AIM

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Centimeter

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7-3978

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

Classification Cancelled and Changed To

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By Authority of CG-PR-2

CA. Swuman 7-12-91

By PM Eick 5-5-94

Verified By SH Wells 5-5-94

100 AREAS

April 23 through April 29
(For Technical Progress Letter No. 95)

May 3, 1946

Author W E Jordan

This Document consists of
3 Pages No. 12
18 Copies, Series 12

Physics

B File

Lay-away work is now approximately 90% complete.

D File

The D File operated at rated level except for a shutdown of about 14-1/2 hours on April 23. During the shutdown 79 tubes of irradiated metal were discharged along with Tubes 2088 and 2788, which contained bismuth.

For the third consecutive week the net gains in reactivity have been essentially zero. This is due to the combined effects of discharges on each of these weeks and the charging of metal which is less reactive than the metal it is replacing, either due to impurities or weight differences. Recent charges have consisted of 90% MZ material and 10% X material, replacing previous charges made up of about 80% A material and 20% Z material.

Comparisons of these classifications of pieces as measured in the 305 Test File average about as follows:

Classification	ΔK_k
A	0
Z	-0.06
MZ	-0.08
X	-0.13

Allowance for these metal differences and for the losses to be expected from weekly discharges representing about 6% of the pile based on the square of the neutron distribution leads to the following analysis of the reactivity balance.

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Loss due to weekly discharge	-4.8 inhours
Loss due to average difference of -0.07 $\Delta K\%$ in the metal	-1.7 "
Gains in 6-1/4 days at 1 ih/day	6.2 "
Net effect to be expected per week	-0.3 "

P Pile

The pile was operated at 50 MW below rated level throughout the week with the exception of a scram on April 25, initiated by a blown fuse in one of the Beckman circuits.

On April 23, just following a pump change, the unit lost 3 inhours over a period of 4 hours. During the next 10 hours the loss was regained and in 12 more hours about 3 inhours more were gained. After the scram on April 25, the flow meter on one of the risers failed to respond to changes of flow. When this condition was corrected the power of the unit was found to be about 2MW below the nominal operating level. The power was raised to its standard level and the reactivity showed the transient behavior associated with a power change. The reactivity changes on April 23 are believed to have been caused by a decrease in the true level of the pile, which in turn was caused by an unrecorded change in water flow. No useful information was obtainable from the transients produced by the return to standard level on April 25 since these transients were superposed on those resulting from the scram earlier in the day.

The gas supply system to B-hole was put into service on April 29 and is operating satisfactorily.

The consumption of CO₂ by the horizontal rod thimble purging system remains high. The system will be tested for leaks and functioning at the next shutdown.

Total gains for the week were 6 inhours.

General Physics

To verify the slight downward trend which has been observed in the crushing strength of graphite from the test holes, a single measurement was made with a parallel-cut capsule sample of 618 MW-days/C.T. exposure. A figure of 5660 lbs./sq.in., 1.3 times that of unirradiated graphite, was obtained. This is substantial lower than the ratio of 2.3 observed in test hole graphite of 640 MW-days/C.T. and indicates that this property is assuming increased importance in the monitoring program.

Submersion of unirradiated graphite in nitric acid for three days has been shown to produce a volume increase of 0.55% and a density increase of 2.5% even after thorough washing and drying. Further experiments are planned to determine whether graphite expansion is in part caused by chemical effects.

An underwater cutting wheel for graphite capsules has been completed and is under test.

Activity measurements on slugs from corrosion tubes 2574 and 2974 of the D Pile have indicated an effective pile length of 36.1 slug lengths for a 32-slug loading. The extrapolation distance was 2.25 and 1.85 slug lengths at front and rear respectively. The cosine distribution appeared to be followed except where perturbations were introduced by horizontal rods. The activity of the slug nearest Rod A in Tube 2974 was only 60-70% of the value expected for a cosine distribution.

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Water, Corrosion and Engineering

Process Water Control and Pressure Drop Studies

The iron content in the process water averaged 0.025, 0.011 and 0.013 ppm at B, D and F Areas, respectively. The rates of pressure drop increase for D and F Areas were 0.55 and 0.27 lbs./sq.in.)(day), respectively.

Colloidal mobility measurements made using the slit ultramicroscope indicate that the negative charge on the colloidal particles has decreased 0.15 to 0.20 units at D and F on all the water from raw water to process water to the pile. This decrease in charge suggests that an increase in film formation rate may be expected. The above condition may be associated with the current increase in river elevation.

Corrosion

Tube 3573 at D was examined with the borescope and the downstream Van Stone flange was examined visually on April 23. Minor pitting was found in scratches in the cold portion of the upstream end of the tube. Pressure drop film was first noted at approximately 21 feet from the upstream flange and became progressively thicker with distance downstream. No serious defects were noted in the tube. Areas of localized etch were found on the downstream Van Stone flange. These areas of etch appeared to be very shallow.

In order to monitor corrosion and rate of film formation at B since the water flow rate was reduced, one tube of dummies was discharged for inspection on April 18. No evidence of film formation or corrosion was noted.

Graphite Expansion

When the mercury-filled traverse equipment is withdrawn from a process tube the volume of the system expands significantly. To obtain check readings on withdrawal it is necessary to withdraw in small steps, adding make-up mercury intermittently, in order to prevent air being sucked in through the head and trapped in the lines.

Horizontal rod thimbles No. 2 and 9 at B were traversed with the mercury-filled equipment on April 24 and 25, respectively. In both cases the graphite track was found to be quite smooth and free of the discontinuities which characterized Thimble 9 at D. No. 2 thimble was bowed upwards 0.82 inches and No. 9 thimble at B was bowed 0.24 inches, as measured above the inlet end of the thimble. The 0.58-inch difference between the bowing of these two thimbles is in excellent agreement with the results of traverse of process tubes. In each case the bowing is about 3/8 inch smaller than predicted, but the vertical clearance around the thimble is 1/2 inch. This indicates that the thimbles are resting on the graphite in the center of the pile but are suspended above the graphite at the side of the pile. Boreoscopic inspection of thimbles No. 2 and 9 showed no change in thimble cross section.

The current program of installing additional pile motion indicators was completed with the installation of a horizontal tight wire on the far side of the unit and the repair of the mirror arrangement for reading the central point of a tight wire on the rear face. Initial readings have been taken on all of these instruments to serve as zero points to future observations.

W. E. Jordan
C.P.K.

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

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9/16/94

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