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7-4027 [redacted]

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Physics

100 AREAS

April 30 through May 6
(For Technical Progress Letter 96)

May 10, 1946

COPY 1 OF 1, [redacted]
 This Document consists of
 4 Pages No. 7 of
 Copies Series A

B Pile

Additional indium foil irradiations in the B Pile have shown that the slow neutron flux is decreasing with time. It is known that the gamma rays from the 40-hour lanthanum fission product can produce photo-neutrons in water and the possibility that the changing neutron production is from this source is being investigated. The lanthanum exhibits the 12.5-day half life of its barium parent. The foil measurement on April 11 was 2775 counts/minute while that on May 6 was 1480 counts/minute.

No consistent set of quantities for the xenon equation constants A, B, and s have yet been determined from the reactivity data of the B Pile shutdown. The equation fitting the 150 MW run has not been brought into agreement with the equation fitting the 0.5 MW run. A report presenting the data and discussing attempted analyses is in preparation.

D Pile

D Pile was shut down for approximately 16-1/2 hours on April 30. During operation after this shutdown it was necessary to reduce the power level 5 MW because of graphite temperature restrictions. This reduced level was maintained for about 5 hours. Throughout the remainder of the period the D Pile operated at rated level.

The orifices of Tubes 0980, 1474, and 3880 were changed to 0.100-inch during the shutdown of April 30. The remaining tubes containing poison or bismuth will be similarly changed during the next shutdown, scheduled for May 7.

Tube 3574 was charged with samples covered by Special Request 13 and Special Request 9 - 1. It was estimated that the column as charged would have a nominal poisoning value of 10 inhours. Observed effects on the reactivity are summarized in the following table.

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Reactivity in rods at shutdown	49	in hours
Loss due to discharge	-4	"
Long term gains in four days	4	"
Loss due to difference in metal quality	-1	"
Expected reactivity for no poison change	48	"
Observed reactivity, 5-4-46	38	"
Effect of special samples	10	"

No shadowing correction was allowed for in the estimated poisoning effect stated above but such a correction would be small and the agreement between observed and calculated effects would remain within experimental error.

F Pile

With the exception of a scheduled shutdown on May 5 the pile was operated at 50 MW below rated level throughout the week.

During the shutdown Special Requests 9-3, 7, 16-1 and 10A were loaded into Tube No. 1565 and three paposes were loaded in Tube No. 2385. There was a loss of 8 ih during the shutdown, 6 ih being attributed to the loading of the special column and 2 ih to the metal discharge.

There was no net change in reactivity during the week.

General Physics

A pneumatically driven abrasive wheel, operated under water, has proved to be a satisfactory instrument for separating capsules from slugs without damaging the graphite samples contained in the capsules. Test cuts on a section of aluminum rod containing a thermocouple indicated that negligible heating (one degree or less) occurs in the aluminum. Of the capsule slugs removed from the B Pile, two remain to be cut.

Installation of an improved lathe for removing aluminum capsules and casing is nearing completion.

Three capsule slugs containing a mixture of 868 MW-days/C.T. and 526 MW-days/C.T. preirradiated capsule graphite, plus additional unirradiated transverse graphite, were loaded into Tube 2385 of the F Pile on May 2.

The present status of the program on Special Requests of the Metallurgical Laboratory is as follows:

<u>Request No.</u>	<u>Material</u>	<u>Quantity</u>	<u>Exposure</u>	<u>Status on May 6, 1946</u>
1	Np ²³⁷	1 mg - 1 slug	58 days	Completed - shipped 1/28/46
2	Thorium	10 g - 1 slug	15 days	Completed - shipped 11/15/46
3	Thorium	33 slugs	2-3 mos.	Charged 1474D 3/26/46
4	"C" Slugs	6 slugs	Select and ship	Completed - shipped 3/22/46
5	N-237	Concentrate		Completed - shipped 3/15/46



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<u>Request No.</u>	<u>Material</u>	<u>Quantity</u>	<u>Exposure</u>	<u>Status on May 6, 1946</u>
6	U ²³³ oxide	1 slug	1 year	Charged 3282F 4/2/46
7	Np ²³⁷	5 mg - 1 slug	120 days	Charged 1565F 5/2/46
8	U ²³⁸	1 slug	14 days	Completed - Charged 3378F 4/2/46 discharged 4/18/46, shipped 5/2/46
9-1	BeO, BeO plus U ₃₀₈	8 slugs	30 days	Charged 3574D 4/30/46
9-2	"	8 slugs	60 days	All cans on hand. One can leaks; insertion withhold pending fur- ther directive.
9-3	"	8 slugs	120 days	Charged 1565F 5/2/46
10A	Sm oxide	1 slug	120 days	Charged 1565F 5/2/46
10B	Gd oxide			Postponed indefinitely
11	Radium	1 gm		Under study by MJC
12A	U ²³⁵			Indefinitely postponed
12B	Pu ²³⁹	540 mg-1 slug	8 mos.	Charged 3378F April 18
13	Be ₃ N ₂	Indefinite	30 days	First 8 slugs charged 3574D on 4/30/46
14	Al-U alloys	3 slugs	2,12, >12 mos.	Slugs expected May or June
15	LiF	50-100 slugs	14 days	First 3 slugs charged 3378F 4/2/46; discharged 4/18/46; shipped 5/2/46
16-1	95 ²⁴¹	2 mg - 1 slug	120 days	Charged 1565F 5/2/46
16-2	"	4 mg - 1 slug	8 mos.	Charged 3378F 4/18/46
17	Graphite	16 lbc.	Remove and ship	One piece shipped 3/22/46; another to be shipped on receipt of container
18	Pb-Cd slug		Select and ship	Completed - Shipped 5/2/46
19-23	Unallocated			
24	X slugs	40 tons	Fabricate	Final design under discussion
25	Be ₃ N ₂ (U. of Cal.)			4 slugs returned for sizing and closing

Water, Corrosion and Engineering

Process Water Control and Pressure Drop

The iron content in the process water averaged 0.025, 0.011 and 0.019 ppm at B, D and F Areas, respectively. The rates of pressure drop increase for D and F Areas were 1.00 and 0.14 lbs./((sq.in.)(day)), respectively.

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Colloidal mobility measurements made using the slit ultramicroscope indicate negligible difference between waters from D and F Areas. However, it has been noticed that a greater number of colloidal particles are found in water from D. The iron analyses on these waters show higher values for F than for D, indicating that many of the colloidal particles which may contribute towards film formation at D are not iron.

Two of the four refrigerating units at F were started on May 6. Two of the six refrigerating units at D are scheduled to be started on May 7.

Graphite Expansion

During the shutdown at F on May 2, it was found very difficult to insert Control Rod No. 2 under power. It was also noted that the rod showed definite signs of abrasion. A borescope examination of this thimble is scheduled for May 9 to note if any change in thimble cross-section has taken place similar to that noted several weeks ago on Control Rod Thimble No. 9 at D.

Tests of the recently constructed two-wire plumb bob have been made in the mock-up thimble at 190-B. The increased inertia of the two insulated wires decrease the rapidity with which readings may be taken, since several minutes are required for the oscillation of the wires to cease even if the bob is at rest against the thimble wall. Readings obtained near the bottom of the thimble appear to be accurate to within at least $1/8$ inch, and this uncertainty is reduced as the distance from the top of the thimble is decreased. Tests in the pile will be necessary to demonstrate the operability of the system in an ionized atmosphere.

Purging of Horizontal Control Rods

The revised CO₂ purge system for horizontal thimbles at F Area was tested this past week. Considerable improvement in air displacement was noted, such that it was possible to build up a high concentration of CO₂ in the thimbles. However, smoke tests showed that seal glands will be necessary if all air is to be eliminated without employing an excessive CO₂ consumption. The greater density of the CO₂ causes it to flow out the under side of the thimble with sufficient velocity to create a syphon action that draws air in the top side of the thimble. Calculations indicate that a seal adequate to offer 0.003 to 0.005 inches of water resistance to the minimum gas flow will be required to overcome this effect. Means for designing such a seal are under consideration.

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