



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

June 3, 1969

Docket No. 50-146

Saxton Nuclear Experimental
Corporation
P. O. Box 99
Saxton, Pennsylvania 16678

Attention: C. R. Montgomery
General Manager

Gentlemen:

Amendment No. 6 to Operating License No. DPR-4 is enclosed. The amendment authorizes the operation of your reactor at steady-state power levels of up to 1 megawatt (thermal) in accordance with your request of April 29, 1969, as modified by Reactor Licensing and agreed to by SNEC.

Copies of the Notice of Issuance of Amendment to Operating License which is being filed with the Office of the Federal Register for publication and the related Safety Evaluation are also enclosed.

Sincerely,

A handwritten signature in cursive script that reads "Peter A. Morris".

Peter A. Morris, Director
Division of Reactor Licensing

Enclosures:

1. Amendment No. 6
2. Federal Register Notice
3. Safety Evaluation

JUN 9 1969

I/83 (4/11)



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

SAXTON NUCLEAR EXPERIMENTAL CORPORATION

DOCKET NO. 50-146

AMENDMENT TO OPERATING LICENSE

License No. DPR-4
Amendment No. 6

The Atomic Energy Commission has found that:

1. The application for amendment dated April 29, 1969, complies with the requirements of the Atomic Energy Act of 1954, as amended, and the Commission's regulations as set forth in Title 10, Chapter I, CFR;
2. Operation of the reactor in accordance with the license, as amended, will not be inimical to the common defense and security or to the health and safety of the public; and
3. Prior public notice of proposed issuance of this amendment is not required, since the amendment does not involve significant hazards considerations different from those previously evaluated.

Operating License No. DPR-4, as amended, is hereby further amended as follows:

Revise paragraph 3.A. to read as follows:

A. Maximum Power Level

Saxton is authorized to operate the facility at steady-state power levels of up to a maximum of 1 megawatt (thermal).

Add following new paragraph to Section 3.B. Technical Specifications:

"The above Technical Specifications are hereby changed by Attachment A appended hereto (designated as Change No. 33) for the operation up to 1 megawatt (thermal) with Core III."

This amendment is effective as of the date of issuance.

FOR THE ATOMIC ENERGY COMMISSION

Peter A. Morris

Peter A. Morris, Director
Division of Reactor Licensing

~~9104190372~~
Attachment A:
Change No. 33 to Technical Specifications

Date of Issuance: June 3, 1969

ATTACHMENT A

SAXTON NUCLEAR EXPERIMENTAL CORPORATION

LICENSE NO. DPR-4

CHANGE NO. 33 TO THE TECHNICAL SPECIFICATIONS

Add to Section F.3.a:

Not more than 42 water-filled, hydrided, Zircaloy-4 tubes as described in Change Report No. 21 and not more than four Zircaloy-4 tubes containing spot-weld specimens as described in Change Report No. 20 may be installed in the aggregate seven assemblies.

Add to Section F.3.c:

To maintain the minimum burnout safety factor under credible accident conditions, fuel rods will not be loaded into those coolant channels which contain both legs of structural support angles for the wrapper cans.

Add Sections F.3.e through F.3.h:

e. Central Removal Subassemblies

The center plutonium-oxide fueled 32-rod loose lattice assembly contains the N-1 test subassembly position which will be occupied by either Subassembly No. 503-4-31 or No. 503-4-33. Each is a 9-rod subassembly, with rods arranged in a square lattice having a nominal 0.536 inch center-to-center distance, having the four corner rod positions occupied by Zircaloy-4 water-filled hollow tubes and the center rod position occupied by a flux thimble. The four remaining rod positions shall be occupied by any previously irradiated plutonium-oxide fueled rods which conform to the fuel rod description in Section F.3.a.

f. Peripheral Removable Subassemblies

The subassemblies described below may be operated in any of the peripheral test subassembly positions designated as N-2, N-3, N-4, or N-5 and each shall contain no more than four test fuel rods, which may be chosen in any combination from those described in F.3.h.

(1) Subassembly No. 503-4-25

One 9-rod subassembly, with rods arranged in a square lattice having a nominal 0.536 inch center-to-center distance, shall have four corner rods and the center rod clad with Type 304

Change
33

stainless steel having a nominal thickness of 15 mils and shall contain uranium dioxide pellets uniformly enriched to 5.7 w/o U-235.

(2) Subassembly No. 503-4-32

One 9-rod subassembly, with rods arranged in a square lattice having a nominal 0.536 inch center-to-center distance, shall have the four corner rods clad with Zircaloy-4 having a nominal thickness of 23 mils and shall contain uranium dioxide pellets uniformly enriched to 12.5 w/o U-235. The center rod position shall be occupied by a flux thimble.

(3) Subassembly No. 503-4-33

One 9-rod subassembly, with rods arranged in a square lattice having a nominal 0.536 inch center-to-center distance, shall have the four corner rod positions occupied by Zircaloy-4 water-filled hollow tubes and the center rod position occupied by a flux thimble.

(4) Subassemblies No. 503-4-34 and No. 503-4-34A

These subassemblies are described in Change Report No. 17 and each accommodates two materials compatibility test rods. These test rods are fabricated from Zircaloy-4 tubes to which are attached stainless steel sleeves. The sleeves are mechanically attached to the Zircaloy-4 tube by expanding the tube and sleeves at a minimum of four points at the top and bottom of each sleeve. Subassembly No. 34 shall contain two test fuel rods which may be chosen in any combination from those described in F.3.h. Subassembly No. 34A shall contain no fuel rods.

(5) Reactivity Oscillator Subassemblies

The reactivity oscillator subassemblies are described in Change Report No. 11 and Change Report No. 13. Only one subassembly may be in the core at any given time. Each oscillator contains a movable tube inside a stationary tube. Reactivity change is caused by hafnium sleeves in the movable tube moving in and out of the stationary hafnium sleeves and is limited to less than 5×10^{-4} .

I

g. Test Capsules

Test capsules containing non-fuel material may be inserted in any of 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.

h. Test Fuel Rods

These rods may be used in any Peripheral Removable Subassembly.

- (1) Eight rods identical to standard stainless steel clad UO_2 fueled rods except that they are internally pressurized to produce tensile stresses up to approximately 41,500 psi in the clad at reactor operating conditions.
- (2) Four rods containing fluoride, moisture and clad bore imperfections as described in Change Report No. 18. The test rods will be pressurized to 1000 psi or less. The experimental parameters are two longitudinal notches 0.0025 inch deep x 0.004 inch wide x 0.187 inch long, both located on the clad I.D. surface, moisture content of 25-130 ppm and local fluoride contamination at the notched areas. One drop of pickling solution containing 43,000 ppm HF has been applied to each of the notched areas and dried prior to loading fuel pellets into the test rods.
- (3) Three rods clad with Zircaloy-4 having a nominal thickness of 23.5 mils and containing PuO_2-UO_2 pellets uniformly enriched to 6.6 w/o PuO_2 . One is pressurized with carbon monoxide to produce an internal pressure of 1500 psi at operating temperature. Two are pressurized with helium to produce internal pressures of 900 and 1500 psi at operating temperature.
- (4) Four rods clad with Zircaloy-4 having a nominal thickness of 23 mils containing uranium dioxide pellets uniformly enriched to 12.5 w/o U-235 and internally pressurized to produce clad tensile stresses up to 16,000 psi at reactor operating conditions as described in Change Report No. 19.

The prediction of core reactivity shall be made based upon extrapolation of preceding numerical core reactivity measurements and shall be made on a weekly basis. An unexplained reactivity gain or loss shall be defined as the difference between the experimental measurements and the prediction based upon extrapolation. If an unexplained reactivity loss of 1.25% delta k/k or more should occur, an evaluation shall be instituted and the Commission notified.

Change Section N.4.b(6) to read:

- (6) Power operation above 1 Mwt - If the following limits are exceeded, action will be initiated to bring this condition back within limits.

Impurities	Less than 5 ppm
Chlorides	Less than 0.1 ppm
Oxygen	Less than 0.14 ppm
Boric Acid	A maximum of 2500 ppm as boron
Potassium, Lithium and/or Ammonia	The total non-volatile alkali (K+Li) may be from 0 to 3.2×10^{-4} molal. Ammonia for experimental purposes may be from 0 to 15 ppm independently of K and Li
Hydrogen	15-90 cc/kg of H ₂ O as measured at STP

In N.4.c(1), delete:

The anti-simmer assist on the pressurizer safety valves shall not exceed 100 psig.

Change Section N.4.e to read:

- e. During "Reactor Operation" (as defined in Section N.3 above) the following operating limitations shall apply:

1. The steady-state reactor power level shall not exceed	1 Mwt
2. Maximum number of fuel assemblies in core	21
3. Maximum fuel burnup (Fuel assemblies)	40,000 MWD/MTM
Maximum fuel burnup (control rod followers and L assemblies)	66,300 MWD/MTM

4. Maximum heat flux (steady-state)	743 BTU/hr-ft ²
5. Average heat flux	6,447 BTU/hr-ft ²
6. Minimum DNB ratios (W-3 correlation)	
Power - 1 Mwt	22
Overpower - 5 Mwt	25

- | | |
|--|--|
| 7. Maximum fuel clad surface temperature
(at nominal system pressure) | 520°F |
| 8. Maximum fuel specific power | <1 kw/ft |
| 9. Average power density | 3 kw/liter |
| 10. Under credible accident conditions as
described in the Final Safeguards Report,
the minimum burnout safety factor shall be | 1.85 |
| 11. The design maximum void coefficient of
reactivity at operating temperature | -0.0015/% void |
| 12. The design maximum temperature reactivity
defect (cold clean to hot clean) | 0.05 |
| 13. The moderator temperature coefficient of
reactivity shall not be more positive than: | |
| a) Borated at 80°F | $+1.0 \times 10^{-4}/^{\circ}\text{F}$ |
| b) Borated at 495°F, 1 Mwt | $-0.5 \times 10^{-4}/^{\circ}\text{F}$ |

Change Section N.4.f.(2) to read:

Maximum reactivity addition rate (six control rods withdrawn simultaneously)	$2.5 \times 10^{-4}/\text{sec}$
---	---------------------------------

Add to Section N.6:

h. Storage well:

(1) Minimum level

791' - 0"

Add to Section N.8.b:

Recirculation system pumps and automatic startup control	Monthly
--	---------

Pressurizer safety relief valves	Every 12-14 months
----------------------------------	-----------------------

In Section N.8.b change "Control rod drive scram speed every 6 months" to read:

Control rod drive scram speed	Each 6 months, each 5 full temperature cycles, or each 4000 MWD, whichever occurs first.
-------------------------------	---

Delete from Section N.8.b:

Automatic unloading of pressurizer safety valve
anti-simmer assist

Every six
months

Delete Supplements 1, 1a, 2 and 3.