USAEC - AECL COOPERATIVE PROGRAM

MONTHLY PROGRESS REPORT

August 1967

J. L. Crandall

Experimental Physics Division
Savannah River Laboratory

This document is furnished pursuant to the memorandum of understanding of June 7, 1960, between the U. S. and Canadian Governments establishing a Cooperative Program on the development of heavy water moderated power reactors.

E. I. du Pont de Nemours and Co.
Savannah River Laboratory
Aiken, South Carolina

Contract AT(07-2)-1 with the
United States Atomic Energy Commission

September 12, 1967

REACTOR PHYSICS EXPERIMENTS

INTRODUCTION

Preparations are under way for measuring temperature coefficients of reactivity on D_2O moderated lattices of the simulated burned-up UO_2 fuel assemblies used in earlier Savannah River Laboratory (SRL) tests. This fuel is currently on loan to Chalk River, but is scheduled to be shipped back to SRL in September. As a preliminary to the UO_2 fuel tests the hot organic loop, which will be used in some of the experiments, was tested using seven UC rod clusters in the Subcritical Experiment (SE).

SUMMARY

The tests of the hot organic loop showed that it performed satisfactorily for both organic and gas cooled studies.

DISCUSSION

Hot Organic Loop Tests in the SE

The hot organic loop described in DPST-67-83-7 has been used to supply organic coolant to seven UC assemblies in the central positions of a 19-assembly load in the SE. The outer 12 assemblies of 12.12-inch triangular fuel lattice consisted of natural UO_2 rod bundles with D_2O coolant. Buckling measurements were made for the following coolants in the UC assemblies; air at 25°C, "Dowtherm A"* at 25°C, "Dowtherm A" at 260°C. Foil irradiations were made for the latter two coolants in order to determine detailed lattice parameters.

A procedure was developed for the removal of organic coolant from the fuel assemblies by introducing nitrogen gas into the system through a remotely operated solenoid valve. The expulsion time for seven assemblies was about 50 seconds. Measurements of the temperature inside the fuel bundle after the expulsion of organic coolant at 260° showed that the e-folding time for the cooling down of a voided assembly was greater than 90 minutes. The rapid expulsion rate and relatively slow cool-down rate show that measurement of buckling of air-filled assemblies at elevated temperatures will be quite feasible, particularly since high speed circuitry has been developed for this purpose.

These SE measurements conclude the preliminary tests of the hot organic loop.

---

* Trademark - Dow Chemical Co., Midland, Mich.

EXTERNAL DISTRIBUTION

RDT Site Representative, SR (2)

G. O. Robinson, SROO
J. A. Koch

Chief, Heavy Water Organic Cooled Reactors Branch, RDT
Chief, Instrumentation and Control Branch, RDT
Chief, Core Design Branch, RDT
Chief, Fuel Fabrication Branch, RDT
Chief, Control Mechanism Branch, RDT
Assistant Director for Reactor Technology, RDT
Chief, Fuels and Materials Branch, RDT
Chief, Reactor Physics Branch, RDT
Assistant Director for Program Analysis, RDT

Senior Site Representative, AI
Senior Site Representative, CE

USAEC Scientific Representative, Chalk River (10)
USAEC Technical Representative, Whiteshell

Director, HWOCR Program Office, Atomics International (6)
HWOCR Program Office-Windsor Representative (3)

HWOCR Project Manager, Babcock and Wilcox
Division of Metals and Ceramics, Oak Ridge National Laboratory
Associate Director, Pacific Northwest Laboratory (2)
Manager, Engineering Research Laboratories/Department of
Chemical Engineering, Columbia University

INTERNAL DISTRIBUTION

L. Squires - M. H. Wahl, Wilm.
J. W. Croach - L. C. Evans
S. A. McNeight
D. F. Babcock

W. P. Bebbington, SRP
L. W. Fox
J. E. Gregory

W. P. Overbeck - A. A. Johnson, SRL
G. Dessauer
J. W. Morris
C. H. Ice
J. L. Crandall
G. F. O'Neill
J. E. Beach
TIS File (5)
TIS File Record Copy
Vital Records Copy