

U.S. ports and non-Russian ports. The Russians captured the cargo between the United States and trading partners and assumed a strategic position. At one point, the Russian lines, particularly the Baltatlantic, took over 25% of the cargo between the United States and West Germany, and captured 13% of the general cargo between the United States and Western Europe.

"In the past 10-15 years Western shipping lines have been faced by growing competition from the Soviet merchant fleet, which has used cutthroat rate policy that has shaken the structure of commercial shipping worldwide, and in some places subjected it to severe pressure," commented Jurg Dedial, a Swiss journalist of the *Neue Zürcher Zeitung* in a report by the National Strategy Information Center Inc. entitled "The Challenge of Soviet Shipping."

Unlike the United States, the Soviets have launched a nuclear merchant shipbuilding program which, by the close of the 1980s, is considered certain to make the Soviet merchant marine the only one in the world to possess both nuclear-powered icebreakers and cargo vessels. They already have oceangoing nuclear icebreakers with an "unlimited sailing range, and an endurance of between 500-700 days," according to their reports. This compares with an endurance of Western icebreakers such as the Canadian *Diberville* and American *Glacier* and *Gletcher* of no more than 50 days. The Russians have already built another giant icebreaker, the *Rossiya*, the fourth in the Soviet fleet. The others are the *Lenin*, the *Arktika*, and the *Sibir*.

According to the U.S.S.R. merchant marine ministry, "The growth of Arctic shipments demanded by growth of the national economy, has called for a new effort to create a new dependable transportation system . . . the operation of oceangoing nuclear vessels has proven the efficiency of their reactors and the feasibility of such plants in other super icebreakers and transport ships."

Dedial emphasized: "In the shadow of this breathtaking build-up of Soviet naval forces, a no less startling expansion is the Soviet merchant marine, fishing and research fleets has taken place and, like that of the navy, appears to be continuing unabated. During the postwar years the Soviet merchant marine grew to numerically the world's largest fleet (7,500). . . . Its equipment is extremely modern, with 90% of its ships less than 20 years old (compared to only about 60% for the U.S.).

freighters in Western shipping lanes also has a military aspect.

"The history of the Soviet merchant fleet is a true success story. Never before has any nation built up so mighty, modern and efficient a merchant marine in so short a time. . . . The result is not only a rate war in which Western shipping lines are steadily losing ground, but also an alarming overall weakening of the U.S. Merchant Marine. American ships now handle only about 6% of the country's foreign trade. Moreover . . . they bring in less than 5% of that import volume of critical raw materials regarded as essential for national security."

## The history of submarines and nuclear propulsion

The submarine was introduced to America during the Revolutionary War with David Bushnell's *Turtle*. Incorporating ballast tanks, a conning tower, and a screw propeller, his attack on the British man-of-war *HMS Eagle* earned him the title "Father of Submarine Warfare."

By the late 1800s, the American Navy recognized the potential value of a ship that could operate both on and below the surface. So, in 1898 the Navy sponsored a competition open to the public for the design of such a vessel.

John Holland's vessel won the first competition, and his *USS Holland* officially joined the U.S. Navy on April 11, 1900. Powered by a 50-horsepower gasoline engine, the submarine was 53 feet long, almost 11 feet in diameter, and had a displacement of 74 tons.

As submarines evolved, diesel-powered engines replaced the old, dangerous gasoline engines. New designs produced boats that operated efficiently on the surface,

but were limited by their battery-powered propulsion systems while underwater. The submariners knew that a new source of power was needed to make their boats more effective weapons.

As early as 1939 a Navy report had noted that an atomic power plant would not require oxygen, and therefore would become "a tremendous military advantage that would enormously increase the range and military effectiveness of a submarine." Early that year the Navy appropriated \$1,500 to begin a study on nuclear power for its ships—the first government money set aside for nuclear research. In 1946, Admiral Harold Bowen, head of the Office of Naval Research argued: "The Navy is not only the greatest single user of power, it is also the largest technical organization in the world. . . . The use of atomic energy as a source of power for war vessels is now justified."

Finally on Jan. 21, 1954, the world's first nuclear-powered submarine, *Nautilus*, slid into the water. It was the first man-made conveyance of any kind to be propelled by nuclear power, which enabled it to endure months underwater rather than just hours.