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April 23, 1958

To: V. A. Cooper

From: R. G. Geier

This document consists of

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Pages

**DISSOLVER CAPABILITIES
DINGOT URANIUM**

The time required to dissolve dingot uranium is known to be appreciable longer than the time required to dissolve ingot uranium. Since HAPU is expecting to receive increasing quantities of dingot uranium in the near future, a review of Chemical Processing Department dissolver capabilities has been made to ascertain whether or not sufficient dissolution capacity is available to meet requirements.

The Redox and Purex plant dissolver experience has been reviewed with the respective Technology personnel. Incorporating development data and off-site results with the plant information resulted in the following bases for estimating the dissolver capabilities of the Chemical Processing Department facilities. Factors such as operator attention, dissolver size, dissolver geometry, and condenser geometry which are known to influence dissolver capability could not be satisfactorily evaluated. Although the above items have not been included, the bases established should lead to a conservative evaluation of dissolver capability.

Bases:

1. The time required to dissolve dingot metal is 1.54 times that required to dissolve ingot metal.
2. The time required to dissolve I and E fuel elements is 0.9 times that required to dissolve solid fuel elements.
3. The time required to dissolve metal irradiated to 1000 MWD/T is 0.9 times that required to dissolve metal irradiated to 500 MWD/T.

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By Authority of CG-PR-12,

W.S. Lewis, 1-6-94.

By Jerri Maley, 4-21-94.

Verified By R. J. Hanson, 4-21-94

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4. A complete Redox dissolver cycle for solid ingot fuel elements requires 36 hours (actual dissolving time equals 24 hours).
5. A complete Purex dissolver cycle/requires 24 hours (actual dissolving time equals 10 hours).

The estimated dissolution capacity of the various types of dissolver vessels available is shown in Table I. It can be concluded that sufficient dissolver capacity is available at present reactor power levels and exposures if all the metal to be dissolved was solid ingot fuel elements. As reactor goals of exposure and power level are approached and E-metal dissolvers are installed in Redox, the amount of excess dissolution capacity will increase. Under reactor goal conditions with all solid ingot fuel element receipts, dissolution could be carried out in the Purex plant if this were necessitated by specialized processing in the Redox plant.

If all receipts are solid ingot fuel elements, dissolution capacity difficulties will only arise if irradiation exposure drops below 475 MWD/T at present power levels. On the other hand, if receipt of solid ingot elements does not exceed the anticipated 200 tons per month, exposure can drop to 400 MWD/T without dissolution capacity problems.

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RG Geier:lbp

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TABLE I

ESTIMATED DISSOLUTION CAPACITY

<u>Dissolver Type</u>	<u>Sustained Dissolution Rate, T/D Per Dissolver</u>			
	<u>500 MWD/T</u>			
	<u>I and E Ingot</u>	<u>Solid Ingot</u>	<u>I and E Dingot</u>	<u>Solid Dingot</u>
Redox A	5.3	5	4.0	3.7
Redox B	4.3	4	3.2	2.9
Purex	9.4	9	7.7	7.3
Redox E-Metal	6.4	6	4.8	4.4

<u>Dissolver Type</u>	<u>Sustained Dissolution Rate, T/D Per Dissolver</u>			
	<u>1000MWD/T</u>			
	<u>I and E Ingot</u>	<u>Solid Ingot</u>	<u>I and E Dingot</u>	<u>Solid Dingot</u>
Redox A	5.8	5.3	4.3	4.0
Redox B	4.6	4.3	3.4	3.2
Purex	9.8	9.4	8.2	7.7
Redox E-Metal	6.9	6.4	5.2	4.8

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