



German chemist Martin Klaproth discovered uranium.

1789

As an early analytical chemist who introduced the balance as a standard analytical instrument, Klaproth specialized in the analysis of minerals, leading to his discovery of three new elements:

- Uranium in 1789
- Zirconium in 1789
- Cerium in 1803



1895 German physicist Wilhelm Conrad Roentgen discovered ionizing radiation.

Above: The very first X-ray is of the left hand of Roentgen's wife, Anna, and her engagement ring.



French physicist Antoine Henri Becquerel discovered radioactivity.

1896

Becquerel showed that rays emitted by uranium caused gases to ionize and that they differed from X-rays in that they could be deflected by electric or magnetic fields. In this way, a spontaneous discovery of radioactivity occurred.



1897 English physicist J.J. Thomson discovered the electron.



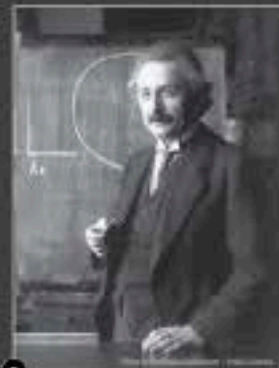
1898



Polish and naturalized-French physicist Marie Curie and her French physicist husband Pierre Curie discovered polonium and radium.

"I am among those who think that science has great beauty."

Madame Marie Curie



1905 Theory of relativity postulated by German-born theoretical physicist Albert Einstein.

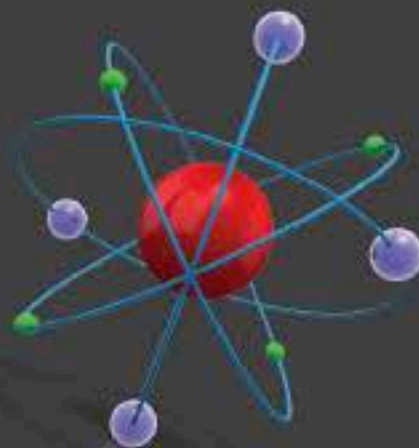
$$E=mc^2$$



1911 New Zealand physicist Sir Ernest Rutherford is credited with proposing the planetary model of the atom. In 1919, Rutherford discovered the proton.



1924 The first radiotracer studies were performed in animals.



1925 Birth of Nuclear Medicine

Bismuth-214 was used for the first time to determine the arm-to-arm circulation time in humans.



British physicist Sir James Chadwick identified the third basic particle of the atom, the neutron.

1932 British and Irish physicists John Cockcroft and Ernest Walton performed the first laboratory-controlled splitting of the atom.



This Cockcroft-Walton particle accelerator was used during the development of the atomic bomb. Built in 1937 by Philips of Eindhoven, it is now in the National Science Museum in London, England.

The discovery of fission

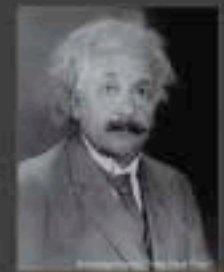


Hungarian-American physicist and inventor Leo Szilard conceived

1933 of the nuclear chain reaction. In 1934, Szilard and Italian-American physicist Enrico Fermi patented the idea of a nuclear reactor.



1938 Nuclear fission was discovered by chemists Otto Hahn and Fritz Strassmann and physicists Lise Meitner and Otto Robert Frisch.



Summer 1939 Albert Einstein was famously a pacifist, but he signed a letter to President Franklin D. Roosevelt urging him to develop the atomic bomb, concerned that Nazi Germany could use nuclear energy to build an "extremely powerful bomb of a new type" that could destroy entire ports.



President Roosevelt formed the Advisory Committee on Uranium.

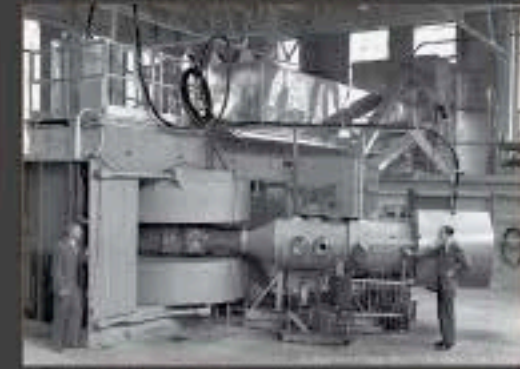
Fall 1939

The discovery of plutonium **was kept secret** after the subsequent discovery that an isotope of the new element, plutonium-239, could undergo fission and be used as fuel for an atomic bomb.



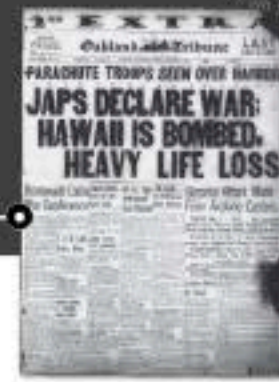
Germany invaded Poland. World War II began.

1 September 1939



Robert Serber at the University of California Lawrence Radiation Laboratory

1940 American physicist Glenn Seaborg led the research team that discovered plutonium in 1940, and in 1941 isolated Uranium-233.



7 December 1941 Japan attacked Pearl Harbor. The United States entered the war.



1942 Lieutenant General Leslie Groves was appointed to head the Manhattan Project. Under his direction, atomic research was conducted at Columbia University and the University of Chicago. The main project sites were built at Los Alamos, Oak Ridge, and Hanford.



Enrico Fermi directed the first experiment that proved an atomic chain reaction could be self-sustaining.

December 1942

How many people does it take to build an atomic bomb? About 125,000, if you count the inhabitants of three entire U.S. cities that were built from scratch as part of the Manhattan Project. It was all done in secret. They weren't on any maps, and almost none of the residents knew they were working on a new type of bomb, only some kind of war effort. For a casual observer, these cities were normal places with the occasional oddity. Every baby born in Los Alamos, for example, had a P.O. box in Santa Fe, New Mexico, listed as their birth place.

written by Jacopo Prisco, CNN (published 13 June 2018)



The 'Fat Man' atomic bomb



Security perimeter at the site



Construction of Hanford's B Reactor, the world's first full-scale plutonium production reactor



Atomic physicist, group looks for final assembly points used by the secretly assembled nuclear device, 'Fat Man'

The U.S. tested the first atomic bomb, Trinity, at Alamogordo, NM.

16 July 1945



Repatronic photograph taken 25 milliseconds after the Trinity nuclear test explosion in 1945



Atomic bombing of Nagasaki on 9 August

6 & 9 August 1945

The U.S. detonated two atomic bombs over the Japanese cities of Hiroshima and Nagasaki.



Japan formerly surrendered. WW II ended.

2 September 1945



United Nations Atomic Energy Commission was established.

January 1946



Truman signs the Atomic Energy Act

August 1946

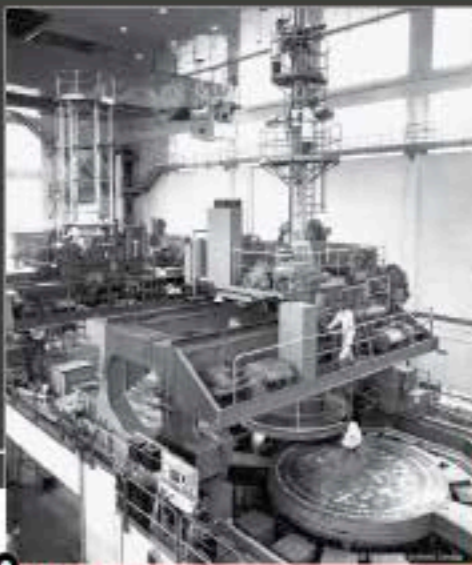
The Atomic Energy Act (McMahon Act) determined how the U.S. would control and manage the nuclear technology it had jointly developed with its World War II allies, the U.K. and Canada.

Canada's nuclear isotope program pioneered a new era in cancer-fighting treatments and in research & development around health care.



1947

The National Research Experimental (NRX) reactor at Chalk River, Ontario, began providing an ongoing supply of radioisotopes.



1949

The design for Chalk River's National Research Universal (NRU) reactor began. Built as the successor to the NRX reactor, it generated radionuclides used to treat or diagnose more than 20 million people in 80 countries annually. At the time of its retirement in 2018, it was the world's oldest operating nuclear reactor.

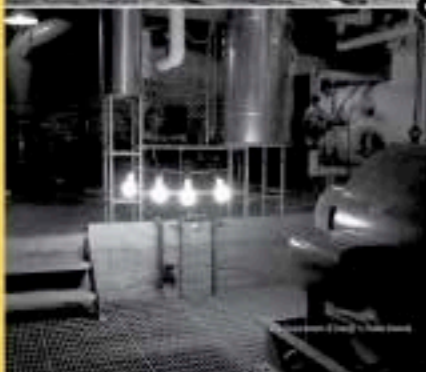


The world's first cancer treatment with Cobalt-60 radiation took place at Victoria Hospital in London, Ontario.

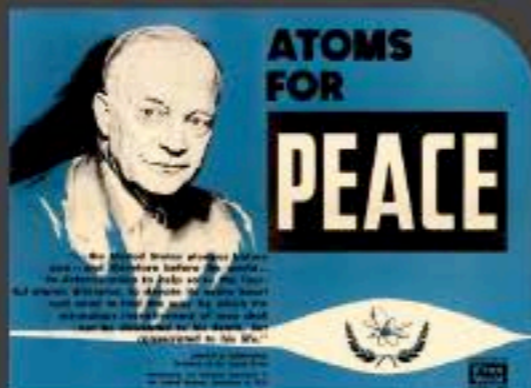
1951



Originally named the National Reactor Testing Station, this sprawling 890 m² complex was established by the Atomic Energy Commission to serve as a national hub of atomic innovation.



20 December 1951
Four light bulbs were lit with electricity generated from the Experimental Breeder Reactor No. 1 (EBR-1) at the National Reactor Testing Station.



"Atoms for Peace" was the title of a speech delivered by U.S. President Dwight D. Eisenhower to the UN General Assembly in New York City.

8 December 1953



1 January 1954

USS Nautilus (SSN-571), the world's first operational nuclear-powered submarine, was launched by the U.S. Navy.



Admiral Hyman Rickover (left) directed the development of naval nuclear propulsion and controlled its operations for more than 30 years.

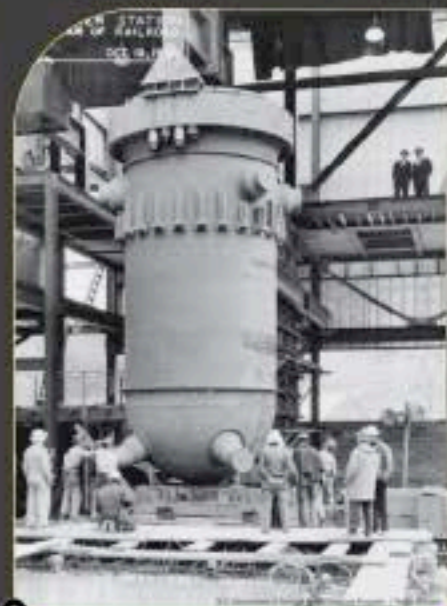
Nuclear Power Firsts

1954—The Soviet Union opened a 5 MW nuclear power plant in, the first to generate electricity for a power grid.

1955—The town of Arco, Idaho, became the first city in the world to be lit by atomic power from a reactor built near EBR-1, the BORAX III.

1956 — Britain opened Calder Hall in Sellafield, the first commercial nuclear power station for civil use.

1956 — France's nuclear program generates its first electricity with the opening of a reactor at Marcoule.



2 December 1957

The Shippingport Atomic Power Station, the world's first full-scale PWR nuclear power plant for civilian needs, was a joint project of the Atomic Energy Commission.



21 July 1959

The NS Savannah was the first nuclear-powered merchant, passenger/cargo ship. At a cost of \$46.9 million, it was funded by the U.S. government to show the positive use of nuclear power.



24 September 1960

The U.S. Navy commissioned the world's largest ship, a nuclear-powered aircraft carrier, the USS Enterprise (CVN-65).

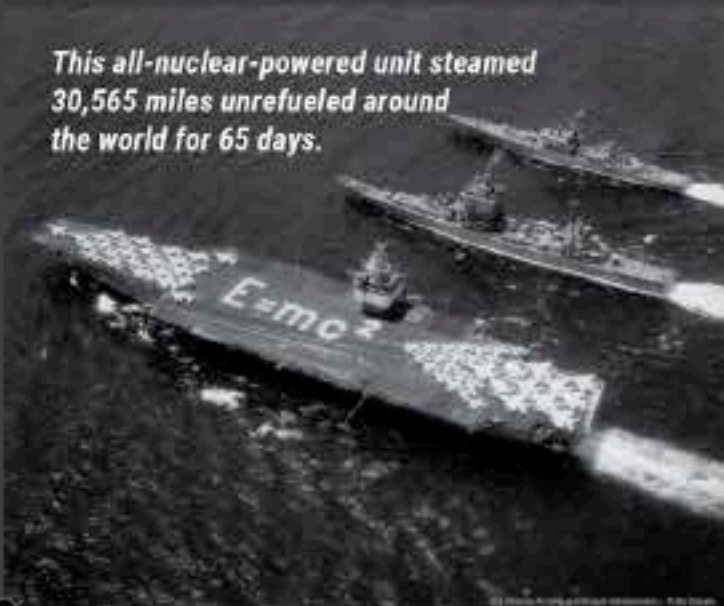


12 October 1960

Dresden Generating Station was built entirely without government funding. One-third of the contract price was shared by a consortium of eight companies comprising the Nuclear Power Group, Inc.

Cuban Missile Crisis 1962

Limited Test Ban Treaty 1963



This all-nuclear-powered unit steamed 30,565 miles unrefueled around the world for 65 days.

1964

Operation Sea Orbit was an around-the-world cruise of the U.S. Navy's Task Force One, consisting of the USS Enterprise, USS Long Beach, and USS Bainbridge. The primary purpose of Task Force One's circumnavigation was to gain knowledge and experience in operating nuclear ships at high speeds for extended periods.



The U.S. launched the first nuclear reactor in space. The 500-watt SNAP 10A auxiliary power unit was operated successfully at full power for 43 days.

1965

Nuclear Non-Proliferation Treaty



1968
TRIUMF, Canada's national particle accelerator center, was founded.



1977

Reprocessing spent nuclear fuel banned.



1971

Barnwell Disposal Facility began accepting low-level radioactive waste.

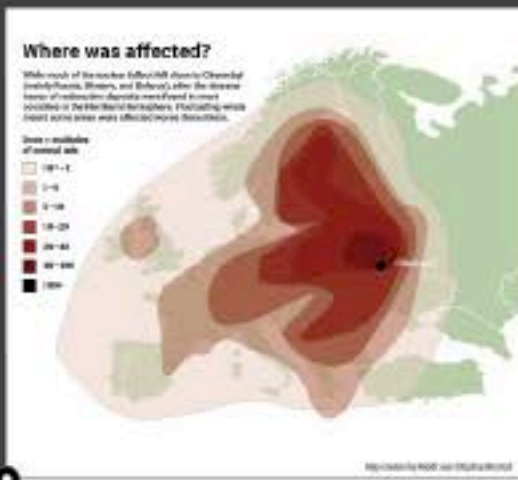
1977

Hittman Transport Services was founded, building a reputation for safe operation.



In 1980, DOE initiated the Three Mile Island research and development program to develop technology for disassembling and defueling the damaged reactor. The program would continue for 10 years and make significant advances in developing new nuclear safety technology.

In the U.S., the atom overtook hydropower to become the **second largest source of electricity**, after coal.



Dissolution of the Soviet Union effectively ended the Cold War.

1991

28 March 1979
The worst nuclear accident in U.S. history: Equipment failures and human error contribute to an accident at Three Mile Island Unit 2 located outside Harrisburg, Pennsylvania.



President Jimmy Carter visited Three Mile Island Nuclear Power Station after the accident on 3 April 1979.

October 1979
Creation of the Institute of Nuclear Power Operations to address issues of safety and performance.



1982
The Nuclear Waste Policy Act is signed into law by President Reagan.

1985
Bear Creek, the nation's largest commercial processor of low-level radioactive waste, opened for business.



Ultracomputer

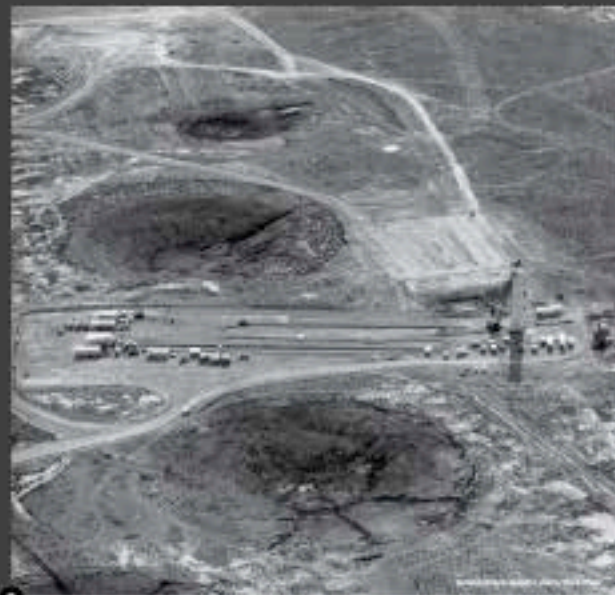


Metal Melt

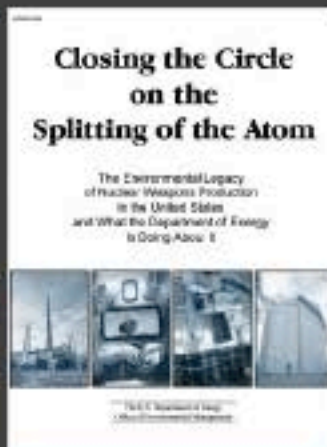
26 April 1986
The Number 4 reactor at the Chernobyl power plant in Ukraine exploded, causing the worst nuclear accident the world has seen. It sent a plume into the atmosphere with radioactive fallout that was 400 times greater than that released in the atomic bombing of Hiroshima.



1988
The Clive Disposal Facility, located in a remote arid climate in the West Desert of Utah, opened for business.



Comprehensive Nuclear Test Ban Treaty
1996



January 1996
DOE published *Closing the Circle on Splitting the Atom*, which described existing environmental, safety, and health problems throughout the nuclear weapons complex and the cleanup challenges that DOE faced.

July 1997
Savannah River Site closed the first high-level waste tanks in the nation.

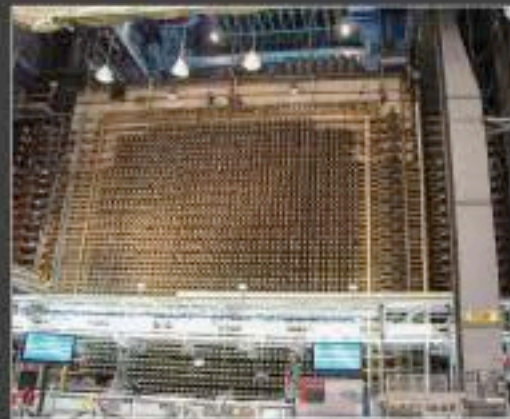


September 1998
C Reactor cocooned at Hanford.



2006
Rocky Flats Site achieved regulatory closure.

2007
EnergySolutions acquired Monserco in Canada.



2008
Hanford's B Reactor declared National Historic Landmark.



B Reactor control station.

Nevada Test Site renamed Nevada National Security Site.
2010



2010
The Zion Nuclear Power Station D&D project began.



11 March 2011
A 9.0 magnitude earthquake and tsunami wrecked the Fukushima Daiichi Nuclear Power Plant, triggering nuclear meltdowns that contaminated food and water and forced mass evacuations.

23 September 1992
The United States detonated a nuclear device named Divider below the Nevada Test Site. It was the nation's 1,054th nuclear weapons test since the dawn of the nuclear age. Less than two weeks after this test, President George H.W. Bush signed a bill into law dictating a nine-month moratorium on nuclear explosive tests.

March 2015

EnergySolutions acquired MHF Services.

September 2018

Zion License Termination Plan approved by the NRC.

April 2019

- SEFOR D&D project completed.
- EnergySolutions awarded Fort Calhoun D&D project.



December 2016

SONGS D&D awarded to a joint venture between EnergySolutions and AECOM.

December 2017

EnergySolutions acquired PHTS Logistics in Canada.

November 2019

EnergySolutions completed the La Crosse D&D project.

December 2020

EnergySolutions acquired the Three Mile Island Unit 2 Nuclear Power Plant from FirstEnergy Corp.



In 2020, the U.S. DOE announced more than \$65m in awards for advanced nuclear technology projects in 28 states.

2020

A virtual software package that can predict reactor performance with pinpoint accuracy secured its first commercial license. Electric Power Research Institute (EPRI) received rights to use the Virtual Environment for Reactor Applications.

The NRC granted first ever small modular reactor design (SMR) to NuScale Power.

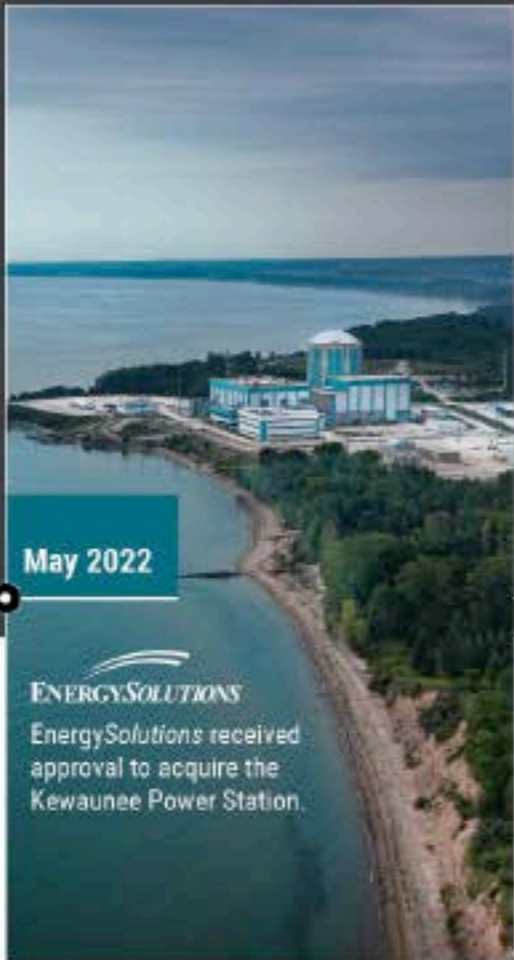
Framatome's first complete accident-tolerant fuel assembly was installed at the Calvert Cliffs Nuclear Power Plant in Maryland.

2021

DOE teamed up with Exelon Nuclear to complete the industry's first fully digital safety system upgrade at the Limerick Generating Station in Pennsylvania.

2021

Southern Company's Vogtle Units 3 & 4 will be the first U.S. reactors to use the AP1000 technology developed by Westinghouse. These new reactors have advanced safety systems that automatically shut the reactor down without any operator action or external power source.



May 2022

ENERGYSOLUTIONS
EnergySolutions received approval to acquire the Kewaunee Power Station.

April 2022

A consortium was formed to advance the development of advanced fluoride salt-cooled high-temperature reactor (KP-FHR) technology.



November 2022

Removal of a nuclear reactor from the NS Savannah, weighing about 350,000 pounds.

ENERGYSOLUTIONS
EnergySolutions formed a partnership to decommission the N.S. Savannah.

In December 2022, Chalk River Laboratories officially broke ground on one of the largest nuclear research facilities ever constructed in Canada.



First Hanford LAW vitrification furnace began heating up.

2022



Throwback to 1999
EnergySolutions test pilot melter was the foundation for the Hanford vitrification plant.

One of the **most impressive scientific feats of the 21st century**

The U.S. Department of Energy announced a monumental milestone in nuclear fusion research: a "net energy gain" was achieved for the first time in history by scientists from the Lawrence Livermore National Laboratory.

December 2022



2023
EnergySolutions
Annual Conference

