



NUCLEAR ENERGY RESEARCH THAT ENABLED **FIRST TRUE SUBMARINE** STILL PAYING DIVIDENDS

On Jan. 21, 1954, the U.S.S. Nautilus, the world's first atomic-powered submarine – featuring a reactor designed by Argonne National Laboratory researchers – launched into the icy waters off Groton, Conn., instantly transforming worldwide submarine and anti-submarine tactics.

THE OPPORTUNITY

In the 1940's, with nuclear power still in its infancy, the United States decided to explore the possibility of using an atomic reactor to power a submarine.

Previous submarines were really “diving boats,” dependent on air-breathing diesel engines for long-distance travel and short-lived battery power for slow underwater mobility. This limited endurance and slow submerged speed were major Achilles' heels of the traditional submarine.

The theory was, since nuclear reactors did not need air and offered exceptional energy capacity, there was an opportunity to develop the world's first true submarine, capable of operating underwater for much longer periods of time and at higher speeds.

THE PIVOTAL DISCOVERY

Argonne National Laboratory was already one of the world's premier centers of nuclear power research and development, so U.S. officials appointed Argonne to lead the project.

Researchers faced many difficult challenges in trying to design a high-efficiency nuclear reactor that would fit into the tight confines of a submarine hull and still produce enough energy to drive the ship.

They settled on using high-pressure water to cool the reactor core, a scheme that was very different from previous reactors.

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THE IMPACT

- Traveling at up to 20 knots, Nautilus could cover 50,000 miles without refueling, allowing it to remain submerged for weeks. This instantly transformed worldwide submarine and anti-submarine tactics.
- In 1958, the Nautilus made the first trip below the polar ice cap (1,830 miles).
- The ship's reactor became the prototype for most of the world's commercial nuclear power plants. These plants now supply more than 20% of the U.S.'s electricity.

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