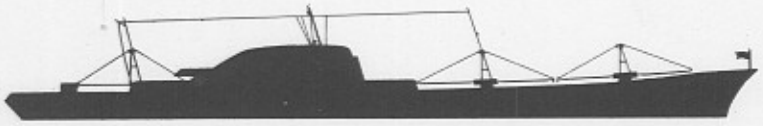

TECHNICAL PRESS INFORMATION N.S. SAVANNAH

COMPILED FOR THE
U.S. ATOMIC ENERGY COMMISSION
U.S. DEPARTMENT OF COMMERCE
MARITIME ADMINISTRATION

BY NEW YORK SHIPBUILDING CORPORATION, CAMDEN, NEW JERSEY

NOTE TO EDITORS AND CORRESPONDENTS:

The accompanying material on the Nuclear Ship SAVANNAH has been prepared especially for your use by the scientists and engineers responsible for the design, development, construction, and initial operation of the ship -- the world's first atomic-powered merchant vessel.

The descriptive material and illustrations may be used at any time, in whole or in part or paraphrased, in the preparation of material for public use concerning the SAVANNAH.

This technical information packet consists of:

A Fact Sheet on the N.S. SAVANNAH

Part I - Background Information on the SAVANNAH project

Part IIA - Description of the Hull and Outfitting

Part IIB - The Propulsion Plant

Part III - Safety Considerations

Part IV - Tests and Operational Plans

Part V - Personnel Training

Part VI - SAVANNAH Equipment Procurement and names of Major Vendors

Appendix "A" - Containment Vessel Design and Construction

Appendix "B" - Mock-Up of Nuclear Power Plant

Photographs Regarding the SAVANNAH

FACT SHEET - NS SAVANNAH

Named for: SS SAVANNAH, first steamship to cross Atlantic Ocean, May-June, 1819; event commemorated annually since 1933 as Maritime Day (May 22) by Presidential Proclamation.

Named by: President Eisenhower, October 29, 1957 in public announcement accepting suggestion of Maritime Industry; he had first proposed building ship in New York speech, April 25, 1955.

Authorized: By Congress in Public Law 848, July 20, 1956; to be built as a joint project of the U.S. Atomic Energy Commission and the U.S. Department of Commerce's Maritime Administration under Sections 715 and 716, Merchant Marine Act of 1936, as amended.

Reactor: Design initiated July 2, 1956; contract for development and fabrication let by Atomic Energy Commission to Babcock and Wilcox, New York City (plant at Lynchburg, Virginia) on April 4, 1957, on fixed-price ($9,872,000) basis; reactor is advanced design pressurized water type with fuel elements enriched to about four percent uranium 235; same type reactor as used in USS NAUTILUS and USS SKATE, and Shippingport Atomic Power Station in Pennsylvania.

Power: 74 megawatts (million watts) maximum

Core: 66 inches high by 62 inches mean diameter, containing about 8,060 kilograms of uranium oxide (UO_2) enriched to 4.4 weight percent in uranium - 235 (312.4 kg of uranium - 235); held in 32 fuel elements (164 fuel rods per element), clad in stainless steel.

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Core life expectancy is 52,000 megawatt days (mwd) or about 3.5 years.

Pressure vessel: 26.5 feet high and 98 inches inside diameter; made of six-inch carbon steel plate, clad on the inside with type 304 stainless steel; has design pressure of 2,000 pounds/square inch and design temperature 650°F.

Primary shield: 17-foot high lead and steel tank with annular water space of 33 inches.

Containment vessel: 50.5-foot long, 35-foot diameter carbon steel closed-cylinder; wall thickness varies from 2 3/8 to 4 inches.

Secondary shield: Lead, polyethylene, concrete, and water; total weight 2,000 tons; constant thickness of 14 inches; plus redwood and steel collision mat, 24-inches thick.

Gross weight: 3,165 short tons (reactor system, containment, and shielding).

Operating pressure: 1,750 pounds/square inch, absolute, for primary coolant.

Temperatures: Inlet - 494 °F, and outlet - 521 °F (primary coolant).

Control: Reactor control maintained through 21 boron-steel, neutron-absorbing rods.

Safeguards: Meets highest safety requirements of Maritime Administration, U.S. Coast Guard, U.S. Public Health Service, American Bureau of Shipping, and Atomic Energy Commission's Advisory Committee on Reactor

(More)

Safeguards.

Auxiliaries: Reactor normally provides all ship's power; when reactor is shut-down an auxiliary oil-fired boiler will provide heat for quarters and galley, two 750 kw diesel generators will provide ship's emergency electricity and emergency propulsion.

Construction: New York Shipbuilding Corporation, Camden, New Jersey, contract signed by Atomic Energy Commission and Maritime Administration December 10, 1957, price - $20,908,774; keel laid by Mrs. Richard M. Nixon, wife of the Vice President of the United States of America, May 22, 1958 (Maritime Day); launched on July 21, 1959, with Mrs. Dwight D. Eisenhower, wife of the President of the United States of America, as sponsor; reactor fuel will be emplaced in early 1960; extensive dock and sea trials will follow.

Engine: DeLaval steam turbine, 20,000 normal shaft horsepower, double-reduction geared to the single shaft (22,000 maximum horsepower).

Propeller: Five bladed, nickel-manganese-bronze

Hull design: Contract for design signed on April 4, 1957, by Maritime Administration with George G. Sharp, Inc., New York City, on cost plus fixed-fee basis; Walter Kidde Nuclear Associates, Inc., New York City, assisted on design of secondary shielding.

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Cargo gear: Specified modified burtoning rig, based on system originated by Francis Ebel (Division of Ship Design, Maritime Administration) and first used on SS SCHUYLER OTIS BLAND; unique in appearance, uses pipe sections rather than familiar masts and kingposts; handles much faster than conventional type gear; will not lift load if weight exceeds safety limit.

Operating Schedule: Ship will be brought into commercial operation via three stages:

(1) Initial tests and trials, extending from six months to one year;

(2) Limited commercial operation, carrying passengers (principally nuclear scientists and engineers studying ship's reactor operation) and cargo at prevailing rates but not on a regular schedule for approximately 18 months; and

(3) At conclusion of second stage, SAVANNAH will be chartered to a private operator to be used in normal commercial service on a specified trade route on established schedules.

General Agent: States Marine Corporation of Delaware, named as operator under General Agency Agreement with Maritime Administration, July 25, 1958; Matson Navigation Company of San Francisco, to act with States Marine as passenger agent; other agents to be chosen, as necessary, to act as subagents in various parts of world.

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Training: 15-month course started September 29, 1958, for 16 licensed engineer officers (including eight on a "standby" status) in reactor theory, engineering, and operation under contract with Babcock and Wilcox Company; Maritime Administration paying tuition, States Marine guaranteeing up to $200,000 for other expenses on nonreimbursable basis; U.S. Maritime Reactor School located at Lynchburg, Virginia; tuition and all other expenses for 20 additional students from outside States Marine Lines' ranks being met by their own sponsors as follows: Kings Point (U.S. Merchant Marine Academy) (1), Maine Maritime Academy (1), U.S. Coast Guard (2), Matson Navigation Co. (1), United States Lines (1), American Export Lines (1), Maryland Shipbuilding & Drydock Co. (2), Socony (1), Cities Service (1), Todd Shipyards (1), New York Shipbuilding Corp. (6), Texaco (1), and Esso Shipping (1); these non-crew trainers will provide respective organizations with nuclear-trained maritime personnel; course includes nine-months of classwork, and five-months of on-the-job training at Atomic Energy Commission and privately-owned reactor sites as well as on SAVANNAH and other special facilities; final month will be intensive review for Atomic Energy Commission reactor operator's license.

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Second course being held on accelerated schedule for 11 additional engineering officer candidates who already hold science degrees; course includes seven foreign technicians sponsored by Atomic Energy Commission; studies same as first course except no mathematics, physics, etc.

Third course: underway for senior deck officers - five States Marine Lines captains.

From 24 States Marine Lines officers taking the courses, SAVANNAH's initial and relief complements will be selected.

Simulator of SAVANNAH main control panel - developed by Westinghouse Electric Corp. at contract price of $180,230 - being used at Lynchburg school for training; simulator gives same instrumental responses as will actual reactor controls; mock-up of SAVANNAH's nuclear system, built at Camden Shipyard, also being used for training.

SAVANNAH
Characteristics: Length - 545 feet between perpendiculars, 595.5 feet overall;

Beam - 78-foot molded beam;

Draft - 29.5 feet (fully-loaded); 18.5 feet (unloaded);

Displacement - 22,000 tons (fully-loaded); 12,000 tons (unloaded);

Deadweight - 9,990 tons; cargo capacity is 9,400 deadweight tons;

Horsepower - 20,000 shp (normal); 22,000 shp (maximum);

Speed - 21 knots (normal)

(More)

Passengers - 60;

Crew - About 110;

Bale cubic - 746,200 cubic feet cargo capacity;

Fuel radius - estimated 300,000 nautical miles during period of 3.5 years (52,000 megawatt days) without refueling; only 57.6 kilograms of initial uranium - 235 fuel loading will be actually consumed; valuable radioisotopes and plutonium, salable products, can be reclaimed from spent fuel.