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MINUTES OF MEETINGS TO DISCUSS EXTRACTION TEST STUDIES OF CERAMIC COPRODUCT TARGETS

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MINUTES OF MEETINGS TO DISCUSS EXTRACTION TEST STUDIES
OF CERAMIC COPRODUCT TARGETS

R. Cooperstein

January 3, 1966

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MINUTES OF MEETINGS TO DISCUSS EXTRACTION TEST STUDIES
OF CERAMIC COPRODUCT TARGETS

The meetings were held on December 6 and 7, 1965 in the 325 Building conference room at PNL.

The persons attending the meetings and their affiliations were as follows:

R Cooperstein, NRD	M Lewis, NRD
TW Evans, NRD	DW Mazur, AEC-RL00
WC Gallagher, AEC-RL00	JH Owen, SRL
KM Harmon, PNL	EG Pierick, NRD
AA Kishbaugh, SRL	JW Weber, PNL
JH Kleinpeter, PNL	WH Yunker, PNL

The objectives of the meetings were:

1. To review the status of the ceramic coproduct target element fabrication technology and the subsequent extraction processing technology of irradiated elements as developed at PNL.
2. To discuss the feasibility of performing extraction studies of irradiated coproduct target elements at the SRL pilot plant facilities in demonstrating the capability of coproduct production in N-Reactor.
3. To identify potential problem areas that could arise when the laboratory scale extraction process would be performed on a pilot plant scale in the existing SRL facility.

T. W. Evans has overall responsibility within Chemistry and Metallurgy in NRD for coproduct fuel element fabrication and extraction programs. R. Cooperstein is specifically responsible for the extraction processing program for the target elements.

The ceramic target element is being fabricated in a rod geometry. The target material is lithium aluminate, $\text{Li}_2\text{O} \cdot \text{Al}_2\text{O}_3$. Lithium-containing silicate materials such as petalite, $\text{Li}_2\text{O} \cdot \text{Al}_2\text{O}_3 \cdot 8\text{SiO}_2$, spodumene, $\text{Li}_2\text{O} \cdot \text{Al}_2\text{O}_3 \cdot 4\text{SiO}_2$ and eucryptite, $\text{Li}_2\text{O} \cdot \text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2$ are also being considered as alternate target materials. The latter, however, are not to be included in current extraction feasibility studies.

The aluminate pellets are being fabricated by standard ceramic techniques such as vibratory compaction and pelletizing followed by sintering. A process tube column charge of 2-foot long target elements containing sintered aluminate

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pellets, clad with aluminum and Zircaloy-2, by standard techniques, is currently being irradiated to a projected GWR level of 3.5. Five of these irradiated target elements (approximately 10 feet of target material clad in aluminum only) will be sent to SRL for pilot plant extraction processing and evaluation. Concurrently, other target elements from this test will be used for hazards studies and further laboratory scale studies directed to expand and improve upon our current extraction technology.

Descriptions of the extraction processes (1) to be used with ceramic target elements irradiated in N-Reactor, and (2) currently used for SRL irradiated target elements were presented and discussed.

From the above, there appeared to be three notable points of difference in processing that would require consideration. These differences between the procedures are:

- a) use of a flux to dissolve the ceramic target,
- b) need for a higher temperature (850°C) to perform extraction from ceramic target than employed in current SRL processing (750°C),
- c) the presence of a greater volume of condensable gases resulting from the use of ceramic targets and/or moisture-containing flux materials in the extraction processing relative to the materials used in SRL processing.

The potential problems resulting from these differences were considered to be solvable by employing a series of mutually agreed upon experimental studies. These are to be performed by March 1966 as part of the first phase of the coproduct feasibility demonstration.

It was also concluded that new tritium technology could result from this effort.

R. Cooperstein
Senior Engineer
Chemistry & Metallurgy
Research & Engineering

R Cooperstein:fom

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