

FLOTATION WORK ON CORE COMPOSITES FROM
STATE LEASE E IN THE PAMLICO RIVER

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by
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Introduction

Mr. Stephen Conrad, North Carolina State Geologist, submitted a set of samples from a drill hole in State Lease E to the Minerals Research Laboratory in September of 1966. P_2O_5 and insoluble analyses were run on the different footage sections. On a visit of the State Geologist to the Laboratory in February 1967 it was decided to determine the recoverable tonnages of concentrate on the basis of composites from the hole sections. Flotation concentration methods as developed for the North Carolina phosphate ore during a project for Texas Gulf Sulphur Company were employed to evaluate the samples and the results are reported here.

The Samples

The samples as received were marked alphabetically and by footage intervals. The samples had been dried for the original P_2O_5 and insoluble determinations, but moisture content and exact bulk weights were not determined. A bulk density figure of 90 pounds per cubic foot, which had been established for other North Carolina phosphate matrix samples, was therefore used for tonnage computations. The assays are presented in Table 1.

Table 1

Phosphate Matrix Samples

<u>Sample</u>	<u>Footage</u>	<u>P₂O₅*</u>	<u>Acid Insolubles*</u>
A	148-151	18.4	33.3
B	151-154	15.7	29.2
C	154-157	13.8	30.6
-	157-159	(missing)	
D	159-162	19.3	34.7
E	162-164.5	18.6	35.4
F	164.5-167	18.0	35.9
G	167-170	11.2	35.8
H	170-172.5	10.2	52.4
I	172.5-175	11.3	51.0
J	175-177.5	11.3	49.2
K	177.5-180	15.6	43.1
L	180-183.5	10.0	55.5
M	183.5-186	3.6	35.2
N	186-188	1.4	37.7
O	188-190	4.7	51.7
P	190-191.5	1.4	21.3

* Assays by Asheville Minerals Laboratory

Two composites were made from the samples by combining sample weights proportional to the footage intervals: composite A through C from 148 feet to 157 feet and composite D through L from 159 feet to 183.5 feet. Samples M, N, O, and P were too low in P₂O₅ to be composited for flotation test work, and they also seem to be high in free carbonates (probably Castle Hayne formation material).

Test Results

Flotation test work was done on the two composites. The results on footage interval 148 to 157 feet are presented in Table 2.

Table 2
Concentration Results - Footage 148 to 157, Test 3

<u>Material</u>	<u>% Wt.</u>	<u>Tons/ Acre</u>	<u>Assays*</u>			<u>CaO/ P₂O₅</u>	<u>Zero Insol P₂O₅</u>	<u>P₂O₅ Distr.</u>
			<u>% P₂O₅</u>	<u>% CaO</u>	<u>% Insol.</u>			
+14 Mesh	1.6	280	15.3	24.1	50.5	1.58	30.9	1.5
-14+35 Conc.	6.9	1,215	30.4	47.4	4.8	1.56	31.9	12.8
-14+35 Tails	3.2	560	1.4	-	96.0	-	-	0.3
-35+200 Conc.	42.4	7,460	31.1	49.0	2.1	1.58	31.8	80.4
-35+200 F.A. Tails	16.8	2,960	1.7	-	94.5	-	-	1.7
-35+200 Amine Tails	1.9	330	7.0	11.2	77.5	1.60	31.1	0.1
-200 Slimes	27.2	4,790	2.0	30.9	34.7	15.40	26.6	3.3
Total	100.0	17,600	15.3	-	-	-	-	100.1
Total Conc.	49.3	8,675	31.0	-	-	-	-	93.2

* Assays by Asheville Minerals Laboratory

At a dry weight of 90 pounds per cubic foot there are 17,600 tons of matrix per acre, yielding a total of 8,675 tons of concentrate with 31.0 percent P_2O_5 .

The results of footage interval 159 to 183.5 feet are presented in Table 3.

Table 3

Concentration Results - Footage 159 to 183.5, Test 1

<u>Material</u>	<u>% Wt.</u>	<u>Tons/ Acre</u>	<u>Assays*</u>			<u>CaO/ P₂O₅</u>	<u>Zero Insol P₂O₅</u>	<u>P₂O₅ Distr.</u>
			<u>% P₂O₅</u>	<u>% CaO</u>	<u>% Insol.</u>			
+14 Mesh	4.9	2,350	28.2	44.3	8.1	1.57	30.7	9.1
-14+35 Conc.	5.1	2,450	29.5	46.2	6.8	1.57	31.6	10.0
-14+35 Tails	3.2	1,540	2.5	-	92.6	-	-	0.5
-35+200 Conc.	30.4	14,590	30.4	48.4	1.8	1.59	30.9	61.2
-35+200 F.A. Tails	33.8	16,220	2.9	-	91.1	-	-	6.5
-35+200 Amine Tails	2.6	1,250	11.3	36.5	32.0	3.23	-	2.0
-200 Slimes	20.0	9,600	8.1	28.1	35.0	3.47	-	10.7
Total	100.0	48,000	15.1	-	-	-	-	100.0
Total Conc.	35.5	17,040	30.3	-	-	-	-	71.2

* Assays by Asheville Minerals Laboratory

At a dry bulk weight of 90 pounds per cubic foot there are about 48,000 tons of matrix per acre, yielding 17,040 tons of concentrate with 30.3 percent P_2O_5 .

Summary

Based on one drill core from the northwestern part of State Lease Section E and flotation test work at the Asheville Minerals Research Laboratory, approximately 25,700 tons of phosphate flotation concentrate with an average P_2O_5 content of 30.5 percent could be obtained from one acre.