UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

Docket No. 50-146

May 23, 1964

Saxton Nuclear Experimental Corporation
P. O. Box 542
Reading, Pennsylvania

Change No. 14

Attention: Mr. W. H. Layman
General Manager

Gentlemen:

This refers to Change Request No. 14 dated March 24, 1964, requesting authorization to change the Technical Specifications of License No. DPR-4 to authorize (1) insertion of a fuel assembly containing a variety of fuel rod types in the central core position, (2) insertion of a fuel subassembly containing some fuel rods with defective cladding in the central core position, (3) insertion of a fuel assembly in a peripheral core position which has been modified to accept a superheat loop, and (4) insertion of irradiation capsules and a gamma thermometer outside of the core region. A specification relating to the exposure of test capsules in dummy fuel element locations or in irradiation sample tubes has been added by the AEC staff.

We have reviewed Change Request No. 14 in accordance with the provisions of Section 50.59 of the Commission's regulations and have found that, as modified in Attachment A to this letter, it does not present significant hazards considerations not described or implicit in the Final Safeguards Report, as amended, and that there is reasonable assurance that the health and safety of the public will not be endangered. A copy of the related hazards analysis is enclosed.

In view of the foregoing, pursuant to Section 50.59, 10 CFR 50, the Technical Specifications of License No. DPR-4 are changed as set forth in Attachment A to this letter.

Sincerely yours,

(Original Sign.
E. G. Case

Edson G. Case
Acting Director
Division of Reactor Licensing

Enclosures:
1. Attachment A, Changes to Technical Specifications
2. Hazards Analysis

From CO - Hdqrs.

ATTACHMENT A

SAXTON NUCLEAR EXPERIMENTAL CORPORATION

CHANGES TO TECHNICAL SPECIFICATIONS

CHANGE NO. 14

Section F.2. of Supplement No. 1 to the Technical Specifications of License No. DPR-4 is changed to read as follows:

"Section F.2.

Uranium oxide (UO_2) enriched to 5.7% of U-235 shall be used in the fuel assemblies, except that the test fuel assemblies listed below having enrichments and other characteristics as described may be inserted in the reactor. In test fuel assemblies the fuel rods as described may be replaced with regular fuel rods, that is, enriched to nominal 5.7% U-235 and constructed as described in Technical Specification F.3.

Test Assembly No. 1

One 61-rod assembly containing rods of the numbers and types listed in the following Table:

No. of Rods	Cladding	Clad Thickness(1)	Pellet Diameter	Enrichment	Peak Power
4(4)	304 SS	80.5 mils(11)	0.294 in.	0.71 w/o	3.1 kw/ft.
4(5)	304 SS	80.5	0.294	0.29 w/o	2.2
3	304 SS	15	0.357	(2)	16
3	304 SS	15	0.357	(2)	16
3	304 SS	15	0.357	(2)	16
3	304 SS	15	0.357	(2)	16
3	16-20 SS	15	0.357	(2)	16
3	348 SS	15	0.257	(2)	16
3	304 SS(9)	15	0.357	5.69 w/o	13.5
3	304 SS	15	0.357	5.69 w/o(3)	13.5
3	Zr-4(6)	23.7	0.337	5.69 w/o	12.0
5	Zr-4(6)	23.7	0.337	6.1 w/o	13.5
3	Zr-2(6)	23.7	0.337	(2)	14
3	Zr-2(6) (Ni free)	23.7	0.337	(2)	14
3	Zr-4(6)	23.7	0.337	(2)	14
3	Zr-4(10)	23.7	0.337	(2)	14
3	Zr-4(8)	23.7	0.337	(2)	14
3	Zr-4(7)	23.7	0.337	(2)	14
3	Zr-4(6)	23.7	0.337	7.3 w/o	16

Notes for Table

(1) All rods are free standing 0.391 in O.D. nominal

(2)
First	14 pellets	5.69 w/o
next	5 pellets	6.81 w/o
next	12 pellets	6.45 w/o
next	5 pellets	6.81 w/o
next	13 pellets	5.69 w/o

(3) Contains approximately 100 ppm boron as zirconium diboride

(4) RCC element with perforated guide tube

(5) RCC element with solid guide tube

(6) Autoclave pre-oxide on O.D.

(7) Autoclave pre-oxide on O.D. and I.D.

(8) Furnace pre-oxide on O.D.

(9) Compartmented rod, 3 sections

(10) As pickled, no pre-oxide treatment

(11) RCC rod O.D. is 0.461 in. nominal

Test Assemblies ii and iii

	Test Fuel Assembly No. ii 9-Rod Subassembly	Test Fuel Assembly No. iii 9-Rod Subassembly
First 14 pellets	5.69%	5.69%
Next 2 pellets	9.19%	7.30%
Next 3 pellets	8.57%	6.81%
Next 12 pellets	8.13%	6.46%
Next 3 pellets	8.57%	6.81%
Next 2 pellets	9.19%	7.30%
Next 14 pellets	5.69%	5.69%

Note: The 9-rod subassembly in the first column shall not be used at reactor power levels greater than 20 MWt.

Test Fuel Assembly No. iv

One 9-rod subassembly shall have four corner rods clad with Zircaloy-4 having a nominal thickness of 23.7 mils and shall contain uranium oxide (UO_2) enriched to 6.1% U-235. The other five rods shall be clad with Type 304 stainless steel having a nominal thickness of 9.5 mils and shall contain uranium oxide (UO_2) enriched to 5.7% U-235.

Test Fuel Assembly No. v

One 9-rod subassembly shall have four corner rods clad with Zircaloy-4 having a nominal thickness of 23.7 mils and shall contain uranium oxide (UO_2) enriched to 6.1% U-235. The other five rods shall be clad with Type 304 stainless steel having a nominal thickness of 9.5 mils and shall contain uranium oxide (UO_2) having the same enrichment as Test Fuel Assembly No. iii.

Test Fuel Assembly No. vi

One 4-rod subassembly shall have rods clad with Type 304 stainless steel having a nominal thickness of 23.5 mils and shall contain uranium oxide (UO_2) fuel pellets uniformly enriched to 8.3% U-235. One of these rods may contain up to 100 ppm boron as zirconium diboride.

Test Fuel Assembly No. vii

One 9-rod subassembly shall have the center rod and four corner rods clad with Zircaloy-4 having a nominal thickness of 23.7 mils and shall contain uranium oxide (UO_2) uniformly enriched to 7.3%. Two of the other rods shall be clad with Type 304 stainless steel having a nominal thickness of 15 mils and shall contain uranium oxide (UO_2) uniformly enriched to 5.7% U-235. One other rod shall be clad with Type 304 stainless steel having a nominal thickness of 16.1 mils, shall contain uranium oxide (UO_2) having a content of 0.29% U-235, and shall be concentrically located within a solid stainless steel guide tube. The remaining rod shall be clad with Type 304 stainless steel having a nominal thickness of 16.1 mils, shall contain uranium oxide (UO_2) having a content of 0.71% U-235 and shall be concentrically located within a perforated stainless steel guide tube.

Test Fuel Assembly No. viii

One 9-rod subassembly shall have three corner rods clad with Zircaloy-4 having a nominal thickness of 23.7 mils and shall contain vibrationally

compacted uranium dioxide (UO_2) enriched to 7.2% U-235 and compacted to 86 ± 2% theoretical density. The fourth corner rod and the cental rod shall be clad with Type 304 stainless steel having a nominal thickness of 15 mils and shall contain vibrationally compacted uranium dioxide (UO_2) enriched to 7.2% U-235 and compacted to 86 ± 2% theoretical density. Three of the remaining rods shall be clad with Zircaloy-4 and shall contain uranium dioxide (UO_2) pellets 0.337 inch in diameter which are enriched to 6.1% U-235. One of these rods shall have a previous irradiation exposure of approximately 7500 megawatt days per metric ton (MWD/MT) and shall contain a 15-mil diameter hole machined through the clad. The second of these rods shall have a previous irradiation exposure of approximately 7500 MWD/MT. The third of these rods shall have a 15-mil diameter hole machined through the clad. The final rod shall be clad with sensitized Type 304 stainless steel and shall contain uranium dioxide (UO_2) pellets enriched to 5.69% U-235 and the ten central pellets shall have 20-mil chamfers on both ends.

Following a period of irradiation, the two defected, Zircaloy-4 clad rods may be replaced by similar, defected, unirradiated Zircaloy-4 clad rods.

Fuel Assembly No. ix

One 9 x 9 fuel assembly shall contain 51 rods clad with Type 304 stainless steel of 15 mils thickness and shall contain uranium dioxide (UO_2) fuel pellets of 5.69% U-235 enrichment. This assembly is made by removing the central 21 rods from a normal 9 x 9 fuel assembly. The space left by removal of the central 21 rods shall be filled by a plug consisting of a stainless steel tube 0.125 inch thick and 2.75 inches in diameter welded to perforated stainless steel end plugs. The end plugs shall be designed so that flow through the plug will experience the same enthalpy rise that is experienced by flow through a normal fuel assembly. The plug shall contain three concentrically mounted stainless steel pipes 0.125 inch thick and of 2.125, 1.50 and 0.75 inch diameters, respectively. Horizontal restraint for the plug shall be provided by the grids of the fuel assembly. Vertical support for the plug shall be provided by a 1.5 inch diameter stainless steel pipe extension of the reactor head port flange.

Uranium oxide being used has a melting point of approximately 5000°F.

Test Capsules

Test capsules containing non-fuel material may be inserted in any of the eleven dummy fuel locations adjacent to the reactor core region or in any of the eight irradiation sample tubes on the periphery of the core provided that:

1. Prior to irradiation, the design of the test capsule has been evaluated by the SNEC Safety Committee and found acceptable with regard to physical, thermal, and hydraulic performance, and effect on core reactivity, neutron flux, and reactivity coefficients.

2. No foreseeable failure of a test capsule could result in mechanical damage to any core component or in any manner alter the ability of the control system to function."

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Saxton Nuclear Experimental Corp.

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