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August 30, 1949

To: V. C. Hamister
From: J. H. West

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Graphite Testing

(A) Non - Experimental

The results of routine tests on purified graphite during July are summarized in Table I.

TABLE I

PURIFIED GRAPHITE SUMMARY

Type	Number of Heats	Average Δ ih (Purity)	Effective Δ ih			Density (gms./c.c.)		
			Ave.	Max.	Min.	Ave.	Max.	Min.
GRT	103	+0.959	+0.965	+1.03	+0.90	1.647	1.667	1.624

The purity of GRT is continuing to improve, as evidenced by the average Δ ih (purity) values of +0.928 and +0.959 in June and July, respectively. The density has not changed appreciably.

Production of graphite for Hanford Works will cease early in August. The 11,000 ton order will have been filled at that time. Testing and sorting of production heats will continue for some time, however, because the heats could not be tested as fast as they were produced. During recent weeks only alternate heats have been tested.

(B) Experimental GRT

In last month's report, test values were listed for experimental heats in which the F_{12} addition was started at a lower temperature than usual. Twelve additional heats have now been made and nine of the heats tested. The addition of two tanks of F_{12} was begun after an energy input of 8,000 KWH instead of the usual 10,100 KWH, and stopped at the usual time. The functional test results are shown in Table II.

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TABLE II

F12 ADDITION AT 8,000 KWH

<u>Heat</u>	<u>Δ ih (Purity)</u>	<u>Density</u>	<u>Heat</u>	<u>Δ ih (Purity)</u>	<u>Density</u>
GEF-1673-X	+ .99	1.639	GEF-1681-X	+1.00	1.642
1675-X	.89	1.640	1682-X	.92	1.640
1677-X	2.01	1.639	1683-X	.99	1.637
1678-X	1.02	1.633	1684-X	.99	1.625
1680-X	1.00	1.637			
			Average	2.979	1.637

These heats are very little, if any, purer than GEF heats made recently according to standard procedure. The density is a little lower, which may indicate some reaction between the carbon and fluorine at low temperatures. Strength tests are yet to be made.

Twelve experimental heats have also been made with the addition of three tanks of F12 beginning at 8,000 KWH and extending over a four hour period. Functional tests have not yet been made on these heats.

(C) Experimental WSP

Approximately 700 WE (Whiting Coke - Standard Pitch) bars from production lot 2 were graphitized and then "F" processed. The remainder (47 bars) of graphitized lot 1 were also "F" processed. The results of functional tests on the WSP heats are shown in Table III.

TABLE III

WSP GRAPHITE

<u>Heat</u>	<u>Number of Bars</u>	<u>Lot</u>	<u>Δ ih (Purity)</u>	<u>Density (gm/cc.)</u>
WSP-1665	122	2	+ .98	1.730
1666	122	2	.90	1.716
1667	122	2	.97	1.731
1668	122	2	.95	1.726
1669	122	2	.98	1.729
1671	47	1	1.00 *	1.669 *
1671	33	2	1.03 **	1.736 **
	Weighted Average		+ .962	1.720

* only 6 bars tested. Previous tests on lot 1 gave an average density of about 1.67

** only 3 bars tested.

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There can no longer be any doubt that high purity graphite is obtained by "F" processing WS bars which have previously been graphitized. Previous tests on "F" processed gas baked WS bars (GEWF type) showed that graphite made in this way is not suitable to use in a pile. A likely explanation of the necessity for the graphitization step is that many of the impurities in WS bars are volatilized at the high temperature ($\sim 2800^{\circ}\text{C}$) in the graphitization furnace. It is unfortunate that due to a misunderstanding, none of the graphitized WS bars were sent to Hanford for testing before being "F" processed.

The density of WSP lot 2 is about 0.07 gms./cc. higher than the average of all GRF tests tested thus far. For an entire pile, this increase in density would contribute about 50 inhours of reactivity. If this high density could be produced consistently, WSP graphite would have a decided advantage over GRF, since its purity is about the same. The ingredients of WS graphite are cheaper and more plentiful than other types, so a high percentage of future effort on graphite development should be focused on the WS variety.

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