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PRODUCTION OF MEDICAL-GRADE Pu-238

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PRODUCTION OF MEDICAL-GRADE Pu-238

R. K. Robinson

June 3, 1970

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DUN-6999

June 3, 1970

U. S. Atomic Energy Commission
Richland Operations Office
Richland, Washington

Attention: W. Devine, Jr., Director
Production Reactor Division

Gentlemen:

PRODUCTION OF MEDICAL-GRADE Pu-238

References: (1) DUN-6812, "PT-209, Improved Neptunium-237 Target Element Configurations," HA McDonald, May 5, 1970 (Secret)

(2) DUN-5113, "PT-163, Clean Pu-238," AF Kupinski, HA McDonald, June 3, 1969 (Secret)

(3) DUN-6339, "PT-194, NpO_2-Graphite Wafer Growth Analysis," HA McDonald, December 18, 1969 (Secret)

This letter is to advise you that on May 10, 1970, we loaded 697 grams of neptunium into four KE Reactor tubes (2x2 array) for a planned 3-month irradiation (reference 1). The targets are all of the thin-shell annular geometry. Half contain a removable graphite core and the other half have process cooling water flowing through the target center. After discharge from the reactor, an additional 3 months of cooling time will be required before the targets will be processed for recovery of the neptunium and Pu-238. Hence, by November 1970, we expect to have demonstrated our ability to produce Pu-238 containing only about 0.2 ppm of Pu-236, as specified for a medical-grade product.

An earlier attempt to demonstrate our capability to produce medical-grade Pu-238 was discontinued because of unanticipated growth of the neptunium oxide-graphite matrix targets (reference 2). It has since been established through a subsequent test (reference 3) discharged in February that the graphite matrix targets failed because of inadequate provisions for target expansion and not because of inadequacies in the graphite fabrication process. We therefore feel confident that graphite matrix targets could be used successfully to produce low impurity plutonium. A report on the graphite matrix growth analysis test will be completed by mid-June 1970.

[redacted]

With the successful completion of the thin-shell annular target test, we will have established the technology for these elements, as well as for graphite matrix elements. In addition, as you will recall, we have earlier established technology using aluminum matrix elements (at 0.5 ppm of Pu-236). Of these three types, the thin-shell annular targets are preferred because of the ease with which they can be processed by ARHCO and since they produce a low impurity product.

We would like to encourage a continuing and expanded program for production of high quality medical-grade Pu-238. In this regard, if you have any questions or wish to discuss this subject further at this time, please let us know and we will be happy to accommodate you.

Very truly yours,

R. K. Robinson, Manager
Technology Section

RKR:bmp

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