HW-- 7-3441

#1 - R. M. Evans
#2 - R. M. Evans
#3 - Area Engineer
#4 - Area Engineer
#5 - Area Engineer
#6 - Area Engineer
Attn.: Patent Group
#7 - N. Hilberry
#8 - N. Hilberry
#9 - N. Hilberry
#10 - D.A. Miller - T.N. Stapleton - 700 Area File
#11 - M. H. Smith
#12 - W. C. Kay
#13 - 300 Area File
#14 - Pink Copy
#15 - Yellow Copy
#16 - W. E. Jordan
#17 - C. P. Kidder - 700 File
#18 - C. N. Gross

February 15, 1946

100 AREAS
February 5 through Febraary 11

Physics

B Pile

The B Pile was operated 25 MW below rated power level except for the shutdown of February 5. This shutdown lasted 25-1/2 hours because of electrical difficulties with the horizontal rods at start-up.

D Pile

The D Pile operated at 25 MW below rated level throughout the week. The rate of gain in reactivity has been averaging 0.9 ih/day. This is in satisfactory agreement with rates of gain observed during recent months of operation. The excess reactivity held by rods at the end of the week was 64 inhours. This excess reactivity was compensated by A rod all in and B rod at about 220 inches out.

During the shutdown of February 12 the gas supply system to the B hole assembly will be inspected; it is hoped that corrosion of the B hole sample carriers may be reduced or eliminated by introducing an atmosphere of helium into the hole.

F Pile

The unit was operated at 25 MW below rated level during the week except for a shutdown on February 7 for metal discharge. During the start-up following this shutdown the discrepancy between the Thermohm Power Recorder and the A Sample Room temperature reached 16 MW when a number of rods were in the unit. This discrepancy decreased as rods were withdrawn but a discrepancy of 3 to 5 MW persists during normal steady operation. A check of the flow meters was carried out by measuring the drop in level in the tanks in 190 Building during a definite interval. This indicated that the flow meters were reading about 3% high. A similar test at the previous shutdown indicated the flow meters were 3% low. During both tests the flow meters in the Pile Building agreed with those in 190 Bldg. within 0.5%. It is not known how accurate the flow can be determined from tank measurements.

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Net reactivity losses during the week were 2 ih; the losses due to the discharge were partially compensated by gains during normal operation.

General

The following describes the reactivity status of the piles at the end of the week.

Reactivity Absorbed by	Reactivity, ih B	D	F
Xenon	464	469	471
Permanent poison columns	326	304	289
Bismuth	16	16	0
Rods	38	64	59
C_oW	-65	-57	-74
Reactivity of cold, clean pile	779	796	745

These cold, clean reactivities are to be compared with 772, 793 and 731 inhours, respectively, on January 7. Since that date 0.29 ih/MW has been accepted as the overall coefficient at B, instead of 0.27 ih/MW. Permanent poison increases were made at D on January 18; at F, on January 20.

A graphite sample which had received an exposure of 836 MW-days/C.T. in the test hole of the D Pile was annealed at 1000°C for 30 minutes. During exposure, this sample had elongated 0.52%. Annealing reduced this elongation to 0.03%. These dimensional changes occurred in the direction transverse to the direction of extrusion.

A Sykes experiment on graphite exposed 836 MW-days/C.T. in the test hole of the D Pile showed 85 cal/gm of stored energy. This was the first test hole sample to show a definite flattening of the stored energy spectrum in the region of 200°C annealing temperatures. Flattening was first observed in capsule samples exposed 616 MW-days/C.T.; later measurements on a 462 MW-days/C.T. showed a similar but smaller effect. In both test hole and capsule samples, the stored energy peak built up until an exposure of 326 MW-days/C.T. was reached. Since that time it has decreased as shown in the following table:

Exposure, MW-days/C.T.	Maximum stored energy (°C) released per degree rise in graphite temperature (Sykes) Capsule Samples	Test Hole Samples
326	2.54	2.61
462	2.39	--
616	1.76	--
641	--	1.56*
834	1.46	--
836	--	1.31

[redacted]

*This sample was subjected to a short period of annealing at about 100 °C shortly before it was removed from the pile; this may have contributed somewhat to the reduction of the peak observed in this case.

During the shutdown of the B Pile on February 5, an attempt was made to obtain information on the intensity and penetrating power of radiation from the graphite stringer in the D test hole, to aid in setting up procedures for removing and handling this material. This attempt was abandoned when it was found that the graphite stringer had been pushed about 15 feet into the unit and was blocked by a short steel-and-masonite plug which could not be removed at the time. A second attempt to obtain the necessary information has been scheduled for the shutdown of the D Pile on February 12.

The pigtail at the exit end of Tube 1061 of the B Pile, which had shown radiation readings of the order of 100 mr/hr during the previous shutdown, was removed on February 5. A small, active chip was lodged in a bend of this pigtail. Chemical analysis indicates the presence of copper and zinc. The origin of the chip is unknown.

Water, Corrosion, and Engineering

Process Water Control and Pressure Drop Studies

The iron content in the process water averaged 0.019, 0.009 and 0.010 ppm at B, D, and F Areas, respectively. The rates of pressure drop increase for these areas were 0.33, 0.40 and 0.20 lbs./sq.in./day, respectively. These values, particularly for the D Area, are slightly higher than normal; the reasons for these higher values are not obvious. These increases may indicate the beginning of a period similar to that experienced a year ago when the rates of pressure drop increases were considerably greater than they were later in the year.

Corrosion

The gravimetric data obtained from the slugs discharged from the four regular corrosion tubes at F on January 20 are summarized below:

Tube	Days Exposure	Penetration Rate - in./mo. Average	Maximum
2274	330	0.00003	0.00006
2580	330	0.00004	0.00007
3576	330	0.00004	0.00007
3586*	330	0.00004	0.00005

* Only the downstream 17 slugs included.

Of the four corrosion tubes discharged at D on January 18, slugs from Tubes 2369 and 3885 and about one half of those from 2974 have been examined to date without finding any blistered slugs. The concentration of product in these tubes was considerably less than that in the corrosion tubes discharged at F, being equivalent to 30 - 35 MW-days/tube.

Eight over-age tubes were discharged at B on February 5. Slugs from three of these tubes, including Tube 2457 which was found to be difficult to reseat on January 20, have been examined. No blistered slugs were found in these tubes.

Graphite Expansion Problem

The strain gage was used on February 7 to examine Tube 4674 at F (top center) for vertical bowing. H.I. limitations prohibited making a check traverse from the discharge end of the unit. The data suggested a vertical displacement of about 1.5 inches at the center of the pile and about 0.4 inches in the reflector at the end of the gun barrel. This latter figure will be viewed with suspicion until confirming data have been obtained by means of the hydraulic test equipment currently under construction.

The sample of neoprene sheeting which is being stretched to the point of rupture has been stretched 35% more than its original length without rupture. This strain has been added gradually in increments of 5% each day.

It is feared that, as the side shields are forced to lean outward by the expansion of the graphite, the redistribution of weight may cause crumbling of the outer edge of the concrete pedestals which support the side shields. Pointers are being installed in the foundation at the sides of each unit to provide reference marks for detecting any changes in elevation which may accompany such crumbling.

WE Jordan

W. E. Jordan, Chief Supervisor
100-300 Technical