Revised April 1, 1969

SAXTON NUCLEAR EXPERIMENTAL CORPORATION

Docket No. 50-146

License DPR-4

Interim Change Request to Technical Specifications,
Application for Interim Amendment of Operating License,

and

Amendment No. 2 to Change Request No. 32,
Revised April 1, 1969

1. On August 26, 1968, Applicant submitted Change Request No. 32 to the Saxton Technical Specifications, and a request for amendment of Applicant's Operating License No. DPR-4, to allow operation of the Saxton reactor with Core III at a maximum power level of 28 megawatts (thermal). Applicant subsequently submitted an Addendum to Change Request No. 32 dated August 30, 1968, and Amendment No. 1 to Change Request No. 32 dated March 12, 1969.

2. Pending the review and approval by the AEC of the above mentioned requests and their supporting documents, Applicant hereby requests that, as an interim measure, Operating License No. DPR-4 be amended, and the Technical Specifications changed, to authorize loading of the main components of Core III into the Saxton reactor.

3. Core III is described in Section F of Applicant's proposed "SAXTON CORE III TECHNICAL SPECIFICATIONS" dated August 21, 1968, which was submitted with Change Request No. 32. Subsections F.1. through F.3.c. have been revised and a new Section O, "DEFINITIONS", has been added. These changes are hereby submitted as Amendment No. 2 to Change Request No. 32.

4. For purposes of this interim request, the term "loading" will include insertion into the reactor of the 21 main fuel assemblies, the six control rods and fuel follower sections, and the nine special L-shaped assemblies. Loading will also include the installation of the reactor pressure vessel head, but will not include loading of the special removable subassemblies which can be inserted after installation of the reactor head.

5. During and after the loading operations under the authority requested, the main coolant will remain at ambient temperature and will not be pressurized. The boron concentration in the main coolant will be sufficient to maintain the reactor subcritical by at least 0.10 with a fully loaded and rodded core.

The fission product inventory of Core III at beginning of life will be at least 30% less than that of Core II at end of life. The fissile inventory of Core III at beginning of life is 18% lower than that of Core II at beginning of life.

The control rod bank worth (all rods) lies between the control rod bank worth of Core I and that of Core II.

SAXTON NUCLEAR EXPERIMENTAL CORPORATION

By /s/ R. L. Meidig
President

(S E A L)

Attest

/s/ R. B. Heist
Secretary

Sworn and subscribed to before me this 1st day of April, 1969.

(S E A L)

/s/ Charles J. Ausel
Notary Public
Muhlenberg Township, Berks County
My Commission Expires October 14, 1970

DESCRIPTION OF CHANGE

Make the following changes to the Saxton Technical Specifications.

Change Section F.1 through F.3.c. to read:

F. REACTOR CORE

A reactor core having the following features shall be provided:

1. The main coolant shall be light water, and shall serve as the moderator and reflector. The designed effective reflector thickness shall be 10 inches.

2. Mixed natural uranium and plutonium dioxide enriched initially to a nominal 6.6 w/o PuO_2 and previously irradiated in Saxton to a maximum fuel burnup of 33,500 MWD/MTM shall be in seven of the nine central fuel assemblies. The remaining 2 central assemblies will be unirradiated enriched UO_2 fueled, having enrichments which vary from a nominal 5.7 w/o to a nominal 12.5 w/o U-235. Eleven of the enriched twelve peripheral assemblies, except for the test assemblies described in F.3.f, will be irradiated UO_2 assemblies (originally 5.7 w/o U-235 enriched) from Saxton Core I. The twelfth peripheral assembly will be unirradiated and contain 5.7 w/o U-235, Zircaloy-4 clad fuel.

3. The fuel assemblies shall be supplied as follows:

   a. General Description: Plutonium fuel assemblies

      Each main plutonium fueled assembly shall have a total overall length of 50.23 inches with a nominal fuel length of 36.6 inches and shall approximate a 5.386 inch square in cross section.

      The fuel rods shall be composed of Zircaloy-4 clad ceramic pellets or vibrationally compacted fuel. The rods shall be arranged in a square lattice with an initial 0.580 inch center-to-center distance.

      Every alternate rod will be a water filled tube so that the center-to-center distance of the fuel rods will be 0.820. The ceramic pellets shall have a diameter of 0.3374 inch (nominal) and a length of 0.3660 inch (nominal).

F. REACTOR CORE (continued)

One end of each pellet shall be initially dished. The total pellet column tolerance shall be 0.183 inches initially. The maximum initial moisture content of the pellet column shall not exceed 30 ppm on a weight basis. The maximum initial nitrogen content of the pellet column shall not exceed 100 ppm on a weight basis.

The vibrationally compacted loose oxide shall have a total column tolerance of 0.188 inches initially. The maximum initial moisture content of the loose oxide fuel column is 100 ppm on a wieg basis. The maximum initial nitrogen content of the loose oxide fuel column is 100 ppm on a weight basis.

The initial clad diameter shall be 0.3445 inches (nominal).

The initial diametral clearance for the pelletized fuel shall be 0.0071 inches (nominal).

The cladding shall have a wall thickness initially of 0.0233 inches (nominal).

The gap between the pellet column and the internal plug end shall contain sintered aluminum oxide (Al_2O_3) discs to provide a minimum end gaps initially of 0.609 inches.

The fuel rods shall be initially hermetically sealed with end plugs welded to the tubing. The end plugs shall be Zircaloy.

The top nozzle of these assemblies is removable.

b. General Description: Uranium fuel assemblies from Core I.

Each Core I uranium fueled assembly shall have a total overall length of 50.25 inches with a nominal fuel length of 36.6 inches and shall approximate a 5.386 inch square in cross section.

The fuel rods shall be composed of stainless steel tubes which contain uranium dioxide fuel in the form of cylindrical ceramic pellets. The rods shall be arranged in a square lattice with an initial 0.580 inch center-to-center distance. The pellets shall have the following initial dimensions:

Diameter (nominal)	0.357 inches
Length (nominal)	0.732 inches

F. REACTOR CORE (Continued)

The ends of each pellet shall be dished initially. The total pellet column tolerance shall be 0.366 inches initially.

The initial clad inside diameter shall be 0.361 inches. The diametral clearance between clad I.D. and pellet O.D. shall be initially 0.004 inches.

The gap between pellet stack and internal plug end shall contain sintered aluminum oxide (Al_2O_3) circular hollow discs, to provide a minimum of 0.174 inch end gap. The initial moisture content of the pellet stack shall not exceed 75 ppm on a weight basis. The fuel rod ends shall be initially hermetically sealed with end plugs welded to the tubing. Those fuel rods which require no further welding shall be clad with 0.015 inch wall of Type 304 welded stainless steel 10% cold-worked with a 400 ppm maximum cobalt content. The end plugs shall be Type 304 L or 308 stainless steel. Those fuel rods which require subsequent brazing shall be composed of 0.028 inch wall of Type 348 modified carbon, annealed stainless steel with a 500 ppm maximum cobalt content. The end plugs shall be Type 304 or 304 L stainless steel.

c. General Description: Unirradiated Uranium Fuel Assemblies

Two of the central nine assemblies will be unirradiated uranium fueled and shall have a total overall length of 50.23 inches with a nominal fuel length of 36.6 inches and shall approximate a 5.386 inch square in cross section.

The fuel rods shall be composed of ceramic pellets clad in Zircaloy-4 and stainless steel and the rods shall be arranged in a square lattice with an initial 0.580 inch center-to-center distance. The dimensions and enrichment of the ceramic pellets are given in the addendum. (1)

(1) WCAP-7219 Addendum to Saxton Core III Licensing Application (Westinghouse Confidential) July 1968.

F. REACTOR CORE (Continued)

The top nozzle of these assemblies is removable and held in place with three tie rods. Two of the tie rods in the UO_2 fueled assemblies will be filled with Inconel and one of the tie rods will be filled with stainless steel.

One of twelve peripheral assemblies will contain unirradiated 5. w/o U-235 enriched Zircaloy-4 clad uranium fuel. This assembly has a reinforced assembly can and shall have a total overall length of 50.23 inches with a nominal fuel length of 36.0 inches and shall approximate a 5.386 inch square in cross section.

The fuel rods shall be composed of Zircaloy-4 tubes which contain uranium dioxide fuel in the form of cylindrical ceramic pellets. The rods shall be arranged in a square lattice with an initial 0.580 inch center-to-center distance. The pellets shall have the following initial dimensions:

Diameter (nominal)	0.338 inches
Length (nominal)	0.600 inches

The ends of each pellet shall be initially dished. The total pellet column tolerance shall be 0.656 inches initally. The initial clad inside diameter shall be 0.3445 inches (nominal). The diametral clearance between clad I.D. and pellet O.D. shall be initially 0.0065 inches.

The cladding shall have a thickness of 0.0245 inches (nominal).

The gap between pellet stack and internal plug end shall ccntain sintered aluminum oxide (Al_2O_3) circular hollow discs, to provide a minimum of 1.473 inch end gap. The initial moisture content of the pellet stack shall not exceed 30 ppm on a weight basis. The fuel rod ends shall be initially hermetically sealed with end plugs welded to the tubing. The end plugs shall be Zircaloy-4.

Add Section O. DEFINITIONS

1. Fuel Burnup (MWD/MTM):

$$\text{MWD/MTM} = \frac{\text{Power Produced in a Fuel Volume (V) x Equivalent Days of Full Power Operation}}{\text{Metric Tons of Heavy Metal in the Fuel Volume (V)}}$$

2. Maximum Fuel Burnup (MWD/MTM):

The burnup in the peak pellet.

Note: For purposes of clarification, the term "maximum fuel burnup" as used in Section F.2 of the proposed technical specifications and as defined in the new Section O, means the burnup achieved by the peak fuel pellet. As it has previously appeared in the technical specifications of License DPR-4, the term "maximum fuel burnup" was used to mean maximum rod average burnup.