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USAEC - AECL COOPERATIVE PROGRAM

MONTHLY PROGRESS REPORT

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Compiled by:

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Technical Information Service

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 29801

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SECTION I

REACTOR PHYSICS EXPERIMENTS

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CANADIAN COOPERATIVE PROGRAM

INTRODUCTION

The temperature coefficients of reactivity for organic-cooled lattices with natural uranium oxide and simulated burned-up UO_2 fuel will be measured in the SE in May and June 1968.

SUMMARY

Assembly and testing of fuel assemblies for the temperature coefficient measurements are scheduled to be completed by May 1, 1968.

DISCUSSION

The hardware for the temperature coefficient measurements was ordered and should be on hand by April 8. Before installation in the SE, each fuel assembly will be tested by May 1 at operating temperatures, flow rates, and pressures.

HEAVY WATER REACTOR PROGRAM

INTRODUCTION

The experimental HWR program for FY-68 consists of measurements on simulated boiling H_2O-cooled assemblies in the SE and control rod experiments simulating xenon oscillation conditions in the PDP.

SUMMARY

All design has been completed and orders have been placed for the necessary hardware for the SE and PDP experiments. The SE experiments are scheduled for April 1968, and the PDP experiments are scheduled for May 1968.

DISCUSSION

Delivery of the hardware is expected by April 1, 1968. The hardware for SE fuel bundles is expected on March 13, 1968, and the bundles will be assemblied during the last two weeks in March. Experiments in the SE are scheduled for April 1968.

The PDP control rod experiments will not require additional hardware and are scheduled for the early part of May 1968.

SECTION II

REACTOR PHYSICS CALCULATIONS

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USAEC-AECL COOPERATIVE PROGRAM

Work continued on the development of techniques to describe neutron collision probabilities for a general cluster geometry.

SECTION III

DEUTERIUM EXCHANGE PROCESSES

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INTRODUCTION

The object of the work is to find promising leads for processes by which heavy water can be produced at a cost substantially below $20/lb. During the first part of this program, a preliminary engineering and economic analysis will be made of variants of the three following exchange processes for concentrating heavy water:

a) ammonia-hydrogen exchange

b) water-hydrogen exchange

c) water-hydrogen sulfide exchange

MIT has selected the ammonia-hydrogen exchange process as the first one to study. This work is being carried out under a subcontract to the Du Pont Company.

SUMMARY

A survey was made of the literature on the ammonia-hydrogen exchange process. Physico-chemical data on mixtures of NH_3, H_2, and N_2, on the solubility of KNH_2 in NH_3 and on the H/D separation factor in mixtures of ammonia and hydrogen are being worked up in a form for convenient use in process design of ammonia-hydrogen exchange process flowsheets.

Information on the kinetics and rate of reaction of the deuterium exchange reaction between liquid ammonia and dissolved hydrogen in the presence of KNH_2 is limited and difficult to adapt to practical exchange towers. As design of these towers is a critical aspect of this investigation, a second research assistant has been assigned to work up the available kinetics data and to develop the theory of applying it to practical contacting equipment.

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