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August 2, 1946

100 AREAS

July 23 through July 29
 (For Technical Progress Letter No. 108)

Physics

D Pile

The D Pile was shut down for about 20 hours on July 23. During the remainder of the period it operated at rated level.

During the shutdown, two tubes containing graphite capsules were discharged and recharged. Fifty tubes of regular metal were discharged.

Examination of the B Test Hole assembly showed that the water leaks mentioned in last week's report occurred in the outer piping assembly. Attempts to weld these leaks were unsuccessful, and the pile was started up with a temporary catch pan under the leak. Further attempts at repair will be made during the next shutdown.

F Pile

Except for a shutdown on July 24, the unit was operated throughout the week at 50 MW below rated level.

During the shutdown, the P-columns in Tubes 1474 and 3274 were replaced by 35 and 34 slugs, respectively, of Request 13-1 (beryllium nitride). P-column 2082 was replaced by 43 myrnalloy slugs. All of these loads were centered in the tubes by means of lead dummies. The following table gives the pertinent data involved in predicting the effectiveness of these columns.

Load	Fraction of full Column length	Fraction of full Column strength	Nominal Strength of Full Column	Nominal Strength of Load
34-1/2 Be ₃ N ₂ slugs (Ave. of 2 columns)	0.56	0.87	24 ih	21 ih
43 slugs (myrnalloy)	0.70	0.95	47 ih	45 ih

These columns replaced tubes whose total nominal strength was 54 ih and thus represent an increase of 23 ih in the nominal strength of the pattern. After correction is made for shadowing, this amounts to a 17 ih increase in the net strength of the pattern. This expected increase in strength was not confirmed by observation, as indicated in the following tabulation:

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In rods before change	68 ih
Increase in pattern strength	-17 ih
Decrease in xenon strength	+ 2 ih
Net long term gains and push losses	+ 3 ih
Expected in rods	56 ih
Observed in rods	65 ih

The net effect of the added columns appears to have been about 9 ih less than expected.

The unit continues to gain about 1 ih per day of operation.

General

Special exposures of aluminum in atmospheres of carbon dioxide, dry and moist air, and helium were begun in the B Test Hole of the F Pile on July 24. The purpose of the test is to determine the cause of a white deposit on the horizontal control rods of the F Pile, the rate of formation of which was believed to have accelerated when the carbon dioxide supply to these rods was increased.

Capsule graphite exposed 1099 Mw-days/CT showed a stored energy content of 108 cal./gm., according to the Sykes methods, in line with previous trends.

The two capsules pushed from the D Pile on July 23 had received 1169 and 1153 Mw-days/CT.

Water, Corrosion, and Engineering

Process Water Control and Pressure Drop Studies

The iron content in the process water averaged 0.029, 0.007 and 0.017 ppm at B, D and F Areas, respectively.

The anthracite layer of the filter beds at D are not quite as deep as design specifications due to some of the anthracite having been back-washed out during the early days of operation. Additional anthracite is scheduled to be added to the filters on July 30 to bring the depth of the beds up to normal.

The rates of pressure drop increase for D and F Areas were 0.16 and 0.19 lbs./ (sq.in.)(day), respectively. These rates are about normal.

Corrosion

The downstream Van Stone flange of Tube 2478 was examined at D on July 23. Some pitting was noted, particularly in the lower quadrant of the flange. This pitting did not appear to be serious.

Graphite Expansion

A set of oversize steel dummy slugs, 8.7 inches long and of various diameters, was used on July 29 to test the freedom of discharge of twelve empty process tubes at B. Attempts were made to insert each slug up to 10 feet in from both charge and discharge ends of the tube. A slug 1.510 inches in diameter should be a snug fit in a process tube; actually, a 1.500-inch diameter slug could rarely be inserted more than a few inches into a tube. A 1.490 inch diameter slug could be inserted at least 10 feet into either end of all tubes tested except for Tube 4574 (top con-

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ter) in which case the slug could only be inserted about 7 feet in from either end. A 1.480 inch diameter slug could be inserted freely from either end of Tube 4574.

These results indicate that the freedom to discharge process tubes has not been seriously limited by the bowing accompanying graphite expansion. The test is to be repeated on Tube 4674 at D, where bowing is more pronounced. Meantime, it is believed that no difficulty in charging top central tubes will be encountered within the next 1-1/2 to 2 years in the absence of seriously pimpled or warped slugs.

Four additional tubes have been tested at 100-D Area with the 1500 lb. pneumatic jack for gunbarrel sum-clearance. The results obtained are in the same general range as those reported previously for the first four tubes tested at D:

Tube Jacking Tests at D

Tube No.	2352	2373	2395	2474
Gun Barrel sum-clearance, inches	27/32	20/32	25/32	23/32
Force required for reproducible movement to limit of clearances, lbs.	500	600	800	400

None of the tubes was found to bind as they were moved in and out during the test.

The overall length of Tubes 2373 and 2474 were measured. These measurements will be taken on 6 central tubes and repeated each time the tubes are discharged, in order to determine whether there is any permanent stretch of the aluminum. Under present operating conditions, these tubes are discharged at about six month intervals.

W. E. Jordan
W. E. JORDAN, CHIEF SUPERVISOR
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