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HW--30989

DE92 009033

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1. AA Ames	22. JE Maider
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4. RO Brugge-RJ Shields	25. JF Music
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March 11, 1954

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4 pages. No. 1 of
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PRODUCTION TEST 105-567-A

COPY 1 OF 1

PRELIMINARY IRRADIATION OF J-Q COLUMNS

INTRODUCTION:

The Atomic Energy Commission has requested that HAPCO produce 30 Kg of U-233 in the form of irradiated thorium (Q) slugs⁽¹⁾. It is requested that delivery be completed by July 1, 1955, and that delivery begin as soon after July 1, 1954 as possible. The bulk of the "Q" pieces will not be available for charging for some time; June 1954 is the best estimate at this time. There are no data on a mixed J-Q loading. There are some⁽²⁾ thorium slugs on-site which are normally used for flattening purposes, and there is time to get some preliminary information by the exposure of a few mixed J-Q columns. It is intended that the U-233 produced in the test will be part of the production requested by the AEC in HAN-53744. This Production Test authorizes the charging of sixteen columns loaded with alternate "J" and thorium

DISTRIBUTION RESTRICTED TO U.S. ONLY

- (1) HAN-53744, 2-15-54, D. F. Shaw to W. E. Johnson, "U-233 Production"
- (2) End-of-Month (February) Inventory shows 316-6" and 45-4" pieces in 100 Area and 13 pieces in 300 Area charged to Technical.

MASTER

JUL 2 1956

300 AREA
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pieces into H-Pile. The only Process Specification limit likely to be exceeded is the current graphite temperature specification (500°C and 30% He). This test authorizes a maximum of 50% helium concentration in the pile atmosphere to maintain graphite temperatures within the J-Q block of sixteen tubes at no more than 500°C, and the discharge of the sixteen tubes at current exposure.

OBJECTIVE:

The primary objective of this test is to obtain information such as to reduce the degree of uncertainty concerning operating behavior which exists regarding the proposed J-Q columns before they are charged. A secondary objective is to determine experimentally the conversion ratio before a large quantity of J-Q tubes is exposed to 100 MWD/tube; with firm information it would be possible to adjust the exposure to produce the required value without unnecessary contingencies or possible shortages. These tubes will be exposed to 100 MWD/tube maximum.

This test will yield data from which more firm plans can be made for the main loading. The tube location has been chosen to surround several graphite temperature monitoring thermocouples; this will yield graphite heating information relative to natural uranium. Tube power relative to natural uranium will be obtained directly. The change of relative tube power with exposure will also be obtained. Plans are being made to obtain isotopic and yield data from the separating agency. It is recognized that the conversion and isotopic information will not be available until the main loading is partially or wholly charged; however, it is expected that the conversion information will be available in time to change the target exposure of the main loading if this is desirable.

PRIORITY:

The main load of about 500 tubes of J-Q slugs will be charged as soon as the material is available. Any information obtained beforehand may influence this loading. If charged in March, these J-Q tubes will experience up to about 50 MWD/tube before the main load is charged. The target exposure for the main load is currently 100 MWD/tube.

COSTS:

Cost Code: 5270-253.66

REACTIVITY:

The reactivity effect of the J-Q columns is calculated to be the same, at the time of charging, as the J-N columns to be charged in DR-Pile. The J-Q columns will lose reactivity during their exposure due to U-235 burnup in the J-Slug; however, the rate of loss will be less than that for the J-N columns since the buildup of U-233 in the Q pieces causes some reactivity gain.

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DOWNTIME:

Additional downtime is authorized by this test for the charging and discharging of this material. The extra time required for charging the numbered slugs is estimated to be ten minutes/tube. The extra time for discharge and special pickup is estimated to be twenty minutes/tube.

HAZARDS:

This is a new type of load but one in which the departures from past practice are not great. The rupture rate for this material is not known; it is not expected to be materially different than that for J-slugs and 10-66 slugs; both of these are very small. All of the charged columns will be charged with a Q-slug at the upstream extremity. The individual column will be staggered relative to the surrounding columns. Proc. Stds. 105-F-020 & 105-F-030 apply to J-Slugs.

SCHEDULE:

This test will be initiated during the first outage at H-Pile following the formal approval of the test.

DESCRIPTIVE DETAILS:

Sixteen columns (Tube numbers 2572, 2573, 2574, 2575, 2672, 2673, 2674, 2675, 2772, 2773, 2774, 2775, 2872, 2873, 2874, 2875) of J-slugs and thorium (Q) slugs will be charged during the March outage. The eight "even-even" and "odd-odd" tubes will each contain 19 J-slugs charged alternately with 19 Q-slugs (6"); the charges will begin with a J-slug at the downstream end and have a Q piece at the upstream end. The 19 pairs will be approximately 290 inches long. The eight "odd-even" and "even-odd" tubes will be charged with 19 J-slugs charged alternately with 19 Q-slugs (6") plus one 4" Q-slug. These charges will begin with a 6" Q slug at the downstream end; the 4" Q-slug will be charged upstream of the last J-slug. The sixteen tubes will use a downstream dummy charge of 14 8" perfs plus one 5" perf with the 5" perf charged first. All Q-slugs will be numbered and their position in the tube recorded. Data will be taken daily pertaining to ΔT , flow, and graphite temperature. One or more columns will be discharged before reaching 100 MWD/tube; this will be done at the discretion of the Technical Section, or at the request of the Process Physicist. All Q-pieces will be held for Technical examination. All discharged Q-slugs will be visually examined.

It is planned that some of the irradiated Q-slugs will be processed to extract the uranium (principally U-233) and the uranium will be analyzed to determine the isotopic makeup. It is hoped that this information will be available before the main loading reaches the goal exposure now planned. An attempt will be made to determine the conversion ratio (grams U-233/MWD) at the goal exposure and at one or two intermediate exposures. The isotopic information may be used to determine if there is an exposure-sensitive buildup of some undesirable isotope.

RESPONSIBILITY:Reactor Section:

The Reactor Section will be responsible for all scheduling, charge and discharge operation, the operational safety and production continuity of the pile, and for the maintenance of records for tubes operating under this test. Requested operational data will be forwarded to the Technical Section.

Technical Section:

②
R. O. Brugge, Pile Engineering, will be responsible for the Technical aspects of pile irradiation, following 105 Building operations, analysis of all data, and issuing the final report.

Process Technology Sub-Unit
Technical Section
ENGINEERING DEPARTMENT

RC Brugge/bam

②

Approvals:

R. B. Richards, Manager
PILE TECHNOLOGY SUB-SECTION

O. C. Schroeder, Process Superintendent
PROCESS SUB-SECTION

R. O. Mehann, Production Superintendent
OPERATIONS SUB-SECTION

J. H. Warren, Manager
REACTOR SECTION

O. H. Greager, Manager
TECHNICAL SECTION

J. E. Maider, Manager
MANUFACTURING DEPARTMENT

Date of Issue _____

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DATE
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4/9/92

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