

2018 Annual Report

Nevada Test Site Historical Foundation



Organizational Profile

VISION

Members of the Nevada Test Site Historical Foundation work as responsible stewards of the U.S. defense legacy by preserving the history of the Nevada Test Site and assuring public access by future generations to resources that define the nation's nuclear testing program.

MISSION

NEVADA TEST SITE HISTORICAL FOUNDATION

The mission of the Nevada Test Site Historical Foundation is to preserve and foster public accessibility to the history associated with the Nevada Test Site and the nation's nuclear weapons testing program. The NTS Foundation promotes and supports cultural, educational, and scientific programming to encourage the development and public exchange of views regarding the Nevada Test Site and its impact on the nation.

NATIONAL ATOMIC TESTING MUSEUM

The mission of the National Atomic Testing Museum is to objectively preserve and interpret the nuclear history of the Nevada Test Site and to educate and inform current and future generations about its impact on 21st Century nuclear science and the world.

CORE VALUES

The Foundation is dedicated to enhancing and supporting the programs and activities depicting the history of our nation's nuclear weapons testing program and recognizing the contribution of its people. In so doing, we affirm our dedication by:

- » Applying creativity and commitment in support of activities that foster open communication and public awareness
- » Pledging ourselves to high standards of integrity and ethics in accomplishing our work
- » Providing a model of excellence in all that we do for others to emulate
- » Instilling a spirit of teamwork and cooperation within the Foundation and among partners
- » Encouraging and rewarding innovation and risk-taking

GOVERNANCE

The Nevada Test Site Historical Foundation management is vested in a Board of Trustees. The Trustees are responsible for Foundation policies and delegate responsibility for oversight of day-to-day operations to the Executive Committee. The Board consists of 30 members who serve for terms of three consecutive years or until their successors are elected.

Table of Contents

Inside Cover	Organizational Profile
1	From the Chairman and Executive Director
2	Operations Report
6	Financial Report
7	Board of Trustees FY 2018
9	Museum Staff and Volunteers
10	Nevada Test Site Historical Profile: Mahlon E. Gates
16	Nevada Test Site Historical Profile: Robert R. Brownlee
Back Cover	2018 Corporate Sponsors

ABOUT THE COVER ART

Sinking of the Saratoga, 1946, by Arthur Beaumont, depicts the USS *Saratoga* during a test of Operation Crossroads. The painting is on loan to the museum from the Naval History and Heritage Command in Washington, D.C. Reprinted with generous permission from Arthur's son, Geoffrey Beaumont.

From the Chairman and Executive Director

Dear Members,

2018 was another great year for the Nevada Test Site Historical Foundation and the National Atomic Testing Museum! We owe our success to the generous support of our members, donors, partners and volunteers. We are especially grateful to our Department of Energy/National Nuclear Security Administration/Nevada Field Office partnership, which has provided the space that we occupy in the Desert Research Institute's Frank Rogers Building since we opened 13 years ago—a major contribution. We had some significant accomplishments this past year.

Visitor growth continues. We exceeded 75,000 visitors in 2018, which is a 12 percent increase from 2017. We are especially pleased with the addition of our new and renewing corporate supporters, a vital part of our ability to sustain operations. In the coming year, we will place renewed emphasis on growing our individual membership base to previous levels with specific strategies outlined in the Membership section.

Our Distinguished Lecture Series had a banner year. It brings to Las Vegas the best and brightest in their fields, from science to history, sharing their knowledge and experience on a wide range of topics. We are grateful for a Nevada Humanities grant that is partially underwriting the cost to professionally videotape these lectures; all are now posted on our webpage.

We opened three significant new exhibits this year. All of them free to the public.

- First, we hosted an exhibit prepared by the United Kingdom's Atomic Weapons Establishment commemorating the 60th anniversary of the 1958 U.S. and U.K. Mutual Defense Agreement. There is a long history of joint cooperation in the nuclear field between our two nations that goes back to the very beginning of the nuclear age. We thank the Ministry of Defense of the United Kingdom of Great Britain and Northern Ireland for this outstanding exhibit and the AWE's International Liaison Office manager Steve Fisher's tireless efforts to bring such an important display to our museum.

- Second is a special art exhibit of seven watercolors depicting Operation Crossroads. The vibrant watercolor paintings on display come from a historic collection of works dealing with that 1946 nuclear test series, and are painted by famed United States Naval Artist Arthur Beaumont. Beaumont served the United States Navy as an artist for almost 50 years. The paintings on exhibit were done on site during the Crossroads tests by Arthur Beaumont, and two special oil paintings in the exhibit were completed by his colleague, Charles Bittinger. These paintings were shown to President Truman after Operation Crossroads and have not been displayed to the public since the 1950s. We give our great thanks to Arthur's son Geoffrey Beaumont for this exhibit.

- Our third new exhibit is titled: "Back to the Future of Technology." This exhibit showcases the lengthy history of consumer electronics and computing technologies within the Las Vegas Valley and around the world. Las Vegas has always had a unique connection to technology serving as the host for numerous technology trade shows and conferences including the Consumer Electronics Show (CES) and COMDEX over the years. We thank Sands Corporation technology experts Matt Heffelfinger and Board Trustee Cory Mazzola for putting this together. This will be an ongoing and expanding exhibit.

Finally, but most important, we continue to make preparations for the long-term sustainable future of the museum. Work is being done on how we can significantly increase the number of visitors coming to experience our museum. In conjunction with this, implementing the ideas from the master plan study done last year on how to better tell the story of U.S. Nuclear Weapons Testing continues. We believe it is important to provide the public with exhibits and updated technology that reflect not only our nuclear testing history but also current national nuclear security programs. With that in mind, we are now planning a major capital campaign to fund these extensive renovations in a manner worthy of our Smithsonian Affiliate designation. We expect in 2019 to begin implementing changes that will significantly impact the future path of the museum.

Warm Regards,

John Longenecker
NTSHF Chairman

Michael Hall
NATM Executive Director

Troy Wade
NTSHF Chair Emeritus



Operations Report

BUSINESS AND FINANCE

In 2018, admissions surpassed 75,000 visitors, a 12 percent increase since the previous year. Museum store sales continued to increase as well, thanks to enhanced product offerings and merchandising. Our net revenue exceeded our expenses, in large part because of the increases in admissions and store sales and, of course, the generous in-kind support of the Department of Energy.



A full audit of the foundation's financials was conducted in 2018 resulting in a positive report. A few recommendations were made, and those have already been implemented. Expenses for 2018 were largely in line with budget expectations. While salary and payroll expenses were less than anticipated due to staff realignments, that was offset by some increases in contract support to strengthen the Foundation's fundraising capabilities. 2018 also saw an upgrade of our accounting software and hardware, resulting in improved financial reporting. We will continue to keep the operations side of the museum segregated from the planned Capital Campaign so that both can be tracked accurately, as it is just as important to know the health of the current organization as it is to make sure that every dollar that comes during the campaign is tracked and spent appropriately with the maximum effect.

FOUNDATION MEMBERSHIP AND CORPORATE SUPPORT

The Foundation continues to focus on developing strategies to strengthen its membership/support base, both individual and corporate.

As of January 2018, the Foundation had 380 members, an upward trend from the previous year. By December 2018, however, membership had decreased 8 percent, due largely to non-renewals linked to memberships offered at deep discounts and as gifts. Emphasis in the coming year will be placed on implementing an automatic membership renewal option and enhancing the web platform supporting the membership program. Current initiatives to enhance membership include expanding outreach through the NATM's popular e-Blast newsletter and encouraging current members to help us reach our goal of 500 members by the end of CY 2019.

On the corporate side, the Foundation welcomed several new or renewing donors/members, including:

Mission Support and Test Services, LLC	\$25,000 (Diamond Level)
Huntington Ingalls Industries	\$25,000 (Diamond Level)
Jacobs	\$15,000 (Donation-60th MDA event)
Chenega Support Services, LLC	\$10,000 (Platinum Level)
Longenecker & Associates	\$5,000 (Gold Level)
SOC	\$5,000 (Gold Level)
Dr. Johnny Foster	\$5,000 (Gold Level)
Critical Nurse Staffing	\$5,000 (Gold Level)
Eagle Research Group	\$5,000 (Gold Level)
JGMS	\$2,500 (Silver Level)
AECOM	\$1,000 (Copper Level)
Thorndal & Armstrong	\$1,000 (Copper Level)
Spencer Springs Animal Hospital	\$1,000 (Copper Level)
The Oughtred Society	\$1,000 (Copper Level)

2 Our profound thanks to the individuals and companies who so generously support the Foundation and the NATM on a continuing basis!

EXHIBITS AND COLLECTIONS

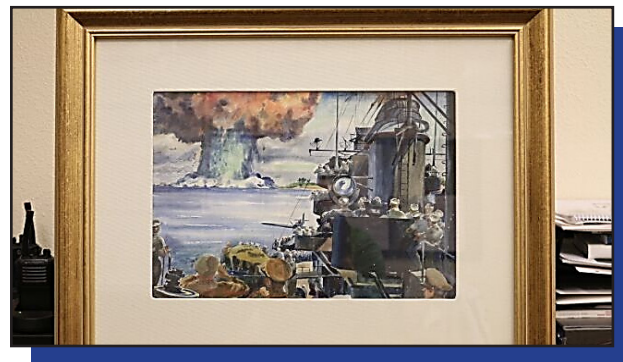


Three new temporary exhibits made their debut inside the museum in 2018. An international exhibit commemorating the 60th anniversary of the 1958 U.S. and U.K. Mutual Defense Agreement was brought to us generously by Steve Fisher, the International Liaison Office manager of the U.K.'s Atomic Weapons Establishment, and the U.K. Ministry of Defence.

The exhibit celebrated the long history of joint cooperation in the nuclear field between the U.S. and U.K., tracing its history from the beginning of the nuclear age. A dinner to celebrate the exhibit opening took place in September with several dignitaries in attendance, including keynote speaker Ambassador Linton Brooks, former administrator of the National Nuclear Security Administration.

The second exhibit is a vibrant watercolor display comprising work from famed U.S. Naval artist Arthur Beaumont depicting Operation Crossroads. We owe our thanks to Arthur's son Geoffrey Beaumont for coordinating this exhibit, who has worked tirelessly to preserve his father's legacy; he worked with Admiral Samuel J. Cox, Commander of the Naval History and Heritage Command in Washington Naval Yard to secure us a sample of this noted collection of nuclear-related works. We also thank head curator Gale Munro of the National Museum of the United States Navy.

Our third new exhibit, "Back to the Future of Technology," was coordinated with board trustee Cory Mazzola of Sands Corporation and his colleague Matt Heffelfinger. The exhibit showcases the lengthy history of consumer electronics and computing technologies within the Las Vegas Valley and around the world through artifacts such as the original production Macintosh. This exhibit will be expanded in the coming year.



The middle of the year brought a photography exhibit featuring Hiroshima and Nagasaki, loaned to us by Kimiko Saki, the widow of U.S. Marine Corps photographer Joe O'Donnell. Painting by Test Site veteran and museum docent Dale Cox were also on display in the Atomic Lounge.

Our stockpile stewardship and Area 51 exhibits continue to evolve and both will be enhanced in the coming year. To that end, our B-61 bomb was moved to the Silo Theatre, as it remains relevant to the stockpile stewardship story. Artifacts and objects of interest related to the pop culture of Area 51 went on display, as did the first iteration of the "World of Radiation" exhibit, which will continue to evolve in the coming year. We offer our thanks to Paul Pate and the facilities team from Desert Research Institute for supporting the coming and going of exhibits and relocating artifacts.

The museum hosted more than 25 researchers in 2018, including five graduate thesis students,

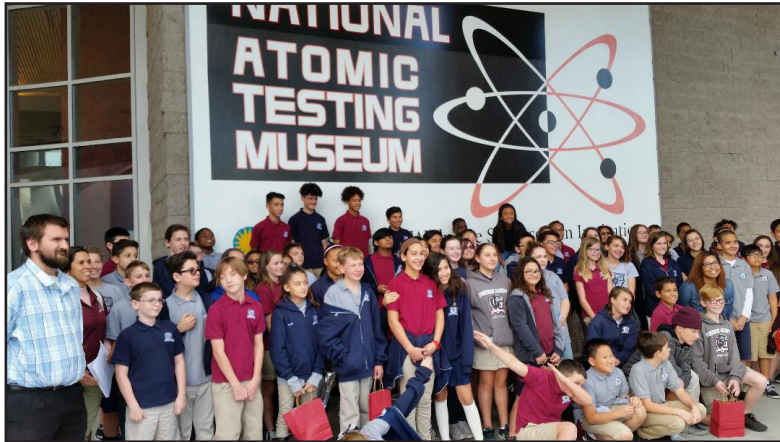
Operations Report

EXHIBITS AND COLLECTIONS (CONTINUED)

two military researchers who were building lectures, and support research for several journalists working on nuclear-testing related stories.

In 2018, the museum received a large variety of donations including, more than 45 survey meters/Geiger counters, mimeographs from 1945, photographs, Las Vegas and Test site memorabilia, maps, books and several oral histories.

EDUCATION



In 2018, we worked to continue and evolve the education programs our visitors have come to value, including the Distinguished Lecture Series (see section below). In January, with the generous support of Longenecker & Associates, we partnered with the Las Vegas-Clark County Library District to sponsor a production of Matheatre's "Curie Me Away," a musical focused on the life and work of Marie Curie.

We continued our partnership with Clark County School District to offer regular professional development seminars for new CCSD teachers; these seminars are led by trustee Jack Doyle and the feedback has been overwhelmingly positive.

We continued our participation in the Las Vegas Science & Technology Festival, partaking in three events: Science Is Everywhere Day, which offered hands-on science demos to visitors and free museum admission; May the Science Be with You, a Star Wars-themed evening offered in partnerships with Desert Research Institute; and the Festival Expo, a day-long exhibitor event where we had several hands-on science demos to share with students from across Southern Nevada. Our collective reach for these events was more than 15,000 people, most of them students. Our thanks to Mission Support and Test Services (MSTS) for joining us in festival events this year.

In August, we presented our annual "Journey Through Japan" family day. This free event, offered in partnership with many Japanese community groups and the Office of the Honorary Consul of Japan in Nevada, exposed families to many aspects of Japanese culture—from learning to fold origami to using chopsticks to writing their names in Japanese calligraphy. Guests were treated to extraordinary performances of Japanese dance and Taiko drums. Findlay Honda Henderson generously sponsored our event this year. Most notably, more than 5,000 students toured the museum in 2018, all of whom were guided by our dedicated team of docents. MSTS donated \$5,000 to underwrite field trips for CCSD students, helping to boost the number of students who are able to visit the museum.

DISTINGUISHED LECTURE SERIES

2018's Distinguished Lecture Series was incredibly popular, and attendance at each lecture was high throughout the year. Once again we welcomed the best and brightest in their fields to speak to our engaged audiences on topics of science and history. We kicked off the year with a panel discussion to commemorate the 40th anniversary of Operation Morning Light; several veterans of that mission joined us to share their stories from the mission. In March, Los Alamos National Labo-

DISTINGUISHED LECTURE SERIES (CONTINUED)



ratory's Patrick McClure spoke about the Kilo-power Project, a collaboration between LANL and NASA on a small nuclear reactor for use in space. Later in March, Georgetown University's Dr. Oriana Skylar Mastro spoke about China and U.S. diplomacy regarding North Korea's nuclear program. In April, the International Spy Museum's historian and curator Dr. Vince Houghton spoke on World War II nuclear intelligence. Geoffrey Beaumont joined us in May to speak about the career of his father, U.S. Naval artist Arthur Beaumont. In June, more than 250 people attended scientist Ben McGee's Asteroid Day lecture. Former Sand-

ia National Labs' director Dr. Tom Hunter spoke in October about the team he led from the national labs to support the Gulf Oil Spill. The year concluded with a panel discussion commemorating the 30th anniversary of the U.S. and Soviet Joint Verification Experiment.

VISITORS AND PARTNERSHIPS

Museum visitor numbers remained strong in 2018—more than 75,000 people visited the museum, a 12 percent increase from the previous year. Most of our domestic guests visited from California, Arizona, and Utah. Our international guests in 2018 hailed from Canada, the United Kingdom, Australia, Germany, France, Italy, Japan, Spain, Brazil, India, and China. Most guests are in the 34-65 age demographic, and family pack purchases increased in 2018, along with visits by senior citizens.

In September, we again participated in Smithsonian Museum Day Live!, where we offered free entrance to those who requested tickets through the Smithsonian program, and saw our highest ever attendance through this event—more than 1,000 people came through the museum that day!



We attribute our strong visitor numbers in large part to the solid community partnerships developed by our director of marketing and business development, Kathy Powell. In 2018, we worked with numerous organizations such as the Mob Museum, Springs Preserve and Nevada State Museum, Friends of the Nevada State Museum, International Spy Museum, American Alliance of Museums, Junior Achievement of Southern Nevada, Cheryl Wagner and the Clark County School District, Silver Sevens, Las Vegas Sands, City of Las Vegas, Embassy Suites, Gray Line Tours, Nevada Ballet Theater, UNLV, and the Las Vegas Convention and Visitors Authority.

We must also offer our sincere thanks to Desert Research Institute (DRI), U.S. Department of Energy/National Nuclear Security Administration (DOE/NNSA), and Mission Support and Test Services (MSTS) for their extensive support of the museum and its mission; so much of what we accomplished in 2018 was due to the support of these important organizations.

Financial Report

NEVADA TEST SITE HISTORICAL FOUNDATION

BALANCE SHEET AS OF DECEMBER 31, 2018*

ASSETS

CURRENT ASSETS

Checking/Savings	571,015.97
Accounts Receivable	168.00

TOTAL CURRENT ASSETS

571,183.97

FIXED ASSETS

38,096.39

OTHER ASSETS

106,863.64

TOTAL ASSETS

716,144.00

LIABILITIES & EQUITY

LIABILITIES

70,321.03

EQUITY

645,822.97

TOTAL LIABILITIES & EQUITY

716,144.00

PROFIT & LOSS, JANUARY THROUGH DECEMBER 2018*

ORDINARY INCOME/EXPENSE

INCOME

4010 • Museum Admissions	784,321.38
4110 • Bank Interest	389.99
4210 • History Walk Brick Sales	6,115.00
4300 • Donations	118,723.27
4410 • Special Events	31,498.77
4510 • Grants	2,383.00
4600 • Membership	110,499.33
4700 • Museum Store Sales	295,228.49
4855 • In-Kind Contribution DOE	491,060.04
4900 • In-Kind Other	247,000.00
4940 • License Plate Sales	30,070.35

TOTAL INCOME

2,117,814.62

COST OF GOODS SOLD

140,001.76

GROSS PROFIT

1,977,812.86

EXPENSE

59900 • POS Inventory Adjustments	10,181.09
6000 • Payroll Benefits	19,760.63
6030 • Outside Services	148.08
6560 • Salary/Payroll Expenses	587,994.82
7020 • Advertising	209,663.45
7021 • In-Kind Advertising	247,000.00
7023 • Education/Outreach	445.97
7026 • In-Kind Rent	461,000.04
7027 • In-Kind Utilities	30,060.00
7030 • Bank & Credit Card Fees	26,255.56
7042 • Refreshments, Lunches, Dinners	3,127.75
7050 • Consultants	73,863.26
7060 • Depreciation	11,587.72
7080 • Equipment Rental	902.05
7090 • Equipment Repairs & Maintenance	4,925.00
7101 • IT Contract Agreements	39,865.00
7102 • Contract Agreements-Accounting	7,484.00
7103 • Contract Agreements-Audit	18,756.00
7200 • Exhibit Expense	3,110.12
7220 • History Walk Brick Expense	1,040.00
7240 • License, Fees, & Permits	1,480.63
7250 • Automobile Expense	6,000.00
7270 • Administrative Expense	3,546.30
7280 • Postage & Shipping	4,051.98
7290 • Printing & Reproduction	4,004.79
7300 • Memberships & Subscriptions	4,374.59
7420 • Special Events Expense	22,094.71
7430 • Supplies	30,959.98
7445 • Software/Hardware/Training	28,663.94
7446 • Website	3,799.25
7470 • Insurance	23,593.92
7500 • Storage	4,074.70
7600 • Janitorial Service	26,075.00
7620 • Telephone	4,566.29
7640 • Utilities	396.00
7650 • Internet Access Server	3,141.00

TOTAL EXPENSE

1,927,993.62

NET ORDINARY INCOME

49,819.24

OTHER INCOME/EXPENSE

Other Income	2,495.93
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Other Expense	10,726.08
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NET INCOME

41,589.09

Board of Trustees FY 2018

NEWLY ELECTED TRUSTEES DENOTED IN BLUE

OFFICERS

JOHN LONGENECKER, Chairman (2019) – President, Longenecker & Associates; former member, Board of Directors, Nuclear Energy Institute; former Chairman, General Atomics International Services; former DOE Deputy Assistant Secretary, Uranium Enrichment

TROY E. WADE, Chairman Emeritus (2019) – Founding member; former Department of Energy (DOE) Acting Assistant Secretary for Defense Programs; former Deputy Manager, Nevada Operations

NELSON COCHRANE, Vice Chairman (2021) – NTSHF Executive, Governance, and Finance Committees; former technical manager with EG&G, Lockheed-Martin Nevada Technologies and National Security Technologies, LLC at the Nevada Test Site

LINDA SMITH, President (2019) - Founding member; NTSHF Executive, Finance, Governance, Membership and Nominating Committees; former Acting Deputy Manager, Nevada Operations Office

CHARLES F. COSTA, Vice President (2020) – NTSHF Executive Committee; scientific consultant, National Security Technologies, LLC; former Test Director, Los Alamos National Laboratory; Captain (Ret) U.S. Public Health Service

LINDA RAKOW, Secretary (2021) – NTSHF Executive and Education Committees; former CFO, SLAC National Accelerator Laboratory and Lawrence Livermore National Laboratory

PAT ARNOLD, Treasurer (2019) – NTSHF Executive Committee; Chair, NTSHF Finance Committee; Principal, Covelop, Inc., San Luis Obispo, CA; grandson of Herb Grier, founder of EG&G, Inc.

TRUSTEES

ROBERT J. AGONIA (2019) – Founding member; NTSHF Governance and Education Committees; former DOE Nevada Operations Office Industrial Relations Director; former member, Peace Corps

NICK C. AQUILINA (2020) – Founding member; former Manager, DOE Nevada Operations Office; former Manager, DOE Savannah River Operations Office; former Deputy Manager, DOE Idaho Operations Office

JOHN C. BENNER (2020) – Vice President, Mission Support and Test Services (MSTS); former Los Alamos National Laboratory scientific leader for 25 years, leading the organization responsible for managing all weapon systems activities

JOHN BROWNE (2019) – Former Director, Los Alamos National Laboratory

BRUCE W. CHURCH (2019) – NTSHF President Emeritus and founding member; former DOE Nevada Operations Office Assistant Manager for Environment, Safety and Health; member of Health Physics Society of America and Society for Risk Analysis

JACK DOYLE (2021) – NTSHF Finance and Education Committees; former EG&G executive; led DOE Nevada Site Office's Remote Sensing Laboratory; founding member of the nation's Nuclear Emergency Search Team (NEST)

DALE FRASER (2019) – Founding member; NTSHF Executive Committee; former President & General Manager, Reynolds Electrical & Engineering Company, Inc., former Vice President EG&G, Inc.

MARK HALL-PATTON (2021) – NTSHF Executive Committee; Administrator of the Clark County Museum system (including the Clark County Museum, Howard W. Cannon Aviation Museum and Searchlight Community Museum); 30 years of museum experience working in institutions in California, South Dakota and Nevada; past president, Nevada Museums Association

PEGGY HALLERBERG (2021) – Founding member; former executive with EG&G, Inc. and associated with NTS programs for more than 40 years

JIM HOLT (2021) – Former President and General Manager, National Security Technologies, LLC; former Associate Director, Los Alamos National Laboratory

THOMAS O. HUNTER (2020) – Former President and Director of Sandia National Laboratories; from 2011-2016, served as Chairman of the Ocean Energy Safety Advisory Committee, established to advise the Secretary of Interior on off-shore energy safety

Board of Trustees FY 2018

RONALD L. KATHREN, PHD (2019) – Past President and Life Fellow of the Health Physics Society; Past President of the American Academy of Health Physics; Life Member of the American Academy of Environmental Engineers; emeritus member of the American Association of Physicists in Medicine

MARK W. MARTINEZ (2020) – President, MSTs; 23 years at Lawrence Livermore National Laboratory, most recently leading as Vice President and Principal Associate Director for Operations and Business; served as Senior Test Director for LLNL experimental activities at the Nevada Test Site

CORY MAZZOLA (2020) – Executive Director, Global Cyber Security, Sands Corporation; former Global Manager, Security Programs and Strategic Services, Mandiant/FireEye, Inc.; developed and taught cyber security courses at the University of Maryland; published author and invited guest speaker at international cyber security events

STEVE MELLINGTON (2019) – Retired federal manager of the DOE Nevada Field Office; former Assistant Manager for Environmental Management, DOE Nevada Field Office; District Planning Coordinator and Project Manager for the Bureau of Land Management; former director, Nevada Wildlife Federation Board; former Co-Chair, Department of Interior Resource Advisory Council

MICHAEL F. MOHAR (2020) – Former Deputy Director, Remote Sensing Laboratory, National Security Technologies, LLC; former scientific positions with SAIC and Bechtel

MARY E. PIKE (2020) – NTSHF Executive Committee, NATM Education Committee Chair; retired from the Clark County School District after 30 years, serving as the Director of Science, Health, Physical Education, and World Languages for the Curriculum and Professional Development Division, a school administrator, and a middle and high school science teacher

HARRY STEINKE (2021) – Former President, AECOM, a global provider of professional, technical and management support services to the transportation, facilities, environmental and energy sectors

ROBERT STOLDAL (2021) – Chair, Nevada State Museum and Historical Society; Chair, City of Las Vegas Historical Preservation Commission; Charter Board Member/Vice Chair, Preserve Nevada; Vice Chair, Board of Directors, Mob Museum; Board Member, Nevada State Commission on Cultural Affairs

DAVID W. SWINDLE, JR. (2020) – Executive Vice President, EG&G Division, URS Corp.

SCOTT TRAEGER (2020) – NTSHF Executive Committee; Deputy Manager, Los Alamos National Laboratory Joint Nevada Program Office; long-time Nevada Test Site technical manager; former technical manager, DOE's Nevada Field Office

ALVIN TRIVELPIECE (2020) – Former Director, Oak Ridge National Laboratory; former Executive Officer of the American Association for the Advancement of Science; former Director, DOE Office of Energy Research; former Vice President, Martin Marietta Energy Systems; former President, Lockheed Martin Energy Research Corporation

ERNEST B. WILLIAMS (2021) – Founding member; former budget officer and engineering technician, DOE Nevada Operations Office; former member, USAF

PETER ZAVATTARO (2021) – Founding member; NTSHF Executive Committee; former President & General Manager, EG&G Energy Measurements, Inc., former Vice President EG&G, Inc.

EX-OFFICIO MEMBERS

DARWIN J. MORGAN – Founding member; Director, Office of Public Affairs, U.S. Department of Energy, National Nuclear Security Administration Nevada Field Office since 1989; prior to joining DOE, served as reporter, anchor and assignment editor for KVBC-TV, Las Vegas from 1964 to 1989; KBIM-TV, Roswell, NM, from 1980-1981; KAUZ-TV, Wichita Falls, Texas, from 1981-1984

PETER ROSS – Founding member; Assistant Vice President for Campus Planning and Physical Plant, Desert Research Institute, Las Vegas and Reno; 30 years of experience in engineering design/project management; managed the design/construction of the National Atomic Testing Museum; supervised the construction of 15 DRI buildings, totaling nearly 300,000 gross square feet

Museum Staff and Volunteers

EXECUTIVE DIRECTOR

Michael Hall

DIRECTOR OF MARKETING & BUSINESS DEVELOPMENT

Kathy Powell

DIRECTOR OF EDUCATION

Jordan McGee

CURATOR

Natalie Luvera

DIRECTOR OF STRATEGIC INITIATIVES AND PHILANTHROPIC PARTNERSHIPS

Cree Zischke

SENIOR MUSEUM TECHNICIAN

Alexey Vlasyuk

MUSEUM STORE MANAGER

Jennifer Dimmick

EXECUTIVE ASSISTANT

Caryn Nacos

MUSEUM TECHNICIAN

Sherry O'Murray

CASHIERS

Carol Billigmeier, Eva Karttunen, Melva O'Neill, Rozinnia Stambek, Jazmine Smith

VOLUNTEERS

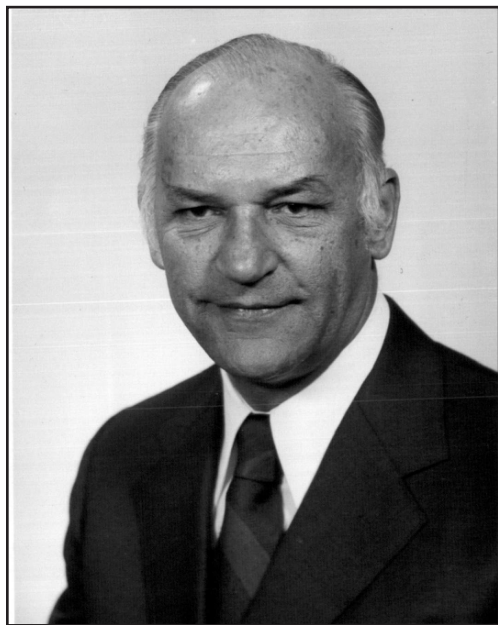
Scott Blair
Dale Cox
Jack Doyle
Audrey Dunn
Gabriel Garcia
Aaron Hain
James Hall
Mike Heiner
David Levesque
Victoria Limon
Mike Lukens
Sam McClain
Jo Mueller
Kathi Neal
Dick Reed
Clint Seal
William Sutcliffe
Rod Walker
Ernie Williams



Docents Jo Mueller, Dick Reed, Dale Cox, Mike Heiner, Jack Doyle, William Sutcliffe, Kathi Neal, Ernie Williams, Clint Seal, and Mike Lukens pose in the museum lobby at our annual volunteer appreciation breakfast.

Nevada Test Site Historical Profile

Mahlon E. Gates by Michael Hall



Nevada Test Site Historical Foundation Board President Linda Smith suggested we write an article on former Nevada Operations Office federal manager Mahlon E. Gates. After reading her insightful article on Gates in the 2013 Journal of the National Atomic Testing Museum, I knew we had an important story with which to reacquaint our readers. Almost all of the following research is thanks to her. There is no one better to recall the times of this great personality and talented leader. Linda Smith began a career at the Atomic Energy Commission in 1965 and, by 1994, she had risen to acting deputy manager of the U.S. Department of Energy Nevada Operations Office. She knows this history because she not only lived it, but also helped make it. We hope as you read this story of Mahlon E. Gates you will share any memories you may have of this remarkable figure.

July 17, 1972

Imagine stepping into a job where you managed 10,000 employees and had a budget of \$1.5 billion. Oh, and by the way, your job description includes testing nuclear weapons. That was the position Mahlon E. Gates assumed when ap-

pointed federal manager of the Atomic Energy Commission's Nevada Operations Office on July 17, 1972. Steering the nation's nuclear weapons testing program would be no small job.

Gates had recently retired from the Army as a Brigadier General. Jim Schlesinger, Chairman of the AEC, chose him for the position at the Nevada Operations Office. It would be a tough assignment because an air of controversy then surrounded the AEC. Years of atmospheric testing had led to many environmental and health effects grievances. A tough man would be needed and Schlesinger knew he had one. Gates would certainly have to deal with the literal fallout on all those issues as time went on.

Gates' appointment appeared to many at the time as a stark departure from previous practice. Federal managers were typically chosen from related fields in the AEC weapons laboratories. Yet Gates' background gave him good organizational skills, and he certainly was not a stranger to the nuclear energy field. As early as 1945, after a tough combat tour in Burma as an Army major where he fought with the famed Merrill's Marauders and won the Bronze Star, he entered the nuclear development program at Oak Ridge. There, his former West Point engineering professor, Colonel K.D. Nichols, supervised operations as a part of the broader Manhattan Project. Gates went on to serve as Nichols' assistant at Oak Ridge for two years. He then attended the University of Illinois, earning a master's degree in civil engineering. Next came an assignment in the Pentagon that gave him further experience in the Air Force Special Weapons Center, which included nuclear weapons. His military career went on to an assignment in NATO, then three years back at the Pentagon working as Assistant to the Director, Joint Staff, in the Office of the Joint Chiefs of Staff. An assignment followed to Iran, advising on engineering projects with the Iranian Army. Next came the Army War College, which is a key milestone for all career military and, after that, Gates went to Ft. Benning as commander of the 1151st Engineer Group and earned his jump wings. After returning to the Pentagon, he had duty as Director of the Engineer Officers Assignment Branch and then attended Harvard Business School. In 1966, Gates volunteered for duty in Vietnam where he served in engineering and bridge construction projects, winning the Distinguished Service Medal. In Vietnam, he earned his general's star as commander of the Cam Ranh Bay Logistics Command and Director of Construction on General Westmoreland's staff.

This Is Not the Army

10 Despite a long and successful military career, Gates' management style did not follow typical military

Nevada Test Site Historical Profile

tradition. He, in fact, instantly endeared those around him because he did not focus on his military background. Instead, he insisted everyone refer to him by his family nickname of “Ink” and not General.

Linda Smith, former acting deputy manager of the U.S. Department of Energy’s Nevada Office and 30-year veteran of federal work, recalls Gates fondly. “He wanted his close staff to know that he would rely on them for advice and assistance, and also that he was very proud of what he believed to be the program’s accomplishments. He was warm, friendly, articulate and professional.” Linda Smith is now a passionate steward of history as president of the Nevada Test Site Historical Foundation and the National Atomic Testing Museum. She recalls that Ink Gates and his wife, Esther, contributed 10 excellent years to Nevada.

Former Department of Energy Nevada Operations Office manager Nick Aquilina also recalls Gates’ elegant style. “Ink was a master of public outreach. So many admired his skill for dealing with the media and public. He remembered names and faces and all those on his immediate staff of over 200, as well as memorized their personal backgrounds.”

Gates’ official record while in Nevada is notable and much of it is still classified. He oversaw the safe and successful execution of 230 underground nuclear tests. Six of these involved the diplomacy of working with the United Kingdom on joint tests. His tenure also involved the period of tedious transition of the Atomic Energy Commission into the more bureaucratic Energy Research and Development Administration, which itself evolved into the even more bureaucratic cabinet-level Department of Energy by 1977.

Troy Wade, pictured here with Gates, recalled him as someone who not only personified an air of professionalism and respect but also as a very human soul:

“Three days after Ink’s arrival, Deputy Manager Charles Williams dispatched then nuclear safety branch chief Troy Wade to escort the new NV manager to the series of pre-event briefings at the Nevada Test Site for a large weapons effects test called Diamond Sculls. So early in the morning of July 20, Troy drove to the Gates’ temporary quarters in an apartment complex adjacent to the Hilton Hotel. He was under strict orders to ‘be on time’—AND to remember that he was escorting a recently retired West Point brigadier general. When Troy arrived—right on time—Ink was ready and waiting. Troy had carefully planned his background briefing for the new boss, providing some critical information about the event during the 90-minute drive time to the Control Point at the NTS. By the time they made the left-hand turn from Paradise to Sahara, heading for Tonopah Highway, Troy began his well-rehearsed “background-er.” He was immediately interrupted by his new boss, who asked ‘Son, sorry to interrupt, but where’s the cheapest place to buy Jack Daniels?’ Troy says it was all downhill from that point onward.”



Both Ink Gates and his wife were highly engaged in the local community. Linda Smith recalls:

“Ink and Esther opened up their home on countless occasions for celebratory events, welcoming staff members at all levels of the organization. . . When Ink arrived, ties to the Southern Nevada community

Nevada Test Site Historical Profile

were slim to non-existent. By the time he retired, the Nevada office had a network of community alliances, including media representatives, which he personally forged. He also actively maintained positive working relationships with representatives of state and local governments. In those days, the Nevada complex was a very significant economic contributor to the state of Nevada—and Ink made sure that it was a recognized and respected force in the at-large community. He also made sure that his key staff took part in these activities.”

Linda Smith also stressed that Gates brought a new respect for diversity to the work place long before it became common practice.

“Early on, it became obvious to Ink that his new organization had no formal approach, or apparent interest, in recruiting, developing or otherwise supporting minorities and females in the work force. Those who rose to positions of power were mostly white males, and no one really questioned that fact. Ink, of course, was married to a woman who had reached the highest professional ranks in the U.S. Postal Service, and they were a team that brought an entirely new perspective to the Nevada culture: formalize the diversity development programs, hire a Federal Women’s Program Manager, and provide mentoring to those in the work force who reflected the capabilities and talents to progress. It was rough going at first, but over a period of months and years, the culture changed significantly. Several women and minority selections resulted in progression up through the ranks.”

Nuclear Testing

A great deal of transition in nuclear testing occurred during Gates’ tenure. He oversaw the last of the long line of Plowshare tests. This was the project to explore the possible peaceful use of nuclear blasts in civil engineering projects, and although the Russians proceeded with such projects, the United States eventually abandoned the idea. The last test of Plowshare’s 26 tests involved an underground explosion to expand, or “fracking” as we say today, the sandstone formations and extract or stimulate natural gas from an expired drill site. That test was called Project Rio Blanco and took place in May 1973 in the Piceance Basin of Colorado, some 50 miles north of Grand Junction. It involved using three 33-kiloton nuclear devices which were detonated almost simultaneously in a single “emplacement well” at depths of 1,779, 1,899 and 2,039 meters below ground level. Linda Smith recalled in her recollections of that time:

“A new AEC Chairman, Dixy Lee Ray, had just taken the reins, and made it clear to Ink (Gates) that she intended to be present for this test. Ink, always epitomizing political correctness, made sure that she was a welcome and accepted part of the oftentimes charged technical debate surrounding these experiments. He knew that Chairman Ray was a strong proponent of the weapons testing program. She sometimes made the national news for her unique method of travel: driving her 28-foot motor home, accompanied by her two dogs, Jacques (a miniature poodle), and Ghillies (a 100-pound Scottish deerhound). When she visited the Nevada office, Ink made sure that the canine contingent was well cared for in the main conference room, often requiring carpet cleaning thereafter. This friendship remained well after Dixy Lee Ray left the AEC and became governor of the state of Washington.”

Ongoing treaties and efforts to limit or even stop nuclear testing became another facet of the decade in which Gates worked at the Nevada Office. To give a little history, in 1963, the United States, the Soviet Union and the United Kingdom signed the Limited Test Ban Treaty, which prohibited nuclear weapons testing in the atmosphere, in outer space and under water. After that, the days of atmospheric testing were over save for a few tests by China and France. So, testing went underground. Next came a treaty on the Limitation of Underground Nuclear Weapons Tests, which became known as the Threshold Test Ban Treaty or TTBT. In 1974, the TTBT established a nuclear “threshold” by banning tests exceeding 150 kilotons in yield. Linda Smith recalled in regard to the diplomacy of the time:

“Ink Gates was the right man at the right time. He possessed a skill set well-suited to play a major role in these complex negotiations. Esther Gates recalls that Ink and other Nevada principals kept their bags packed, ready for the international shuttle diplomacy that preceded and followed the signing of

Nevada Test Site Historical Profile

the TTBT in 1974. As a result, the United States and Soviet Union agreed to pursue further restrictions on nuclear testing. A team of U.S. experts, including Nevada representatives, were sent to Moscow for technical talks. This then led to many years of technical exchanges related to verification issues, culminating in the verification tests conducted by the USSR at the NTS and by the U.S. at the Soviet test site in the late 1980s."

Nuclear Threats

Another reality of that time, which continues to this day, concerns the threat of nuclear terrorism or extortion. No system yet existed for response to the threat of a nuclear device being planted in a major American city, which would then literally be held for ransom. There were some early hoaxes involving reports of nuclear weapons being set to detonate in a particular city. All such threats had to be addressed and it did bring the concept of nuclear terrorism to attention. Deputy manager of the Nevada Operations Office, Troy Wade, had a great deal to do with the concept and organization of an emergency response team and Gates had the political will to make it a reality. They formed what became well-known as the Nuclear Emergency Search Team (NEST). (Today it is called Nuclear Emergency Support Team) NEST formed officially in 1974 at the Nevada Operations Office under Gates' direction. Linda Smith has stated that this was the challenge that gave Gates his greatest sense of accomplishment:

"The accomplishment in which Ink Gates professed gave him the most pride was the development of this nation's Nuclear Emergency Search Team (NEST), now called Nuclear Emergency Support Team. He also gave much credit to his staff, especially Troy Wade in his role as federal director of the Nevada Operations Office's Nuclear Safety Division. In May 1974, the FBI received a letter, demanding that \$200,000 be left at a specific location or a nuclear bomb would be detonated somewhere in Boston. In response to this threat, scientists and technical personnel associated with the weapons testing program, led by Nevada, were dispatched to Boston to search for the alleged device. This event, combined with many others over a 10-year period, resulted in the creation of NEST. The team included scientific and technical staff from Nevada, the national weapons laboratories and support contractors. A high-level directive assigned the Nevada Operations Office with the responsibility for search and detection operations, but this was also a complex, multi-agency endeavor—something that well suited the talents of Ink Gates, a master of integrating inter-agency response efforts. Grace Plummer, former Nevada program manager, recalls that Ink exhibited a strong knowledge of 'how government works and the interactions necessary for program development and implementation.' In subsequent years, NEST personnel deployed to a number of U.S. cities in response to several nuclear extortion threats. Ink assumed an active leadership role, representing the AEC at the highest levels."

We have all heard about NEST and the fear of nuclear terrorism, but very few people today recall a real nuclear threat that occurred in 1978. In January of that year, the Russian Satellite Cosmos 954 crashed into Canada's Northwest Territories. Satellite debris was nothing new at the time, but this one proved very unique because Cosmos 954 contained a nuclear reactor using enriched uranium. Numerous pieces of the nuclear-powered generator survived reentry and debris fell between the Great Slave Lake and Baker Lake. Someone had to respond. A valuable and experienced collection of talent for such emergencies did exist - the newly formed NEST. This contingent included the rare breed of people tasked with nuclear testing and they rose to the occasion. Responding to the emergency, Gates led a team with Troy Wade and 75 people involving NEST specialists as well as key Nevada Test Site contractor and scientific laboratory personnel.. They all headed to the great Canadian Northwest Territory to work in cooperation with the Canadians to address the situation. Jack Dole, a distinguished Nevada Test Site Historical Foundation trustee and museum docent, has recently provided a series of lectures on this endeavor, given the name "Operation Morning Light." Jack explained that at the time NEST people wore many hats and formed a cooperative initiative to which numerous civilian Nevada Test Site contractors and scientific laboratories contributed personnel. The firm EG&G, for which Jack worked, is a good example. An emergency one year later at the Three Mile Island nuclear facility utilized many of those same specialists, representing numerous scientific and technical disciplines. This included health physicists, diagnostic specialists, logistical personnel, photographers, and many other specialties. In a speech to the Nevada Test Site Historical Foundation in 2000, Gates recalled Operation Morning Light:

Nevada Test Site Historical Profile

"I recall Troy Wade coming into my office in early December 1977 and telling me about the pending satellite crash somewhere unknown in the world. That began what was to become Operation Morning Light. . . I had to conduct daily press briefings at the Edmonton [Alberta, Canada] hangar, responding with the confidence provided by sound scientific data to the hundreds of questions thrown their way. The initial goal was to search the entire 15,000 square-mile area; but as U.S. scientific data came in and



more was learned about debris distribution, search priority was given to population centers and traffic corridors. Radioactive debris was located and recovered in four general areas, all of them in remote areas of the Northwest Territories. By mid-March, our team had concluded their tasks."

Public Outreach

Back in Nevada, Gates can also be credited with promoting greater outreach to the local community and to the public in general. He encouraged his staff to be active

in the local community, and he, himself, set an example to follow in that effort. He even served as the director of the Las Vegas Chamber of Commerce. He also worked to accommodate public tours of the Test Site. He recognized, even in his day, that history was being made at the Nevada Test Site.

A Thorny Issue

The issue of nuclear waste storage in the Nevada area has been around for a long time and goes back to the days of Gates' tenure. This began with Nevada Governor Mike O'Callaghan and then State Senator Richard Bryan (later Nevada Governor and U.S. Senator) who led an initiative to address the dangerous practice of storing high-level nuclear waste on-site at nuclear power plants across the nation. They proposed to move the waste to a more secure and safer facility at or near the Nevada Test Site. This of course, like everything related to nuclear issues, had significant political implications; however, a major downturn in the local economy at the time made it seem like a reasonable venture for the State of Nevada to pursue. Gates certainly had a highly professional manner of working with all state and local officials and he gained tremendous respect in his dealings with political figures. Linda Smith remembers:

"In the early 1970s, it was not unusual for Nevada Governor Mike O'Callaghan and Lieutenant Governor (now U.S. Senator) Harry Reid to stop by the Nevada Operations Office on Highland Avenue—via helicopter. The chopper would land adjacent to the west parking lot, and Governor Mike, as he was known to all, would gingerly hop out, despite having a prosthetic leg due to a war injury. Governor Mike, wearing his characteristic big grin, was always met by Ink and a small contingent of Nevada staff. The relationship of the AEC and especially the Nevada staff with state officials was at its apex. A downturn in the economy led Governor Mike, State Senator (later U.S. Senator) Richard Bryan and others to actively and willingly explore the possibility of bringing high-level nuclear waste temporarily stored at nuclear power plants across the nation to the Nevada Test Site. The AEC had been conducting studies of salt domes near Lyons, Kansas, as a possible storage site, but those had led to the conclusion that other sites must be explored. The Nevada Test Site was a very viable candidate for many reasons. This state-federal team developed a proposal, which actually resulted in state legislation in 1975, expressing support for Nevada as a candidate site. Ink's role in this was significant. He not only forged the federal-state relationship, but worked the 'internal piece,' as well, meeting frequently with headquarters officials responsible for devising a solution to the nation's high-level waste challenges. Ink established the first formal organization within Nevada dedicated to conducting scientific planning studies related to high-level waste storage, and personally selected a well-qualified team to oversee these responsibilities.

Nevada Test Site Historical Profile

One of the 'hires' was Robert 'Bob' Nelson, an experienced engineer with naval nuclear reactor operations experience, who Ink mentored, and who—much later—became Deputy Manager and Manager of Nevada. In later years, former Governor O'Callaghan and then U.S. Senators Bryan and Reid recanted their earlier support and became avid foes, as did most elected politicians in the state of Nevada. Bruce Church, who was Nevada's health physics director at that time, attributes the beginning of this 'about face' by state officials to a high-profile event that occurred in 1976 at a private low-level waste facility located near Beatty, Nevada. Its employees had been removing articles from the site and passing them on to the public, some of which was contaminated drill pipe from an AEC nuclear test. When this was uncovered by the media, it made national news, events that led the state of Nevada to strongly oppose high level waste storage within state boundaries."

Final Thoughts

After his 10-year tenure at the Nevada Test Site as manager of the DOE Nevada Operations Office, Gates served briefly as Acting Assistant Secretary of Energy in Washington, D.C. Gates had also been asked by the Republican party to run in the Nevada Governor's race, but he declined. He left Las Vegas in 1983 and moved to San Antonio to serve as senior vice president of operations at the Southwest Research Institute where he served until 1989. The institute's president, J. Dan Bates, called him an "exceptional person" who "provided critical leadership." In his semi-retirement he authored a book titled Preventing Nuclear Terrorism. Adding to his lengthy resume, Gates had established the Southern Nevada Federal Executive Association, became a member of the Association of the U.S. Army Athletic Association, served as a director of the Nevada Development Authority, served on the Advisory Board of the Desert Research Institute of Nevada, and was a founding director of the Continental National Bank of Las Vegas. Gates also served as president of the Boulder Dam Area Boy Scouts Council, and chaired the Advisory Board of the Clark County Community Colleges. He also proudly served as a member of Rotary International, the Harvard Breakfast Club, the Majestic Club, and the K Supper Club. He finally served as a director of the USAA Bank.

He was a man who enjoyed life and found time for a productive retirement, traveling the world. He and Esther visited 26 countries and sailed many of the world's seas. His Army biography states that "his greatest joy came from the close relationship he shared with his four children, six grandchildren and eight great-grandchildren."

Mahlon E. Gates passed away in San Antonio, Texas, in 2008. So, unfortunately, we cannot ask him for his personal retrospective on his years at the Nevada Test Site. Although if we could ask him, he may very well say something similar to the address he gave to the Nevada Test Site Historical Foundation on October 24, 2000. They are fitting final words:

"The development of nuclear weapons was of massive importance in American weaponry and national security. Let us remember, however, to be effective, an atomic weapon must work properly. A dud is of no use in wartime. Testing a weapon or weapons must be accomplished before it can be placed in the stockpile. The importance of the programs at the Nevada Test Site cannot be denied. . .Witness the many historical markers through our country commemorating the Civil War, the world wars, the war in Korea, and now the Vietnam Wall. Many of these great sites properly honor those persons who have given their lives for our country. The Nevada Test Site memorial honors the many persons who did not have to give their lives but were saved from what could have been the most disastrous war of human conflict."

Mahlon E. Gates proved a hero of his time. He, and many other veterans of the Nevada Test Site, helped win the peace of the Cold War. His example helps our museum to use lessons of the past to better understand the present.

Thank you to National Nuclear Security Administration Archive Manager Martha DeMarre for her assistance on researching this paper.

Nevada Test Site Historical Profile

Robert R. Brownlee by Michael Hall



It is with the greatest pleasure that we review the distinguished life of Robert R. Brownlee. The Board of the Nevada Test Site Historical Foundation and staff of the Smithsonian-affiliated National Atomic Testing Museum honor his memory. Our reflections come from Mr. Brownlee's own autobiography and shared memories of those who knew and worked with him. Born in 1924, only a little more than a half century after the end of the Civil War, Bob Brownlee would live to see men and women travel into space. In his own words, he developed a great scientific curiosity for all things around him from age five on. He never stopped learning nor

contributing in the field of science. One memory states:

"As a boy in Zenith, Kansas, he remembers his fascination with the "sea horizon"—which means that the rising and setting points of the stars, and the variable points for the sun, moon, and planets, could be traced, night after night. When he asked his father what made the sun shine, he was flabbergasted to hear that "no one knows." Perhaps that is when Bob decided he'd find out for himself."

Like a lot of very reputable scientists of the 20th Century, Bob Brownlee grew up on H.G. Wells science fiction stories and the 1930s radio dramas like "Buck Rogers" and "Flash Gordon," which collectively were the first to use the term "atomic bomb." As a boy, he loved dreaming about the future and the cosmos as he traveled across the rural expanses of the Kansas prairie with his parents in a Model-T Ford. His early trips only spanned from the farm to town, but he dreamed of a whole world and beyond.

In 1941, at age 17 Bob Brownlee entered Sterling College in Kansas where he majored in mathematics and physics, although his true passion remained astronomy. Both the Great Depression of the 1930s and the Second World War were formative events in his life and both influenced his determined efforts in a quest for learning. The war interrupted Bob Brownlee's formal education but not his "life education," as he put it. He went into the service at a Cavalry school at Fort Riley, Kan., immediately upon turning 18 in March of 1942. Horses and mules, however, were not what he had expected in this new world war of tanks and airplanes. He had decided to volunteer for his country and as such he felt entitled to put his best foot forward but not behind a horse. Soon he found a timelier branch of the service, joining the Army Air Corps where his proficiency in science led to an officer's commission. With his skills in astronomy he became suited to the role of navigator in a B-29 squadron headed across the vast Pacific for the Marianas. The crew christened their state-of-the art aircraft, which like all B-29s had severe teething problems, "The Last Dammed Straw."

Flying into the Pacific Theater, Bob Brownlee's plane made a stop at Johnston Island for an emergency landing. In his autobiography, Brownlee recalled this as an ironic introduction to an island at which he would spend a lot of time 30 years later. After continuing to Guam, he arrived at his squadron's assignment on Tinian as part of the 58th Bombardment Wing. On Tinian, Bob Brownlee got a close-up look at the Enola Gay:

"After the nuclear drop on Hiroshima by the Enola Gay that plane sat on the flight line just like any other B-29. Conscious that there was a real history sitting there and our plane was parked quite nearby, I managed to get to the plane, crawl up into the cockpit, and then go back through the bomb bays. I did this quite alone, neither asking nor expecting to obtain permission. I wondered if the plane might be saved, and what the world might be like in the future by having us using the same energy as the sun, but mostly I just celebrated the thought that at last, the war could be over."

Nevada Test Site Historical Profile

With the end of the war, Bob Brownlee continued his college education at Sterling College and eventually went into graduate work at the University of Kansas. There, with his love of astronomy, he earned a Master's Degree in that field. This was also a time for family. During the war Bob Brownlee had married Addie Leah and, in the post-war boom, they began a family of two daughters and then a son. This also proved a time for Brownlee's second great passion, music. Between finishing college and graduate school, he was able to devote time to his pursuit of mastering the pipe organ at the local United Presbyterian Church. Also, at this time, Bob Brownlee taught math and science at Osborne, Kansas City High School. Next came the pursuit of a doctoral degree in astronomy and thus a move to Bloomington, Ind., to study at Indiana University. Bob Brownlee's expertise in pipe organs actually came in handy at that time and led to some extra income working for an organ company. He also became a University Scholar and a Science Foundation Fellow and completed a Ph.D. in astronomy with a minor in astrophysics. His dissertation examined eclipsing binaries. Bob Brownlee was one of only five people in the United States in 1955 receiving a Ph.D. in astronomy. He reflected that such a small fraternity might sound very prestigious, but the reason so few were receiving degrees in astronomy was simply due to the mundane fact that there were so few jobs being offered in that field. Bob Brownlee later wrote:

"I applied to many places . . . finally I applied to Los Alamos Scientific Laboratory. Los Alamos was not on IU's list so I was given no encouragement in that direction. My interview in New Mexico was fascinating, and I was flown to Nevada in time for the first nuclear test in Operation Teapot. Immediately I was offered a position in the nuclear Test Division, and I accepted. As the lab was one of only two places where I could get my hands on material hotter than the center of the sun, I was extraordinarily pleased."

Bob Brownlee had the great foresight to write down many of his interesting experiences, which provide a great deal of texture to the canvas of his life:



"Arriving in Los Alamos was a real experience. We were driving a '52 Ford with 3 kids (our 4th just three months away), our belongings, and a parakeet, predating a scene from the Beverly Hillbillies by about seven years. The guards at Los Alamos' front gate took us in stride and we were permitted to proceed after lots of paper checks and proper identification. We had the south end of a duplex on Villa Street. It was a fine place, but there was no furniture there, nor did we arrive with any. It was floor time. I borrowed money from the First National Bank of Santa Fe to buy a table and chairs, a refrigerator and some blankets. The bank deducted the interest on the loan before giving me money."

Bob Brownlee first went to work in J-Division, also known as the nuclear test division. He established close friendships with its two leaders, Dr. Alvin C. Graves and Dr. William E. Ogle. He recalled this as one of the most formative periods in his life:

"J-Division people were awe inspiring! . . . Our work schedule was a 54-hour week for many years. Nine hours a day for six days a week sounds like hard work, but preparations for the next series or the next test were so intense that each person only saw time as being short-time, even weeks went past very quickly. Wherever you went, people were working, day or night, and on any day including Sundays each person seemed to be working furiously. Reasons for this behavior were easy to understand. Either there was a nuclear test operation in being, and most everybody was at the Test Site, or one being planned. . . An important lesson to be learned was in communication. Code words were everywhere. Most of them had very little to do with secrets and classification. . . Each test program had a name, and each test, and each experiment on a test, and sometimes even pieces of equipment had names. . . An intense race with the Soviets for nuclear knowledge was known to all, and Los Alamos was very much

Nevada Test Site Historical Profile

in the thick of it. . . At the University of Indiana I had my first and most rudimentary information about computers, so was delighted when I was introduced to the computer room. The lab had a policy—someone would teach you but you had to promise to teach someone else.”

Bob Brownlee would go on to spend most of his professional life associated with the field of nuclear weapons testing, barring a brief time spent as an assistant professor at UCLA in 1961. During a 37-year career, he became a member of the Joint Task Force that performed atmospheric tests on Bikini and Enewetok Atolls. Then came the era of underground testing in 1963 with the Limited Test Ban Treaty. He wrote one of the best synopses about the beginning of underground testing I have ever read. This passage is worth quoting. Titled “Learning to Contain Underground Nuclear Testing,” I hope to soon make this one of our signage boards at the Museum:

“Sometime in 1956, Dr. Alvin Graves, Division Leader of the Test Division at Los Alamos told me that we were going to have to test underground in order to reduce fallout as much as possible. He asked me to see what I could learn about it by making what calculations I could. The temperatures and pressures generated by a nuclear explosion are such that there was considerable doubt that any underground test buried at a ‘reasonable’ depth could be contained.

In 1956, we were severely limited in computing capabilities—compared to nowadays they were laughable, and minuscule, and arguably nonexistent. I had the equations of state of four materials. They were air and water, aluminum and uranium. As it happens, there is a lot of aluminum in NTS soil, so I called that ‘earth.’ I called that of uranium ‘fire,’ and the others were air and water, so with earth, air, fire and water, how could I fail?

In attempting to mock up the earth, I had some information about NTS soil densities and water content. I used a cylindrical pipe filled with air of several densities, depending upon the possible use of vacuums. I was allowed considerable freedom to choose other parameters as I wished. For example, what might the efficacy of plugs of various masses be, and where might they be placed for optimum results. I worked regularly with Bill Ogle, the deputy division leader, and we decided to have a first test in an ‘empty’ pipe (cables were present), open at the top. Then we would do a test with a cap, and then do tests with plugs, the first one used to be in the middle of the hole, and the second one at the bottom. Thus, we hoped to learn from test to test, acquiring data and information incrementally. Incidentally, the Pascal B test, and those immediately following, had a 4-foot diameter pipe. The cap welded to the top of Pascal B was four inches thick, so was of appreciable mass from a ‘man-handling’ point of view. The first test of our ‘series’ was Pascal A, with results as documented.

For Pascal B, my calculations were designed to calculate the time and specifics of the shock wave as it reached the cap. I used yields both expected and exaggerated in my calculations, but significant ones. When I described my results to Bill Ogle, the conversation went something like this.

Ogle: ‘What time does the shock arrive at the top of the pipe?’

RRB: ‘Thirty-one milliseconds.’

Ogle: ‘And what happens?’

RRB: ‘The shock reflects back down the hole, but the pressures and temperatures are such that the welded cap is bound to come off the hole.’

Ogle: ‘How fast does it go?’

RRB: ‘My calculations are irrelevant on this point. They are only valid in speaking of the shock reflection.’

Ogle: ‘How fast did it go?’

RRB: ‘Those numbers are meaningless. I have only a vacuum above the cap. No air, no gravity, no real material strengths in the iron cap. Effectively the cap is just loose, traveling through meaningless space.’

Ogle: ‘And how fast is it going?’

Nevada Test Site Historical Profile

This last question was more of a shout. Bill liked to have a direct answer to each one of his questions.

RRB: 'Six times the escape velocity from the earth.'

Bill was quite delighted with the answer, for he had never before heard a velocity given in terms of the escape velocity from the earth! There was much laughter, and the legend was now born, for Bill loved to report to anybody who cared to listen about Brownlee's units of velocity. He says the cap would escape the earth. (But, of course, we did not believe that would ever happen.)

The next obvious decision was made. We'll put a high-speed movie camera looking at the cap, and see if we can measure the departure velocity.

In the event, the cap appeared above the hole in one frame only, so there was no direct velocity measurement. A lower limit could be calculated by considering the time between frames (and I don't remember what that was), but my summary of the situation was that when last seen, it was 'going like a bat!!' As usual, the facts never can catch up with the legend, so I am occasionally credited with launching a 'man-hole cover' into space, and I am also vilified for being so stupid as not to understand masses and aerodynamics, etc, etc, and border on being a criminal for making such a claim.

I'll add that we learned a lot with our series of low-yield tests. Plugs helped, but the closer to the nuclear device, the better. "Tamping" the device is better yet, and there are some ways to do that which are more clever than others. Mostly we learned that even an empty hole could cause a reduction to the atmosphere of as much as 90 percent, depending on specific design parameters. Later we were to see that if the hole is deep enough and the yield is high enough, an empty hole will close completely, allowing nothing whatsoever out except the initial light, which is not radioactive of course. In time, the tests became very sophisticated and expensive, but we were able to achieve complete containment for almost every test, and for all but a handful of those that had containment "failures," nothing was detected off site. So, I would judge our containment efforts to be quite successful. The case for these views are pretty well laid out in the book *Caging the Dragon*, by Carothers.

But it took time and money!"

In this article, I have chosen not to use the term Dr. in front of Mr. Brownlee's name, which seems very counterintuitive for me coming from the academic disciplines. I do this, however, because as I understand, the tradition at the national laboratories and the Nevada Test Site was to not use titles. John Hopkins wrote us:

"Incidentally, Los Alamos always prohibited the use of titles for all except the military and physicians. Bob was always just Bob. We worked together for almost 50 years. He was my deputy when I was the J-Division leader. More than that we were good friends professionally and socially. He was interested in everything, a gracious raconteur and a font of testing knowledge. His passing is a great loss to all who knew and loved him. I will miss him."

Bob Brownlee's career continued all through the many years of underground testing. He served on Project Cannikin in the Aleutian Islands, and on many other tests. His credentials state:

"He chaired the Hazards Evaluation Group, an advisory body to the Commander of the Joint Task Force, with the object of conducting nuclear tests safely. He eventually became the Scientific Deputy Commander of the Task Force, holding that position until the Task Force was inactivated in 1970. He also was a key member and served as alternate chairman of the Containment Evaluation Panel of DOE's Nevada Operations Office. From 1970 until 1993, he was assigned as the scientific adviser to the Director, Office of Military Applications, DOE Headquarters, Washington, D.C. After the Baneberry test released radioactive material, in 1970, Bob chaired a panel to investigate the causes. That led to essential changes in the structure and processes of the testing program, particularly in the area of

Nevada Test Site Historical Profile

containment evaluation.”

Vincent J. Jodoin added an important note about Bob Brownlee’s career:

“He was a key contributor to the UNWTOP course. I thought his first-hand experiences and ability to answer student questions both directly, as well as with anecdotes from his atmospheric testing days was invaluable. I only met him during that one-week course.”

From 1973 to 1992 Bob Brownlee developed a close association with Johnson Island. The Island had actually been expanded for atmospheric testing for 1964 but with the signing of the Limited Test Ban Treaty in 1963, no further above ground tests took place. The Atomic Energy Commission still felt it important to keep Johnson Island ready for nuclear tests if the need ever again arose for atmospheric trials. He served as the Scientific Advisor for readiness in that period and became the last Scientific Deputy Commander of Joint Task Force Eight to Johnson Island. He made many trips to that Pacific Island to keep an eye on its state of preparedness but he never forgot his first war-time landing on that tiny piece of real estate described earlier. In his later career he would enjoy extensive travel to many parts of the globe. Bob Brownlee’s quest for knowledge and fascination with the world around him never ended:

“Bob’s diverse scientific interests and assignments took him around the globe. During the 1980s, he was involved in the geothermal energy area, principally with Japan, Germany and Thailand. He also worked closely with a number of British scientists, and with a scientific colleague in Finland. His personal research involved him with a number of rocket experiments conducted at Johnston Island and on the island of Kauai, at a test range near Fairbanks, Alaska, and at Kwajalein Atoll.

Another area of interest and expertise for Bob was in solar eclipses. He explored those in an Air Force NC 135, and observed them in Mexico, Canada, the South Atlantic, the Indian Ocean, and in Montana and Hawaii. He also had a strong interest in volcanology and had been known to be one of the first to visit sites experiencing volcanoes such as Mt. Kilauea, in Hawaii.

Since Bob’s retirement from the Laboratory, his global adventures continued. He visited 90 countries, many with his wife, Addie Leah, and their four children and twelve grandchildren. They went to Palau, in the Pacific; Mexico, Peru, Bolivia, Egypt, India, Thailand, China, Micronesia, the Marshall Islands, and Western Europe. Bob and Addie Leah traveled around the world three times. They also had a foster son, Elimelek John, of Ebeye Island, on Kwajalein Atoll, and six foster-grandchildren.

Bob also had diverse outside interests. He gave two organ recitals while in college, and always loved organ music. His interest in European cathedrals led him to do stained glass work as a hobby, and as a result, he completed sixteen windows for the United Church in Los Alamos. One of the windows has over 2,500 pieces of glass. Many friends and family have been the happy recipients of panels or lampshades that he has created.”

One longtime associate of Bob Brownlee who did not want his name mentioned said, “Bob is with God now. His like may never be seen again.” We appreciate all the reminiscences we received.

Ron Cosimi wrote the following memory of Bob Brownlee:

“I worked with Bob for 52 years. When I joined Los Alamos Scientific Laboratory in 1965, Bob Brownlee was the first person I did engineering designs for experiments he was fielding on an underground test. I continued working with Bob on many underground tests until he left J-Division to become Director of G-Division, basically a geothermal and energy research division. During the years that he was leading the division without any nuclear testing assignment, he continued to seek engineering support from our group (J-7). The projects he sponsored were many, exciting, and varied. The incredible mind of Bob was forever seeking new, exciting challenges.

Nevada Test Site Historical Profile

Bob never seemed to suffer for finding an experiment to conduct—an underground nuclear test, new ideas for containment of a nuclear test, a geothermal project, experimental hardware for mounting on the Lab airplane during monitoring of solar eclipses, rocket launches from Hawaii or Poker Flats in Alaska, photographic documentation of atmospheric experiments, photography experiments at the DOE station on Haleakala, Maui. Many in Los Alamos were amazed at how easy it appeared for Bob to talk his way into obtaining funds for putting his ideas to a test. When Bob became the Los Alamos authority for containment of underground nuclear tests, he relied on J-7 to design, test, and field the various types of containment valves, pipes and closures used in almost all the tests conducted by Los Alamos. In typical Brownlee fashion, he never took credit for his ideas, but constantly praised the engineering efforts of J-7 for the many successes in containing the underground nuclear explosions that provided the sources for many of his experiments.

After his retirement, Bob remained active and continued the education of younger generations by sharing his knowledge of atmospheric testing and containment of underground tests with the DOE-sponsored Underground Nuclear Weapons Testing Orientation Program (UNWTOP) at DOE/NV and the Nevada Test Site. (I also was a lecturer for UNWTOP). At the week-long classes held two or three times a year, attendees always gave Bob the highest ratings of all the speakers, and he was always sought out by students in the off hours for more in-depth insight to atmospheric testing or containment. Not only did Bob lecture for the programs in Nevada, but he also was invited to present his atmospheric testing and underground containment lectures at many other venues. Even though he was now in his 90s, Bob continued lecturing from the time of his retirement until he passed away in May of 2018. During the years that Bob was employed at Los Alamos, he and I traveled together to many of the places where he was able to turn his incredible knowledge into a test. (After he retired and he joined the UNWTOP, and as he became unstable, he and I traveled together so that I could help him when needed). Bob Brownlee had an incredible theoretical mind and an uncanny memory for all that he did. Anyone who spent time with Bob recognized that he was very humble, never failed to praise others for their work, and loved to share his experiences with others in a manner that passed on his legacy to future generations – always in the guise of a Kansas farm boy.”

Having read Bob Brownlee’s autobiography “Atomic Testing in a Nuclear Age” I am most struck by one of his concluding thoughts on the nature of time itself. As an astrophysicist, he may have been very in tune to the new concepts being explored in the expanding field of quantum physics. Bob Brownlee commented in his last chapter that he had recently toured China where he posed the question at Fudan University in Shanghai, about the meaning of time. He said from a historical point of view we as a world culture have always viewed time as either representing events that have happened in the past or those that will happen which represent a future. He, however, became increasingly struck by modern culture and its emphasis on the “now” and how modern technology can present so much “information” as one whole. Perhaps he was leaning toward Albert Einstein’s final reflections in his own life when he theorized that the past, present and future all exist simultaneously. This concept of all one whole seems to now be born out in recent discoveries in quantum mechanics.

Certainly, Bob Brownlee from childhood to death never stopped asking such important questions about the world around him. Unfortunately, I only had the pleasure of meeting Dr. Brownlee once. Having been a former director of the Robert H. Goddard Planetarium, I would have loved to talk about the stars with him not to mention the history of nuclear testing. He, after all, served as one of those scientific veterans who helped secure the peace of the Cold War through nuclear deterrents.

During that onetime meeting with him I did not then know his vast background. I had been at the museum just a very short time when he came for a visit. Certainly, I would not have guessed he knew who I was. Yet, he went out of his way to greet me on that day and instantly made me feel like a part of the team. I truly wish I could have known this great personality better. He has taught all of us by his example to never stop asking questions and exploring the wonders of life.

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