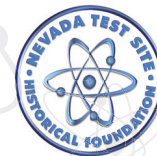




 **NATIONAL  
ATOMIC TESTING MUSEUM**  
A Program of the Nevada Test Site Historical Foundation  
A Smithsonian Affiliate

## ANNUAL REPORT 2020

*Learning from our past to enable a secure,  
peaceful future.*



**NEVADA TEST SITE  
HISTORICAL FOUNDATION**



## MISSION

Objectively facilitate education and awareness of the science and technology associated with the past, present, and future of the nation's nuclear weapons testing and national security programs.

## VISION

We are a world-class facility that successfully educates the local, regional, and international community on the U.S. Nuclear Weapons Testing Programs and the National Security Programs being executed at the Nevada National Security Site. This experience will inspire visitors to seek further information and gain a better understanding of how this work affected, and continues to affect, our world.

## VALUES

- Ensure Objectivity
- Champion Intellectual Curiosity
- Demand Integrity and Transparency
- Encourage Creativity
- Respect Diverse Opinions
- Strive for Excellence
- Value Learning



*NATM  
Future  
Exhibit*



*NTSHF  
Trustee  
encouraging  
curiosity  
and learning*



# IN MEMORIAM

*Our Dear Friend and Colleague Nelson Cochrane*

The year 2020 brought us many challenges and more than our share of sadness, most notably the unexpected loss of our dear friend and colleague Nelson Cochrane in May 2020. In so many ways, Nelson personified the best of the thousands of people who work at the Nevada Test Site (now the Nevada National Security Site-NNSS). After retiring, Nelson dedicated much of his time and talent to telling their stories through the National Atomic Testing Museum. He was indeed the heart and soul of the museum's mission and programs for some 20 years.

Nelson's knowledge of the history of the Nevada Test Site, gained from nearly 40 years of experience with EG&G, Lockheed Martin (Nevada Technologies) and National Security Technologies (NSTec), is irreplaceable. After his retirement in 2008, Nelson brought to the NTS Historical Foundation his wealth of experience in technical and managerial areas gained while working at the NTS since the late 1960's. He advanced from being a diagnostics instrumentation engineer

to operations manager of the NSTec Stockpile Stewardship program. As an EG&G and later a Lockheed Martin manager, he led DOE Nevada's Remote Sensing Laboratory at Nellis AFB.

Shortly after his retirement, Nelson joined the NTSHF Board of Trustees and served in many capacities, among them President and Vice Chair. He was also in demand as a docent, leading tours of both the former NTS and the NATM which always received rave reviews from visitors and special guests. Many people who were fortunate enough to be in a Nelson-led tour expressed amazement at his depth of knowledge about nuclear testing history. He also served as a consultant to NSTec and later Mission Support and Test Services, leading special tours to the NNSS.

Nelson was a life-long learner, completing many classes on a broad array of subjects offered by UNLV's Division of Educational Outreach. He was often asked by UNLV to instruct classes that related to his areas of



*Nelson Cochrane, a true  
Cold War Patriot*

expertise which he enthusiastically supported.

Nelson and his wife of 50 years, Sara, have one son, Scott, a daughter-in-law, Stephanie and two grandchildren, Alexander and Benjamin who were and are the center of their lives and hearts. As noted by several of his friends, his eyes lit up as he shared stories about them and how important they were to his life.

A large memorial brick, recognizing his contributions, has been placed in the NTS History Walk, and an exhibit exemplifying the Remote Sensing Laboratory has been named in his honor.

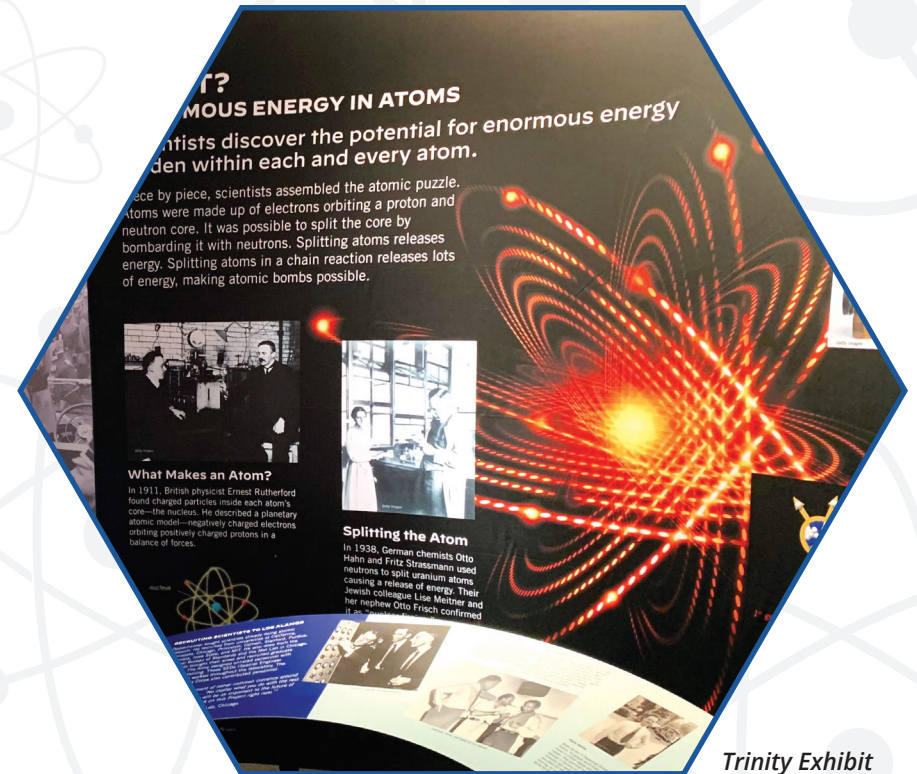


## FROM THE CHAIRMAN

2020 was certainly one of the most challenging years that our nation and the National Atomic Testing Museum (NATM) has ever encountered. We appreciate the strong commitment of our staff during these trying times and are most appreciative for the generous support of our members, donors, partners, and volunteers who helped us during 2020. The US Department of Energy/National Nuclear Security Administration (NNSA)/Nevada Field Office has been a tremendous partner throughout the history of the museum, and this relationship broadened and strengthened in 2020. Additionally, the Desert Research Institute team continued their close cooperation through extensive efforts to assure that the NATM could continue operating.

Despite the pandemic, we were able to remain open with limited operations, and to introduce some new exhibits, including a national security program/Nevada National Security Site (NNSS) overview video featuring the NNSA Administrator and the new Trinity exhibit.

On July 16, 2020, the NATM honored the 75th anniversary of the first nuclear test known as Trinity. We did this by opening a stunning new permanent exhibit which can now be enjoyed online as well as in-person during these challenging times of pandemic. This exhibit sets a standard or template as we make plans for expansion and strategic goals. Our museum entry remains on a reservation-only basis with a Thursday through Sunday schedule from 10am to 3pm. Reservations can easily be made on our web page at <https://nationalatomicmuseum.org>. This exhibit is



thanks to the expertise of our longtime exhibit designer, Andrew Merriell, consulting historian Dr. Roger Meade, Exhibit Committee Chairman Chuck Costa, and important advisors like Glen McDuff, Tim Pfaff, Matthew Noe's Pronto Signs & Graphics, and New Mexico Highlands University's Media Arts & Technology Department. Our Distinguished Lecture Series shifted to a virtual format, but again had a very successful year. The popular series featured a range of fascinating speakers, including renowned authors, senior managers from NNSA and the Department of Homeland Security,



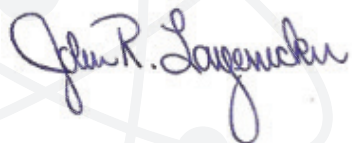
and museum administrators from around the country. These lectures are shown on the NATM website and have received many views from the public.

In 2020, the Nevada Test Site Historical Foundation (NTSHF) Board and NATM staff continued planning new exhibits and evaluating relocation options for the museum that might provide both more space and the opportunity for more visitors.

The generous contributions received from private and corporate sponsors allowed us to match roughly 75% of the \$1 million appropriated by the state of Nevada for relocation planning, and we are actively seeking additional funds from both private and government sources to help ensure that the museum remains a world-class institution, serving the needs of the community, state and region by telling the story of our national security programs and the role that Nevada has played in securing the nation's future and world peace.

Thank you again for your support during these very difficult times, and we hope that you will continue your steadfast support in 2021.

With our thanks and best personal regards,



John R. Longenecker  
Chairman,  
Nevada Test Site Historical Foundation





*Executive Director's Report*

# IN 2020, WE ROSE TO THE CHALLENGE

While 2019 proved the best year of operation in the history of the *National Atomic Testing Museum* with a little over 80,000 visitors, the year 2020 proved to be the most challenging. Having said that, 2020 was a year of learning, innovation, and forward-thinking. In many ways, it was a time for us to rise to the challenge. It was truly one of those "finest hours" that made us stronger.

I have often told my son during the year that this period will be one that he will be telling his grandchildren about, just as I grew up on stories from my grandfather of the 1918-19 Pandemic. In fact, of all the historic events my grandfather struggled through from two world wars to the Great Depression to living to see man walk on the Moon, the Pandemic a century ago was the only historic event he continued to emphasize.

I have a feeling few of us will forget this past year. As with all difficult periods, it has brought out the best in us with an inner determination. In many ways it has

made the *NATM* an even stronger and a more dynamic museum! It has moved us to the next level of educational outreach as we now offer all our programming virtually as well as virtual field trips to the *Clark County School District*. Although we have been open only with limited hours, we are still in the black at a time when well over 60 percent of the museums in this country are not. We are and remain a successful organization.

I have seen a fair number of museums in this country from behind the scenes and our *NATM* is an upper-tier operation with a dedicated staff working to promote a valued public asset. After 37 years in the field of museum administration, I feel qualified to make that observation. I am proud to be one of our staff who is chipping-in down on the floor every single weekend to keep this museum open to the public in a safe and measured way.

We give great thanks in this difficult



*James Hall and Michael Hall in the National Atomic Testing Museum*

time to the support of the *Small Business Administration*. We also give our gratitude to *Nevada Humanities* for funding which came through Congress and the *National Endowment for the Humanities* as part of the *CARES Act, Economic Stabilization Plan of 2020*.

In addition, despite the challenges to operations, we continue to present two of our most highly praised exhibits to date. These comprise a stunning new permanent display that can now be enjoyed online as well as in-person, honoring the 75th anniversary of the first nuclear test known as *Trinity*. It has also included a display from the *U.S. Navy Heritage Command* of the 1946 *Operations Crossroads* atomic tests—told through the magnificent paintings of Author Beaumont which will be renewed next year for that historic event's 75th anniversary.



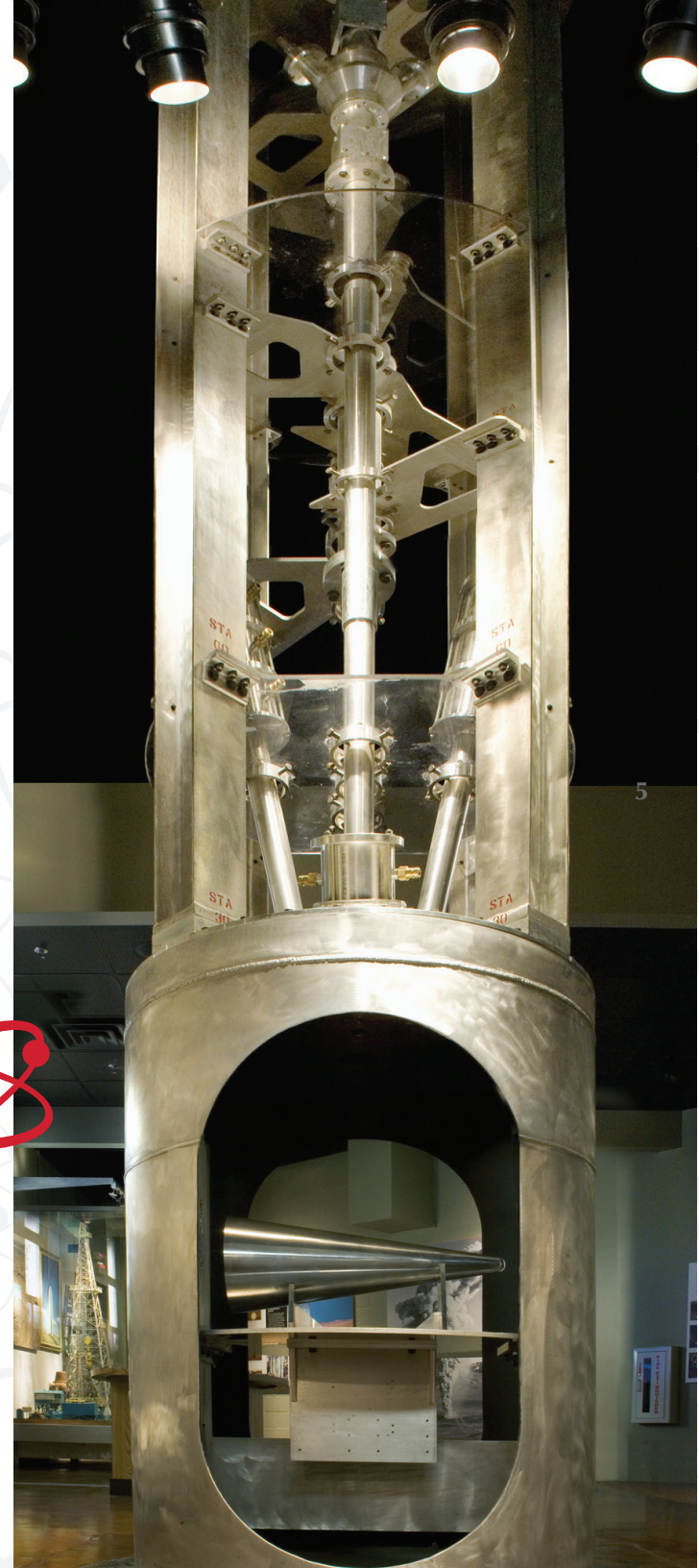
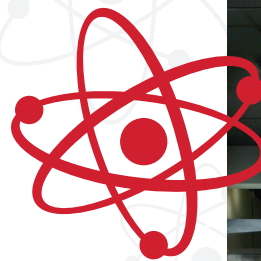
I also want to stress that we have continually developed working partnerships in our community as well as nation-wide. This is another key area in which all progressive museums are striving. Fostering critical partnerships is imperative now in the world of not-for-profits, and we are meeting those goals. As in all years, we also owe our success to the generous support of our members, corporate sponsors, donors, and partners. 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*. We thank the *Desert Research Institute* staff for their continuous assistance and team spirit as we all share a safe and well-maintained facility. Also very appreciated are our many years of friendship with the *Mob Museum (officially the National Museum of Organized Crime and Law Enforcement)*, *Neon Museum*, *Springs Preserve*, *The National Museum of Nuclear Science and History*, *The Bradbury Science Museum*, *White Sands Missile Range Museum*, *Friends of Nevada State Museum*, *City of Las Vegas*, *Henderson Chamber of Commerce*, *Las Vegas Chamber of Commerce*, *Nevada Humanities*, and the *Clark County School District*, and many, many others.

We could not do what we do without the dedicated men and women of our diverse *Nevada Test Site Historical Foundation Board*, *National Advisory Council*, veterans, volunteers, sponsors, members, stakeholders, and patrons. They all have such tremendous passion for the important history we conserve and all its many related stories that make our expanded mission so relevant to present-day events. We honor the men and women who have addressed the challenges of the nuclear age in war and peace. As we move this museum into the future, veterans of the *Nevada Test Site* continue to give this organization support and guidance. They have allowed us to go forward in this challenging past year with steady determination as we value our past, present, and future.

Warm Regards,

*Michael Hall*

Michael Hall  
Executive Director  
Smithsonian Affiliated National Atomic  
Testing Museum



## EDUCATION REPORT

*Over the course of 2020, the National Atomic Testing Museum successfully shifted most of our educational and outreach programs online and made them available through virtual platforms. This was largely thanks to the tireless efforts of Museum Technician Alex Vlasyuk and Battle Born Design's Torey Hodges, along with the resolute leadership of Executive Director Michael Hall and the NTSHF Board of Trustees.*

Since reopening the National Atomic Testing Museum to the public on June 12th, staff and volunteers have continued to host tours, both in person and remotely, and have been involved in several outreach events. Using Google Meet, we have held virtual field trips with students to discuss the Manhattan Project and introduced them to the "Trinity - The Day the World Changed" exhibit for the 75th anniversary of the test. The docents and staff have also continued to take small groups on tours through the museum.

During the summer, I personally gave presentations entitled "Strange Tales from the Nevada Test Site" and "Dawn of the Atomic Age" as part of a webinar series put on by Henderson Libraries in Henderson, Nevada and the National Museum of the Pacific War in Fredericksburg, Texas. In the fall and winter, we participated in Clark County School District's Virtual New Teacher Symposium, hosted a virtual new teacher Community Meet Up with CCSD, and helped judge Lied STEM Academy's STEM Tank competition.

While the long-running Distinguished Lecture Series was initially postponed

**NATIONAL ATOMIC TESTING MUSEUM**  
A Program of the Nevada Test Site Historical Foundation  
A Smithsonian Affiliate

広島平和記念資料館  
Hiroshima Peace Memorial Museum

**Distinguished Lecture Series**  
**Keiko Ogura,**  
**Atomic Bomb Survivor**

The NATM is proud to be partnering with the Hiroshima Peace Memorial Museum for this virtual testimonial of Keiko Ogura, a survivor of the 1945 atomic bombing of Hiroshima.

Keiko Ogura is an official atomic bomb survivor of the Hiroshima Peace Cultural Foundation. She continues to share her experience with people around the world.

Thursday, August 6, 2020  
6:00 PM PT / 9:00 PM ET  
**LIVE ON ZOOM**  
**FREE**  
(Please consider making a donation to help support us during these trying times)  
*Pre-Registration Required*

Please **PRE-REGISTER** for this event by visiting  
[www.NationalAtomicTestingMuseum.org](http://www.NationalAtomicTestingMuseum.org)  
755 E. Flamingo Road Las Vegas, NV 89119

Find us on Facebook & Twitter at AtomicMuseum!

**NATIONAL ATOMIC TESTING MUSEUM**  
A Program of the Nevada Test Site Historical Foundation  
A Smithsonian Affiliate

NEVADA HUMANITIES

**Distinguished Lecture Series**  
**"Robert Oppenheimer:  
The Myth & the Mystery"**  
**Richard Rhodes**

Watch as renowned author Richard Rhodes discusses the life of enigmatic figure J. Robert Oppenheimer, the "father of the atomic bomb."

Richard Rhodes is the author of twenty-six books including "The Making of the Atomic Bomb," which won several awards including a Pulitzer Prize in Nonfiction. His latest book, "Energy: A Human History," was published in 2018.

He has received numerous fellowships and has been a visiting scholar at Harvard and MIT. He lives in Half Moon Bay, CA with his wife, Dr. Ginger Rhodes.

Thursday, July 16, 2020  
6:00 PM PT / 9:00 PM ET  
**LIVE ON ZOOM**  
**FREE - Pre-Registration Is Required**  
Please visit our website for more information!

Please **PRE-REGISTER** for this event by visiting  
[www.NationalAtomicTestingMuseum.org](http://www.NationalAtomicTestingMuseum.org)  
755 E. Flamingo Road Las Vegas, NV 89119

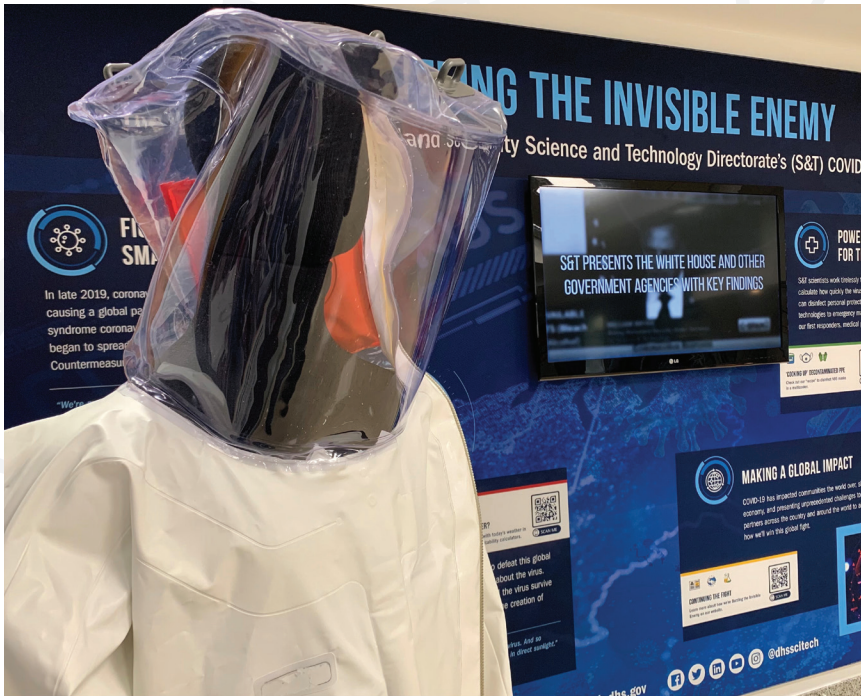
Find us on Facebook & Twitter at AtomicMuseum!

following the first two events of the year, which featured authors Stanley Paher and Dr. Vince Houghton, we began hosting a virtual version of the series in July. Speakers have included Richard Rhodes, renowned author and World War II historian; Dr. Brent Park, the Deputy Administrator for Defense Nuclear Nonproliferation for the National Nuclear Security Administration; Keiko Ogura, a survivor of the 1945 atomic bombing of Hiroshima; Mark Adams, Education Director for the Harry S. Truman Presidential Library and Museum; Chris McDougal, Director of Archives and Library for the National Museum of the Pacific War; Dr. Victor Reis, former Senior Advisor to the DOE and Assistant Secretary for Defense Programs; Reba Wissner, television music historian, author, and Assistant

**Diversity in  
STEM**

**NATIONAL ATOMIC TESTING MUSEUM**  
A Program of the Nevada Test Site Historical Foundation  
A Smithsonian Affiliate





Professor of Musicology at Columbus State University; Dr. Paul Dabisch, a senior research scientist leading coronavirus research studies at the Department of Homeland Security's National Biodefense Analysis and Countermeasures Center; and Jay Tilden, Associate Administrator and Deputy Under Secretary for Counterterrorism and Counterproliferation for the National Nuclear Security Administration.

Further reflecting the need for accessible educational content, the National Atomic Testing Museum continued to expand its virtual offerings to include worksheets and activity sheets, Manhattan Project and Trinity features, and countless articles and

videos. One new series that started out of necessity in 2020 is our Diversity in STEM Podcast. Replacing our planned Women in STEM roundtable event, this podcast is broader in scope and presents interviews with leaders in the field of science, technology, engineering, and mathematics to help inspire students of all ages. Past guests on the podcast have included Dr. Julie

Mitchell of Oak Ridge National Laboratory, Dr. Karen Schlauch of Desert Research Institute and University of Nevada, Reno, Dr. Shanna Ratnesar-Shumate of National Biodefense Analysis and Countermeasures Center, and Dr. Jessica Osuna of Lawrence Livermore National Laboratory.

From the start of the March 2020 shutdown through to the end of the year, we posted almost daily on our Facebook and Twitter pages, generating interest in the museum's wide variety of educational offerings.

Despite the challenges, the National Atomic Testing Museum has charged ahead with brand new exhibits and



displays. In addition to the *Operation Crossroads: Bikini Atoll Collection and Trinity – The Day the World Changed* exhibits, we also worked closely with the Department of Homeland Security's Science and Technology Directorate on the design of the "COVID-19: Battling the Invisible Enemy" exhibit. This display highlights the COVID-19 research being done at the DHS's National Biodefense Analysis and Countermeasures Center.

*Joseph M. Kent*

Joseph Kent  
Director of Education  
National Atomic Testing Museum



# NTSHF/NATM RELOCATION PLANNING PROJECT MOVES FORWARD

*A strategic goal of the Foundation is to obtain funding from private, local, state and federal sources in order to expand and upgrade the National Atomic Testing Museum (NATM) to assure its long-term viability.*

8 Since its opening in 2005, the museum (one of two Smithsonian Affiliates in the state of Nevada) has successfully operated as the world's premier archive and exhibition depicting the history of this nation's nuclear weapons testing and related national nuclear defense programs. However, only minor changes have been made to NATM core exhibits, limiting its useful life span. Many visitors do not realize that the Nevada Test Site (NTS), now the Nevada National Security Site (NNSS), still exists nor do they know about its current work which is vital to our nation's global nuclear deterrence. To remain relevant, the NATM must adopt new technologies and expand its timeline to today and beyond.

Recognizing this, in 2018 the NTSHF Board authorized studies to examine relocating the NATM due to limitations at its current location including: lack of "walk-in" traffic; space constraints which limit physical expansion for current NNSS/NNSA programs as well as science, technology, engineering and mathematics (STEM) education initiatives; and lack of

event rental space (important as a revenue source for self-sustainment). The expansion of the Foundation's STEM program is believed by the Board to be especially important to its long-term success.

Since 2018, the Foundation has examined eight sites in the downtown Las Vegas area, working closely with City of Las



Conceptual Sketches By Carpenter Sellers Del Gatto Architects



Vegas officials, most notably Las Vegas Mayor Carolyn Goodman who strongly supports NATM's relocation. Her vision is to strengthen the downtown "cultural corridor" which now includes the Neon, Mob, and Children's Discovery Museums. The review of potential downtown locations has culminated in the identification of a specific site in the Symphony Park area (called Site "L"), now owned by the City of Las Vegas.

## Progress to Date

The Foundation has:

- Been allocated \$1M by the State of Nevada Legislature, to be matched by the Foundation, for relocation planning activities. As of December 2020, approximately \$700K of that allocation



has been matched through mostly private donations and reimbursed to the Foundation by the State of Nevada. The remaining funds must be matched by the Foundation by May 2021 to receive the remaining State funding.

- Established an internal Relocation Project Oversight Committee, chaired by Trustee Jim Holt, which provides review and recommendations to the Executive Committee and Board on all aspects of the project.
- Been awarded a grant of \$250K by the City of Las Vegas Centennial Commission for specific activities associated with the relocation planning process.
- Acquired the services of a well-respected regional firm, Grand Canyon Development Partners, to serve as the Foundation's manager for development activities.
- Entered into a non-binding Exclusive Negotiating Agreement (ENA) with the City of Las Vegas to further explore the economic and operational feasibility of the proposed project. This was initially a one-year agreement which has recently been extended through November 2021. The "due diligence" deliverable dates continue to be met by the Foundation.

- Completed several planning deliverables, including a Master Plan; an economic and operational analysis of the proposed project; and specific conceptual sketches of the proposed new museum at the proposed Symphony Park site.
- Acquired the services of a national fundraising company to assess the fundraising feasibility for a major capital campaign. The report is due for the Board's review mid-January 2021, providing the basis for initiating a large capital campaign for both constructing and operating the new NATM.

## The Path Forward

If all ENA deliverables are met by November 21, 2021, the Foundation and the City of Las Vegas will jointly assess whether to proceed further with an agreement to acquire the Symphony Park site. This agreement, known as a Disposition and Development Agreement, sets forth the terms and conditions of acquiring the property and proceeding with construction.

***Assuming all systems are "go", the project could be completed by the end of CY 2026!***

## FINANCE REPORT JANUARY - DECEMBER 2020

### INCOME

Museum Admissions	267,278.22
Donations	856,119.72
Special Events	17,301.00
Membership	25,461.92
Museum Store Sales	79,064.72
In-Kind Contribution DOE Rent & Utilities	493,161.12
In-Kind - Advertising & Other	132,776.88
Other Income	36,404.72
<b>Total Income</b>	<b>\$1,907,568.30</b>
Cost of Goods Sold	\$38,742.71
<b>Gross Profit</b>	<b>\$1,868,825.59</b>

### EXPENSES

Payroll Benefits	538,974.68
Advertising	75,419.16
In-Kind Advertising & Other	132,776.88
In-Kind Rent & Utilities	493,161.12
Bank & Credit Card Fees	15,562.70
Refreshments, Lunches, Dinners, Travel	3,830.68
Contractors & Consultants	329,545.97
Licenses, Fees & Permits	1,006.00
Memberships & Subscriptions	4,367.00
Special Events Expense	17,137.38
Office & Supply Expense	31,735.01
Software/Hardware/Training/Website	51,907.67
Insurance	21,041.80
Interest Expense	2,031.90

<b>TOTAL EXPENSES</b>	<b>\$1,718,497.95</b>
<b>NET INCOME</b>	<b>\$150,327.64</b>

\*Figures stated in this report are as yet unaudited and are subject to revision due to potential changes in estimates and accounting rule adjustments.

The NTSHF was awarded an appropriation by Senate Bill 501 of \$1 million dollars. Allocation of the award is contingent upon match made by NTSHF.



## BALANCE SHEET

### ASSETS

Checking/Savings	706,224.96
Accounts Receivable	264,628.41
Other Current Assets	6,217.27
Fixed Assets	231,075.31
Inventory Store	25,710.39
<b>TOTAL ASSETS</b>	<b>\$1,233,856.34</b>

### LIABILITIES AND EQUITY

Current Liabilities	71,995.96
PPP Loan	140,800.00
Long-Term Liabilities	2,049.37
EIDL Loan	160,000.00
<b>Total Liabilities</b>	<b>\$374,845.33</b>
Equity	859,011.01
<b>TOTAL LIABILITIES AND EQUITY</b>	<b>\$1,233,856.34</b>

Trinity Exhibit in the National Atomic Testing Museum



## LEADERSHIP TEAM

### NEVADA TEST SITE HISTORICAL FOUNDATION BOARD OF TRUSTEES

**John Longenecker, Chairman** – NTSHF Governance and Development Committees; President, Longenecker & Associates; former member, Board of Directors, Nuclear Energy Institute; former Chair, General Atomics International Services; former DOE Deputy Assistant Secretary, Uranium Enrichment

**Linda Rakow, Vice Chair** – NTSHF Executive, Development, Governance, Relocation Project Oversight & Education Committees; former Chief Financial Officer, SLAC National Accelerator Laboratory and Lawrence Livermore National Laboratory

**Linda Smith, President** – NTSHF Executive, Development, Governance, and Membership Committees. Former Acting Deputy Manager/ Assistant Manager for Administration, DOE/Nevada; former Manager, Administration, Central Arizona Project, US Bureau of Reclamation

**Charles F. Costa** – NTSHF Vice President; NTSHF Executive & Governance Committees; Chair, NTSHF Exhibit Committee; scientific consultant, Mission Support & Test Services (MSTS), LLC; former Test Director, Los Alamos National Laboratory (LANL); and Captain (Ret.) US Public Health Service

**Mary E. Pike** – NTSHF Secretary; NTSHF Executive Committee; Chair, NTSHF Education Committee; former Director of Science, Health, Physical Education, and World Languages, former school administrator, and former science teacher for the Clark County School District

**Pat Arnold** – NTSHF Treasurer; NTSHF Executive, Governance, and Relocation Project Oversight Committees; Chair, NTSHF Finance Committee; Principal, Covelop, Inc., San Luis Obispo, CA; native of Southern California; grandson of Dr. Herbert Grier, founder of EG&G, Inc.

**Robert J. Agonia** – NTSHF founding member; NTSHF Education Committee; former DOE Nevada Operations Office Industrial Relations Director; former member, Peace Corps

**Nick C. Aquilina** – NTSHF founding member; former Manager, DOE Nevada Operations Office; former Manager, DOE Savannah River Operations Office; former Deputy Manager, DOE Idaho Operations Office

**John C. Browne** – NTSHF National Advisory Council; NTSHF Relocation Project Oversight Committee; former Director, LANL; former Associate Director for Computational and Information Sciences, LANL, with responsibility for Los Alamos Neutron Science Center

**Bruce W. Church** – 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

**John F. Doyle** – NTSHF Executive, Finance and Education Committees; former EG&G executive; led DOE Nevada Operations Office's Remote Sensing Laboratory; founding member of the nation's Nuclear Emergency Search Team (NEST)

**David Feather** – Former Senior Director, Business Operations, MSTS; former Senior Director for Program Integration, MSTS; over 25 years of weapons and program experience both as a federal manager with DOE NNSA in Washington, DC and Honeywell at

the Kansas City National Security Campus

**Dale Fraser** – NTSHF founding member; lead, NTSHF memorial brick program; former General Manager, Reynolds Electrical & Engineering Company, Inc.

**Mark Hall-Patton** – 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** – NTSHF founding member; NTSHF Development Committee; former executive with EG&G, Inc. and associated with NTS programs for over 40 years

**James Holt** – Chair, Relocation Project Oversight Committee; former President and General Manager, National Security Technologies, LLC; former Associate Director, LANL

**Thomas O. Hunter** – NTSHF National Advisory Council; NTSHF Relocation Project Oversight Committee; former President and Director, 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

**Mark W. Martinez** – President, MSTS; 23 years at LLNL, 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 NTS

**Cory Mazzola** – NTSHF Development Committee; Executive Fellow, Tuck School of Business at Dartmouth College; Management Instructor, SANS



Institute; Co-Chair, International Museum of Science & Technology Exhibition; former Executive Director, Global Cyber Security, Sands Corporation; Global Manager, Security Programs and Strategic Services, Mandiant/FireEye, Inc.; developed and taught cyber security courses at the University of Maryland

**Robert A. Savoie** – CEO, Geocent, a national information technology and engineering services company, headquartered in Metairie, LA; former CEO, Science & Engineering Associates; serves on Boards of Directors, National World War II Museum, Loyola University, and the University of New Orleans  
**Harry Steinke** – NTSHF Development Committee; President, VisX Corporation, providing support services in the areas of mission execution, program integration, program management, process improvement, business operations, and strategic planning; previously, AECOM Vice President, Federal Services Group for Strategic Development

**Robert Stoldal** – NTSHF Development Committee; 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

**Ernest B. Williams** – NTSHF founding member; former budget officer and engineering technician, DOE Nevada Operations Office; former member, USAF

**Peter Zavattaro** – NTSHF founding member; NTSHF Executive, Finance and Development Committees; former President, EG&G Energy Measurements, Inc.

## *Emeritus*

**Troy E. Wade** – NTSHF Chair Emeritus and founding member; former DOE Acting Assistant Secretary for Defense Programs; former Manager, DOE Idaho Operations Office; former Deputy Manager, DOE Nevada Operations Office

**Tom Axtell** – Former NTSHF Trustee; General Manager, KLVX-TV (PBS), Channel 10, Las Vegas,

**Joseph Behne** – Former NTSHF Trustee; former NTS Test Director, LLNL

**Ronald L. Kathren** – Former NTSHF Trustee; Past President and Life Fellow of the Health Physics Society; Past President, American Academy of Health Physics

**Stephen Mellington** – Former NTSHF Trustee; former Manager, DOE Nevada Field Office; former Assistant Manager for Environmental Management, DOE Nevada Operations Office

**Dominic J. Monetta** – Former NTSHF Trustee; President, Resource Alternatives, Inc.; former DOE Assistant Secretary

**Jay H. Norman** – Former NTSHF Trustee; former DOE Nevada Field Office Deputy Manager; former LANL scientific manager

**John Thorndal** – Former NTSHF Trustee and founding member; Partner, Thorndal, Armstrong, Delk, Balkenbush & Eisenger, Las Vegas, NV

**Alvin Trivelpiece** – Former NTSHF Trustee; 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

## *Ex-Officio Members*

**John C. Benner** – Former executive, MSTs; former LANL scientific executive for 25 years, leading the organization responsible for managing all weapon systems activities

**Mary Beth Hartleb** – Founder & CEO, Prism, HR Global Management Group LLC; her career spans over 30 years in the human resources field working for Fortune 500 companies while developing human resource departments for smaller, entrepreneurial ventures; experienced in various industries, including gaming, restaurant management, education, telecommunications, broadcasting, engineering and nonprofits

**Rick Higgs** – Resident Manager, LLNL Joint Laboratory Office Nevada; 35 years of weapons program and nuclear testing experience, including 25 years supporting the NNSS missions at both DOE Nevada Field Office and DOE's Pantex facility, Amarillo, TX

**Darwin J. Morgan** – NTSHF founding member; Director, Office of Public Affairs, DOE NNSA's Nevada Field Office since 1989; prior to joining DOE, served as reporter, anchor and assignment editor for KVBC-TV, Las Vegas, NV from 1964 to 1989; KBIM-TV, Roswell, NM from 1980-81; and KAUZ-TV, Wichita Falls, TX, from 1981-1984

**Peter Ross** – NTSHF founding member; Assistant Vice President Campus Planning and Physical Plant, Desert Research Institute, the environmental research arm of the Nevada System of Higher Education

**Scott Traeger** – Manager, LANL Joint Laboratory Office Nevada/Nevada Operations Manager; long-time NTS/NNSS engineer and technical manager; and former technical manager, DOE Nevada Field Office

## NTS HISTORICAL FOUNDATION NATIONAL ADVISORY COUNCIL

In CY 2019, the NTSHF created the National Advisory Council (NAC) to advise the Board and its primary program, the National Atomic Testing Museum (NATM) on matters related to developing NTSHF/NATM priorities; expanding the Foundation's membership/stakeholder base; and assisting the Board in establishing long-term goals and strategies. The NAC meets quarterly.

### **Chair, David Johnson** **Vice President, Honeywell Federal Solutions**

**John Browne** – Former Director, Los Alamos National Laboratory

**Jeffrey “Skunk” Baxter** – Consultant to members of Congress, DoD, DOE, DHS, various law enforcement agencies and the defense and national security industry. Professional musician, lead guitarist for Steely Dan and The Doobie Brothers

**Linton Brooks** – Former US Ambassador; former Under Secretary for Nuclear Security & Administrator of the National Nuclear Security Administration

**Don Cook** – former Director, United Kingdom's Atomic Weapons Establishment; former Deputy Administrator for Defense Programs, DOE/NNSA

**Madelyn Creedon** – former Deputy Administrator, NNSA – Consultant

**Vince Houghton** – Historian and Curator of the International Spy Museum, Washington, DC; former history professor at the University of Maryland; former member, US Army

**Tom Hunter** – former Director, Sandia National Laboratories

**David Johnson** – Vice President, Honeywell Federal Solutions; retired US Air Force colonel who served as a space and missile officer during a 23-year military career

**Robert Kuckuck** – Former Director, LANL & former Deputy Director, LLNL

**William Madia** – Vice President Emeritus, Stanford University; former Director, Oak Ridge National Laboratory

**Peggy McCullough** – General Manager, Nuclear, Security & Operations, Bechtel; former Project Director, Daunia Coking Coal Project, Queensland, Australia; Deputy General Manager, Bechtel SAIC; named Bechtel Senior Vice President in 2014

**David Overskei** – President, Decision Factors, Inc.; President/CEO, CommNexus; Senior VP, Ventures & Investments, General Atomics

**Glenn Podonsky** – Department of Homeland Security Science and Technology Directorate Executive Director, Enterprise Services; former Department of Energy Director, Enterprise Assessments

**Valerie Roberts** – Senior Vice President, Global Strategy, Jacobs Engineering

**K. Anne Street** – Former Vice President, Battelle and DynCorp; former President/COO of Geo-Centers; Past President, MIT Alumni Association; former member of MIT Corporation; former trustee of The Aerospace Corporation; former Board Trustee, NTS Historical Foundation

**David W. Swindle** – Experienced corporate leader with more than 40 years of line management responsibilities; board memberships in the US and internationally, and profit-loss responsibility for global operations exceeding \$3B annually

**Karen Wayland** – Principal, kW Energy Strategies; former Deputy Director for State and Local Cooperation, DOE Office of Energy Policy and Systems Analysis; former Senior Advisor to Speaker of the House Nancy Pelosi; former Legislative Director, Natural Resources Defense Council; former Congressional Sciences Fellow, Office of Nevada US Senator Harry Reid



## MUSEUM STAFF & CONSULTANTS

- 1 **Michael Hall** – Executive Director  
michael.hall@natm-nv.org
- 2 **Joseph Kent** – Director of Education  
joe.kent@natm-nv.org
- 3 **Alex Vlasyuk** – Museum Technician
- 4 **Jennifer Dimmick** – Store Manager
- 5 **Rozinnia Stambek** – Admissions/Store
- 6 **Elizabeth Borngesser** – CPA
- 7 **Torey Hodges** – Social Media & Web Master
- 8 **Lee Evan Ortiz** – IT
- 9 **Mary Beth Hartleb** – HR & Development
- 10 **Brian McAnallen** – Legislative Advisor & Relocation Public Relations
- 11 **James Gatling** – Relocation Project Management



## FELLOWS

- Parker Arecchi** – Curatorial  
**Natalia Miles** – Grant Writing





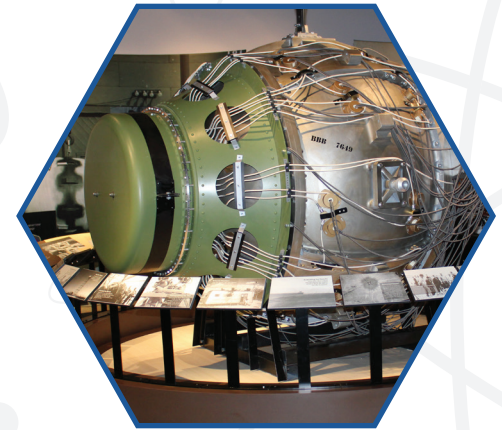
## MUSEUM VOLUNTEERS

Charles Costa  
Dale Cox  
Amanda Dacquel  
Jack Doyle  
Benjamin Dush  
Quinton Gibson  
James Hall  
Michael Heiner  
Lynda Israel  
Zachary Lavine  
Michael Lukens  
Faye Mazzia  
Samuel McClain  
Kris Morris  
Richard Reed  
Clint Seal  
Dallas Shewmaker  
Jacob Siao  
John Sutcliffe IV  
Grant a Gift Autism Foundation  
(TeenWORKS Program)  
Dean Browne  
Bryant Camp  
Julien Sierski  
Jorge Valadez  
Rodney Walker  
Ernest Williams  
Diane Zapach





# TRINITY: THE DAY THE WORLD CHANGED



*In 2020 the National Atomic Testing Museum honored the 75th anniversary of the first nuclear test known as Trinity. We did this by opening a stunning new permanent exhibit which can now be enjoyed online as well as in-person during these challenging times of pandemic. Our museum entry remains on a reservation-only basis with a Thursday through Sunday schedule from 10am to 3pm. Reservations can easily be made on our web page at <https://nationalatomicmuseum.org>. This exhibit sets a standard for all future displays and is thanks to the expertise of our longtime exhibit designer, Andrew Merriell, consulting historian Dr. Roger Meade, Exhibit Committee Chairman Chuck Costa, and important advisors like Glen McDuff, Tim Pfaff, Matthew Noe's Pronto Signs & Graphics, and New Mexico Highlands University's Media Arts & Technology Department. This is the story of Trinity which the exhibit is based on.*

The first nuclear test in history occurred on July 16, 1945, in the desolate region of

New Mexico known as Jornada del Muerto. The early Spanish explorers coined this phrase which means "route of the dead." The world soon changed forever after that experiment in the wilderness. The leader of the scientific project to build an atomic bomb, Robert Oppenheimer, had a premonition of that change. A highly-learned man in many disciplines, poetry moved him to select a codename for this momentous operation. Inspired by the John Donne poem titled *Holy Sonnet XIV: Batter My Heart, Three-Personed God*, or "Trinity" as Oppenheimer interpreted it, became the term ever-linked with that first nuclear test.

*Batter my heart, three-personed God; for you as yet but knock, breathe, shine, and seek to mend; That I may rise and stand, o'erthrow me, and bend Your force to break, blow, burn, and make me new. I, like an usurped town, to another due, Labor to admit you, but O, to no end; Reason, your viceroy in me, me should defend, but is captured, and proves weak or untrue. yet dearly I love you,*

*and would be loved fain,  
But am betrothed unto  
your enemy. Divorce me,  
untie or break that  
knot again; Take me  
to you, imprison me,  
for I, Except you enthrall  
me, never shall be free,  
Nor even chaste, except you  
ravish me.*



John Donne

John Donne called upon God in his poem to envelope him in a collection of spiritual images. The atomic test which Oppenheimer and his collection of physicists and engineers worked so hard to achieve, created just such an image.

Great planning went into this first-of-its-kind explosion. The revolutionary device was placed on top of a 100-foot steel tower for the test. This elevation was designed to keep as much of its tremendous fireball off the ground as possible so as to decrease the amount of dust stirred up by the radioactive explosion and thus limit the

spreading of radionucleotides through that debris. In later years of nuclear testing, the towers would be much higher and thus more efficient, but this symbolized the first attempt.

However, another primary reason for the elevation focused on the evaluation of an airburst explosion. The idea gained favor that the best use of the atomic bombs over Japanese cities would be to explode them at least 1,000 feet or more in the air. The theory went that an elevated explosion would maximize the destructive power of the bombs as opposed to a conventional bomb that had to hit its target point-

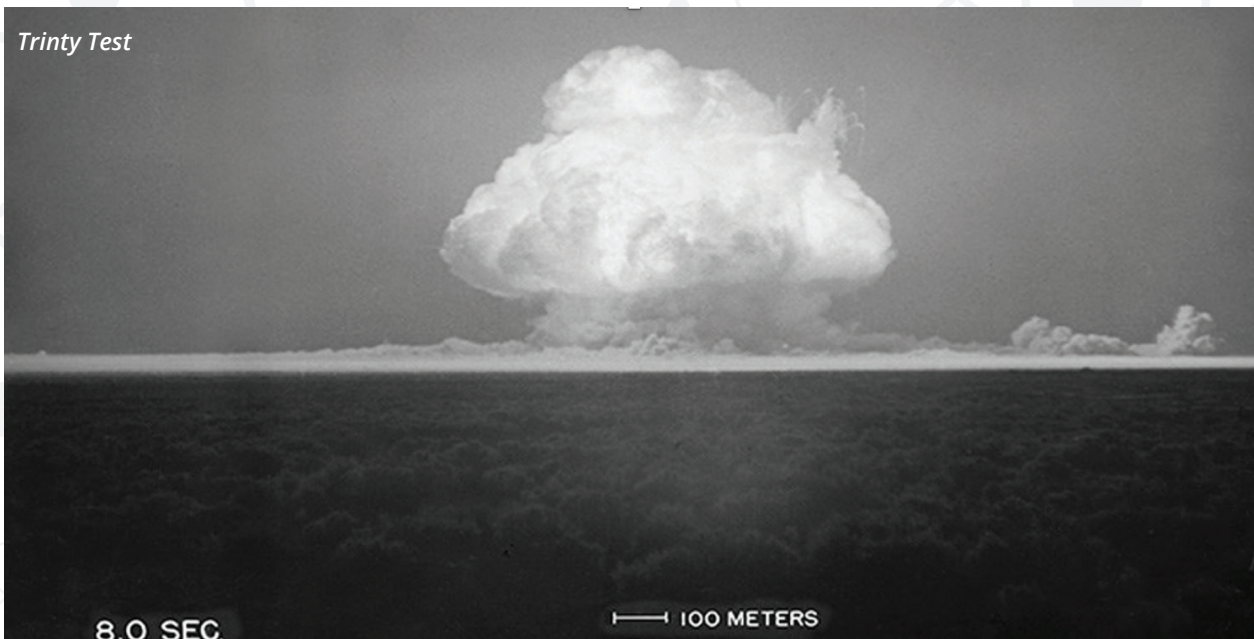
blank. The Trinity bomb used plutonium in contrast to enriched uranium which was in much shorter supply. In fact the enrichment program of uranium and the production of the man-made element plutonium as a byproduct of uranium reactors became as complex of a project as building the actual bomb itself.

It proved a race against time, but enough enriched plutonium was produced for three bombs and enough enriched uranium for one bomb by mid-1945. The uranium core bomb resulted in an extremely simple and elegant design. To vastly oversimplify it, this involved smashing one sub-critical

mass of enriched uranium into another sub-critical mass of enriched uranium in a gun barrel-like chamber to make it become a critical mass. (Critical mass simply means enough fissile material to start/and or maintain a nuclear chain reaction, which in this case was 60 kilograms of material that was at least 80 percent pure, known as Uranium-235.) They knew this formula would work, and the bomb design called Little Boy soon destroyed Hiroshima. Little Boy was already in preparation for transport to the Pacific as the Trinity test readied. The plutonium bomb, however, had far more challenges.

The problem with the plutonium bomb design was that you could not simply collide it with another piece of itself to attain a chain reaction. Enriched plutonium has spontaneous fission characteristics which produce a high rate of neutrons all the time. If you use a gun assembly method it will pre-detonate this material because of the profusion of neutrons, thus preventing a controlled critical-mass explosion. For a controlled critical release, plutonium must be detonated with an implosion method to uniformly and simultaneously compress itself together. That became a highly problematic task from an engineering standpoint.

Although, this method had advantages

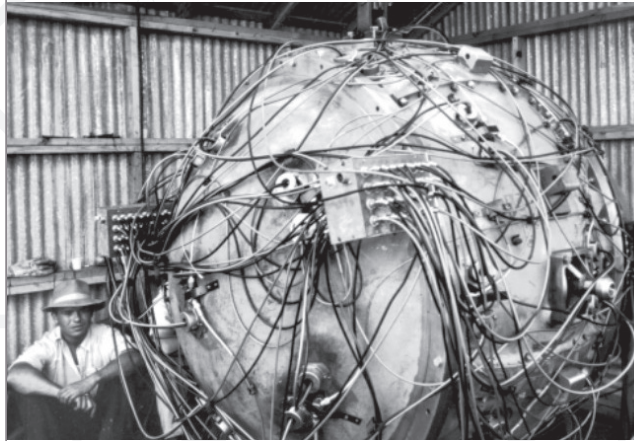




because it required only one-tenth the fissile material required in a U-235 gun-type design. In fact, in the resulting Fat Man bomb eventually used on Nagasaki, a mere 6 kilograms of plutonium was required.

The first plutonium bomb was basically a mockup for what became the core of the Fat Man design and that is what they tested at Trinity. The test was required because the process of developing conically-shaped explosive lenses to implode the plutonium into a critical-mass was such a radical idea that no one could guarantee it would work. Trinity of course did work, so the second plutonium bomb would be used on Nagasaki on August 9, 1945, just three days after the Hiroshima uranium, Little Boy, bomb dropped. A third plutonium Fat Man bomb sat on standby to be sent to the Pacific, but thankfully Japan surrendered before we exhausted our first nuclear arsenal.

Putting these complicated bomb designs into a casing small and light enough for an airplane to deliver was also a great challenge of engineering and physics. The word engineering is stressed! The great success of the Manhattan Project is due to the fact Oppenheimer gave great value to his engineers. That was a mistake, among many others, that the Germans made in



their bomb project—not utilizing skilled engineers in tandem with physicists.

The Trinity test bomb would explode with a force of 21 kilotons of TNT, yet, before the Trinity detonation took place no one knew what its scope would be. That yield figure thus became a critical data point for the test. Prior to this no one could precisely calculate how plutonium would react. Edward Teller, the future inventor of the Hydrogen Bomb, even openly questioned if the Trinity test could fuse nitrogen atoms in the Earth's atmosphere and ignite it. Teller estimated the Trinity yield could be as high as 45,000 tons. Robert Oppenheimer, on the other hand, estimated only 300 tons. He also had a bet it would not work at all. Enrico Fermi, the inventor of the first nuclear reactor with Leo Szilárd, "offered to take wagers from his fellow scientists on

whether or not the bomb would... merely destroy New Mexico or the entire world." This infuriated the military leader of the Manhattan Project, General Leslie Groves, who had little patience for such conjecture. Just four days before the test, the plutonium core arrived at the test area. It was transported in a simple Army sedan and upon arrival readied for fitting into the bomb, which they called the "Gadget." On Sunday July 15th final assembly under the supervision of Norris Bradbury had been largely completed, and the device was hoisted to the top of the tower where a small shed protected it, allowing a covered area for final last-minute adjustments. To everyone's horror, as the plutonium pit began to be inserted into the bomb, it initially did not fit. Then they realized the carefully-machined sphere had to equalize in temperature to that of the bomb encasement. It all eventually fit together although pictures of this first device look very much like a patched-together affair. Indeed, all the physicists admitted that the early bombs were basically handmade science projects.

The biggest concern was not over the theory that the bomb would ignite the Earth's atmosphere because that idea, although given serious consideration, had been thoroughly

discounted. The problem lay with the summer monsoonal forecast. Wind and rain would present problems and add to possible fallout over populated areas.

When General Groves arrived at the Trinity site that Sunday night, rain poured from the sky. Other legends in the development of the bomb who had just arrived were similarly concerned about the weather. These distinguished observers included Vannevar Bush, James Conant, Ernest Lawrence, Thomas Farrell, and James Chadwick.

20 Oppenheimer and Groves obsessed over the weather and realized at best it would mean a delay from the scheduled 4:00 a.m. zero hour. Understandably, nerves were frayed. Groves' main concern centered on what he would tell his superiors if the test failed. The new President, Harry Truman, was about to negotiate with the Russians at the Potsdam Conference, and the stakes were very high. How would Japan be defeated? The casualty figures for an invasion of mainland Japan were estimated at a million American fatalities as well as twice that many Japanese deaths expected.

Everyone felt a sense of duty to bring the war to an end even though Germany, the most feared enemy, had been defeated in May. So the Manhattan group had an

interest in watching their work succeed. (Some dissension arose later, but not in regard to anyone's patriotism.)

The observation area for the key groups consisted of two makeshift bunkers each located 10,000 yards from ground zero. As the weather reports remained bleak, Edward Teller grated everyone's nerves by applying multiple layers of sunscreen, advocating that it would help shield from the radiological effects. To ease the tension, Oppenheimer bet \$10 against George Kistiakowsky's entire month's pay that the bomb would not work at all. That did not make Groves feel any better.

They missed the 4 a.m. test time because of persistent foul weather but hoped for 5 a.m. or 5:30 a.m. Groves got so frustrated with the meteorologists that he demanded they give him a time when the weather would improve and then insisted that they sign their forecast. He also contacted the governor of New Mexico, warning that martial law would be required if there was an unforeseen disaster.

As it looked like a window in the weather would prevail, key personnel moved to different locations with the idea that observing from multiple areas would circumvent some sort of catastrophic

accident and prevent all the important observers from being killed at once. Groves accordingly went further back to base camp with Bush and Conant. Oppenheimer remained at a forward bunker. Then, a final nerve-racking incident occurred that became almost surreal to the tense atmosphere. The intercom system they were using for communication inexplicably picked up music on a local radio station. Finally, the Trinity test detonated at 5:29 a.m. on Monday, July 16. The blast wave vaporized the test tower and sent a shock wave strong enough to knock some observers off their feet. The sand at the base of the tower turned into a green glass now known as trinitite. Many wore welders' glasses, and through those dark prisms they saw a light that previously had only been observed in the celestial images of a star.

The overriding recollections, however, focused on the intense wind and radiated heat waves felt on everyone's skin during that damp cool morning. As the first man-made nuclear explosion took place, a great mushroom cloud rose above the blast, giving an iconic signature to what has ever since been known as the Atomic Age. The official government radiological report on Trinity published in 1982 stated that, "A column of smoke and debris rose as high as 15,000 feet before drifting eastward..."



Offsite monitoring teams in an area northeast of ground zero encountered gamma readings ranging from 1.5 to 15 R/h (Roentgen per hour) two to four hours after the detonation."

In his reflections, Oppenheimer again added a great emotional and artistic bend to Trinity. He stated that the explosion reminded him of a line from the Hindu holy text called the *Bhagavad-Gita*. He later stated: *I remembered the line from the Hindu scripture, the Bhagavad-Gita. Vishnu is trying to persuade the Prince that he should do his duty and to impress him takes on his multi-armed form and says, "Now, I am become Death, the destroyer of worlds."*

No one recalls Oppenheimer commenting on that at the time. Physicist Frank Oppenheimer, who stood right beside his brother, only remembers "Oppie" (as everyone called him) saying simply: "It worked." Shortly after the war, Oppenheimer did publicly comment on that moment at Trinity:  
*We knew the world would not be the same. A few people laughed, a few people cried. Most people were silent. . . We thought of the legend of Prometheus, of that deep sense of guilt in man's new powers, that reflects his recognition of evil, and his long knowledge of*

*it. We knew it was a new world...*

As the Trinity test unfolded, the sure-fire Little Boy bomb components were already being loaded aboard the USS Indianapolis in San Francisco Bay. The war with Japan ended with the atomic bombing of two key Japanese cities. America did not have to risk a million estimated U.S. casualties. Nor did Japan lose as many as had been estimated in a D-day style conventional invasion of the mainland. Of course, many scholars have argued the Japanese would have had to eventually sue for peace. Yet, the fact remains that the plans for the invasion of Japan were already in motion by August of 1945 and scheduled for that fall. The invasion would have taken place as would have the continued mass fire bombings of cities which had already proved far more destructive than both atomic bombings. Oppenheimer, in fact, commented at the time of the bomb's early development that it was more of a psychological weapon than a strategically useful device considering the limited number of devices available. Yet, the bigger significance of Trinity is the war that did not follow the Second World War. The concept is as controversial as



Robert J. Oppenheimer

the decision to use the bomb on Japan. Although, many do subscribe to this theory that nuclear weapons, even with current problems of proliferation, have created a true deterrent to another world war. Admittedly, while nuclear weapons have not prevented conventional wars, and although they do hold us hostage to our own invention, we have yet to face another world war since the dawn of the atomic age.

Others argue that nuclear weapons have only made war a civilization-ending proposition. It is worth paraphrasing the respected pacifist Albert Einstein, who had originally lobbied President Roosevelt for an atomic bomb project out of fear that Nazi Germany might get it first.

Einstein later stated, "The splitting of the atom changed everything, except the way we think." Certainly, as Robert Oppenheimer described almost 75 years ago, there is no doubt that Trinity was the day the world changed.

Michael Hall  
Executive Director



# THANK YOU TO OUR SPONSORS



## NATIONAL ATOMIC TESTING MUSEUM

A Program of the Nevada Test Site Historical Foundation  
A Smithsonian Affiliate



755 E. Flamingo Rd. Las Vegas, NV 89119-7363  
[www.nationalatomicmuseum.org](http://www.nationalatomicmuseum.org)  
 702-794-5151 | #atomicmuseum | #NATM

