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Project On Nuclear Issues Conference Introduction



Sept. 7, 2022
Laura McGill, Deputy Laboratories Director for Nuclear Deterrence

UPDATED DECEMBER
2021



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SANDIA OPERATES AT THE INTERSECTION OF U.S. NATIONAL SECURITY OBJECTIVES



*“Our nuclear triad remains the ultimate backstop of our national defense. Maintaining global strategic stability – particularly in light of Russia’s significant nuclear capability and China’s expanding nuclear arsenal – requires the United States to **maintain a safe, secure, and effective nuclear capability.**”*

Secretary of Defense Lloyd Austin

Testimony to the Senate Armed Service Committee, April 7 2022



“NNSA has a duty to **advance nuclear nonproliferation, counterproliferation, and counterterrorism.** The NNSA’s primary efforts with respect to nuclear nonproliferation are:

- **Securing nuclear and radiological materials** both domestically and around the world;
- **Minimizing and eliminating weapons-usable materials**, including replacing nuclear and radiological materials with viable alternatives wherever feasible;
- **Controlling the further spread of proliferation-sensitive materials, technology, and expertise**; and
- **Advancing nuclear nonproliferation and arms control concepts and monitoring and verification techniques.**”

NNSA Administrator Jill Hruby

Nuclear Deterrence Summit, February 7 2022

NATIONAL POLICY DRIVES THE DEFINITION OF REQUIREMENTS FOR THE SANDIA NUCLEAR WEAPONS MISSION AREA

Sandia plays a key role in the principle of extended deterrence



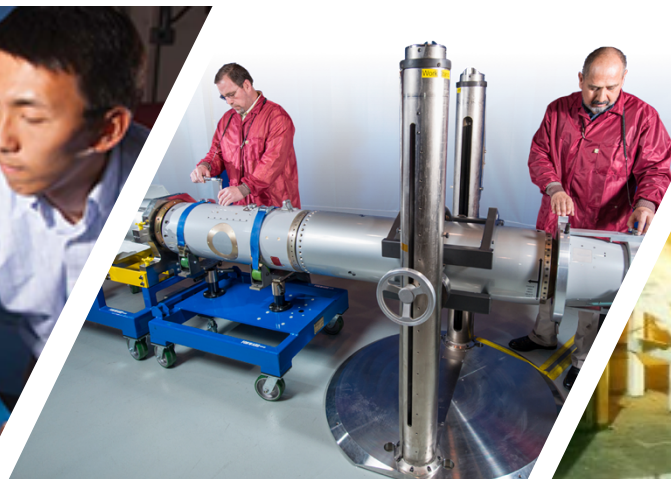
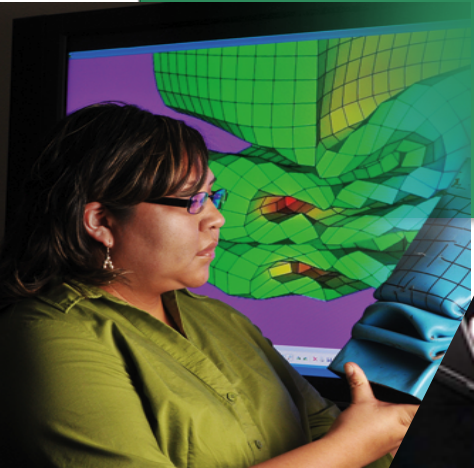
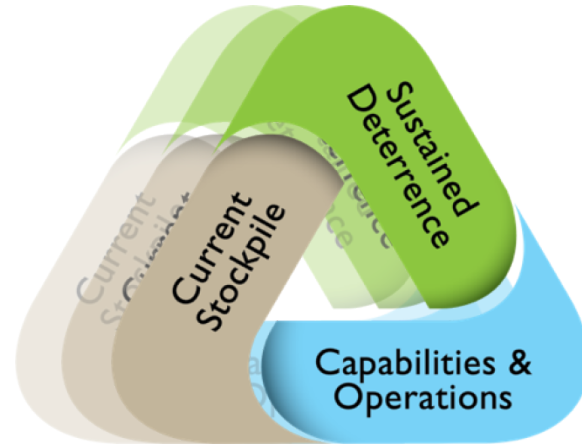
NUCLEAR WEAPONS

Maintaining the safety, security, and effectiveness of the stockpile



Fiscal Year 2022 Stockpile Stewardship and Management Plan

Report to Congress
March 2022



NUCLEAR DETERRENCE

Benefits from capabilities across the Labs



*Our future programs
rely on our capabilities*

- Weapon Component and System Surveillance and Assessment
- Radiation Effects and High Energy Density Physics (Z machine, Saturn...)
- Materials Science & Engineering, and Advanced Manufacturing
- Engineering Sciences and Testing
- Physical and Biological Sciences and Engineering
- Codes, Models, Data Analytics
- Advanced Experimental Diagnostics and Sensors
- Agile Component and System Surveillance and Assessment
- High Performance Computing
- Cyber and Intelligence Science
- Synergistic Global Security Engineering
- Microsystems R&D and Manufacturing (MESA)



ENVIRONMENTAL SIMULATION AND TEST



THERMAL TEST COMPLEX



MOBILE DAVIS GUNS



BURN SITE



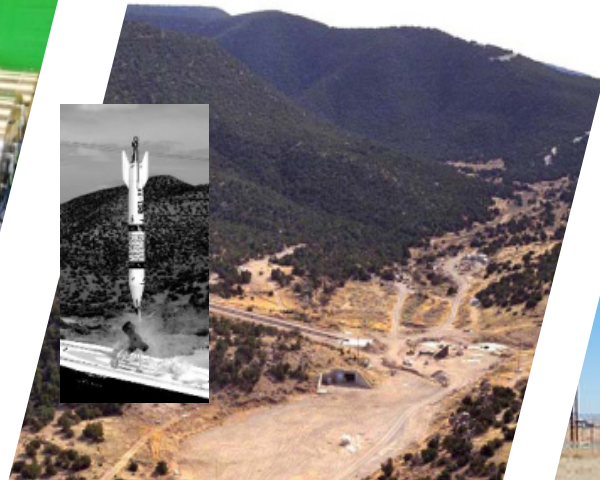
BLAST TUBES



2,000' ROCKET SLED TRACK



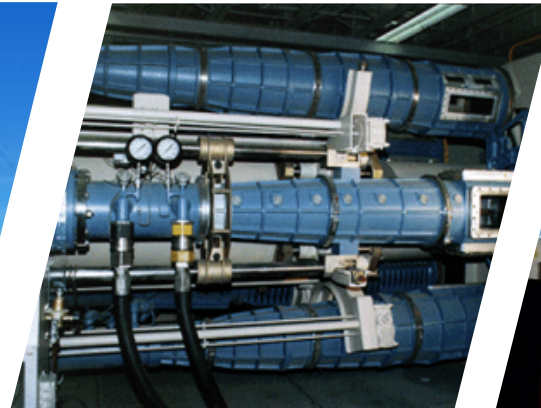
LARGE SCALE MULTI-AXIS VIRE



AERIAL CABLE FACILITY



DROP TOWERS/ LAKE



WIND TUNNELS



10,000' ROCKET SLED TRACK

MODERNIZATION

A more responsive nuclear security enterprise

LAWRENCE LIVERMORE NATIONAL LABORATORY

- Nuclear Explosive Package Design Agency
- National Ignition Facility

NEVADA NATIONAL SECURITY SITE

- Hydrodynamic Testing
- Subcritical Pu Experiments
- Special Nuclear Material Operations at Device Assembly Facility (DAF)

SANDIA NATIONAL LABORATORIES

- Warhead Systems Engineering and Integration
- Non-Nuclear Component Design Agency
- Production Agency for Specialized Components

LOS ALAMOS NATIONAL LABORATORY

- Nuclear Explosive Package Design Agency
- Pit Production and Plutonium Sustainment Strategy

KANSAS CITY NATIONAL SECURITY COMPLEX

- Non-Nuclear Component Production

Y-12 FACILITY

- Highly Enriched Uranium (HEU) Storage and R&D
- Uranium Processing Facility (UPF)

SAVANNAH RIVER SITE

- Tritium Production R&D and Supply Management

PANTEX PLANT

- Full Warhead Assembly/Disassembly
- High Explosive Production and Machining
- Weapon Surveillance

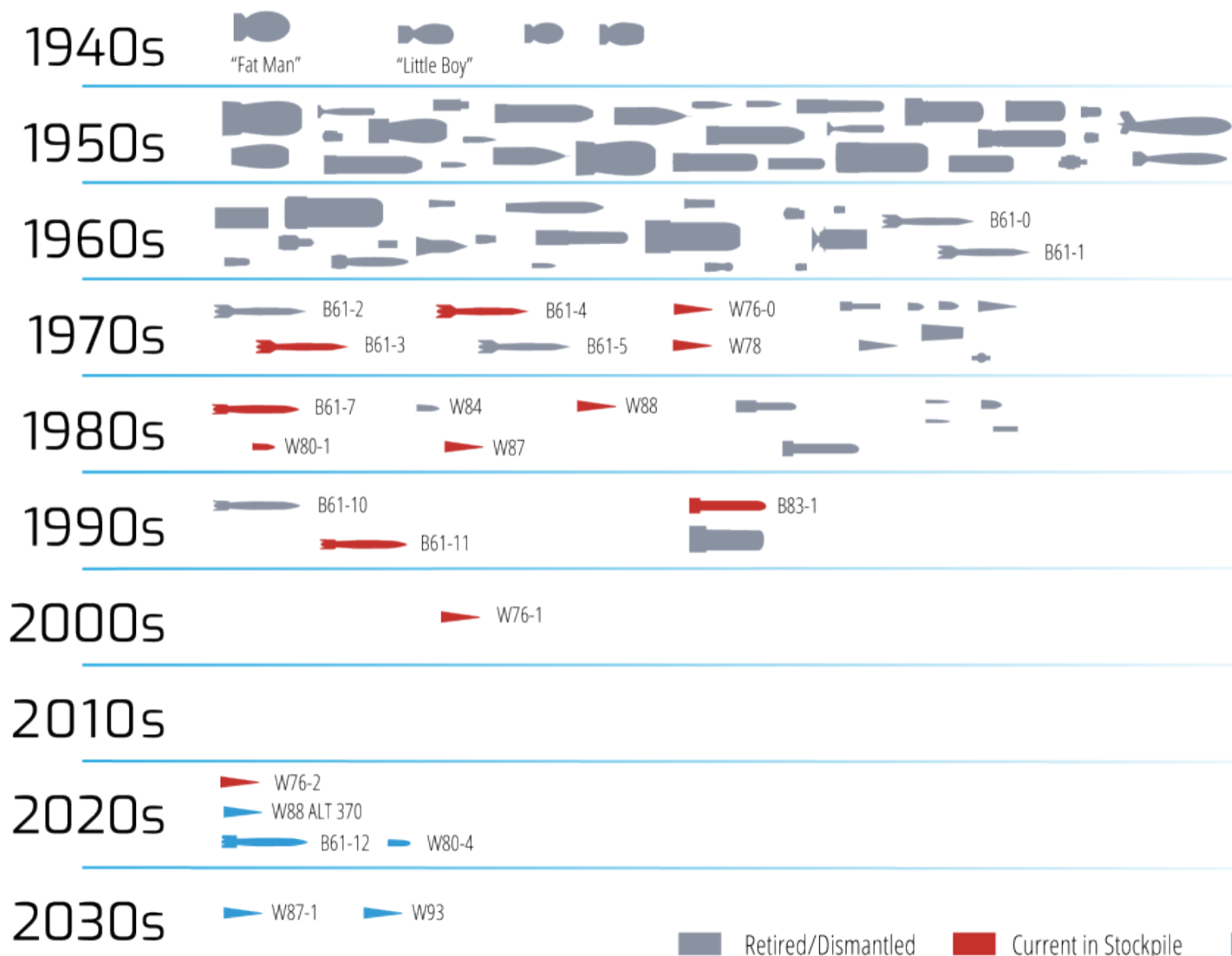
Weapons Research, Development and Testing (WRD&T)

Nuclear Weapons Production (NWP)

Nuclear Materials Production (NMP) and WRD&T

NMP and NWP

U.S. STOCKPILE MILESTONES OVER TIME



1945 - World War II Ends

1947 - Cold War Begins



1969 - Arms Race Intensifies

1975 - Vietnam War Ends



1991 - Cold War Ends

1992 - Stockpile Stewardship Begins

2015 - Life Extension/Modernization



Retired/Dismantled
 Current in Stockpile
 Future Stockpile

ASSURING A SAFE, SECURE, & EFFECTIVE STOCKPILE

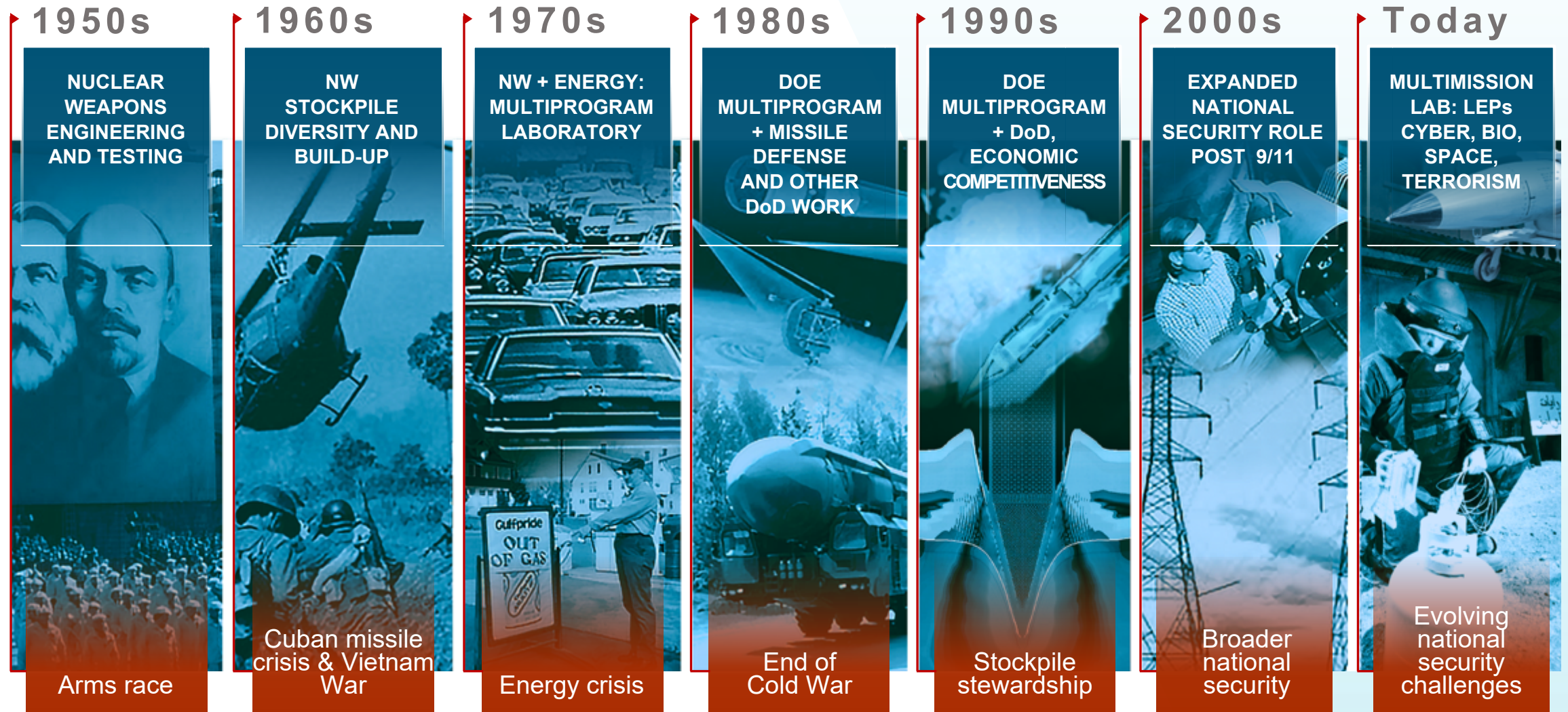
Labs Director Annual Assessment Letter is our **#1 priority**: to ensure a **safe, secure, and reliable** stockpile

- Responsible for ensuring that a nuclear weapon will **always** work as intended when called upon by the U.S. president...and **never** work under any other circumstances
- Underpinned by our extensive science and technology capabilities.


“I couldn’t be prouder of the work performed through field and lab testing and modeling and simulation to determine the health of the current stockpile, as well as the progress on life extension programs that includes increased weapon surety through the Mobile Guardian Transporter program and weapon alterations.”

—Dr. James Peery

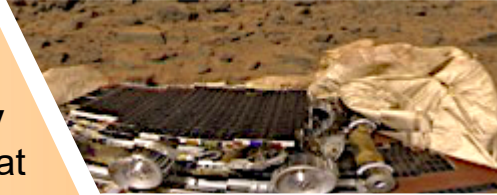
OUR MULTIMISSION ROLE HAS EXPANDED OVER THE DECADES



SANDIA'S MULTIPLE SCIENCE AND ENGINEERING DISCIPLINES UNITE TO PRODUCE TECHNOLOGIES THAT CHANGE THE WORLD




Sandia pioneered clean room technology to protect the circuitry that controls nuclear weapons. It went on to be used in hospitals, computers, and smartphones.



Parachute technology designed for nuclear weapons helped the Pathfinder spacecraft land on the surface of Mars



Sensor technology developed to detect the acceleration pattern of warheads was an early component of automobile airbags



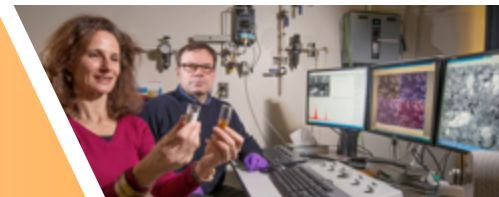
The Galileo spacecraft survived Jupiter's radiation belts because of **rad-hard components** designed and built by Sandia



Copperhead, a **Synthetic Aperture Radar** system, has saved the lives of countless servicemen and women by detecting IEDs from unmanned aerial vehicles



Hydrogen fueling systems in Sandia's transportation energy research draw on our work in **gas transfer** that provides gas boosting for a nuclear weapon

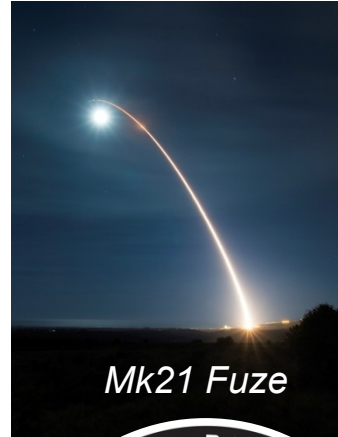


Sandia's method to remove radioactive contaminants from wastewater helped clean up contaminated water from Japan's Fukushima nuclear power plant

CONCLUSION

Sandia is **maintaining and refurbishing** the U.S. nuclear weapons stockpile through a deep scientific understanding of the technologies supporting safe, secure, and effective legacy weapons so that UGT will not be required.

Legacy warhead refurbishment efforts focus on **modernizing the inherent safety, security, and effectiveness** needed for the U.S. and its allies to have confidence in a smaller stockpile.



Mk21 Fuze



W93/Mk7



B61-12
IEP



W87-1 Modification
Program (Mod)



W88-0/Mk5
Alteration
(ALT) 370

W80-4
Life Extension
Program (LEP)

