TRINITY TEST
75th ANNIVERSARY

TRINITY SCIENTIFIC FIRSTS

THE TRINITY TEST was perhaps the greatest scientific experiment ever. Seventy-five years ago, Los Alamos scientists and engineers from the U.S., Britain, and Canada changed the world. July 16, 1945 marks the entry into the Atomic Age.

PLUTONIUM:
Scientists confirmed the newly discovered ^{239}Pu has attractive nuclear fission properties for an atomic weapon. They were able to discern which production path would be most effective based on nuclear chemistry, and separated plutonium from Hanford reactor fuel.

PRECISION HIGH-EXPLOSIVE IMPLOSION TO CREATE A SUPER-CRITICAL ASSEMBLY:
Project Y scientists developed simultaneously-exploding bridgewire detonators with a pioneering high-explosive lens system to create a symmetrically convergent detonation wave to compress the core.

ADVANCED IMAGING TECHNIQUES:
Complementary diagnostics were developed to optimize the implosion design, including flash x-radiography, the RaLa method, the magnetic method, pins, and betatron accelerator gamma rays.

CRITICAL ASSEMBLY EXPERIMENTS:
These determined the critical masses of uranium, plutonium, and tamper materials for the design of the weapon and validated an understanding of the neutron chain reaction.

THE ORIGINS OF STOCKPILE SAFETY:
Project Y scientists designed relatively simple safing features, such as fuzing plugs and insertable cores, into wartime nuclear weapons. These innovations would inspire more complex and entirely reliable safing technologies in future weapons.

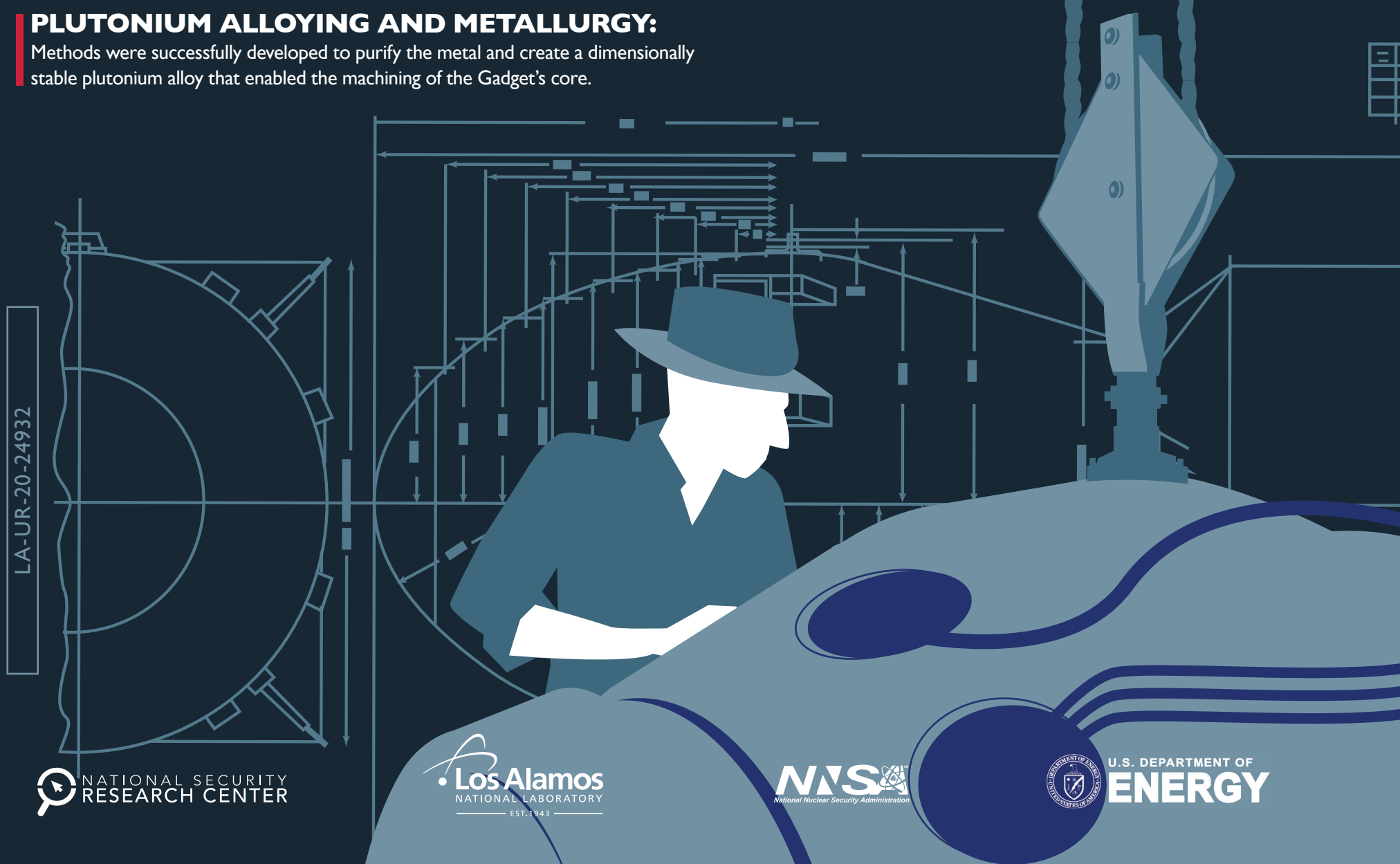
PLUTONIUM ALLOYING AND METALLURGY:
Methods were successfully developed to purify the metal and create a dimensionally stable plutonium alloy that enabled the machining of the Gadget's core.

THE BETHE-FEYNMAN FORMULA:
Nobel Laureates Hans Bethe and Richard Feynman developed the physics equation used to estimate the yield of a fission weapon, building on earlier work by Otto Frisch and Rudolf Peierls. The equation elegantly encapsulates essential physics involved in the nuclear explosion process.

FOUNDATIONAL RADIOCHEMICAL YIELD ANALYSIS:
Wartime radiochemistry techniques developed and used at Trinity provide the foundation for subsequent analyses of nuclear detonations, both foreign and domestic.

NEW FRONTIERS IN COMPUTING:
Human computers and IBM punched-card machines together calculated hydrodynamics, instabilities, and neutronics algorithms that began the modern era of multi-physics simulations.

THE DAWN OF THE ATOMIC AGE:
Trinity verified fission could be harnessed in the form of a revolutionary weapon: about 6 kilograms of plutonium yielded an equivalent of 21,000 tons of TNT. The use of nuclear weapons helped bring World War II to an abrupt and victorious conclusion. Today, the atom provides clean energy and enhanced national security.



LA-UR-20-24932

NATIONAL SECURITY RESEARCH CENTER
Los Alamos NATIONAL LABORATORY EST. 1943
National Nuclear Security Administration
U.S. DEPARTMENT OF ENERGY