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

April 7, 1965

IN REPLY REFER TO:
Docket No. 50-146

Mr. William D. Manly
Chairman, Advisory Committee
on Reactor Safeguards
U. S. Atomic Energy Commission
Washington, D. C.

Dear Mr. Manly:

Transmitted herewith for the information of the Committee are three (3) copies of the following:

SAXTON NUCLEAR EXPERIMENTAL CORP.

Letter dated April 2, 1965, transmitting:

Change Request No. 17 to Tech Specs and Amendment No. 16 to Operating License DPR-4 to permit Saxton to irradiate a 9-rod subassembly enriched with plutonium (proof test of mechanical design for Saxton Core II).

Sincerely yours,

Edson G. Case, Assistant Director
Division of Reactor Licensing

Enclosures:
As stated above

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Project: Saxton Nuclear Experimental Corporation

Revised 5/3/65

Status: Review of Supercritical Loop and Plutonium Lo ding by Subcommittee on May 4, 1965.

I. Supercritical Loop

Background: This proposal was originally furnished to the ACRS as a three copy (Category B) item. Some questions about it were raised by the ACRS staff, and the Committee decided (at its March special meeting) that the Subcommittee should consider this proposal and recommend whether the project should come before the full Committee. The project is listed on the 53rd meeting agenda, but will be dropped if the Subcommittee so decides.

DRL Staff Analysis: DRL has prepared its public staff analysis which concludes that the use of the loop "involves no significant hazards considerations not described or implicit in the Final Safeguards Report."

Principal Question: Could a failure in the loop instigate an MCA or other failure of the primary system? (Neither the application nor the DRL analysis answer this question directly.)

Miscellaneous Questions:

1. The loop nozzle on the reactor vessel head is a critical region. What temperature gradients and thermal stresses will exist there under normal and abnormal cooling conditions?

2. The clad will collapse against the fuel at full loop pressure. What stresses will exist in the clad? How many cycles are allowable?

3. What will the maximum UO_2 central temperature be?

4. How important is the internal insulation and how reliable is it?

5. What standards of water quality will be maintained in the loop? (This is of greater importance in a supercritical once-through system to avoid deposition on the fuel clad.)

6. Why was a Lithcote IC-53 coated carbon steel accumulator selected, and how adequate will it be in view of the need for high water quality?

7. What is the justification for a 2000 psi scram set point for loss of loop pressure? Also, why is there no scram for a large pressure drop increase as well as the one for pressure drop reversal?

8. What might be the consequences of a large rupture of the pressure tube within the core? (This was really not analyzed by the applicant.)

9. Why not start the emergency condenser immediately after loss of flow (perhaps even automatically) rather than waiting 50 seconds and then manually valving it in?

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10. Can we rule out persons being in the containment when the reactor is operating at power? (If not, what doses might these persons receive following a loop rupture and loop fuel meltdown?)

11. What is the justification for using Type 316 stainless steel as the pressure tube material? What about sigma-phase formation?

II. Plutonium Loading

Background: This loading has been referred to the ACRS for review and will come up at a future meeting (not the 63rd).

DRL Review: DRL has begun its review but has not formulated a position as yet. DRL is meeting with the Saxton and Westinghouse on Wednesday, May 4th to discuss this subject further.

Miscellaneous Questions:

1. What evidence is there that 15 mil cold-worked 304 stainless steel will be satisfactory for use as cladding for this fuel in service?

2. The goal is to achieve 30,000 MWD/T burnup. What problems does this present in terms of fission gas pressure, clad stress, and reactivity coefficients?

3. Why was 16 kw/ft chosen as the specific power limit for this fuel? How does this compare with previous or present irradiations of UO_2 - PuO_2?

4. What are the maximum expected local void and temperature coefficients?

5. What is the likelihood and what would be the consequences of a reactivity accident under cold conditions where the moderator temperature coefficient is positive?

6. What is the status of the critical experiments? What has been learned which is of interest to a safety analysis?

7. Has it been decided whether the plutonium will be in the center or on the edge of the core?

8. Is there a specific shutdown margin criterion which will be adhered to?

9. If the supercritical loop will remain in use during Core II irradiation, what hazards might a loop failure then present?

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10. What resolution was made of the question of <u>ejection of</u> control rod followers?

11. What Pu releases is credible and what dose to the public would result?

12. How will storage of the UO_2 - PuO_2 fuel be handled to protect against accidental criticality?

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