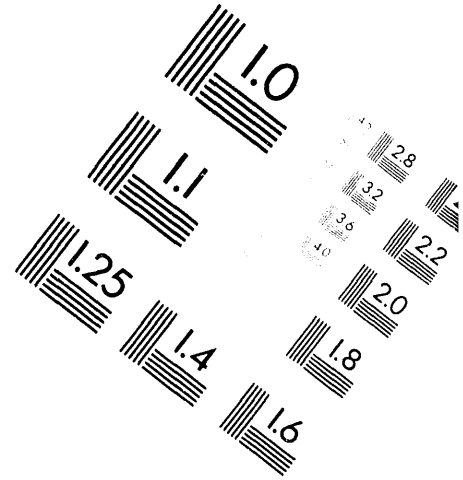
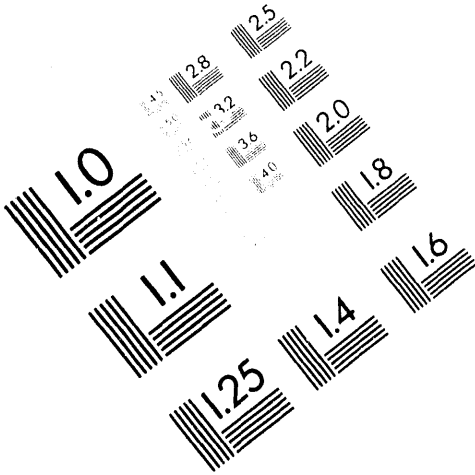




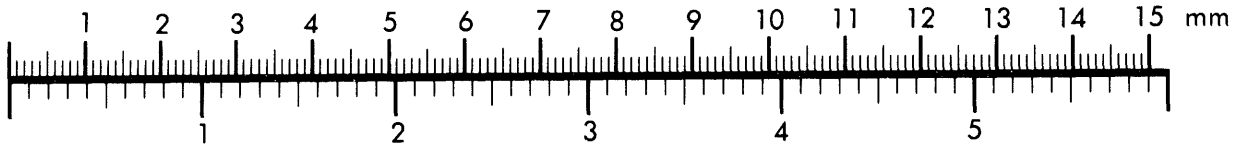
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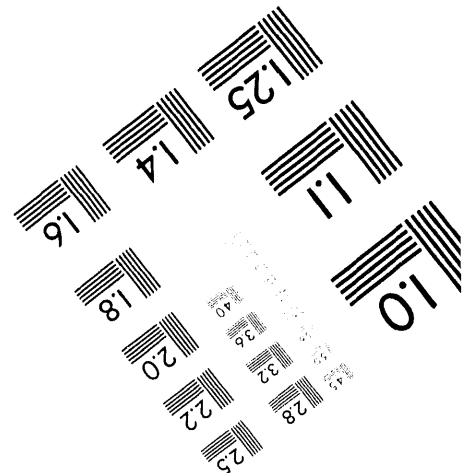
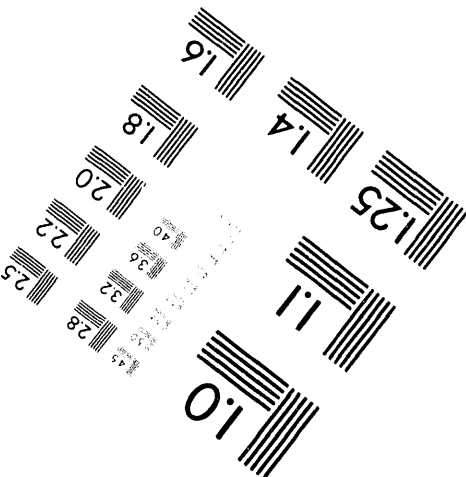
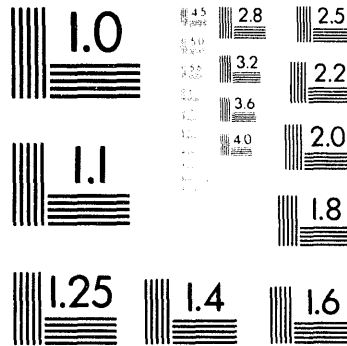
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W. E. Jordan

This document contains of
Serial Form No. 7
XX Control Series

July 26, 1946

100 AREAS:

July 16 through July 22nd
(For Technical Progress Letter No. 107)

INV.
3-47

Physics

D Pile

The D Pile was shut down for about 21 hours on July 16. Throughout the remainder of this period, it operated at rated level.

Special Request 15-2, (lithium fluoride), was charged into Tube 2682 during this shutdown. The special charge consisted of 36 pieces each about 3-3/4 inches long centered in the tube with jacketed lead pieces. It was estimated to have a nominal poison value of 52 inhours and replaced a poison column of 51 inhours nominal strength. Observed reactivity changes were in close agreement with predictions.

On July 18 the thermocouple in the B Test Hole became erratic. Similar difficulties had been encountered with two previous thermocouples and had been attributed to corrosion caused by dampness in the hole. On the same day, a slow water leak was noted around the B Test Hole assembly. During the shutdown scheduled for July 23, it is planned to remove the front end of the assembly and determine if the water leak is in the piping connections at the outside of the pile or in the central part of the assembly.

F Pile

At the shutdown of July 17 the three vertical rods which did not function properly at the previous shutdown were examined. It was found that the difficulty in withdrawing these rods was due to slipping clutches. The clutches were readjusted to their original clearances.

There was no net change in the reactivity of the unit during the week; the gains during normal operation just compensated the losses due to the metal discharged on July 17.

General

Two casings of graphite samples were removed from the B Test Hole of the F Pile on July 17 after total exposures of 920 and 188 Mw-days/CT, respectively. The first casing was exposed 757 Mw-days/CT at ambient F Pile temperatures plus 163 Mw-days/CT after cooling was applied to the test hole. The second casing was exposed 39 Mw-days/CT in the cooled test hole of the F Pile plus 149 Mw-days/CT in the cooled test

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hole of the F Pile. No measurements have been made on these samples.

Further experiments on the propagation of thermal disturbances in graphite of 407 Mw-days/CT exposure (stored energy, 84 cal./gm. by the Sykos method) indicate that under favorable conditions (ambient temperature 100°C, bath temperature about 500°C) the graphite temperature can be made to pass through a small transient maximum of the order of 6°C. above its final steady-state temperature. The stored energy, however, appears to make only a small contribution to the velocity at which the disturbance is propagated. The velocity is of the magnitude predicted on the basis of the thermal diffusivity of the material, namely, about 0.05 cm./sec. at one centimeter from the origin of the disturbance, and decreases with increasing distance from the origin.

Annealing experiments on 1007 Mw-days/CT graphite which expanded 0.77% during irradiation showed that in a carbon dioxide atmosphere the recovery in length amounted to 16% after 112 hours at 425°C, 26% after an additional 24 hours at 600°C, and 38% after further heating at 600°C for 168 hours. No crumbling was noted. In air, the recovery was 58% after 112 hours at 425°C, with very slight surface roughening, and 60% after an additional 24 hours at 600°C with moderate surface roughening. An additional 168 hours at 600°C produced complete crumbling.

Water, Corrosion and Engineering

Process Water Control and Pressure Drop Studies

The iron content in the process water averaged 0.031, 0.009 and 0.010 ppm at B, D and F Areas, respectively. These values are about the same as they have been for the past several weeks.

The rates of pressure drop increase for D and F Areas were 0.11 and 0.34 lbs./ (sq.in.)(day), respectively.

Corrosion

Cast material from Tube 2363 was discharged at F on July 3 to examine the slugs for blistering and to determine the corrosion rate of these slugs. One slug from this tube appeared to be slightly blistered. It was unexpected to find blistered slugs in this tube and in Tube 2063 at D, discharged July 8, because of their relatively low exposure. Gravimetric data for Tube 2363 at F are summarized below:

<u>Exposure, days</u>	<u>Corrosion Data, Tube 2363 F</u>		
	<u>Accumulated Power, MWd</u>	<u>Penetration Rate, in./mo.</u>	
		<u>Average</u>	<u>Maximum</u>
92	11	0.00004	0.00007

These penetration rates are normal. No unusual corrosion was noted on any of the slugs.

Graphite Expansion

At the time of the B shutdown in March, the internal distance between straps on the neoprene seal at the far side was as much as 3-3/4 inches. Recent stretch tests on a sample of neoprene taken from the middle of the seal strip after it had been replaced showed that the neoprene became taut when the width between tie strips was 2-1/2 inches and failed when stretched to 4-1/2 inches. Since the stretch test does

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not duplicate the rate of stretching by the pile, and since tests on a sample from the neoprene strip at D showed failure after 35% elongation instead of the above 80% elongation, it is concluded that neoprene seals are in danger of failing soon after they have been stretched taut.

Push-pull tests were made with the 1500 lb. pneumatic jack on six tubes at D on July 23. During the tests the pigtails were replaced with a rubber hose but the tubes were not discharged. Results are given in the following table.

	Push-Pull Tests on Tubes at D					
Tube No.	1474	2362	2364	3474	3959	4068
Gun Barrel Sur-clearance, in.	22/32	21/32	22/32	14/32	18/32	7/32
Force required for full & reproducible movement, lbs.	700	900	600	800	800	1000
Binding	No	No	No	Yes	No	Yes

Tube 3474 moved 14/32 inch with a 600 lb. force the first time it was tried. On subsequent trials the movement was reduced to 3/32 inch. With an increase of force to 800 lbs. a movement of only 3/32 inch could be obtained on two trials. The tests were then discontinued because of the probability of increasing the binding under conditions of the test.

Tube 4068 could only be moved 7/32 inch at the front and 4/32 inch at the rear by a force of 1000 lbs. This test was not extensive enough to determine whether or not this high friction would increase as the tube was moved in and out.

The data obtained from tubes where binding was not encountered are intended to provide a base for following subsequent changes in clearance between the gun barrels and the graphite. The clearances measured are comparable to those measured at B and are larger than had been anticipated earlier this year.

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