomic bombs. Through the years, it was his sense of humor and scientific prowess that made him legendary and beloved.

He died in 2013, though his remarkable life of service is now further documented in the collections of the Lab's National Security Research Center (NSRC).

Harold's son, John, recently donated to the NSRC hundreds of images and about 15 documents that belonged to his dad. The contents are nothing short of remarkable, one-of-a-kind, and, in some cases, hilarious.

He was on the team that produced the world's first self-sustaining nuclear chain reaction, he filmed from an aircraft the rising mushroom cloud after the release of Little Boy on Hiroshima, and he was present for Ivy Mike, the world's first full-scale test of a thermonuclear device (H-bomb).

Now a part of the NSRC, Harold's images and documents from his remarkable career demonstrate he was not only a witness to history, but most certainly a maker of it.

Listen to some of Harold Agnew's best stories.

http://bit.ly/3z7pfbR

Supporting Working Women

WWII LAB OPENED A DAYCARE TO HAVE 'WOMANPOWER' ON STAFF

By Brye Steeves, Communications Specialist, National Security Research Center

Kay Manley arrived in Los Alamos with two degrees and two children.

It was June of 1943 and Kay (pictured left in her Lab badge photo) traveled from Chicago by train with a toddler and a newborn to meet her husband in New Mexico. A physicist, John Manley had been recruited to work at the top-secret laboratory in Los Alamos, which was part of the U.S. government's Manhattan Project to build the atomic bomb and help end World War II.

After her arrival in Los Alamos, Kay – well-educated, highly skilled, and with professional experience – was recruited, too.

"[T]hey were encouraging all the wives to work who could possibly work," she recalled in an oral history interview nearly 50 years later.

The Los Alamos Laboratory had been established almost overnight as the death toll from the world's bloodiest conflict mounted and the United States feared Nazi Germany's own nuclear weapons development.

Rather than recruit even more personnel who would require already scarce housing, Manhattan Project leader General Leslie Groves wanted the wives living in the secret city to join the Lab's payroll.

Motivated by patriotism and likely cognizant of a chance at careers from which they had previously been excluded, many women were eager to accept the jobs. However, Kay and other would-be working mothers still faced at least one very significant obstacle to joining their husbands at the Lab.

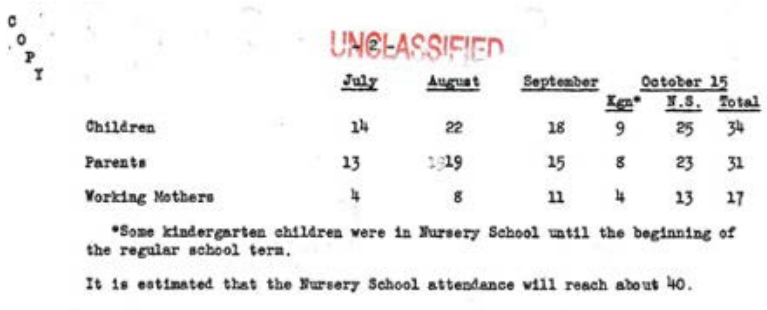
"Then as now," said authors Ruth H. Howes and Caroline L. Herzenberg in *Their Day in the Sun*, "child care presented problems for working women."

Filling a need

In his memoir, Groves noted: "Some of the wives were scientists in their own right, and they, of course, were in great demand, but with labor at a premium we could put to good use everyone we could get, whether as secretaries or as technical assistants or as teachers ..."

The Lab's librarian and only female Group Leader of the Manhattan Project, Charlotte Serber, wrote in her personal accounts, "For the potential working wife, there was one chief worry … Would her children become delinquents?"

To address the need for child care and perhaps further incentivize women, Groves approved a partially government-funded nursery. "[T]he obvious and sufficient justification is the release of womanpower, which the [nursery] school makes possible," according to a 1943 financial report (pictured right).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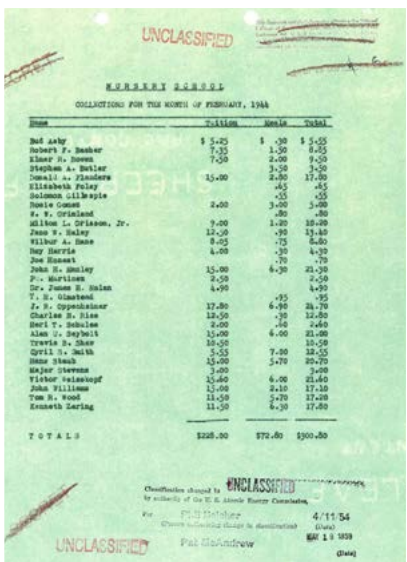
	July	August	September	October 15 Kgn*	October 15 N.S.	October 15 Total
Children	14	22	18	9	25	34
Parents	13	19	15	8	23	31
Working Mothers	4	8	11	4	13	17

*Some kindergarten children were in Nursery School until the beginning of the regular school term.

It is estimated that the Nursery School attendance will reach about 40.

Father of the atomic bomb and two kids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NURSERY SCHOOL

COLLECTIONS FOR THE MONTH OF FEBRUARY, 1944

Name	Tuition	Meals	Total
Bud Ashy	$ 5.25	$ .30	$ 5.55
Robert F. Bacher	7.35	1.50	8.85
Elmer H. Bowen	7.50	2.00	9.50
Stephen A. Butler		3.50	3.50
Donald A. Flanders	15.00	2.50	17.50
Elizabeth Foley		.45	.45
Solomon Gillespie		.55	.55
Rosie Gomez	2.00	3.00	5.00
H. V. Grinland		.80	.80
Milton L. Grisson, Jr.	9.00	1.20	10.20
Jane F. Haley	12.30	.90	13.20
Wilbur A. Hase	8.05	.75	8.80
Ray Herrin	4.00	.30	4.30
Joe Hosset		.70	.70
John H. Manley	15.00	6.30	21.30
F. Martinez	2.50		2.50
Dr. James H. Nolan	4.00		4.00
T. H. Olmstead		.95	.95
J. R. Oppenheimer	17.80	6.90	24.70
Charles H. Rice	12.50	.30	12.80
Meri T. Schulze	2.00	.40	2.40
Alan C. Seybolt	15.00	6.00	21.00
Travis B. Shaw	10.50		10.50
Cyril S. Smith	5.55	7.00	12.55
Emma Staub	15.00	5.70	20.70
Major Stevens	3.00		3.00
Victor Weisskopf	15.60	6.00	21.60
John Williams	13.00	4.10	17.10
Tom N. Wood	11.50	5.70	17.20
Kenneth Zering	11.50	6.30	17.80
TOTALS	$228.00	$72.80	$300.80

UNCLASSIFIED

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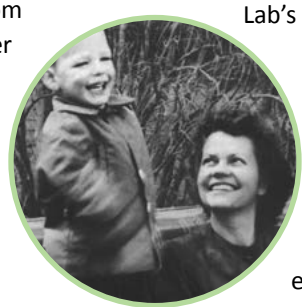
^ ***This 1944 roster lists Lab staff with children who attended the daycare. Among the parents' names is Lab Director J. Robert Oppenheimer, whose son Peter was almost 3 years old at that time.***

The nursery school opened in June 1943 for 2- to 5-year-old children. According to a Manhattan Project report, it was staffed by a director, four teachers, a cook, a maid, and a janitor. The facility had the capacity for as many as 40 children. Parents paid a monthly rate of about $12.50 per child, which, adjusted for inflation, is about $200 today.

In addition to Kay and John Manley, the roster of parents' names also included Lab Director and physicist J. Robert Oppenheimer, whose son Peter (pictured below with his mother) would have been almost 3 years old. In a rare audio interview from 1965, Oppenheimer talks about taking Peter to nursery school on his way to work at the Lab. Oppenheimer and his wife also had a baby girl named Katherine after her mother, but called Toni. She was born in Los Alamos.



For younger children, "maids were provided for child care, and the variety of talent the wives possessed was put to good use," according to *Their Day in the Sun*. Older children attended school in town.

Seizing an opportunity

Women worked in nearly every aspect of the Lab's creation of the atomic bomb. By August 1945, more than 600 women supported the wartime Laboratory, said Ellen McGehee, Lab historian. Population figures for the entire town in late 1945 have been estimated at 8,200, which includes the entire workforce, such as Lab staff, military personnel, and construction and townsite workers, as well as their family members.

Included in the small percentage of working women was of course Kay Manley. With child care, "it was possible to work. So, I worked in one of the statistician's groups," Kay said in her oral history interview.

Known as a "human computer," her calculations contributed to the success of the Trinity test, the first-ever detonation of an atomic bomb, said Nicholas Lewis, NSRC historian. Simulation data aided the design and development choices made by the Lab's scientific and engineering staff for the Trinity device, along with the multitude of other decisions that helped guide Lab scientists throughout the war, he said.

Flexibility to plan work schedules around child care needs also made it easier to recruit female staff, Lewis said. For example, computing personnel Jean Bacher and Mici Teller, both wives of prominent Lab physicists during World War II, alternated working mornings and afternoons in order to trade child care responsibilities around the nursery school schedule.

It is unclear when the nursery school closed (Los Alamos National Laboratory does not have an on-site day care center today), but oversight of the facility was transferred to the Atomic Energy Commission in 1947, along with the Lab's other entities.

"The Manhattan Project offered talented women the opportunities to pursue careers at the forefront of scientific research," Howe and Herzenberg wrote. "They were encouraged to enter occupations and develop skills that had been considered distinctly unfeminine, and the encouragement extended to science. Women rose to the challenge."

McGehee agrees with this assessment.

"These women who were a part of the Lab's earliest workforce are role models for the women who have followed them," McGehee said. "Myself included."

FOLLOWING GENERATIONAL FOOTSTEPS

Serendipitous discovery connects grandfather and granddaughter at the Lab 60 years apart

By John Moore, Image/Media Archivist, National Security Research Center

A third-generation employee learns about family from historic collections.

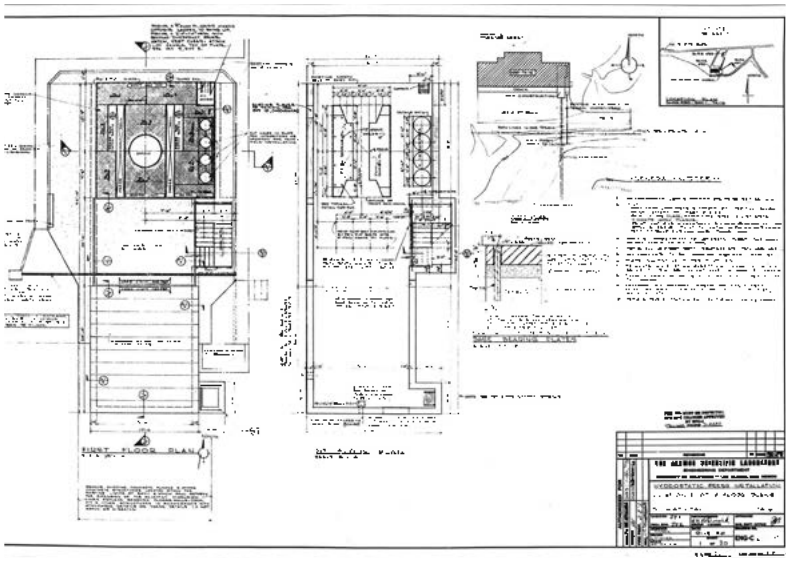
Its enduring national security mission means staff like Cameron Townsend are one of many family members who have careers at Los Alamos National Laboratory.

Cameron is her family's third generation to work at the Lab, starting with her great grandparents, followed by her grandparents (skipping her parents), and now including her and her husband. She didn't know many details about her family history at the Lab until she started working there three years ago and made a serendipitous discovery.

Cameron, who is an architect in the Lab's Environmental Stewardship organization and helps manage the Lab's historic buildings program, was given a drawing from 1960 (see opposite page) to aid in an assessment. The drafter's name listed on the sketch: Ron Turner, her grandfather.

"Who would have thought the first drawing that I would get came from my grandfather? It's so cool that I'm working on the same buildings 60 years later," Cameron said.

She has since come across other drawings by her grandfather,



asked her family members a lot of questions, and wondered if other Lab documents related to her family existed.

Cameron also checked with the Lab's National Security Research Center (NSRC), where staff are often asked for information related to family members who have worked at the Lab. These types of materials are preserved among the NSRC's collections of national security materials because they are important to the Los Alamos legacy. And they're filled with interesting stories from the Lab's earliest days — just like those that Cameron heard from her grandparents.

LOS ALAMOS MEMORIES

Now retired and living near Aztec, New Mexico, Cameron's grandparents, Ron and Pat, grew up in Los Alamos. They also both worked at the Lab.

Ron was a fifth-grader when the Turner family arrived in 1947 from Oak Ridge, Tennessee. Ron's parents were working at the Oak Ridge lab as part of the Special Engineer Detachment (SED) during the Manhattan Project, which was the U.S. government's top-secret effort to create atomic weapons and help end World War II. (Oak Ridge was the site of the pilot plutonium plant and the uranium enrichment plant; Los Alamos designed and built the atomic bombs.)

His father, John Turner, worked as a shift supervisor at Los Alamos, where detonators were produced during World War II and then where explosive shots were conducted after the war.

Ron remembers when the town was still enclosed with a protective fence: "In those days we'd also go into the canyons, take .22s and shoot cans. The army ran the gates, but never said much about us playing; we were just kids."

In 1952, Pat's family moved to Los Alamos from Colorado. Her father, William Eaton, was a machinist. Today, Pat describes Los Alamos as the "best place to grow up ever."

Ron and Pat attended what is still the only high school in town. Ron was part of the first graduating class to complete all grades. Pat recalled that in high school, she and classmates "climbed and wrote on the water towers and we were even the first to make the L.A. sign on the mountains."

Ron and Pat Turner met in high school. (Courtesy photo.)

Their social circles intersected when they were teenagers; their relationship began with a game of spin the bottle, followed by Pat's frequent visits to Ron's ice cream cart, which often passed by her house.

One incident in particular from her childhood sticks with Pat: "In high school, we had a sleepover and prank-called a teacher because he wouldn't chaperon a dance that we wanted to have." The Los Alamos police found out and when she interviewed years later for a security clearance at the Lab, the incident was in her records.

FOLLOWING THEIR FAMILY'S FOOTSTEPS

Both Ron and Pat began their careers at the Lab in the mid-1950s. With Pat's typing and shorthand-writing skills, she started right after high school. At one point, Pat was part of the Theoretical Division (T Division), where she worked for famed scientists Hans Bethe and Stan Ulam, among others.

Pat and Ron on their wedding day in 1957. (Courtesy photo.)

"We had old electric typewriters," Pat said. "We'd do so many equations that we had to change the keys out to get the specific symbols for the formulas that we were typing."

Pat's brother, Ed Eaton, also worked at the Lab in chemistry and metallurgy. Meanwhile, Ron was "brought on to draft components and parts for the device systems that were developed onsite at the Laboratory," he said.

Six decades later, several of those drawings have made their way to Cameron.

"There are probably more that I just haven't happened to come across yet," she said.

The family was certainly surprised by the coincidence, which gave Ron and Pat an opportunity to share these stories with their granddaughter.

NATIONAL SECURITY RESEARCH CENTER

POWERING TOMORROW'S INNOVATIONS TODAY

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The NSRC is the classified library at Los Alamos National Laboratory. It is one of the largest libraries in the United States and houses the nation's most-comprehensive collection of materials related to the development, testing, and production of nuclear weapons. The NSRC's specialized staff supports Los Alamos and other National Nuclear Security Administration's labs and sites, as well as partners in the Department of Defense.

NATIONAL SECURITY RESEARCH CENTER

LOS ALAMOS NATIONAL LABORATORY

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The National Security Research Center's collections include the badge photos of over 1,400 Manhattan Project staff who worked at Los Alamos. The photos of today's staff featured here replicate that early, now-iconic style as a tribute to the first worforce.

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LA-UR-22-25226

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