ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
UNITED STATES ATOMIC ENERGY COMMISSION
WASHINGTON 25, D.C.

December 13, 1960

Honorable John A. McCone
Chairman
U. S. Atomic Energy Commission
Washington, D. C.

Subject: REPORT ON NS SAVANNAH

Dear Mr. McCone:

At its thirtieth meeting the Advisory Committee on Reactor Safeguards reviewed the NS SAVANNAH nuclear power plant through that phase identified as Sea Trials, Phase V. The Committee had the benefit of comments from members of the Division of Licensing and Regulation, New York Shipbuilding Corporation, Babcock & Wilcox Company, States Marine Lines, U. S. Coast Guard, and George C. Sharp Inc. The more recent Committee reports on this reactor system were addressed to you on February 1 and July 25, 1960. Information supplied to the Committee since that time (see the reports referenced below) enables the ACRS to remove the restrictions stated in these reports. The Committee now concludes that, with the two restrictions mentioned below, the reactor can be operated without undue hazard to the health and safety of the public.

1. The Committee believes that it would be imprudent to operate the ship reactor at more than 7 MW (10% of full power) in the start-up at Camden. At this level it is reasonable certain that the fuel elements would not release significant amounts of fission products into the containment vessel in the event of an accident. In spite of the very low probability of escape of radioactivity, it is not incredible that at higher power levels during the initial start-up operations amounts of radioactivity which could be harmful to the public might escape due to a now unforeseen maloperation of equipment or to faulty operational procedures. It must be recognized that the reactor is essentially mobile and can be transported safety to the York River site for further testing. Furthermore, from tests up to 10% of full power, sufficient information will be obtained about the behavior of the power plant to make a large shore support facility unnecessary.

It is, therefore, our belief that it is unwise to take a risk, however small, at initial start-up in the highly populated Camden area when the risk can be avoided by easily achievable means. The Committee wishes to emphasize that this opinion does not reflect a lack of confidence in the design, start-up procedures, or operation of this reactor. It merely recognizes that with any reactor which has not been extensively tested at power or as a full prototype, there exists a remote possibility of errors, in design or in operating procedures, which might be hazardous to the public.

2. Before the return of the ship to Camden with the primary system pressurized or before the start of Phase VI testing -- Extended Sea Trials -- the ACRS recommends that the performance of the NS SAVANNAH be documented for formal review by the staff and the ACRS. It is highly desirable to establish as soon as possible what limitations, if any, should be placed, because of reasons of safety to the public, upon subsequent operation of the ship.

   The ACRS also recommends that the following items be followed up by AEC and settled to their satisfaction without further review by ACRS. ACRS, however, would like to be informed of the results of the AEC's effort as soon as possible.

   a. The results of the start-up test program should be obtained through the 10% power level before the reactor is operated at higher power levels. The ACRS commends the good judgment of the New York Shipbuilding Corporation in proposing a review at this level.

   b. A review should be made of the pertinence of recent failures of 17-4 PH steel to be used in the NS SAVANNAH control rod design, and to work out a satisfactory alternative design if the AEC deems it to be necessary.

   c. A study should be made of the chance that undesirable events might result from the flooding of the reactor compartment, which has recently been proposed as a "last resort" protective procedure. In particular, the AEC should determine that no adverse stresses will be induced by the possible contact of cold water with the hot containment vessel, especially in the regions of the structural and attachment welds.

   d. A review should be made of the program aimed at developing a nondestructive monitoring procedure which is capable of

being used for frequent checking of the integrity of the filters for iodine and particulates. It is desirable that this test be available before the ACRS review mentioned under restriction (2) above takes place.

Sincerely yours,

/s/

Leslie Silverman
Chairman

References:

1. Supplementary Information Concerning the NS SAVANNAH: Status of Ebasco Services Design Review dated Nov. 18, 1960; NS SAVANNAH Containment Vessel, Stress Calculations for Dynamic Loading dated Nov. 3, 1960; ACRS Information dated Nov. 17, 1960.
2. Resume of Filter Characteristics - NS SAVANNAH dated Nov. 18, 1960.
3. SAVANNAH Supplement dated Nov. 30, 1960.
4. Reactor Systems Coordinated Tests, undated, received Dec. 2, 1960.
5. Supplement to Vol. I, Safeguards Report dated Sept. 16, 1960.
6. Nuclear Merchant Ship, Final Safeguards Report - Test, Start-up and Trials dated Sept. 16, 1960.
7. BAW 1164, Nuclear Merchant Ship, Final Safeguards Report, Vol. V, Crew Training dated Sept. 1960.