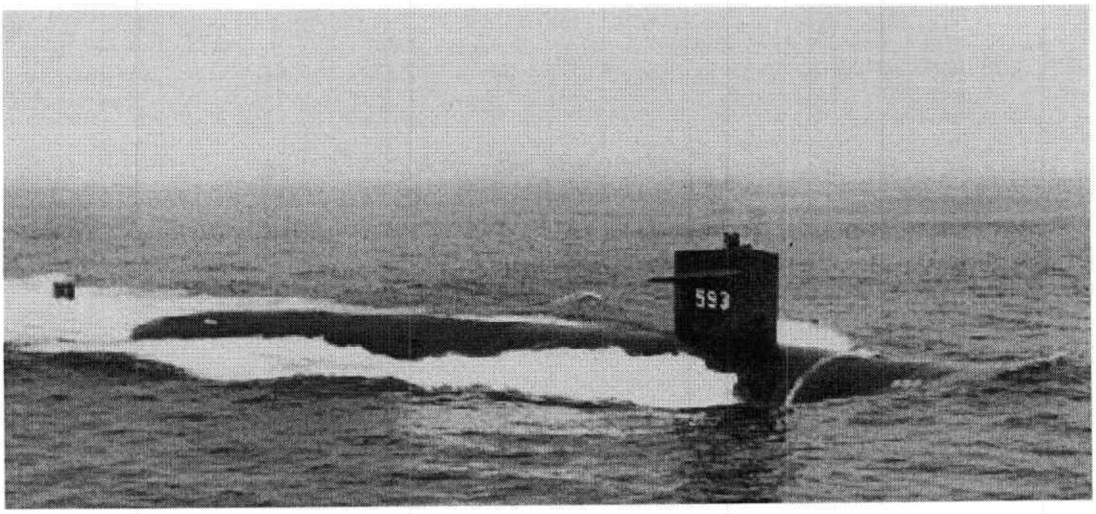

USS THRESHER (SSN-593)

dp. 3070 tons (surf.), 3500 tons (subm.); l. 278.5'; b. 31.8';
s. 15k (surf.), 28k (subm.); td. 700'; a. 4-21" tt. amidships aft of bow.;
cpl. 9 officers - 76 enlisted men; cl. "THRESHER"

Keel laid down by Portsmouth Naval Shipyard, Kittery, ME, 28MAY58;
Launched: 9JUL60; Sponsored by Mrs. Frederick B. Warder;
Commissioned: 3AUG61 with Cdr Dean L. Axene in command.

Following trials, the nuclear fast attack submarine, *USS THRESHER* (SSN-593), took part in Nuclear Submarine Exercise (NUSUBEX) 3-61 off the northeastern coast of the U.S. from 18 to 24 September 1961.

On 18 October, she headed south along the east coast. After calling in at San Juan, Puerto Rice, she conducted further trials and test-fired her torpedo system before returning to Portsmouth on 29 November. The boat remained in port through the end of the year and spent the first two months of 1962 evaluating her sonar system and her Submarine Rocket (SUBROC) system. In March, the submarine participated in NUSUBEX 2-62, an exercise designed to improve the tactical capabilities of nuclear submarines, and in antisubmarine warfare training with Task Group ALPHA.

Off Charleston, the boat undertook operations observed by the Naval Antisubmarine Warfare Council, before she returned briefly to New England waters from whence she proceeded to Florida for SUBROC tests. However, while mooring at Port Canaveral, the submarine was accidentally struck by a tug which damaged one of her ballast tanks. After repairs at Groton, CT., by the Electric Boat Company, the boat returned south for more tests and trials off Key West. *THRESHER* then returned northward and remained in dockyard hands through the early spring of 1963.

In company with *USS SKYLARK* (ASR-20), *THRESHER* put to sea on 10 April 1963 for deep-diving exercises. In addition to her 16 officers and 96 enlisted men, the submarine carried 17 civilian technicians to observe her performance during the deep-diving tests.

Fifteen minutes after reaching her assigned test depth, the submarine communicated with *SKYLARK* by underwater telephone, apprising the submarine rescue ship of difficulties. Garbled transmissions indicated that -- far below the surface -- things were going wrong. Suddenly, listeners in *SKYLARK* heard a noise *"like air rushing into an air tank,"* -- then, silence.

Efforts to reestablish contact with *THRESHER* failed, and a search group was formed in an attempt to locate the boat. Rescue ship *USS RECOVERY* (ASR-43) subsequently recovered bits of debris, including gloves and bits of internal insulation. Photographs taken by bathyscaph *TRIESTE* proved that the boat had broken up, taking all hands on board to their deaths in 1,400 fathoms of water (approximately 8,500 feet), some 220 miles east of Boston. The photos indicate she is in six major sections on the ocean floor, with the majority of the debris in an area about 400 yards square. The major sections are: the Sail; Sonar Dome; Bow; Engineering; Operations and Tail sections.

THRESHER was officially declared lost on 10 April, 1963.

Comprehensive deep ocean radiological monitoring operations were conducted in August 1983 and August 1986 at the *THRESHER* site. The *THRESHER* site had been previously monitored in 1965 and 1977 and none of the samples obtained showed any evidence of release of radioactivity from the reactor fuel elements. Very low concentrations of cobalt 60 in the form of corrosion products from *THRESHER* piping systems were detected in sediment. Cobalt 60 is the predominant activated corrosion product found in the reactor coolant piping system on U.S. nuclear powered warships. Therefore, it was the primary radio-nuclide released when the coolant piping system aboard *THRESHER* was breached. The conclusion of the earlier surveys was that *THRESHER* had not had a significant effect on the radioactivity in the environment. The purpose of the monitoring in 1983 and 1986 was to identify whether radiological conditions had changed and to demonstrate the use of improved sampling and navigation equipment deployed from both a surface ship and a deep ocean submersible.

The 1983 and 1986 surveys confirmed the conclusion of earlier surveys. Fission products were not detected above concentrations typical of world wide fallout levels in sediment, water, or marine life samples. Thus, there continues to be no evidence of release of radioactivity from the reactor fuel elements. Cobalt 60 concentrations in the sediment were generally lower than those found in 1977 as would be expected due to radioactive decay. No cobalt 60 was detected in the large number of fish and other marine life specimens or in undisturbed water samples collected at the *THRESHER* site. This confirmed that cobalt 60 in the form of insoluble corrosion products is not concentrated in the deep sea food chain. No Uranium was detected above background levels from natural radioactivity and world wide fallout from past atmospheric weapons testing.

The maximum cobalt 60 concentration detected in the sediment was 0.32 pCi/gm and most samples contained much less. This is approximately a factor of 100 lower than the concentration of naturally occurring radioactivity in sediment. For perspective, if a person's entire diet contained Cobalt 60 at the maximum concentration detected in the sediment at the *THRESHER* site, that person would receive less than five percent of the radiation exposure typically received from natural background radioactivity.

The 1983 and 1986 survey results confirm that *THRESHER* has not had a significant effect on the radioactivity in the environment.

The reactors used in all U.S. Naval submarines and surface ships are designed to minimize potential hazards to the environment even under the most severe casualty conditions such as the actual sinking of the ship. First, the reactor core is so designed that it is physically impossible for it to explode like a bomb. Second, the reactor fuel elements are made of materials that are extremely corrosion resistant, even in sea water. The reactor core could remain submerged in sea water for centuries without releases of fission products while the radioactivity decays, since the protective cladding on the fuel elements corrodes only a few millionths of an inch per year. Thus, in the event of a serious accident where the reactor is completely submerged in sea water, the fuel elements will remain intact for an indefinite period of time, and the radioactive material contained in these fuel elements should not be released. The maximum rate of release and dispersal of the radioactivity in the ocean, even if the protective cladding on the fuel were destroyed, would be so low as to be insignificant.

Radioactive material could be released from this type of reactor only if the fuel elements were actually to melt and, in addition, the high-strength, all-welded reactor system boundary were to rupture. The reactor's many protective devices and inherent self-regulating features are designed to prevent any melting of the fuel elements. Flooding of a reactor with sea water furnishes additional cooling for the fuel elements and so provides added protection against the release of radioactive fission products.

A report of the 1983/1986 environmental monitoring expeditions to the *THRESHER* site is available and provides details of the environmental sampling of sediment, water and marine life which were taken to ascertain whether *THRESHER* has had a significant effect on the deep ocean environment. It also explains in detail the methodology for conducting deep sea monitoring at the *THRESHER* site from both surface vessels and submersibles.

Compiled by SUBNET from U.S. Navy press releases;
"Dictionary of American Naval Fighting Ships," - Navy Department; and
"UNITES STATES NAVAL SUBMARINE FORCE INFORMATION BOOK" -- *J. Christley*