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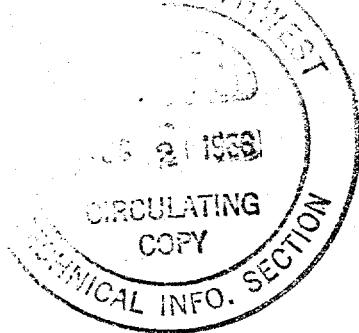
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**RICHLAND FIVE-YEAR
02 R&D PROGRAM**

INTEGRATED SITE OPERATION



RICHLAND OPERATIONS OFFICE
DOUGLAS UNITED NUCLEAR, INC.
GENERAL ELECTRIC COMPANY - HAPD
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July 11, 1966

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PRINCIPAL CONTRIBUTORS

J. T. Stringer, Chairman - DUN

M. Lewis - GE

L. H. Rice - DUN

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INTEGRATED SITE OPERATION

Introduction

The technical feasibility of using an electrolytic reduction process to reduce metal scrap and oxide to usable uranium metal is being studied.

Incentives

The incentives for using electrolytic reduction at Richland may be summarized as follows:

- (1) Reduce the unit and total costs of producing plutonium.
- (2) Increase the flexibility of the Richland reactors for producing isotopes, particularly U-236.
- (3) Simplify the present fuel cycle complex.

Scope and Objectives

The objective of this mission is to demonstrate the feasibility of the electrolytic reduction process as a technique for producing sound metal billets from metal scrap and oxide, and the subsequent extrusion of the billets to high quality fuel cores.

The scope of the mission is limited to the evaluation of hollow extruded I&E cores, the evaluation of electroreduced uranium, an investigation of the solution rate of UO_2 in the electrolyte, and small-scale irradiations of UO_2 fuels in the N and K Reactors.

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Progress During FY 1966

During the reporting period, FY 1966, the feasibility of hollow-extrusion of I&E cores was demonstrated on the NRD extrusion press, three columns of UO_2

Progress During FY 1966 (Cont.)

elements were irradiated in KW Reactor, and two columns of UO₂ elements were prepared for irradiation in N Reactor.

FY 1967 - 1968 Plans and Expected Results

Two columns of UO₂ elements will be irradiated in N Reactor. The hollow-extrusion of I&E cores will be demonstrated, and an irradiation test of extruded cores will be conducted in a small reactor. Cores fabricated from electroreduced uranium produced by Mallinckrodt Chemical Works will be irradiated to compare the behavior of electroreduced and magnesium-reduced uranium.

Statistical Summary Schedule

	1967	1968	1969	1970	1971	5-Year Total
<u>Dollars (in Thousands)</u>						
General Electric (N-Reactor)	10	0				
Douglas United Nuclear, Inc.	30	30				
Isochem	0	0				
Pacific Northwest Laboratories	0	0				
TOTAL	40	30	20	0	0	90
<u>Man Years</u>						
General Electric (N Reactor)	0.3	0				
Douglas United Nuclear, Inc.	0.8	0.8				
TOTAL	1.1	0.8				
<u>Equipment</u>						
General Electric	0	0				
Douglas United Nuclear	10	5				
TOTAL	10	5				

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Evaluation of Progress Against Plans and Objectives

Development effort progressed essentially as planned on a reduced scope. Filled billet and straight mandrel techniques were used to demonstrate the feasibility of extruding I&E fuel cores. Aluminum contamination of the electroreduced uranium produced by Mallinckrodt Chemical Works has delayed the evaluation of this material. Compacted-powder and sintered-pellet type UO_2 fuel elements were irradiated in KW Reactor to obtain preliminary fuel design and performance data.

REFERENCES

(1) Hill, O. F., "RL-GEN-22 SUP3 REV1 Richland Integrated Process Development Program--Integrated Site Operation," July 30, 1965, SECRET.

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