ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
UNITED STATES ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

October 15, 1965

Honorable Glenn T. Seaborg
Chairman
U. S. Atomic Energy Commission
Washington, D. C.

Subject: REPORT ON SM-1A PRESSURE VESSEL REPLACEMENT

Dear Dr. Seaborg:

At its sixty-seventh meeting, October 7-9, 1965, the Advisory Committee on Reactor Safeguards considered the proposed replacement of the SM-1A pressure vessel. The SM-1A, a 20 MW(t) pressurized, light water moderated reactor which has been supplying electricity and steam for space heating at Fort Greely, Alaska, since 1962, was last discussed by the Committee in a report dated November 7, 1960. During its current review, the Committee had, in addition to a presentation by representatives of the Army Engineer Reactors Group, the benefit of discussions with members of the AEC Regulatory Staff, the United Nuclear Corporation, other members of the Corps of Engineers, and of the documents listed below.

The present SM-1A pressure vessel, which is made of stainless steel clad carbon steel, is estimated by the Army to require replacement by the spring of 1967, because of the shift in nil-ductility transition temperature (NDT) under neutron irradiation. As part of the replacement operation, the Army plans to install a new steam generator, to remove one of the two presently installed primary coolant pumps, and to modify the primary system piping. The new pressure vessel will be made of Type 304 stainless steel, by a fabricator not yet selected. Because of climate restrictions, the outside portion of the replacement operation is scheduled for the period between March to October 1967.

High radiation levels present during decontamination, dismantling, and removal of the present vessel and primary system components present problems in radioactive waste management, and in health physics monitoring and personnel protection. The Committee believes that the Army's plan provides assurance that both project workers and other personnel will be adequately protected during the pressure vessel replacement operations.

The Army has stated that the fabricator of the pressure vessel will be chosen by the prime contractor subject to Army approval. The vessel will be manufactured to Section III of the ASME Boiler and Pressure Vessel Code. Under the Code, some important selections are optional, e.g., the type of weld rod to be used, and whether the vessel is to be heat treated or not. It is the opinion of the Committee that these selections should be made and specified by the Army rather than being left to the prime contractor or vessel manufacturer. In this connection, the Committee wishes to re-emphasize the opinion previously expressed in its report on Nuclear Reactor System Mechanical Design, of September 11, 1961:

> "Bids should not be accepted for nuclear vessels without assurance that the bidders can adequately fabricate and inspect, and are of demonstrated competence in the construction of similar nuclear or nonnuclear equipment."

The Committee believes as a result of its review that the following points, having to do with operation of the SM-1A reactor with the present vessel as well as with the replacement, should be clarified:

1. The Army plans to insert radiation surveillance specimens into the new, stainless steel pressure vessel. The Committee would like more information on the rationale behind the surveillance program that is contemplated.

2. Operation of the SM-1A reactor with its present pressure vessel is planned until the spring of 1967. Based on information presented, the Committee believes that there is some uncertainty about the amount of NDT shift to be expected due to the anticipated fast neutron exposure during this period. Hence, it is not clear whether a sufficient margin between the NDT and the temperature-pressure operating limits will be maintained.

3. Further information has recently become available concerning stainless steel metal-water reactions. The Committee requests that the postulated loss-of-coolant accident be reviewed taking the new data into account.

In summary, the Committee believes that the SM-1A pressure vessel can be replaced as proposed without undue hazard to the health and safety of the public. The Committee, however, emphasizes that the new vessel should be built only by an experienced, fully-qualified fabricator. The Committee urges that there be prompt resolution of the questions of the NDT shift on the existing vessel and of the metal-water reaction problem, and would also like additional information on the rationale of the surveillance program.

Sincerely yours,

/s/ W. D. Manly

W. D. Manly
Chairman

References:

1. Letter dated July 29, 1965 from W. B. Murphy, Dept. of the Army, to Dr. Richard Doan, AEC.
2. UNC-5110, Special Safeguards Report, SM-1A Reactor Pressure Vessel Replacement, dated March 26, 1965.
3. MDEO-105, SM-1A Design Report, Volume I, Reactor Vessel Design, United Nuclear Corporation, dated March 26, 1965.
4. MDEO-105, SM-1A Design Report, Volume II, Modified Plant Design and Replacement Plan Engineering, United Nuclear Corporation, dated March 26, 1965.
5. Report No. G-4080-3, Hazards Summary Report, Southwest Engineering Company, dated May 24, 1963.
6. Specifications for SM-1A Reactor Vessel Replacement Program at Fort Greely, Alaska, Part III, Technical Provisions, Volume I, U. S. Army Engineer District, Alaska, Corps of Engineers, undated. received August 3, 1965.
7. HIT-3534-1, Addendum to SM-1A Hazards Summary Report for Core III, Hittman Associates, Inc., dated June 30, 1965.