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PRODUCTION TEST 105-533-A - SUPPLEMENT C
LOCAL CONTROLLED INCREASES IN C-PILE TUBE POWERS

INTRODUCTION

Production Test 105-533-A and Supplements A and B authorize an "experimental area" in C-Pile in which the tube power limits are relaxed to allow tube power increases up to 16-2/3 per cent above the maximum allowed tube power outside of the experimental area. Supplement B (HW-28775) further limits the maximum tube power to 820 kw. The planned increase of tube powers at C-Pile (from 700 kw/tube to 800 kw/tube) for the tubes outside of the experimental area will cause the experimental area to operate at tube powers up to 935 kw.

SUMMARY

Since Supplement B became effective (1) more than 180 equivalent tubes have been exposed from zero to 600 MWD/T at tube powers up to 820 kw. In this time there

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HW-28775, "Production Test 105-533-A - Supplement B", R. O. Brugge
(7-21-53).

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have been no ruptures in the experimental area in production-run uranium and this establishes, with 95 per cent probability, rupture rate limits of zero and 0.0150 (2) (In addition to this, more than 50 tubes within this same group have been exposed to 900 MWD/Ton and discharged without a rupture or any other observed deleterious effects. The exposure vs. rupture-rate relationship at lower exposures leads to the conclusion that this probably corresponds to about four times this number on an equivalent 0 to 600 MWD/Ton basis.) As provided by the test, exposed slugs and process tubes have been discharged regularly for visual examination. No deleterious effects have been noted to this date. (3)

This supplement authorizes a maximum tube power of 935 kw in the experimental area as defined on Figure I. This supplement does not alter the OBJECTIVE, BASIS AND JUSTIFICATION, PRIORITY, COSTS, REACTIVITY, DOWNTIME, HAZARDS, SPECIAL EQUIPMENT, SPECIAL ADJUSTMENT, DATA DESIRED, nor RESPONSIBILITY portions of the production test (HW-26810). No flattening changes will be made and the tube power distribution will remain substantially as shown in the interim report (4) except that all values will increase approximately 14 per cent in addition to the 16-2/3 per cent increase authorized by Supplement B (a total of 33 per cent).

TUBE POWER LIMITS

The primary justification of this test is that higher tube powers can be explored with very small risk to the uranium charges or the pile. This test has to date clearly demonstrated the validity of this premise. The postulated "end cap boiling limit" (5) was exceeded in the experimental area since 8-4-53 with no observable deleterious effects. The tube powers authorized by this test exceed this proposed limit by another increment. The graphite temperature limit (500°C) (6) will be controlled by the addition of lithium. The outlet water temperature limit will be 100°C as authorized by this supplement (7). The recent replacement of the 0.318 orifices with venturis and the lowering of the front-header pressure has resulted in a maximum permitted tube power of more than 935 kw in the experimental area under the "trip before boiling" philosophy. Since the tube power permitted under this philosophy of operation is dependent upon the relationship of the Panellit reading to the high and low trip pressure (in addition to other factors) the minimum value of this maximum tube power is subject to drift; however, any downward drift can be compensated by re-adjustment of the Panellit gauge during operation if this is necessary and if the number of gauges is not too large.

RO Brugge/bam

R. O. Brugge
Process Technology
Technical Section
ENGINEERING DEPARTMENT

- (2) HW-26810, "Production Test 105-533-A - Local Controlled Increases in C-Pile Tube Powers", L. W. Lang and R. O. Brugge (1-20-53) (See page 12.).
- (3) The details will be reported in a subsequent Interim Report.
- (4) HW-27652, "Interim Report on Production Test 105-533-A", R. O. Brugge (4-13-53)
- (5) See Process Specifications - Reactor Process - HW-27632, page 17-1, also HW-25312, HW-26784, and HW-28713.
- (6) Ibid, page 41-2
- (7) Experimental area only.

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Approvals:

R.B. Richards

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

O. C. Schroeder

O. C. Schroeder, Superintendent
PROCESS SUB-SECTION

R. O. Mohann

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

J. H. Warren

J. H. Warren, Manager
REACTOR SECTION

O. H. Greager

O. H. Greager, Manager
TECHNICAL SECTION

J. E. Maider

J. E. Maider, Manager
MANUFACTURING DEPARTMENT

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Figure I
TEMPERATURE MAP

H-808-D (1-53)

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