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CF-50-9-37

REACTORS—POWER

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UNITED STATES ATOMIC ENERGY COMMISSION

REVIEW OF ORNL HOMOGENEOUS REACTOR
EXPERIMENT BY THE REACTOR SAFEGUARD
COMMITTEE

By
C. E. Larson

Photostat Price \$ 1.80

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Available from the
Office of Technical Services
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September 11, 1950

Oak Ridge National Laboratory
Oak Ridge, Tennessee

Technical Information Service Extension, Oak Ridge, Tenn.

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CLASSIFICATION CANCELLED

DATE FEB 15 1957 *ml*

For The Atomic Energy Commission

H. F. Caneel

Chief, Declassification Branch

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September 11, 1950

U. S. Atomic Energy Commission
Oak Ridge Operations
P. O. Box E
Oak Ridge, Tennessee

Attention: John H. Roberson
Director of Research and Medicine

Subject: Review of ORNL Homogeneous Reactor Experiment by
the Reactor Safeguard Committee

Gentlemen:

The following comments are offered in reply to your letter of August 9, regarding the above-entitled subject.

1. It is recognized that the thinness of the diaphragm in the Westinghouse soup pump represents a potential hazard for release of large quantities of activity to the atmosphere. Fortunately, the other side of the diaphragm, or the cooling oil side of the pump is already designed to withstand pressures equal to that of the soup side of the pump. The design specifications have now been revised to include a closed pressure-tight oil system, normally operating at atmospheric pressures and equipped with a pressure sensitive switch which, in the event of an unusual pressure rise in the oil system (from a leak), will initiate a scram, including dumping of the soup system and lowering to atmospheric pressure the whole of the soup system.

2 (a). As Dr. Benedict stated at the time he injected his comments into the record on the corrosion situation at the Reactor Safeguard Committee Meeting, that if one knew of a satisfactory inherently corrosion resistant material, it would obviously have been specified in the feasibility report as the material of construction. As the next best alternate one would prefer a material which if it is dependent upon a film for corrosion protection,

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that the film be self-healing under the actual source conditions. Whether a corrosion resistant material is "naturally corrosion resistant" or is dependent on a "self-healing film" is a matter upon which corrosion experts cannot agree. These considerations lead us to the conclusion that the question can best be settled by an extensive set of experimental tests recommended in part 2 (b) of their comments.

2 (b). Extensive corrosion tests have been prepared under conditions simulating service in all ways except for the presence of radiation and its subsidiary effects. These results are reported in the Homogeneous Reactor Quarterly Report, ORNL 826. Similar but less extensive tests are in progress in the X-10 reactor (at 1/40 HRE flux), with experiments planned for insertion in the MTR Mock-Up when it is operated at neutron fluxes (about January 1, 1951) of about 1/4 of HRE levels. With the increased availability of space at higher flux in the Mock-Up an accelerated experimental program will be put into effect.

2 (c). Initial operations will include frequent hydraulic pressure testing of the system. The tentative plans are for tests at the following intervals: 1 month, 2 months, 4 months, 6 months, 1 year, and each $\frac{1}{2}$ year thereafter.

3. A program is well underway by Mr. Clewett's chemistry group, aided by the experimental engineering group of Mr. Graham. It is presently planned that all of the gas handling equipment be demonstrated in the Y-12 HRE Mock-Up as well as in simulated tests at the reactor installation before the reactor is allowed to go critical. It now appears that if equipment is designed to withstand 20 times the absolute operating pressure, that an explosion of $2 \text{ H}_2 + \text{O}_2$ will be contained without damage to the equipment.

4. The attached memo indicates that a disruptive accident caused by the sudden introduction of soup is impossible. It also indicates that sudden introduction of cold soup should not be adopted as a standard operating procedure. For this reason, a simple interlock is proposed on the pump start switch with a spring return type by-pass, allowing the operator to restart the pump if he is certain that k is under control. The pump will automatically stop and cannot be restarted without resorting to the by-pass if the steam temperature in the heat exchanger is too low, or if for any reason the soup circulating pump is not actually operating (as determined by an undercurrent relay in the motor power supply).

5. Subsequent discussions between F. Ward, K. Kasschau, and C. E. Winters and a further review of ORNL 731 indicate that sufficient data are incorporated in this report, so as to make submission of additional data or evaluations unnecessary.

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6. The Laboratory concurs in that parallel hand controls are necessary for reactor control and are incorporated as such in the design. Reactor control by regulation of power output will be undertaken on an experimental basis only, until such time as the feasibility of control by this means is conclusively demonstrated.

Very truly yours,

OAK RIDGE NATIONAL LABORATORY

C. E. Larson

C. E. Larson, Director

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Attachment:

Memo dtd. 9-11-50 (CF#50-9-38)
frm WLRoss to CBGraham

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