UNITED STATES OF AMERICA

ATOMIC ENERGY COMMISSION

In the Matter of the
Saxton Nuclear Experimental Corporation
Application for Construction Permit

Docket No. 50-146

FINDINGS AND CONCLUSIONS PROPOSED
BY THE AEC STAFF

The proposed findings and conclusions filed by the applicant, dated December 29, 1959, are adopted by the AEC staff, with the following amplifications and revisions:

1. In proposed Finding 4, in the last line, after "109", add ", 115-16".

2. In proposed Finding 5, on line 8, after "[Tr. 20-21, 101]", insert:

"The Saxton Steam Generating Station is located on the Raystown Branch of the Juniata River, which flows northeast and joins the Frankstown Branch of the Juniata River to form the main branch of the Juniata River which empties into the Susquehanna River above Harrisburg, Pennsylvania. [TR. 18] Public water supplies in this area within a ten mile radius of the site are obtained primarily from springs and wells; none is derived from ground water in the valley in which the reactor is to be located. There is no drinking, commercial or industrial use of water from the Raystown Branch of the Juniata River downstream from the site (approximately five miles); however, several miles below the site the river becomes a recreational area. [Tr. 22, 102] The only known use of drinking water from the main branch of the Juniata, downstream from Saxton, is an emergency

intake at the Borough of Newport sixty miles east of Saxton. This water is filtered before entering the borough mains. [Tr. 102]."

3. In proposed Finding 6, on line 3, delete "it is" and substitute:

"The steam generated in the steam generator is directed to an existing turbine generator plant at the site. The reactor is designed to develop twenty thermal megawatts of power. To achieve flexibility in the conduct of tests which may be run with the reactor facility, the steam generator is designed to extract a maximum of 28 megawatts of heat from the coolant. The Saxton reactor is"

4. Delete applicant's proposed Finding 7, insert the following Findings 7-14, and renumber applicant's Findings 8-16 as 15-23, respectively:

"7. Conceptual design and design criteria for the major components of the facility have been described in considerable detail in Saxton's application and in testimony at the hearings. Although detailed engineering design of the Saxton reactor is not complete, the information provided, as partly summarized in Findings 8-14 below, supports the conclusion that the Saxton reactor can be satisfactorily designed and safely operated. After all engineering details of the plant have been settled, Saxton will submit additional information to the Commission as an amendment to its application for construction permit in the form of a final hazards summary report. Saxton expects to submit this information approximately June 1, 1961. [Tr. 84-85]."

"8. The initial core consists of thirty-two fuel assemblies arranged in a grid pattern forming an approximately cylindrical active core 40.2 inches in height and 33.6 inches in diameter. The nuclear fuel is uranium dioxide, enriched in the uranium 235 isotope to approximately 3 - 4 percent, compacted and sintered in the form of solid cylindrical pellets. The core is similar in design to the cores of a number of other reactors particularly the Yankee reactor. [Tr. 30-31, 94-95]"

"9. The reactor core is contained within a vertical cylindrical carbon steel pressure vessel approximately seventeen feet in overall height, internal diameter of fifty-eight inches and shell thickness of 4.5 inches. The vessel is designed and will be constructed in accordance with the ASME Boiler and Pressure Vessel Code. The design pressure is 2500 psia. The operating pressure of the primary coolant system is not expected to exceed 2000 psia and relief valves are provided to limit system pressure transients to less than the design pressure of 2500 psia. [Tr. 32-34, 95-96]"

"10. The reactor control system is comprised of control rods and a nuclear poison dissolved in the primary coolant. The control rods, six in number, are of a cruciform shape containing a cadmium-indium-silver poison section clad with stainless steel. The control rod system design is similar to that used on a number of reactors. In particular the rod material and drive mechanisms are similar to those of the

Yankee reactor. The control rods possess reactivity values sufficient to shut down the reactor in the hot clean condition by 2 to 3 per cent in reactivity. A chemical neutron poison material, boric acid, will be added to the primary coolant to maintain the reactor in a sub-critical condition when it is cold. The use of liquid poison for reactor control is being extensively studied by Westinghouse with respect to this reactor and the Yankee and Belgian reactors. The results of these studies to date indicate that this method will be feasible. Since the Yankee and Belgian reactors will be completed before the Saxton reactor, operating information on this method of control is expected to be available for further review before the Saxton reactor is completed. [Tr. 31-32, 96-97]"

"11. Standard instrumentation of usual types is used to measure process parameters throughout the plant and neutron levels of the reactor. The usual protective systems and interlocks for this type of reactor are also provided. The design of the instrumentation system has not been completed, but there are no unusual features proposed and no unusual problems are anticipated. [Tr. 35-38, 97-98]"

"12. A safety injection system is provided to supply boronated water to the reactor vessel for cooling the core in the event normal core coolant is lost. This water can be pumped directly into the main coolant loop from the refueling water storage tanks. These tanks have sufficient capacity to provide cooling water to the core for one hour after which time the water which has leaked from the primary

system and collected in the lower part of the containment vessel can be recirculated by sump pumps through the storage well heat exchanger and back to the core for continued cooling. [Tr. 43-44, 98-99]"

"13. A steel containment shell, partially lined with concrete, encloses the reactor and high pressure primary system. The containment vessel is designed as a pressure vessel in accordance with the ASME Code to contain - in the event of a pipe rupture - the flashing of all the primary coolant, including any water or steam that might be associated with experimental operation of the reactor, to an equilibrium mixture of water and steam. The design pressure is conservatively chosen and the integrity of the vessel would be expected to be preserved in the event of a rupture of the primary system. The design leakage rate of the containment vessel is .2 percent of the contained volume in twenty-four hours at the design pressure of the vessel. Experience with other vessels of this type indicates that this leakage rate can be attained. [Tr. 40, 49-50, 99-101, 111]"

"14. Waste disposal facilities will be provided to receive and process all liquid and solid wastes from the plant. Gaseous wastes will be collected and processed prior to being dispersed through the stack under monitored, controlled conditions. As there are no unusual features proposed nor unusual features anticipated, there is

no reason why a satisfactory design of the waste disposal system cannot be developed to monitor, control, and process plant wastes and permit discharges to the environment to be made within permissible limits. [Tr. 44, 50, 103]"

5. In applicant's proposed Finding 8, at page 5, line 6, after "64-71, 104-107]", insert:

"Assuming that the containment vessel leaks at its design rate of .2 percent of the contained volume in twenty-four hours, that atmospheric dispersion conditions are the worst that might prevail, i.e., a severe temperature inversion exists, and that exposed persons are unprotected and stand on the site boundary - approximately 1000 feet - at the cloud centerline for eight hours following the assumed accident, the radiological doses in roentgen or rem to these individuals are calculated to be:

Direct radiation to whole body:

From Containment	6 roentgen
From Leakage	0.8 roentgen

Lifetime dose due to inhalation of nuclides affecting the following organs:

Bone (Sr^{89} -Sr^{90})	8.5 rem
Thyroid (Iodine)	1500 rem"

6. At the end of applicant's proposed Finding 8, insert:

"Considering all of the factors involved in the analysis of this hypothetical accident, including the conservatism employed and the unlikelihood of such an accident occurring, the possible dosages described above represent a degree of potential hazard in public areas which is not unacceptable. [Tr. 107, 111-113]"

Respectfully submitted,

Maurice Axelrad

Maurice Axelrad
Attorney for the AEC Staff

Dated: January 7, 1960

CERTIFICATE OF SERVICE

I hereby certify that two copies of the Findings and Conclusions Proposed by the AEC Staff in the matter of the Saxton Nuclear Experimental Corporation Application for Construction Permit have been mailed to the attorney for the applicant, George F. Trowbridge, Esq., 1200 - 18th Street, Washington 6, D.C., this 7th day of January, 1960.

Maurice Axelrad

Maurice Axelrad
Attorney for the AEC Staff

Dated: January 7, 1960

SAXTON NUCLEAR EXPERIMENTAL CORPORATION

In the Matter of)
) Docket No. 50-146
Saxton Nuclear Experimental Corporation)

ANSWER TO NOTICE OF HEARING ON APPLICATION FOR CONSTRUCTION PERMIT

Applicant acknowledges receipt of Notice of Hearing dated November 5, 1959 in the above-entitled matter and will appear in support of its application for construction permit at the hearing specified in said Notice of Hearing. Applicant will present testimony which will bear on the issues to be considered at the hearing, as set forth in said Notice of Hearing.

SAXTON NUCLEAR EXPERIMENTAL CORPORATION

By /s/ R. E. Neidig
President

Dated this 18th day of November, 1959.