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Reserves of Phosphate in the Land-Pebble Phosphate Field, Hardee, Hillsborough, Manatee, Osceola, Pasco, and Polk Counties, Florida

Trace Elements Investigations Report 141

UNITED STATES DEPARTMENT OF THE INTERIOR GEOLOGICAL SURVEY

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Sincerely yours,

from

Esper S. Larsen, 3d Acting Chief Geologist

UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

RESERVES OF PHOSPHATE IN THE LAND-PEBBLE PHOSPHATE FIELD

HARDEE, HILLSBOROUGH, MANATEE, OSCEOLA,

PASCO, AND POLK COUNTIES,

FLORIDA

by

J. B. Cathcart, C. G. Tillman, and H. B. Dutro

January 1951

Trace Elements Investigations Report 141

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RESERVES OF PHOSPHATE IN THE LAND-PEBBLE PHOSPHATE FIELD

HARDEE, HILLSBOROUGH, MANATEE, OSCEOLA,

PASCO, AND POLK COUNTIES,

FLORIDA

by

J. B. Cathcart, C. G. Tillman, and H. B. Dutro

ABSTRACT

Investigations of the land-pebble phosphate deposits of Florida by the Geological Survey began in November 1947. This report presents the computation of reserves of phosphate rock in the northern part of the district. Reserves were computed from company data, and are broken down into measured, indicated, and inferred classes. Each class of reserves is further broken down into various grade categories. Total reserves of phosphate rock of all grades and all classes are 1,662,667,600 short tons, excluding reserves on land owned by the Virginia-Carolina Chemical Corp.

INTRODUCTION

Investigations of the land-pebble phosphate deposits of Florida by the Geological Survey began in November 1947. Computations of reserves have been an important phase of the work to date, and this report represents the final computation of the reserves in the northern part of the district. Prospecting data are so meager in the southern part of the district, in Hardee and Manatee Counties, that the computation of reserves was done for the northern tier of townships only. We gratefully acknowledge the courtesy of various mining companies, without whose cooperation this report could not have been prepared. Seven companies are actively engaged in mining phosphate at the present time and only one company has failed to supply reserve data to the Geological Survey. The American Cyanamid Co., the American Agricultural Chemical Co., Coronet Phosphate Co., Davison Chemical Corp., International Minerals and Chemical Corp., and Swift and Co., turned over full information as to their reserves of phosphate; in addition, the Polk Phosphate Co., Independent Chemical Co., U. S. Phosphoric Co., the Atlantic Coast Line Railroad, and Wayne Thomas, independent consultant, gave us reserve data. Cores and logs of holes drilled by the Tennessee Valley Authority were also examined and sampled.

NATURE OF THE DATA

Company prospecting

Six of the seven operating companies, three inactive companies, and Wayne Thomas turned over to the Geological Survey all prospecting information in their possession. This information included maps or logs showing hole locations, thickness of phosphate-bearing strata, grade in percent BPL, and tons of product per acre.

Prior to the introduction of flotation methods, about 1934, all prospecting was for coarse material, and only rock that was retained on a 14-mesh screen was saved. Since 1934, company prospecting has taken into account phosphate of flotation size as well as the pebble. Much of the land prospected for coarse phosphate previous to 1934 has not yet been re-prospected for the flotation-size material.

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Tonnages of phosphate for individual drill holes were calculated by company engineers, using long tons per acre as the basic figure. (In this report, long tons have been converted to short tons.) The tons per acre figure is used for plotting on maps, and the figure is multiplied by the number of acres that the drill hole represents to arrive at a tonnage figure. Prospect drilling is laid out on a square grid, with a 40-acre tract as the basic unit, and drilling densities are expressed as a function of the 40-acre tract, for example, 4, 8, or 16 holes per 40. The grade is always reported as percent B.P.L. (bone phosphate of line). B.P.L. is an artificial product, representing tricalcium phosphate, and is computed by multiplying percent P_2O_5 by the factor 2.18.

Pre-flotation prospecting reported tonnage and grade of the pebble fraction only, often dividing the pebble into a coarse and a fine fraction. Since 1934, prospecting maps include both pebble- and flotationconcentrate tonnages and grades. The practice of reporting coarse and fine pebble, and coarse and fine flotation concentrates, varies with the companies, but generally phosphate rock coarser than 14 mesh is called pebble, and phosphate rock finer than 14 mesh, but coarser than 150 mesh, is called flotation concentrate, and for the sake of simplicity this practice has been followed in this report. Material finer than 150 mesh, called slime, is too fine to be treated, and is handled as a waste product, although it contains appreciable amounts of phosphate.

Tennessee Valley Authority

The Tennessee Valley Authority drilled prospect holes on Governmentowned land in the land-pebble field in 1948 and 1949. Most of the

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drilling was in Hardee and Manatee Counties. Because the Tennessee Valley Authority samples were not screened before analysis, the results of the drilling indicate only the presence or absence of phosphatebearing strata, and there is no way to compute the tonnages and grade of merchantable products. However, the Tennessee Valley Authority drilling showed that phosphate is present in Hardee and Manatee Counties. Scattered company drilling in this area indicates that this reserve is low grade, and it is not now considered economic.

EXPLANATION OF RESERVE CATEGORIES

For purposes of this report, tonnages of all grades reported by company drilling are classed arbitrarily as reserves, although, at the present, any rock assaying less than 65 percent B.P.L. is not considered economic. Also, any areas with less than about 500 tons per acre of product are reported as "blank" or "trace" on the maps, therefore, all areas included in estimates of reserves contain more than 500 tons per acre of product.

For convenience, and following the general company practice, the basic areal unit used in computing reserves is 40 acres. All information received from companies was entered on plats representing 40 acres, and tonnages were computed for each 40-acre tract. The 40-acre tracts were then plotted on a township plat, with symbols representing the reserve categories into which they were placed.

Measured ore

The rock on 40-acre tracts on which 4 or more holes were drilled is classed as measured. For areas drilled prior to 1934, where only pebble data are available, the reserves of pebble are classed as measured, and flotation tonnages, where computed, are classed as indicated.

Indicated ore

The rock on 40-acre tracts where the drilling density is 1 to 3 holes, and on 40-acre tracts with no drilling, but which are adjacent to measured tracts, is classed as indicated ore.

Inferred ore

The rock on 40-acre tracts with no drilling, but which are adjacent to areas of indicated reserves, is classed as inferred. Areas which have not been drilled, but which are surrounded by areas of indicated or inferred reserves, have not been considered as reserves in the report because of several factors; (1) these areas may be broken up into small privately owned farm land, or town lots, and can not be purchased; or (2) these areas may have been drilled recently or are to be drilled in the future, so that further company information may add considerable to the computed reserves.

Land owned by Virginia-Carolina Chemical Corp. is distinguished on the maps by a cross-hatch pattern. This land undoubtedly contains phosphate reserves, but no prospecting information has been given to the Geological Survey by this company.

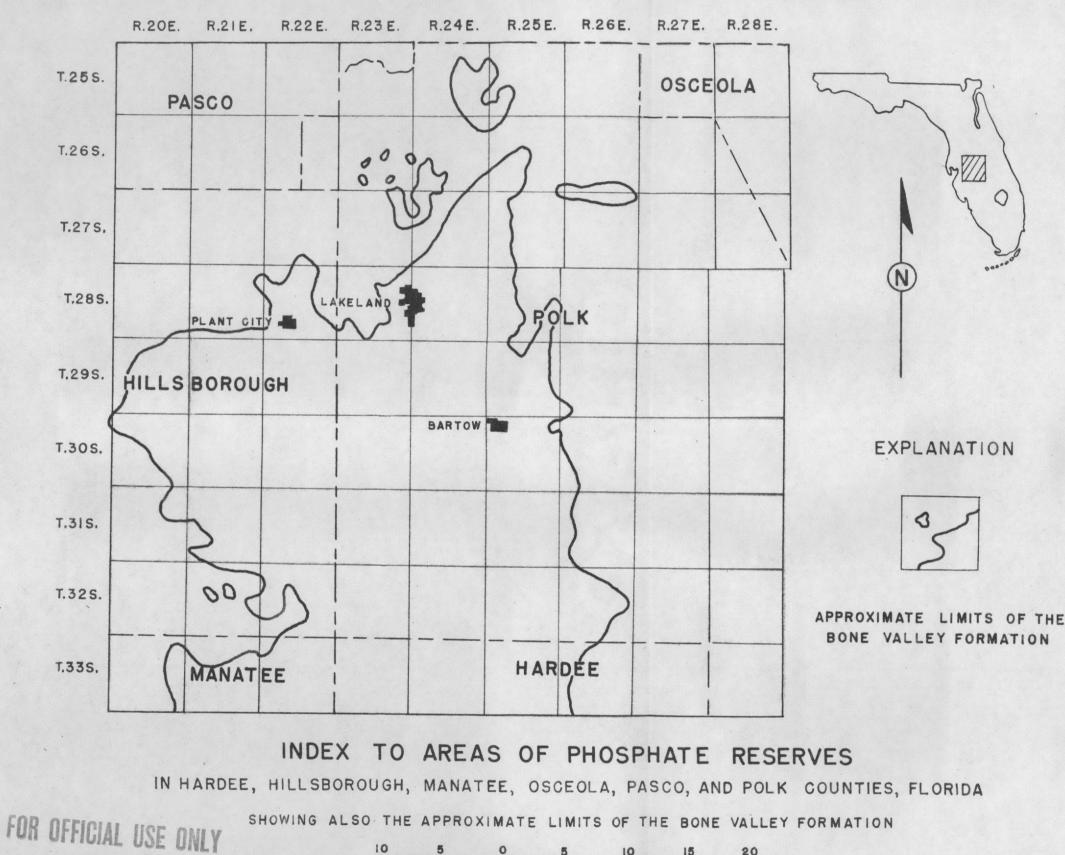
GRADE CATEGORIES

Each class of reserves has been broken down into grade categories on an arbitrary basis, but following closely the practice of the companies. The category greater than 75 percent B.P.L. corresponds closely to the company designation of high-grade ore, 70-75 percent to mediumgrade ore, and 65-70 percent to low-grade ore. Grades below 65 percent are considered by the companies to be non-economic, but are included in this report for completeness. Phosphate content unknown is used for those areas where tonnage was computed, but where no chemical assays were reported. Probably most of this tonnage can be divided proportionately among the various grade categories.

SUMMARY OF RESERVES

Table 1 summarizes data concerning tonnage and grade. This table was computed from the detailed figures given in tables 2-55.

U.S. DEPARTMENT OF THERINTERIOR USE ONLY . 7 TRACE ELEMENTS INVESTIGATIONS REPORT 141 GEOLOGICAL SURVEY



Scale 5 0 5 10 15 20 Miles

AS OF NOVEMBER I, 1950

FOR OFFICIAL USE UNLY

Table 1

Total Phosphate Reserves 1/

in the Land-Pebble Phosphate Area

Hardee, Hillsborough, Manatee, Osceola, Pasco and Polk Counties, Florida

Phosphate	Measured	reserves	Indicated	l reserves	Inferred	reserves	Tot	als
content (percent .B.P.L. 2/)	Pebble fraction (f14 Mesh)	Flotation concentrate (-14, /150 Mesh)	(+14	Flotation concentrate (-14 /150 Mesh)	(714	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)
75	32,275,800	69,605,900	17,962,000	69,800,000	11,781,000	30,507,000	62,018,800	169,912,90
70-75	126,773,500	127,087,400	65,900,000	155,627,000	34,042,000	56,500,000	226,715,500	339,214,400
65-70	195,798,000	24,077,100	143,917,000	170,734,000	55,234,000	30,334,000	394,949,000	225,145,100
60-65	17,049,800	1,411,100	26,599,000	17,647,000	13,684,000	4,623,000	57,332,800	23,681,100
60 Content	5,050,900	277,200	7,188,000	3,784,000	3,285,000	1,926,000	15,523,900	5,987,200
unknown	54,451,500	8,400	30,098,000	57,629,000			84,549,500	57,637,400
Subtotal	431,399,500	222,467,100	291,664,000	475,221,000	118,026,000	123,890,000		18(1.3)) 18(1.3))

Grand total Measured, Indicated, and Inferred reserves 84

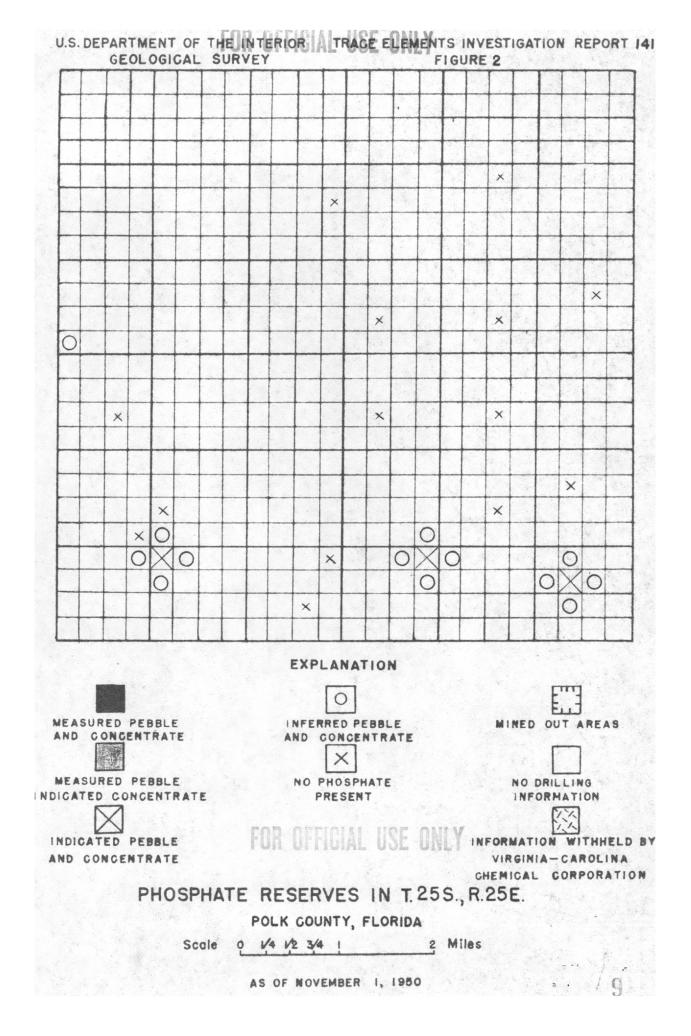
841,089,500 821,578,100

FOR OFFICIAL USE ONLY

1/ Short tons

0

2/ P.P.L. = Bone Phosphate of Lime = percent P205 x 2.13



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Table 2

Phosphate Reserves in T. 25 S., R. 25 E. 1/

Polk County, Florida

Phosphate	Measured	reserves	Indicated	reserves	Inferred	reserves	Tot	als
content (percent B.P.L. 2/)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 / 150 Mesh)	Pebble fraction (/14 Nesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Lesh)	Flotation concentrate (-14 /150 Mesh)
75			p.					
70-75								
65-70								
60-65				×	100,000	100,000	100,000	100,00
60 Content unknown					100,000	100,000	100,000	100,000
Subtotal					200,000	200,000		

Grand total Measured, Indicated, and Inferred reserves

200,000 200,000

FOR OFFICIAL USE ONLY

1/ Short tons

Contraction

2/ P.P.L. = Bone Phosphate of Lime = percent $P_20_5 \times 2.18$

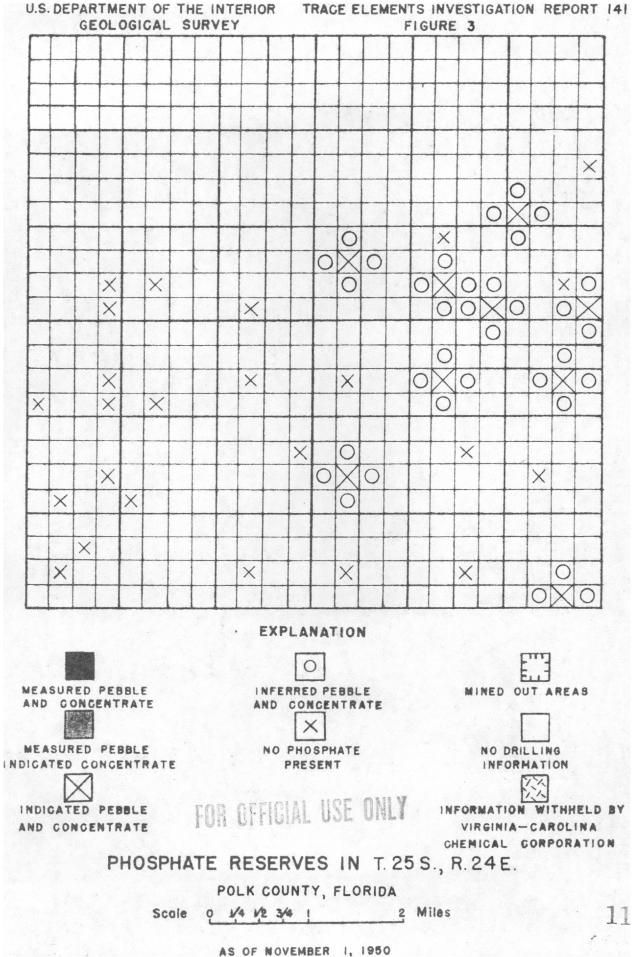


TABLE 3

Phosphate Reserves in T. 25 S., R. 24 E. 1/

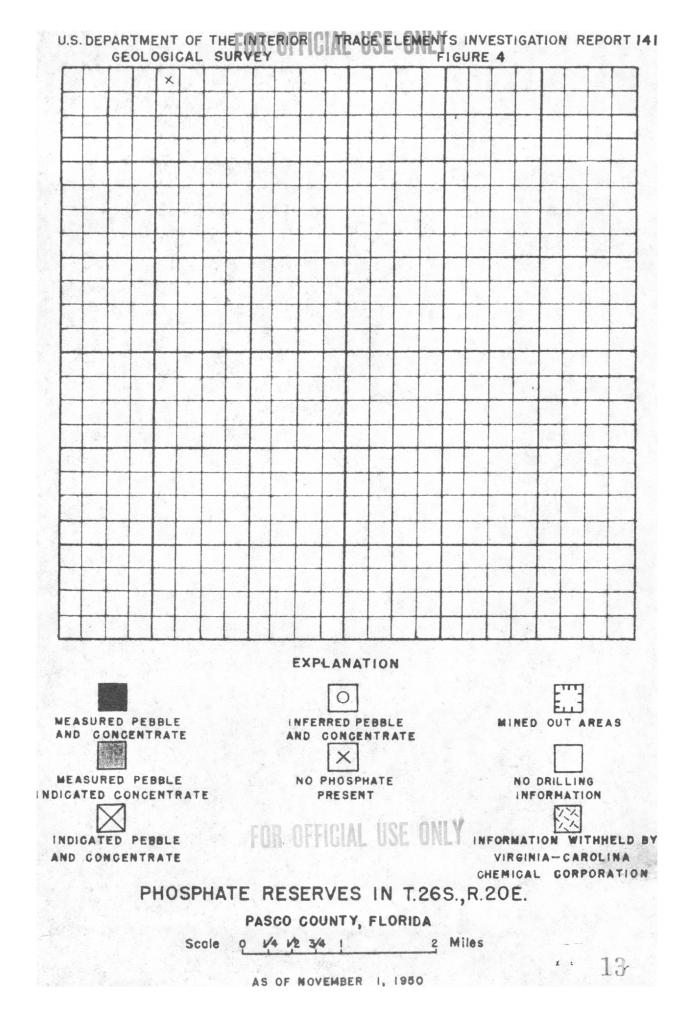
Polk County, Florida

Phosphate	Measured	reserves	Indicated	reserves	Inferred	reserves	Tot	als
content (percent B.P.L. 2/)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Lesh)	Flotation concentrate (-14 /150 Mesh)
75								
70-75								
65-70			100,000	100,000	300,000	300,000	400,000	400,00
60-65			200,000	200,000	700,000	600,000	900,000	800,00
60 Content unknown						100,000		100,00
Subtotal			300,000	300,000	1,000,000	1,000,000		

Grand total Measured, Indicated, and Inferred reserves FOR OFFICIAL USE ONLY 1.300.000 1.300.000

1/ Short tons 2/ P.P.L. = B

P.P.L. = Bone Phosphate of Lime = percent P205 x 2.18



OFFICIAL USE ONLY

Phosphate Reserves in T. 26 S., R. 20 E. 1/

Pasco County, Florida

Phosphate	Measured	reserves	Indicated	reserves	Inferred	reserves	Tot	als
content (percent B.P.L. 2/)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Wesh)
75			West of the					a de la desa
70-75								
65-70			NO PHOSE	HATE REVEALE	D BY DRILLIN	G		
60-65							i u	1
60 Content unknown					•••			
Subtotal								

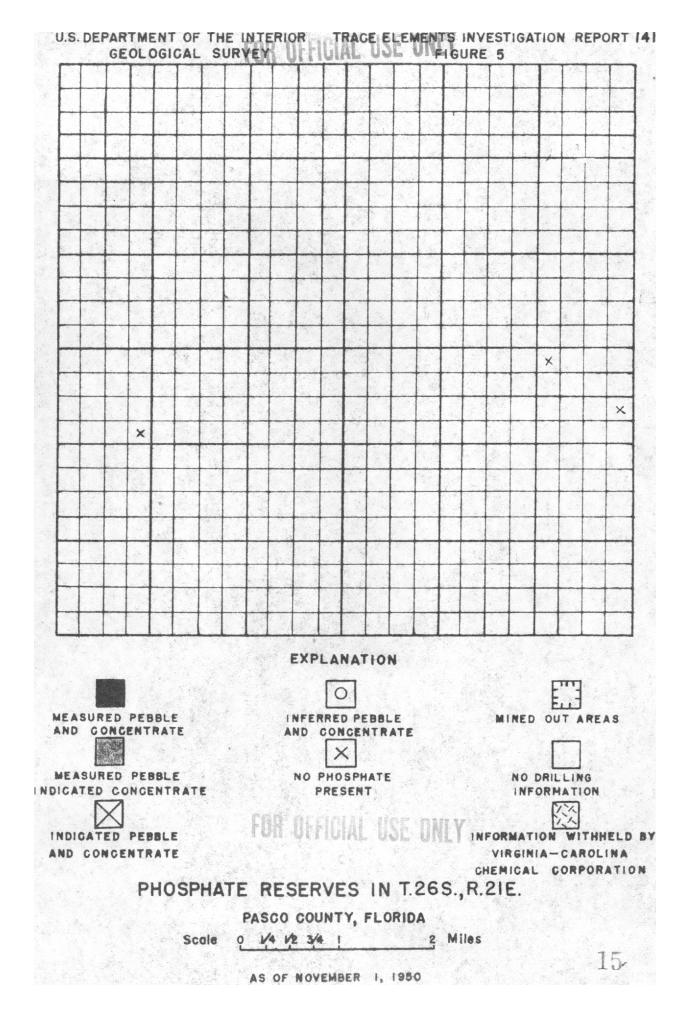
Grand total Measured, Indicated, and Inferred reserves

FOR OFFICIAL USE ONLY

12 Short tons

100

P.P.I. = Bone Phosphate of Lime = percent $P_20_5 \ge 2.18$



FOR OFFICIAL USE ONLY

Table 5

Phosphate Reserves in T. 26 S., R. 21 E. 1/

Pasco County, Florida

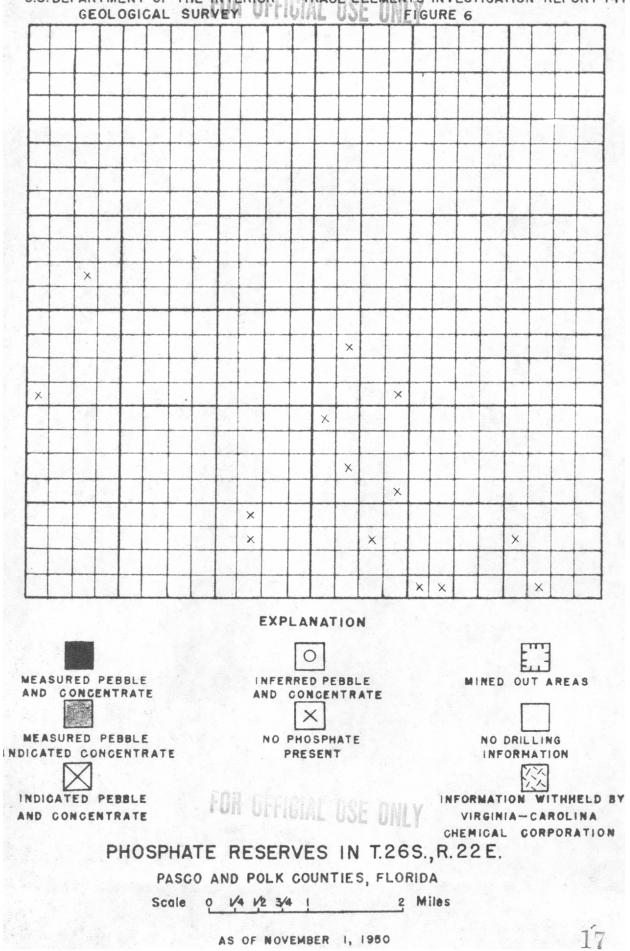
Phosphate	Measured	reserves	Indicated reserves		Inferred reserves		Totals	
content (percent B.P.L. 2/)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	(+14	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 #150 Mesh)
75								
70-75				· · ·				
65-70			NO PHOSF	HATE REVEALE	d by drillin	¢		
60-65								
60 Content unknown	×							
Subtotal								

Grand total Measured, Indicated, and Inferred reserves

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/ Short tons I UN UNUAL / P.P.L. = Bone Phosphate of Lime = percent P205 x 2.18

5



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FOR OFFICIAL USE ONLY

Table 6

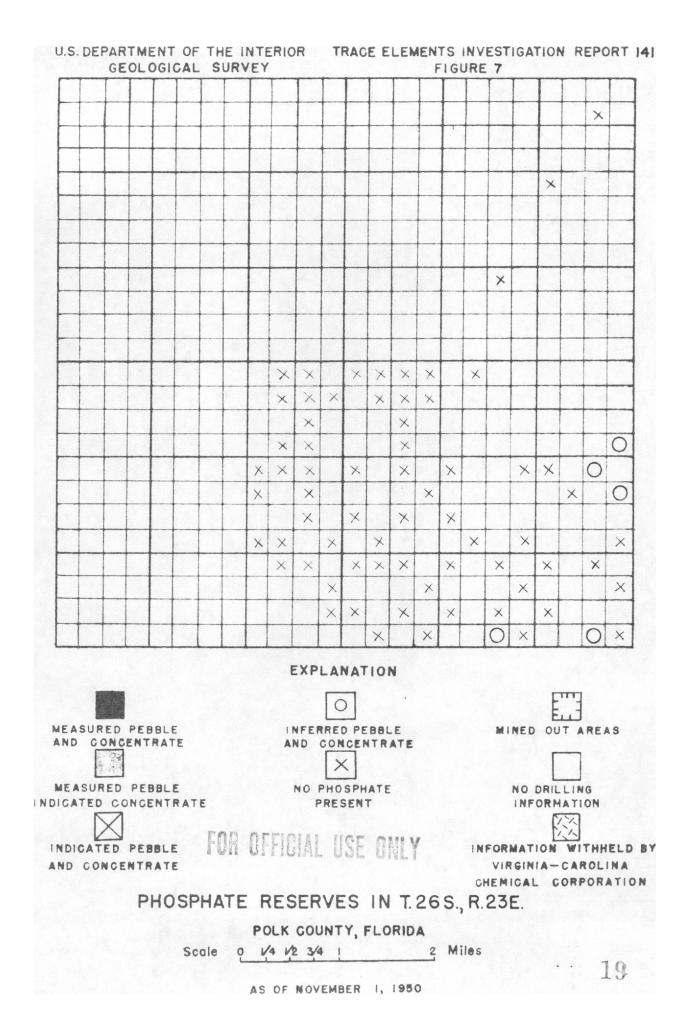
Phosphate Reserves in T. 26 S., R. 22 E. 1/

Pasco and Polk Counties, Florida

Phosphate	Measured reserves		Indicated reserves		Inferred reserves		Totals	
content (percent B.P.L. 2/)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (f14 Mesh)	Flotation concentrat (-14 /150 Mesh
75							En la contra de la	
70-75								
65-70			NO PHOSI	HATE REVEALE	D BY DRILLIN	G		1.1.29
60-65								
60 Content								1 Martin
unknown								
Subtotal								

FOR OFFICIAL USE ONLY

1/ Short tons 2/ P.P.L. = Bone Phosphate of Lime = percent P₂0₅ x 2.13

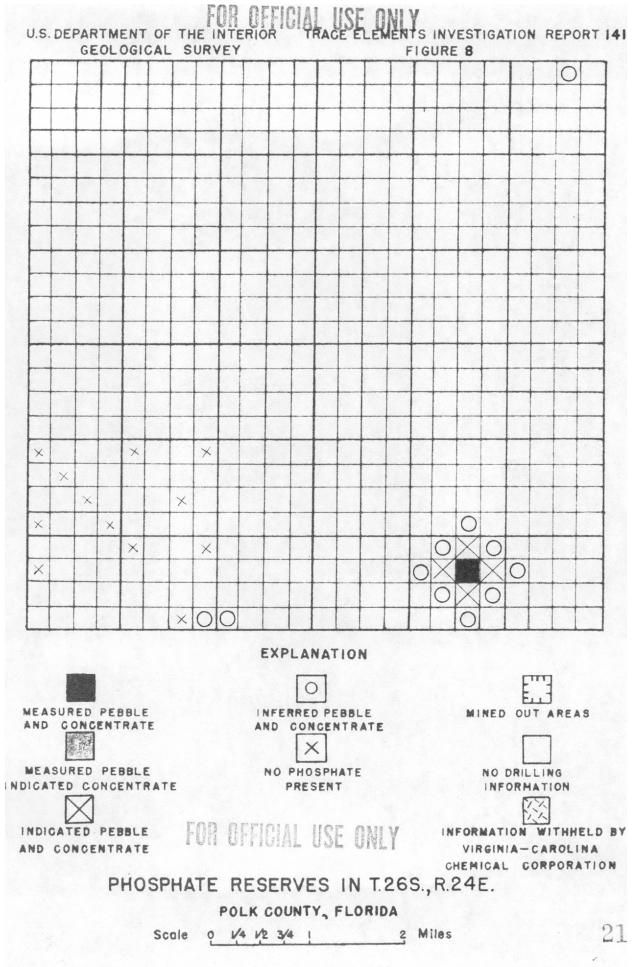


FOR OFFICIAL USE ONLY Table 7

Phosphate Reserves in T. 26 S., R. 23 E. 1/

Polk County, Florida

Phosphate	Measured	reserves	Indicated	reserves	Inferred reserves		Totals	
content (percent B.P.L. 2/)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 · Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Lesh)	Flotation concentrat (-14 +150 Mesh
75	12				in Le			
70-75								
65-70								
60-65					100,000		100,000	
60 Content unknown		-						
Subtotal					100,000			
		anond tot	tol Noneymod	, Indicated,	and Informa		100,000	



AS OF NOVEMBER 1, 1950

OR OFFICIAL USE ONLY

Phosphate Reserves in T. 26 S., R. 24 E. 1/

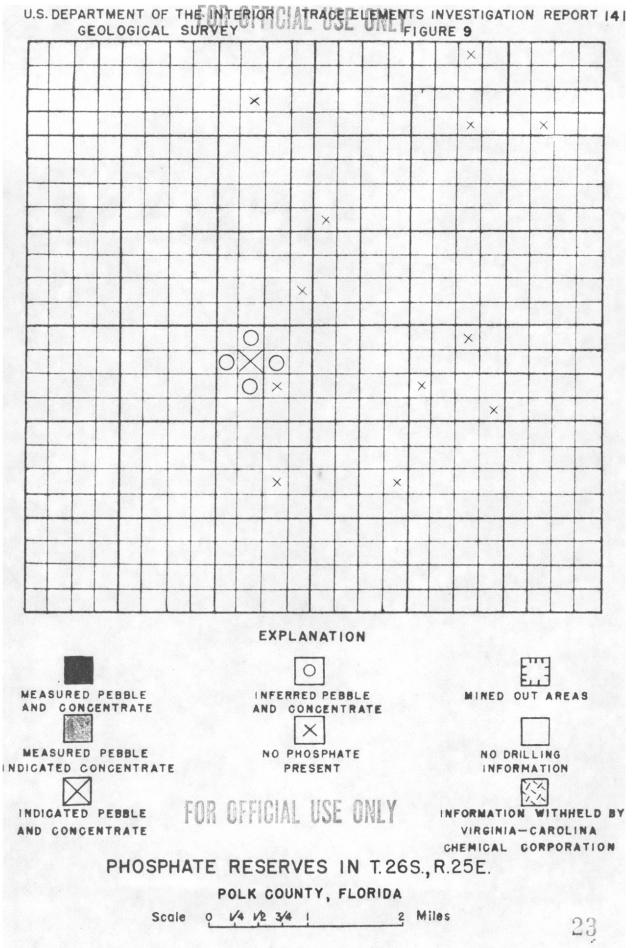
Polk County, Florida

Phosphate	Measured	reserves	Indicated	reserves	Inferred	reserves	Tot	als
content (percent B.P.L. 2/)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Lesh)	Flotation concentrate (-14 /150 Mesh
75	19,600	128,800	100,000	400,000		200,000	119,600	728,80
70-75	. 33,600	51,500	100,000	200,000	100,000	100,000	233,600	351,50
65-70	16,800		100,000				116,800	
60-65	3,900						3,900	
60 Content unknown								
Subtotal	73,900	180.300	300,000	600,000	100.000	300,000		

Short tons P.P.L. = Bone Phosphate of Lime = percent P205 x 2.18

0 0

1/2/



AS OF NOVEMBER 1, 1950

FOR OFFICIAL USE ONLY

Table 9

Phosphate Reserves in T. 26 S., R. 25 E. 1/

Polk County, Florida

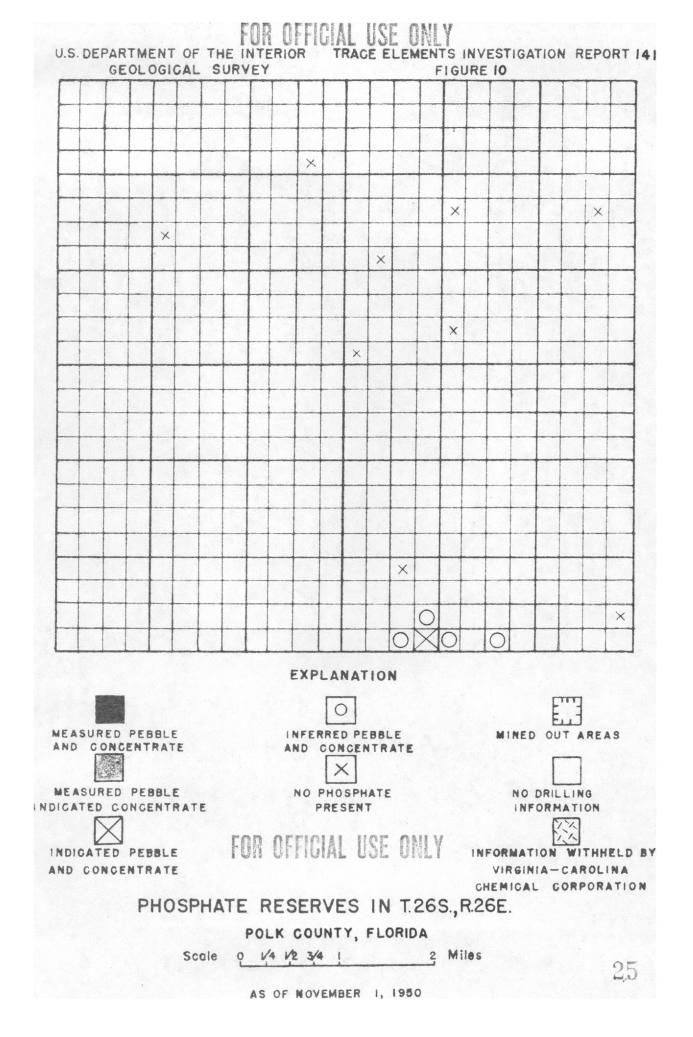
Phosphate	Measured	reserves	Indicated	reserves	Inferred :	reserves	Tot	als
content (percent B.P.L. 2/)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Lesh)	Flotation concentrate (-14 #150 Mesh)
75								
70-75								
65-70					100,000	100,000	100,000	100,000
60-65								
60 Content unknown								
Subtotal					100,000	100,000		

Grand total Measured, Indicated, and Inferred reserves

100,000 100,000

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1/ Short tons 2/ P.P.L. = Bone Phosphate of Lime = percent $P_2O_5 \ge 2.18$



FUR UPPICIAL USE ONLY Table 10

Phosphate Reserves in T. 26 S., R. 26 E. 1/

Polk County, Florida

Phosphate	Measured	reserves	Indicated	reserves	Inferred :	reserves	Tot	als
content (percent B.P.L. 2/)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 L'esh)	Flotation concentrate (-14 /150 Mesh)
75								
70-75						100,000		100,00
65-70		172 1			200,000		200,000	er Angener Ang
60-65								
60 Content unknown		•						
Subtotal	ter Billion a construction and				200,000	100,000		

Grand total Measured, Indicated, and Inferred reserves

FOR OFFICIAL USE OM

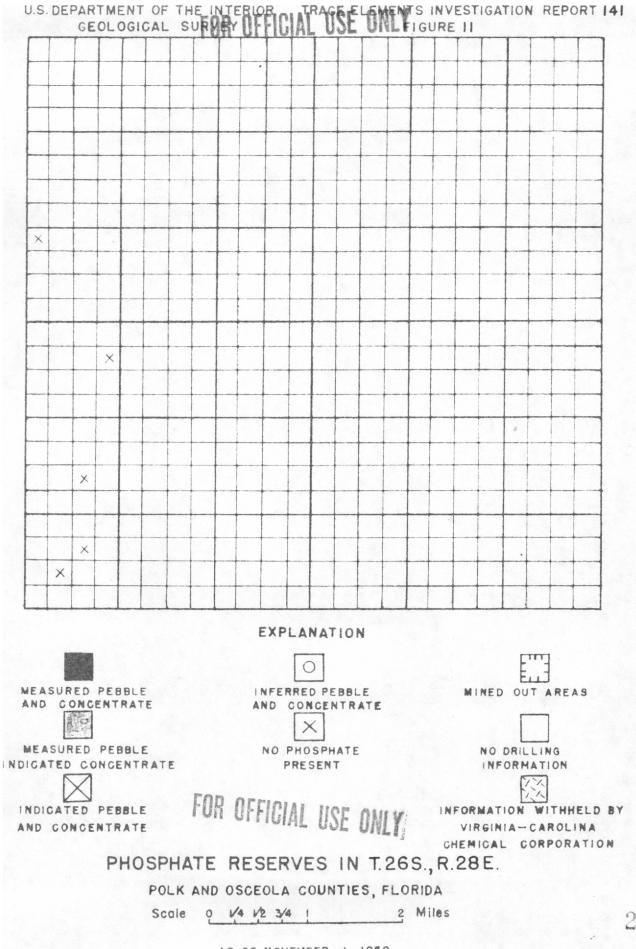
200.000 100,000

25

1

2/

Short tons B.P.L. = Bone Phosphate of Lime = percent P205 x 2.18



27

FOR OFFICIAL USE CHEY

Table 11

Phosphate Reserves in T. 26 S., R. 28 E. 1/

Polk and Osceola Counties, Florida

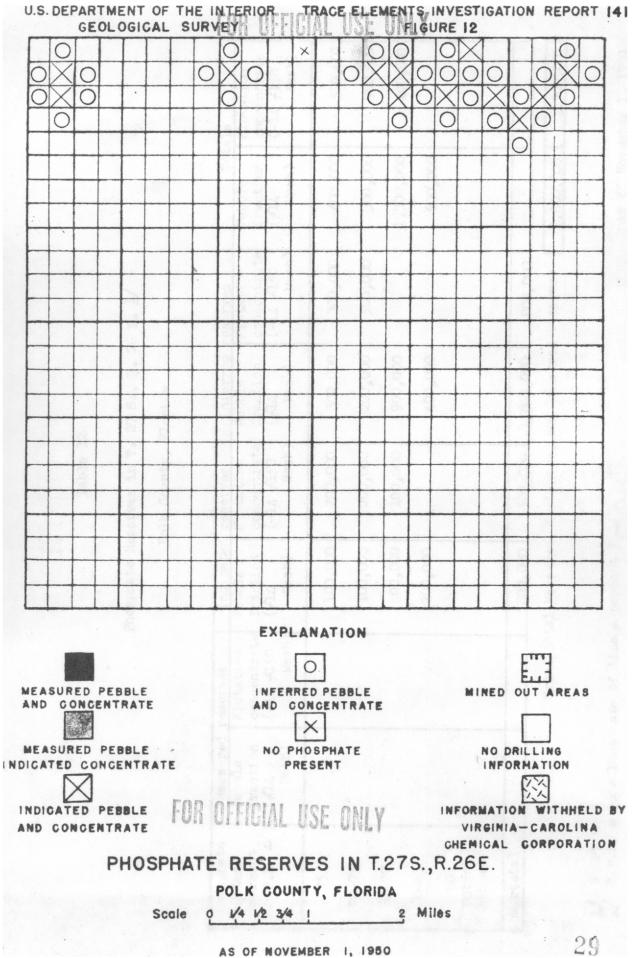
Phosphate	Measured	reserves	Indicated	reserves	Inferred	reserves	Tot	als
content (percent B.P.L. 2/)	Pebble	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Megh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh
75						1 Same		
70-75								
65-70			NO PHOS	PHATE REVEAL	D BY DRILLI,	NG		
6 06 5								
60 Content unknown								
Subtotal								1

283

Grand total Measured, Indicated, and Inferred reserves

As of November 1, 1950

1/ Short tons 2/ P.P.L. = Bone Phosphate of Lime = percent P205 x 2.18



Phosphate Reserves in T. 27 S., R. 26 E. 1/

Polk County, Florida

Phosphate	Measured	reserves	Indicated	reserves	Inferred	reserves	Tot	als
content (percent B.P.L. 2/)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)						
75			100,000	200,000	300,000	300,000	400,000	500 ,0 0
70-75			100,000	200,000	200,000	500,000	300,000	700,00
65-70			400,000	100,000	900,000		1,300,000	100,00
60-65			200,000		400,000		600,000	
60 Content unknown								
Subtotal			800,000	500,000	1.800.000	800,000		

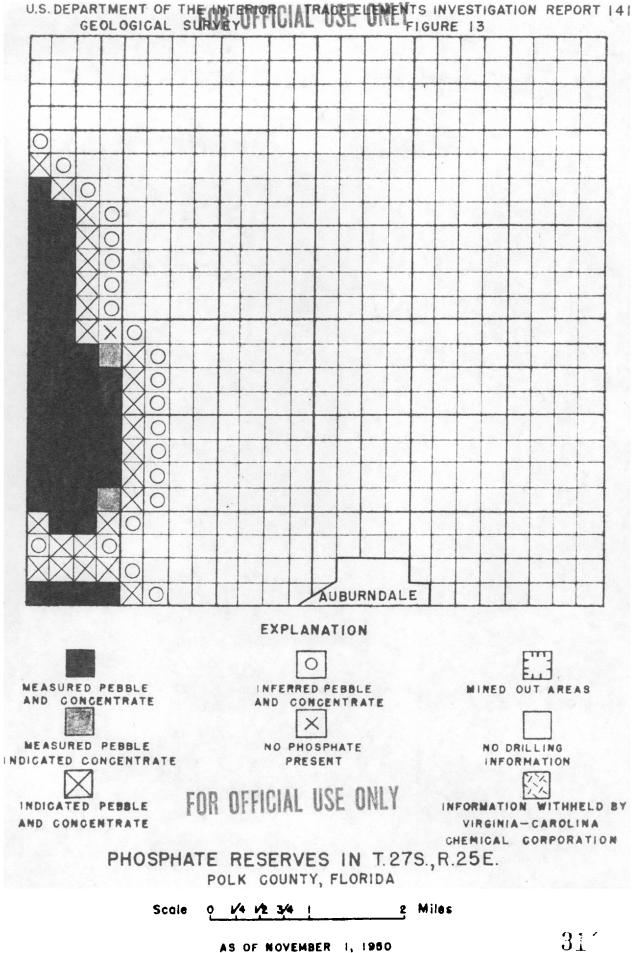
Grand total Measured, Indicated, and Inferred reserves

FUR UTFICIAL USE UNLY

2,600,000 1.300.000

00

Short tons B.P.L. = Bone Phosphate of Lime = percent P205 x 2.18 2/2/



Phosphate Reserves in T. 27 S., R. 25 E. 1/

Polk County, Florida

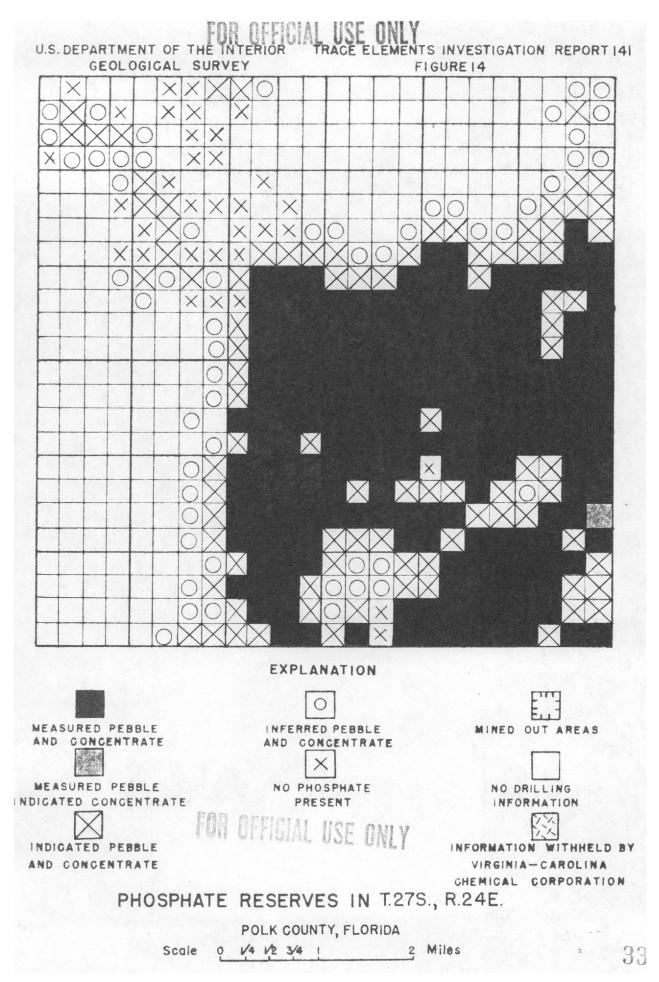
Phosphate	Measured	reserves	Indicated	reserves	Inferred :	reserves	Tot	als
content (percent B.P.L. 2/)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Lesh)	Flotation concentrate (-14 /150 Mesh)
75	501 , 500	1,986,100	200,000	500,000	200,000	500,000	901,500	2,986,10
70-75	3,071,400	2,019,400	800,000	600 ,000	500,000	200,000	4,371,400	2,819,40
65-70	1,017,000	89,600	400,000	100,000	200,000	100,000	1,617,000	289,60
60-65	51,500	44,800	100,000				151,500	44,80
60 Content	16,800			•			16,800	
unknown	296,800		100,000				396,800	
Subtotal	4,955,000	4,139,900	1,600,000	1,200,000	900,000	800,000		

Indicated, and inte

7,455,000 6,139,900

32

Short tons P.P.L. = Bone Phosphate of Lime = percent P205 x 2.18 2/2/



Phosphate Reserves in T. 27 S., R. 24 E. 1/

Polk County, Florida

Phosphate	Measured	reserves	Indicated	reserves	Inferred	reserves	Tot	als
content (percent B.P.L. 2/)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 / 150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 / 150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)
75	3,177,500	9,526,700	700,000	2,000,000	500,000	1,200,000	4,377,500	12,726,700
70-75	6,122,500	9,051,800	2,200,000	2,300,000	1,700,000	2,000,000	10,022,500	13,351,800
65-70	2,475,500	512,400	1,000,000	300,000	500,000	100,000	3,975,500	912,400
60-65	292,500	56,000	500,000	200,000	400,000	200,000	1,192,500	456,000
60 Content unknown	312,500	14,000	400,000	80,000	200,000	50,000	912,500	144,000
Subtotal	12,380,500	19,160,900	4,800,000	4.880.000	3.300.000	3,550,000		

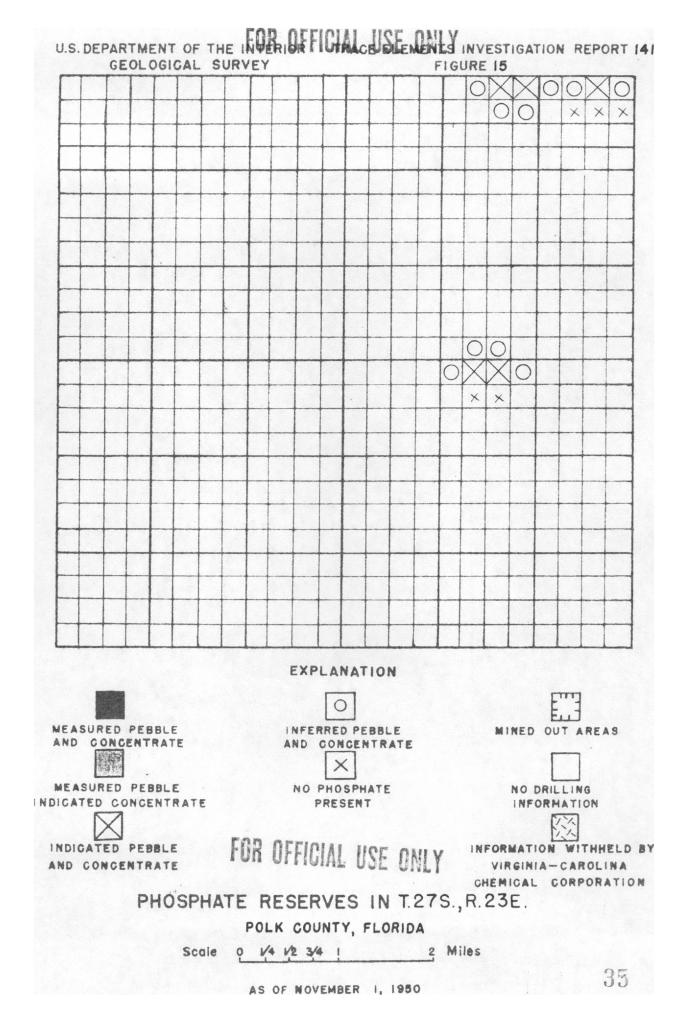
Grand total Measured, Indicated, and Inferred reserves

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20,480,500 27,590,900

34

Short tons P.P.L. = Bone Phosphate of Lime = percent P205 x 2.18 2/2/



Phosphate Reserves in T. 27 S., R. 23 E. 1/

Polk County, Florida

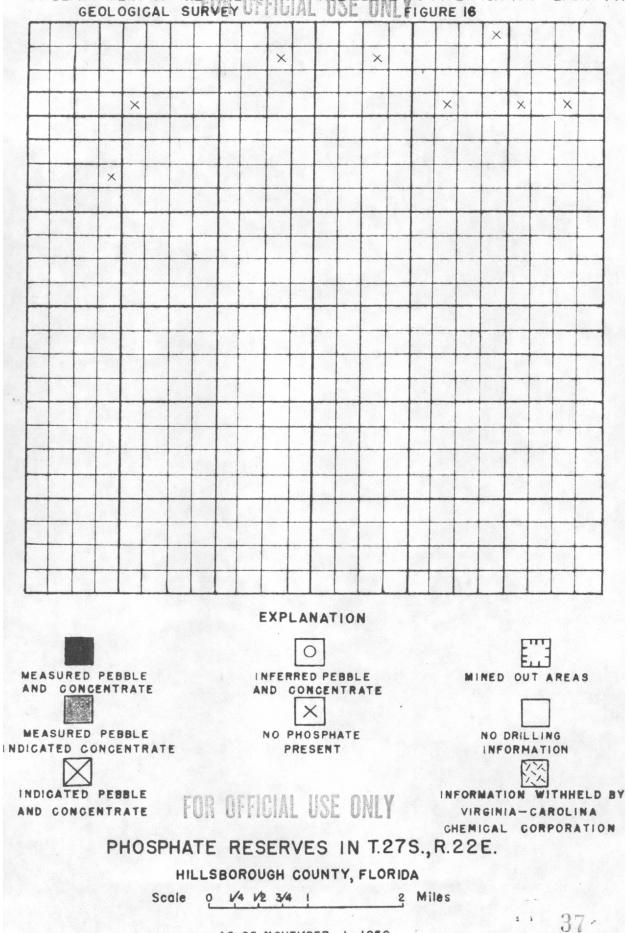
Phosphate	Measured	reserves	Indicated	reserves	Inferred :	reserves	Tot	als
content (percent B.P.L. 2/)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 / 150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)
75			100,000	100,000	200,000	100,000	300,000	200,000
70-75								
65-70					Carl Star			1.2.2.2.200
60-65					100,000		100,000	
60 Content unknown								
Subtotal			100,000	100.000	300.000	100.000		

Grand total Measured, Indicated, and Inferred reserves

400,000 200,000

C) 1/ Short tons

2/ B.P.L. = Bone Phosphate of Lime = percent P205 x 2.18



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AS OF NOVEMBER 1, 1950

Phosphate Reserves in T. 27 S., R. 22 E. 1/

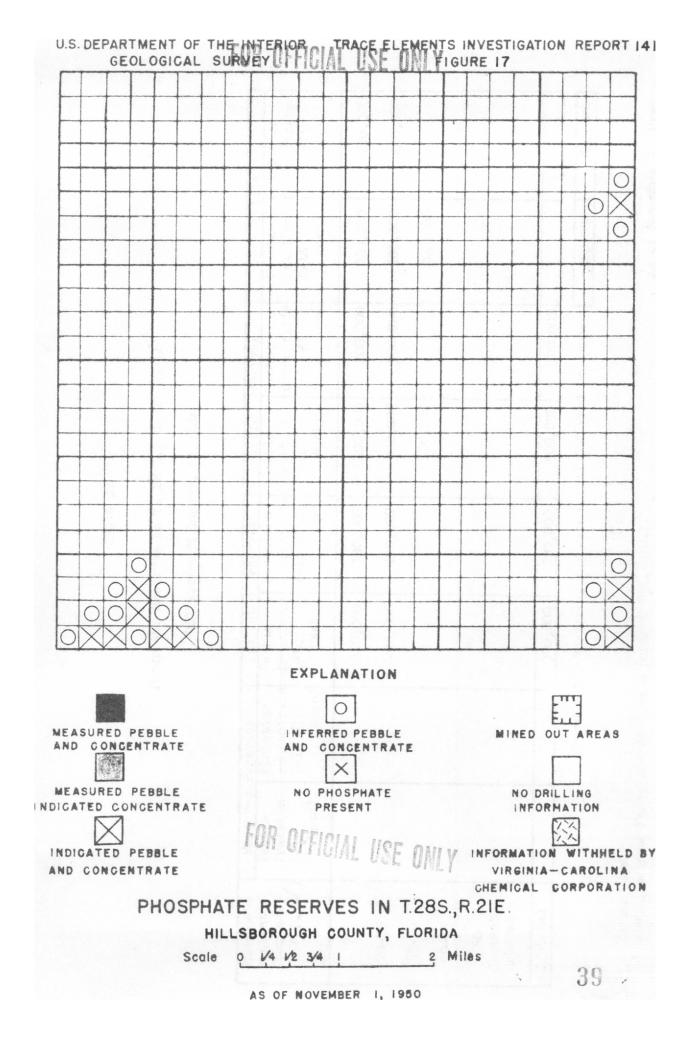
Hillsborough County, Florida

Phosphate	Measured	reserves	Indicated	reserves	Inferred	reserves	Tot	als
content (percent B.P.L. 2/)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (f14 Mesh)	Flotation concentrat (-14 /150 Wesh
75		Pro State						
70-75						19. Jan 19. Jan		
65-70			NO PHOSI	HATE REVEALE	D BY DRILLD	G		
60-65								
60 Content			1 24			3 Sec.		
unknown			to a series					
Subtotal	and the second				and the second	1	Sec. Sec.	

Grand total Measured, Indicated, and Inferred reserves



Short tons P.P.L. = Bone Phosphate of Lime = percent P205 x 2.18

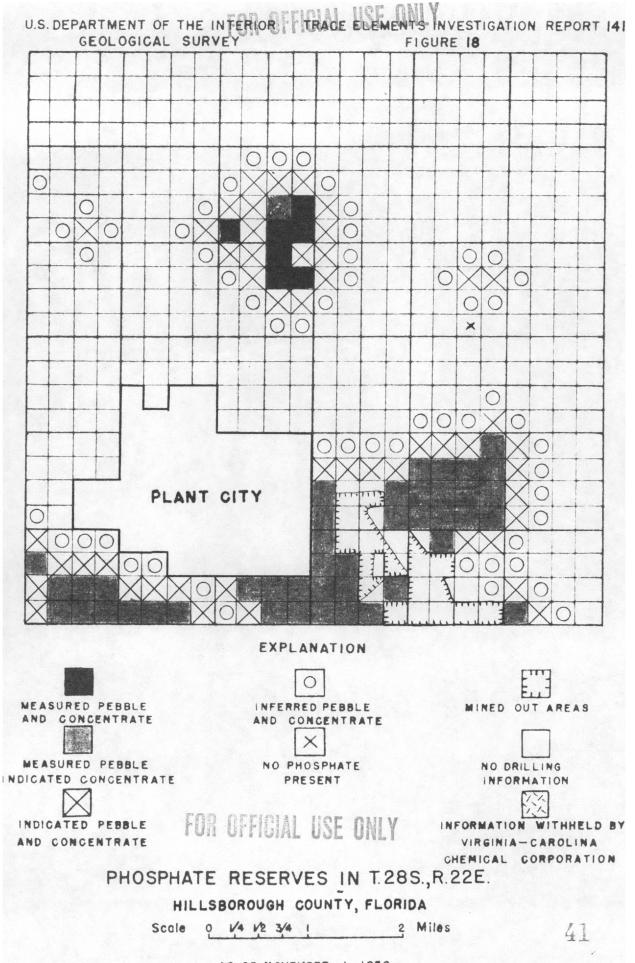


Phosphate Reserves in T. 28 S., R. 21 E. 1/

Hillsborough County, Florida

Phosphate	Measured	reserves	Indicated	reserves	Inierred .	reserves	Tot	als
content (percent B.P.L. 2/)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (A14 Mesh)	Flotation concentrate (-14 /150 Wesh)
75			100,000	100,000	100,000	100,000	200,000	200,00
70-75			200,000	100,000	300,000	300,000	500,000	400,00
65-70					100,000		100,000	1970 - E
60-65								de la companya
60								
Content unknown								
Subtotal			300,000	200,000	500,000	400,000		
		Grand tot	tal Measured	, Indicated,	and Inforre	d reserves [800,000	600,00

Short tons P.P.I. = Bone Phosphate of Lime = percent $P_2O_5 \propto 2.13$.



TIUME UUE WIN Table 18

Phosphate Reserves in T. 28 S., R. 22 E. 1/

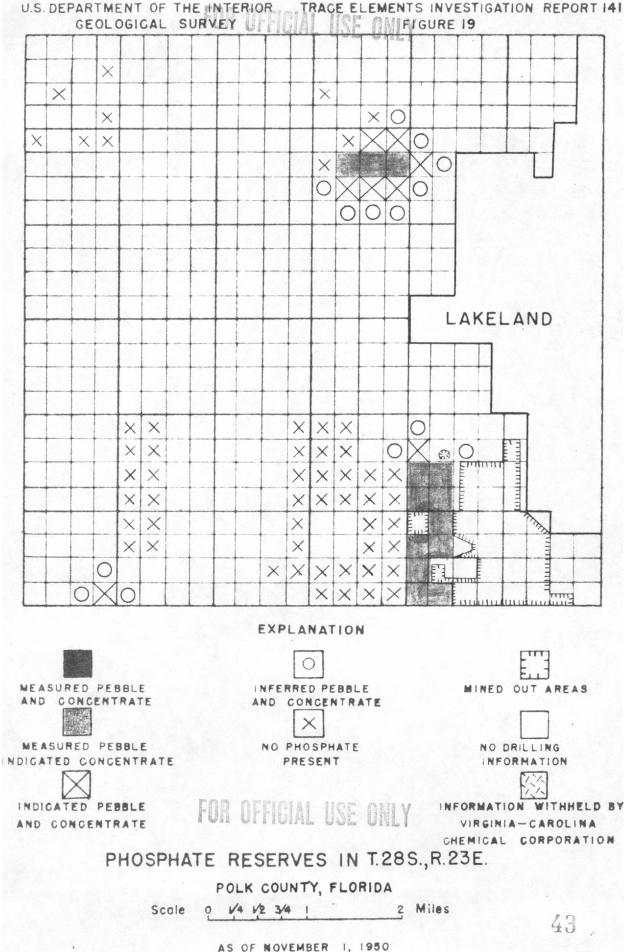
Hillsborough County, Florida

Phosphate	Measured	reserves	Indicated	reserves	Inferred :	reserves	Tota	als
content (percent B.P.L. 2/)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Lesh)	Flotation concentrate (-14 /150 Mesh)
75	1,327,200	291,200	800,000	1,600,000	800,000	800,000	2,927,200	2,691,200
70-75	1,935,400	112,000	600,000	2,100,000	400,000	400,000	2,935,400	2,612,000
65-70	401,600		200,000	500,000	300,000	200,000	901,600	700,000
60-65	21,500		100,000		100,000	N. S. A.	221,500	
60 Content	22,400		100,000		100,000		222,400	
unknown	191,400		200,000	300,000			391,400	300,000
Subtotal	3,899,500	403,200	2,000,000	4,500,000	1,700,000	1,400,000		

1/

2/

Short tons FOR OFFICIAL USE ONLY P.P.L. = Bone Phosphate of Lime = percent P205 x 2.18

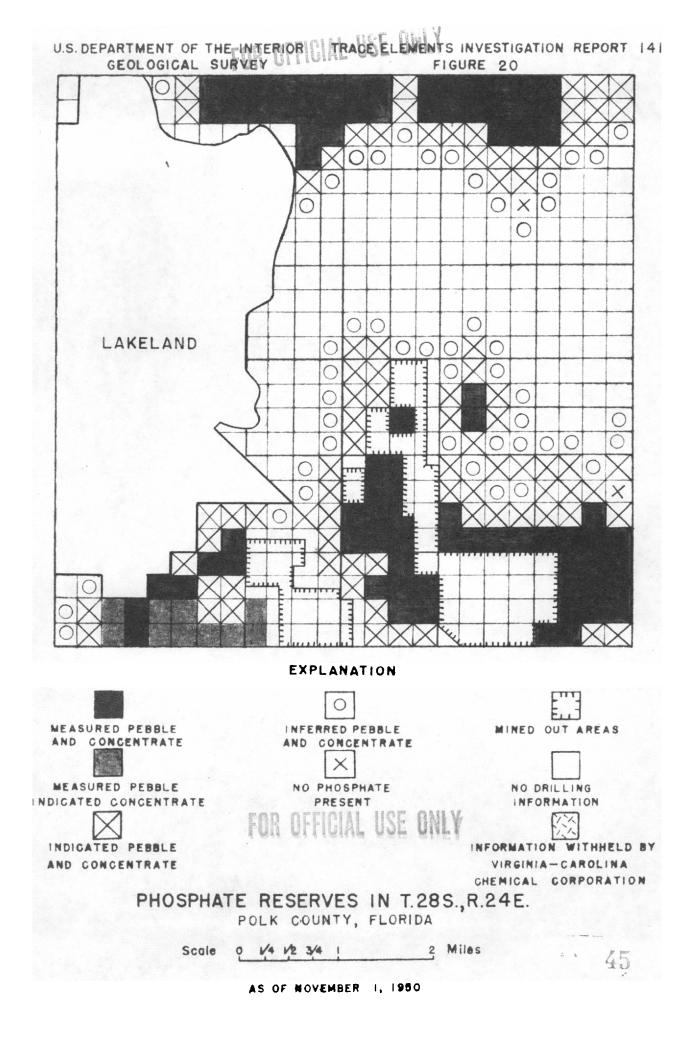


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Phosphate Reserves in T. 28 S., R. 23 E. 1/

Polk County, Florida

Phosphate	Measured	reserves	Indicated	reserves	Inferred	reserves	Tot	als
content (percent B.P.L. 2/)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Nesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (f14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Lesh)	Flotation concentrate (-14 /150 Mesh)
75	169,400		100,000	200,000	100,000	100,000	369,400	300,00
70-75	247,500		100,000	300,000	100,000	400,000	447,500	700,00
65-70	74,400			and the second	100,000		174,400	
60-65	9,500						9,500	
60 Content	19,700						19,700	
unknown	69,800			100,000			69,800	100,00
Subtotal	590,300		200,000	600,000	300,000	500,000		
		Grand tot	al Measured	, Indicated,	and Inferre	d reserves	1,090,000	1,100,000
1/ Short to 2/ B.P.L.		hate of Lime	• percent P	FOR 2 ⁰⁵ x 2.18	OFFICIAL	USE ONLY	As of Nov	ember 1, 195



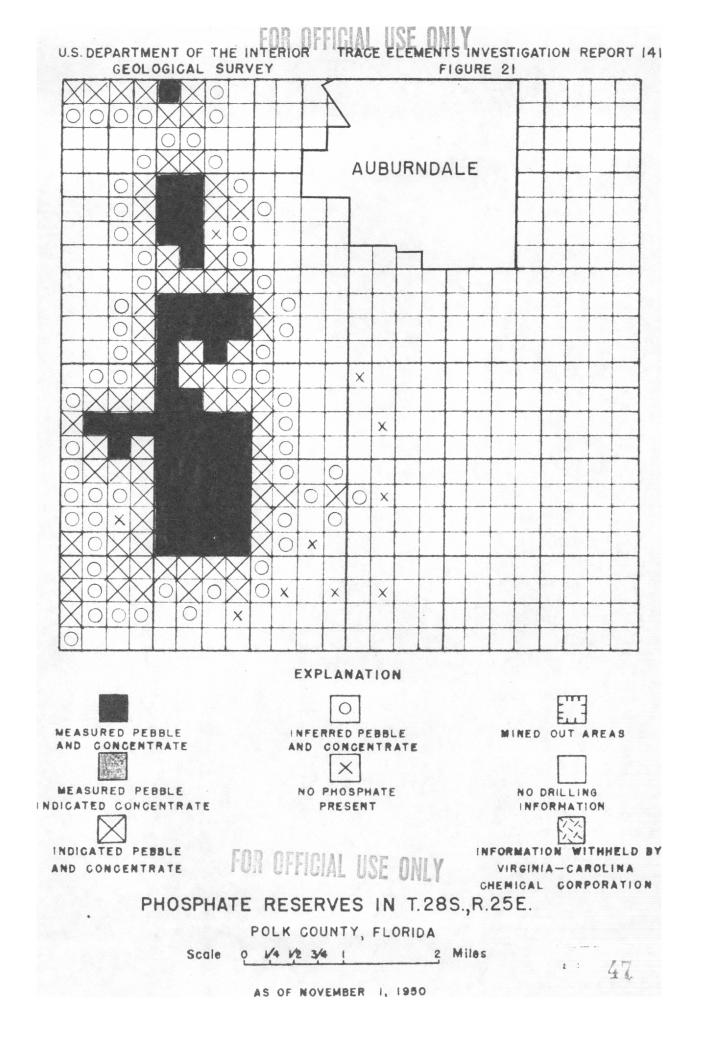
Phosphate Reserves in T. 28 S., R. 24 E. 1/

Polk County, Florida

Phosphate	Measured	reserves	Indicated	reserves	Inferred	reserves	Tot	als
content (percent B.P.L. 2/)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 fl50 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (A14 Lesh)	Flotation concentrate (-14 /150 Mesh)
75	2,774,800	5,520,900	1,400,000	4,200,000	500,000	1,400,000	4,674,800	11,120,900
70-75	2,912,600	2,880,600	1,700,000	3,200,000	900,000	1,700,000	5,512,600	7,780,600
65-70	2,735,000	281,000	1,500,000	500,000	800,000	600,000	5,035,000	1,381,000
60-65	460,300	5,000	400,000		200,000		1,060,300	5,000
60 Content	85,800		100,000				185,800	
unknown	98,600			100,000			98,600	100,000
Subtotal	9,067,100	8,687,500	5,100,000	8,000,000	2,400,000	3,700,000		

FOR OFFICIAL USE ONLY

Short tons B.P.L. = Bone Phosphate of Lime = percent P205 x 2.18 2/2/



Phosphate Reserves in T. 28 S., R. 25 E. 1/

Polk County, Florida

Phosphate	Measured	reserves	Indicated	reserves	Inferred	reserves	Tot	als
content (percent B.P.L. 2/)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 / 150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)
75	714,700	2,573,600	400,000	2,100,000	200,000	1,700,000	1,314,700	6,373,600
70-75	1,508,100	2,509,200	1,600,000	2,200,000	1,300,000	1,600,000	4,408,100	6,309,200
65-70	1,119,600	127,700	1,200,000	900,000	1,400,000	900,000	3,719,600	1,927,700
60-65	381,500		400,000		400,000	300,000	1,181,500	300,000
60 Content unknown	236,300		300,000		100,000		636 ,300	
Subtotal	3,960,200	5,210,500	3,900,000	5,200,000	3,400,000	4,500,000		

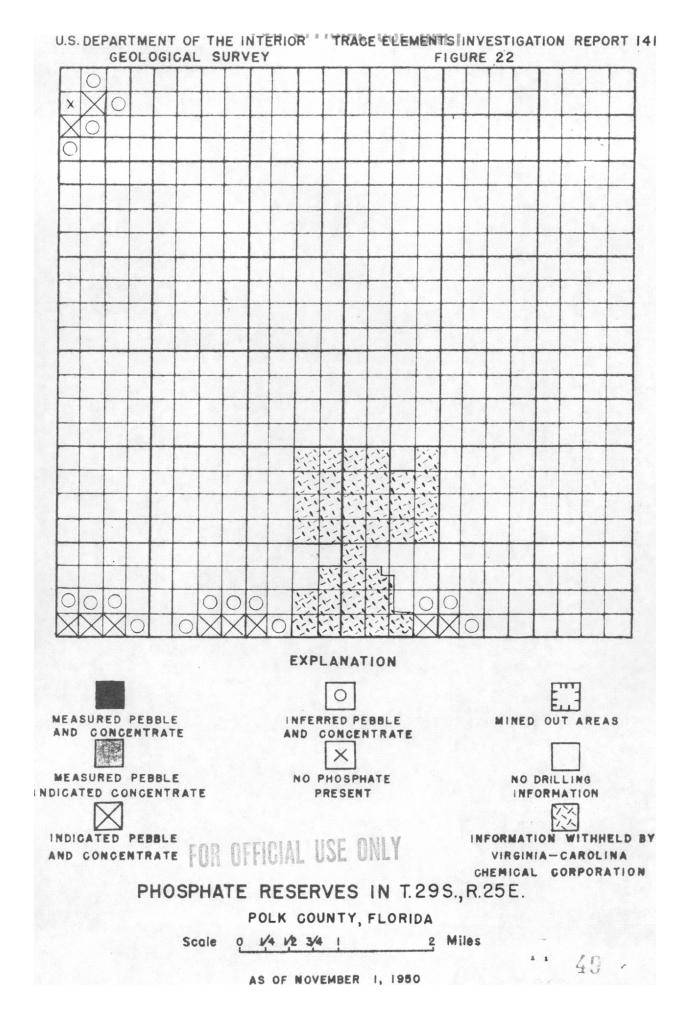
Grand total Measured, Indicated, and Inferred reserves

11,260,200 14,910,500

FOR OFFICIAL USE ONLY

481 P.P.L. = Bone Phosphate of Lime = percent P205 x 2.18 2/

Short tons



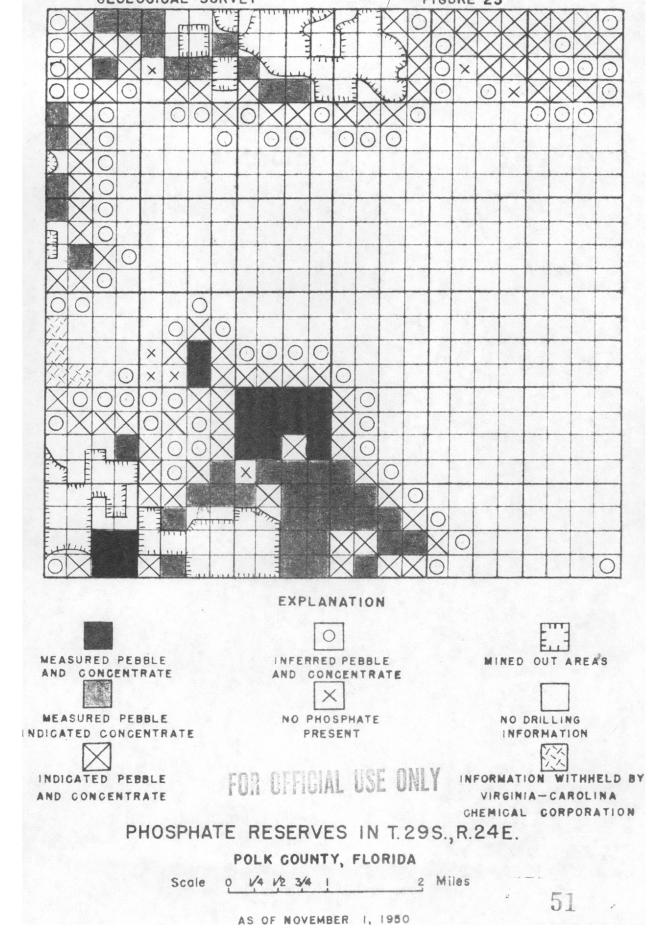
Phosphate Reserves in T. 29 S., R. 25 E. 1/

Polk County, Florida

Phosphate	Measured	reserves	Indicated	reserves	Inferred	reserves	Totals	
content (percent B.P.L. 2/)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 fl50 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Lesh)	Flotation concentrate (-14 /150 Mesh)
75			100,000	100,000	100,000	100,000	200,000	200,000
70-75			300,000	300,000	400,000	400,000	700,000	700,000
65-70			200,000	100,000	100,000	100,000	300,000	200,000
60-65								
60 Content			45,000	34,000	100,000	100,000	145,000	134,000
unknown			100,000	100,000		200	100,000	100,000
Subtotal			745,000	634,000	700,000	700,000		

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1/ Short tons 2/ P.P.L. = Bone Phosphate of Lime = percent P205 x 2.18 USE ONLY



U.S. DEPARTMENT OF THE INTERIOR CHARGE ELEMENTS INVESTIGATION REPORT 141 GEOLOGICAL SURVEY

Phosphate Reserves in T. 29 S., R. 24 E. 1/

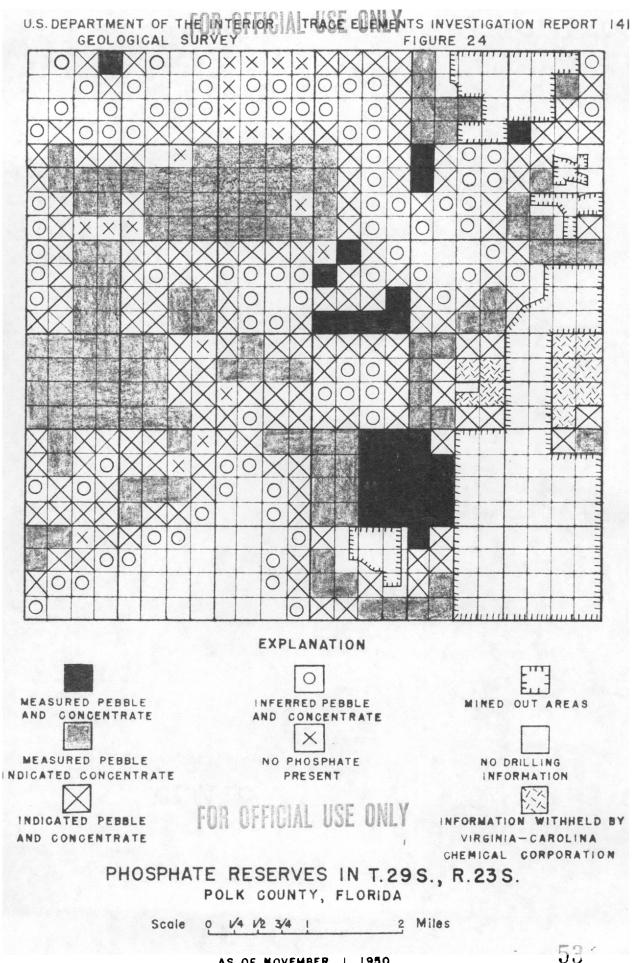
Polk County, Florida

Phosphate	Measured	reserves	Indicated	reserves	Inferred	reserves	Tot	als
content (percent B.P.L. 2/)	Pebble fraction (f14 Mesh)	Flotation concentrate (-14 fl50 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (#14 Mesh)	Flotation concentrate (-14 /150 Mesh)
75	1,084,600	168,100	.900,000	1,100,000	600,000	1,500,000	2,584,600	2,768,100
70-75	4,226,300	735,300	2,600,000	2,500,000	2,200,000	1,700,000	9,026,300	4,935,300
65-70	7,051,500	847,300	4,100,000	2,900,000	3,600,000	1,600,000	14,751,500	5,347,300
60-65	1,059,000	168,000	1,100,000	200,000	500,000	100,000	2,659,000	468,000
60 Content	17,400		200,000	13,000	43,000	6,000	260,400	19,000
unknown	520,800		100,000	33,000			620,800	33,000
Subtotal	13,959,600	1,918,700	9,000,000	6,746,000	6,943,000	4,906,000		

Grand total Measured, Indicated, and Inferred reserves FOR OFFICIAL USE ONLY

29,902,600 13,570,700

Short tons E.P.L. = Bone Phosphate of Lime = percent $P_2O_5 \ge 2.18$



Phosphate Reserves in T. 29 S., R. 23 E. 1/

Polk County, Florida

Phosphate	Measured	reserves	Indicated	reserves	Inferred	reserves	Tot	als
content (percent B.P.L. 2/)	Peoble fraction (+14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 #150 Mesh)
75	943,300	412,700	500,000	1,400,000	300,000	500,000	1,743,300	2,312,700
70-75	2,786,900	925,800	1,900,000	3,800,000	700,000	1,500,000	5,386,900	6,225,800
65-70	3,585,100	262,400	1,300,000	2,200,000	900,000	600,000	5,785,100	3,062,400
60-65	150,500	67,200	36,000	200,000	8,000	14,000	194,500	281,200
60 Content	129,100		100,000	300,000	57,000	1,000,000	286,100	1,300,000
unknown	2,736,500		1,600,000	2,600,000			4,336,500	2,600,000
Subtotal	10,331,400	1,668,100	5,436,000	10,500,000	1,965,000	3,614,000		-

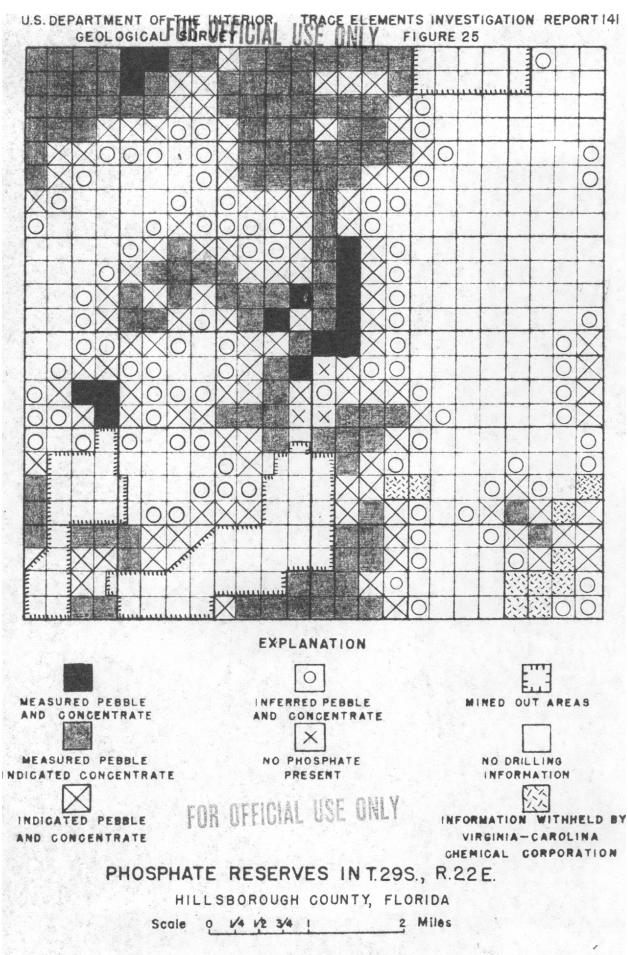
Grand total Measured, Indicated, and Inferred reserves FOR OFFI

17,732,400 15,782,100

1/2/

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Short tons P.P.I. = Bone Phosphate of Lime = percent $P_2O_5 \times 2.18$



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Phosphate Reserves in T. 29 S., R. 22 E. 1/

Hillsborough County, Florida

Phosphate	Measured	reserves	Indicated	l reserves	Inferred reserves		Totals	
content (percent B.P.L. 2/)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 #150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (f14 Lesh)	Flotation concentrate (-14 /150 Mesh)
75	2,907,200	648,700	1,600,000	4,200,000	1,100,000	1,200,000	5,607,200	6,048,700
70-75	4,181,800	602,100	2,400,000	5,600,000	1,900,000	1,800,000	8,481,800	8,002,100
65-70	1,026,600	77,300	1,300,000	2,200,000	1,200,000	1,300,000	3,526,600	3,577,300
60-65	108,600	3,400	400,000	500,000	300,000	300,000	808,600	803,400
60 Content	25,200						25,200	
unknown	859,300		600,000	1,300,000			1,459,300	1,300,000
Subtotal	9,108,700	1,331,500	6,300,000	13,800,000	4,500,000	4,600,000	the state of the s	

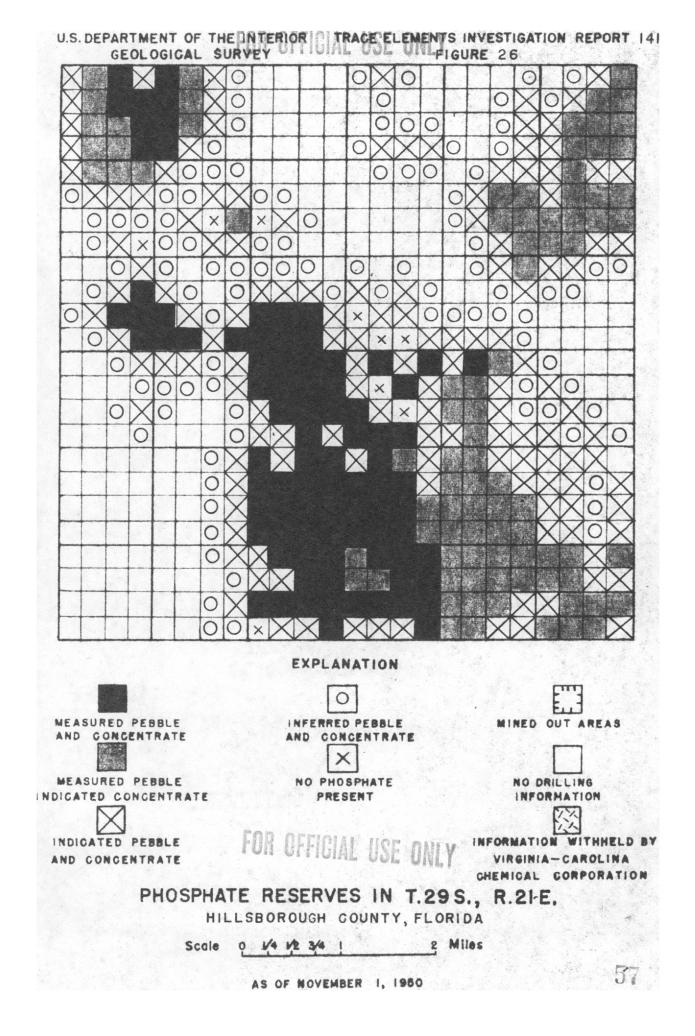
Grand total Measured, Indicated, and Inferred reserves

19,908,700 19,731,500

2/2/

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Short tons E.P.L. = Bone Phosphate of Lime = percent P205 x 2.18



Phosphate Reserves in T. 29 S., R. 21 E. 1/

Hillsborough County, Florida

Phosphate	Measured	reserves	Indicated	reserves	Inferred	reserves	Tot	als
content (percent B.P.L. 2/)	Pebble fraction (f14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 / 150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)
.75	6,099,100	3,077,900	2,900,000	3,900,000	1,700,000	1,300,000	10,699,100	8,277,900
70-75	5,054,800	2,762,000	3,700,000	3,300,000	2,000,000	1,700,000	10,754,800	7,762,000
65-70	1,114,200	174,500	1,300,000	800,000	500,000	200,000	2,914,200	1,174,500
60-65	244,700	16,800	300,000	100,000	200,000		744,700	116,800
60 Content	293,400	16,800	200,000	100,000	200,000		693,400	116,800
unknown	762,200		400,000	500,000			1,162,200	500,000
Subtotal	13,568,400	6,048,000	8,800,000	8,700,000	4,600,000	3,200,000		

Grand total Measured, Indicated, and Inferred reserves

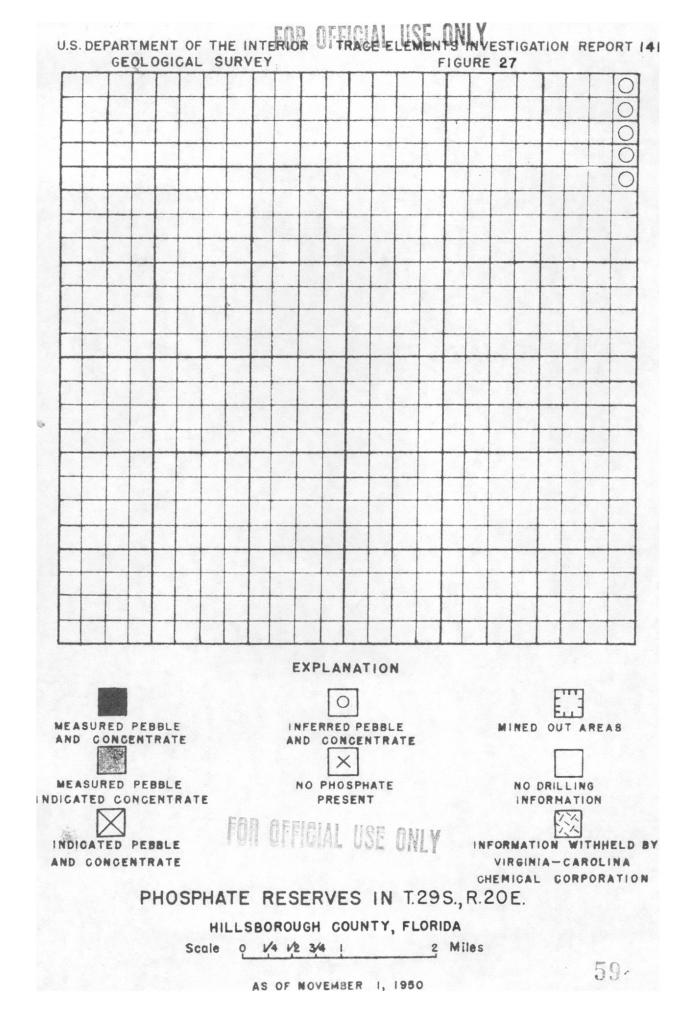
17,948,000

26,968,400

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Short tons E.P.L. = Bone Phosphate of Lime = percent $P_2O_5 \propto 2.18$



Phosphate Reserves in T. 29 S., R. 20 E. 1/

Hillsborough County, Florida

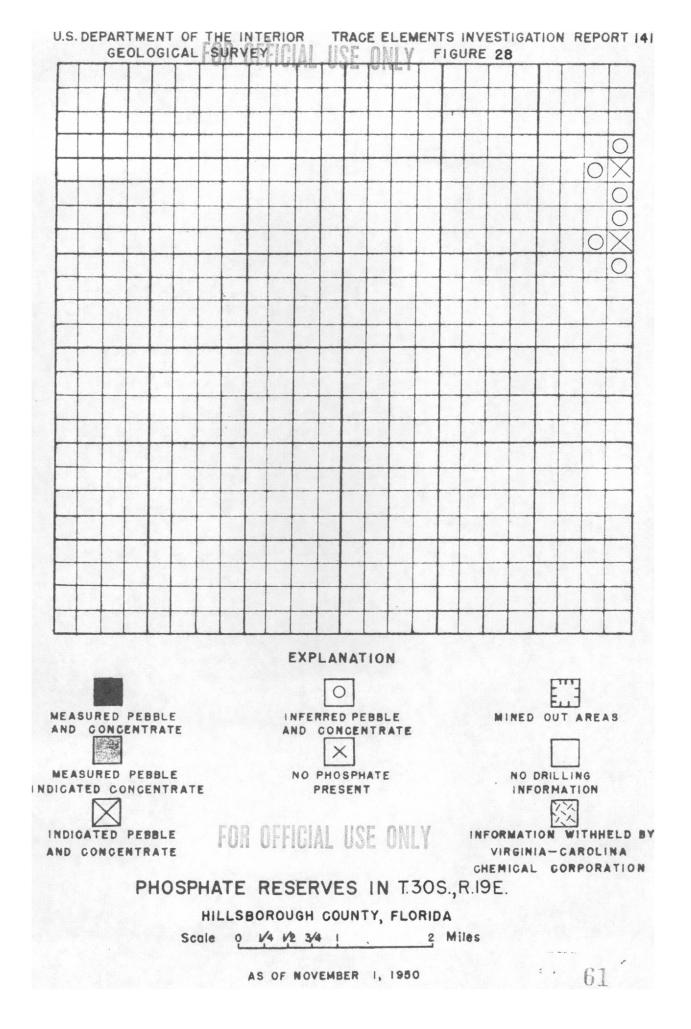
Phosphate	Measured	reserves	Indicated	reserves	Înferred	reserves	Totals	
content (percent B.P.L. 2/)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Nesh)	Flotation concentrate (-14 / 150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (A14 Nesh)	Flotation concentrate (-14 /150 Mesh)
75	1971 - C. 1				100,000	100,000	100,000	100,000
70-75		0.313		and a	100,000	1	100,000	
65-70				· · ·				
60-65								No. 100
60 Content unknown								
Subtotal					200,000	100,000		

Grand total Measured, Indicated, and Inferred reserves

200,000 100,000

2/

Short tons P.P.L. = Bone Phosphate of Lime = percent P205 x 2.18 ... Unit USE Unit. 2/



Phosphate Reserves in T. 30 S., R. 19 E. 1/

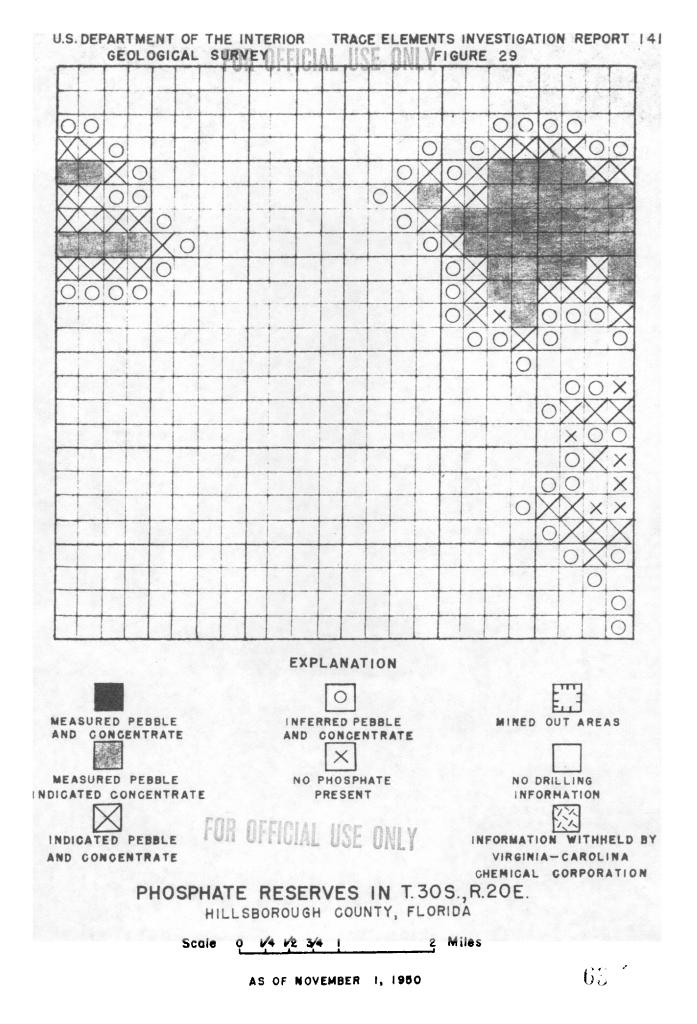
Hillsborough County, Florida

Phosphate	Measured	reserves	Indicated	reserves	Inferred	reserves	Tot	als
content (percent B.P.L. 2/)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)						
75			100,000	100,000	200,000	200,000	300,000	300,00
70-75		h said	200,000	200,000	200,000	200,000	400,000	400,00
65-70			100,000	100,000	300,000	300,000	400,000	400,00
60-65	· · · ·			en la la		10. 8 1.00		No.
60 Content unknown		· mer and						
Subtotal			400,000	400,000	700,000	700,000		
		Grand tot	tal Measured	, Indicated,	and Inferre	d reserves	1,100,000	1.100.00

600

1/ 2/

FOR UPHUAL USE UNLY Short tons P.P.L. = Bone Phosphate of Lime = percent $P_2O_5 \ge 2.18$



Phosphate Reserves in T. 30 S., R. 20 E. 1/

Hillsborough County, Florida

phosphate [Measured	reserves	Indicated	reserves	Inferred	reserves	Totals	
content (percent B.P.L. 2/)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 L'esh)	Flotation concentrate (-14 /150 Mesh
75	1,039,800	244,700	1,000,000	1,900,000	1,000,000	1,100,000	3,039,800	3,244,700
70-75	1,366,700	227,900	1,500,000	2,400,000	1,800,000	1,700,000	4,666,700	4,327,90
65-70	381,400		400,000	· 600,000	400,000	400,000	1,181,400	1,000,00
60-65								
60 Content	8,400			16			8,400	
unknown	430,400		200,000	500,000			630,400	500,00
Subtotal	3,226,700	472,600	3,100,000	5.400.000	3.200.000	3,200,000		

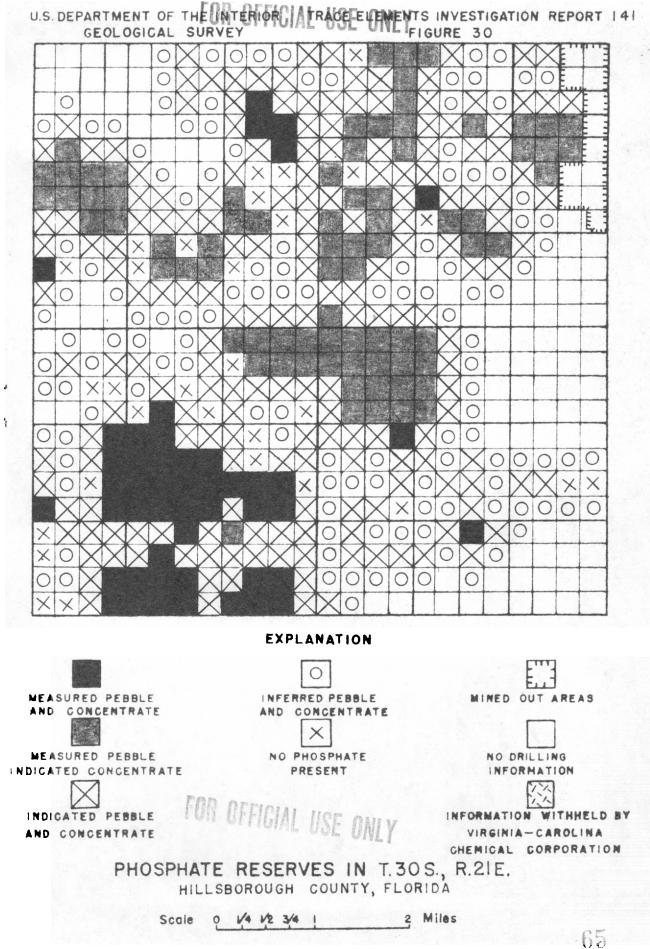
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Short tons B.P.L. = Bone Phosphate of Lime = percent P205 x 2.18



Phosphate Reserves in T. 30 S., R. 21 E. 1/

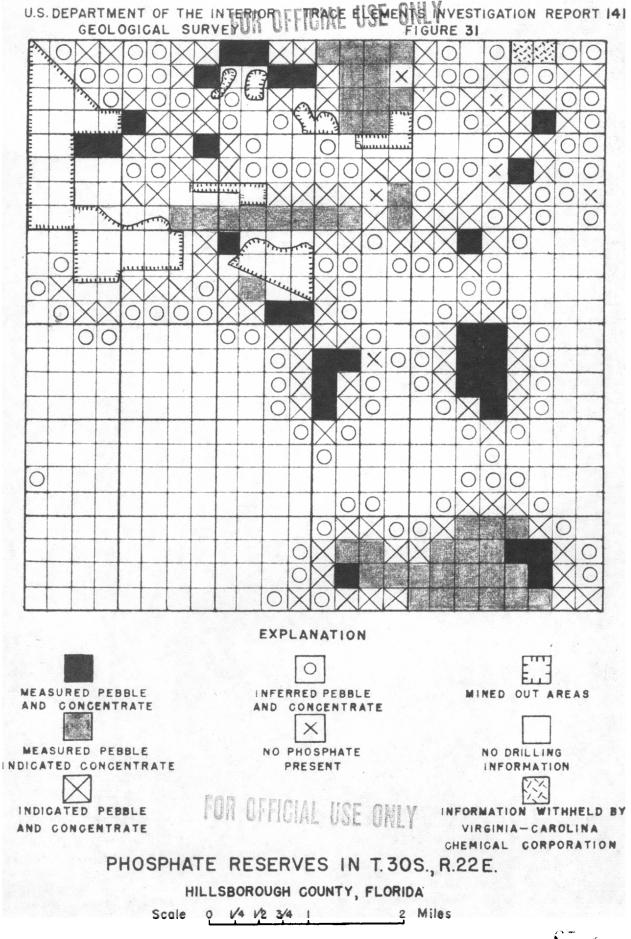
Hillsborough County, Florida

Phosphate	Measured	reserves	Indicated	reserves	Inferred	reserves	Tot	als
content (percent B.P.L. 2/)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Lesh)	Flotation concentrate (-14 /150 Mesh)
75	1,245,400	1,726,000	700,000	1,800,000	300,000	400,000	2,245,400	3,926,000
70-75	2,438,600	867,500	2,300,000	3,000,000	1,000,000	1,300,000	5,738,600	5,167,500
65-70	926,000	204,400	1,500,000	1,600,000	400,000	600,000	2,826,000	2,404,400
60-65	83,000	11,200	600,000	600,000	200,000	200,000	883,000	811,200
60 Content	75,600	39,200	500,000	100,000	100,000	41,000	675,600	180,200
unknown	2,249,300		1,200,000	2,800,000			3,449,300	2,800,000
Subtotal	7,017,900	2,848,300	6,800,000	9,900,000	2,000,000	2,541,000		

Grand total Measured, Indicated, and Inferred reserves

15,817,900 15,289,300

Short tons $P.P.L. = Bone Phosphate of Lime = percent P_20_5 x 2.18$



67

Phosphate Reserves in T. 30 S., R. 22 E. 1/

Hillsborough County, Florida

Phosphate	Measured	reserves	Indicated	reserves	Inferred	reserves	Tot	als
content (percent B.P.L. 2/)	Pebble fraction (14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 L'esh)	Flotation concentrate (-14 /150 Mesh)
75	1,032,100	611,500	1,200,000	2,100,000	800,000	1,400,000	3,032,100	4,111,500
70-75	4,120,000	1,002,400	2,300,000	4,900,000	1,700,000	2,100,000	8,120,000	8,002,400
65-70	2,571,000	564,500	1,900,000	3,500,000	1,800,000	2,000,000	6,271,000	6,064,500
60-65	266,600	16,800	500,000	100,000	400,000	100,000	1,166,600	216,800
60 Content	132,200		100,000	46,000	49,000	13,000	281,200	59,000
unknown	56,000		100,000	20,000			156,000	20,000
Subtotal	8,177,900	2,195,200	6,100,000	10,666,000	4,749,000	5,613,000		

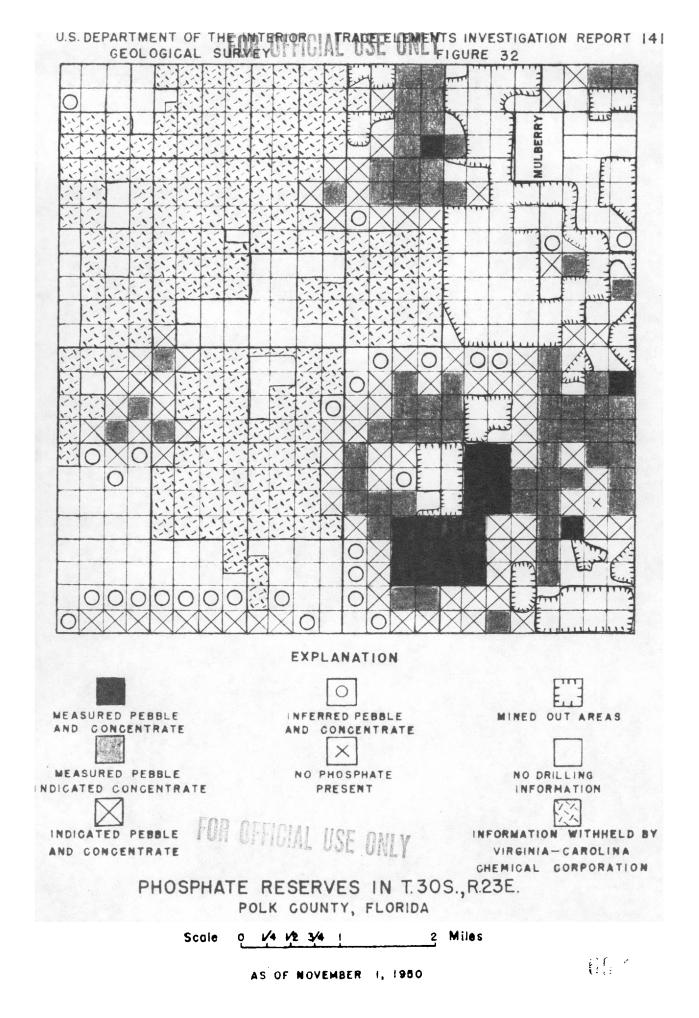
Grand total Measured, Indicated, and Inferred reserves

19,026,900 18,474,200

1/2/

68

Short tons B.P.L. = Bone Phosphate of Lime = percent P205 x 2.18 OFFICIAL USE CULI



Phosphate Reserves in T. 30 S., R. 23 E. 1/

Polk County, Florida

Phosphate	Measured	reserves	Indicated	reserves	Inferred	reserves	Tot	als
content (percent B.P.L. 2/)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (A14 Mesh)	Flotation concentrate (-14 /150 Wesh)
75	400,200		200,000	200,000			600,200	200,000
70-75	2,208,100	707,600	2,000,000	2,100,000	700,000	700,000	4,908,100	3,507,600
65-70	11,157,700	1,639,500	9,100,000	7,200,000	2,900,000	1,300,000	23,157,700	10,139,500
6 0-6 5	2,869,800	694,400	2,100,000	1,800,000	700,000	300,000	5,669,800	2,794,400
60 Content	1,229,200	117,600	400,000	300,000	19,000	8,000	1,648,200	425,600
unknown	2,042,200		1,600,000	1,500,000			3,642,200	1,500,000
Subtotal	19,907,200	3,159,100	15,400,000	13,100,000	4,319,000	2,308,000		

Grand total Measured, Indicated, and Inferred reserves

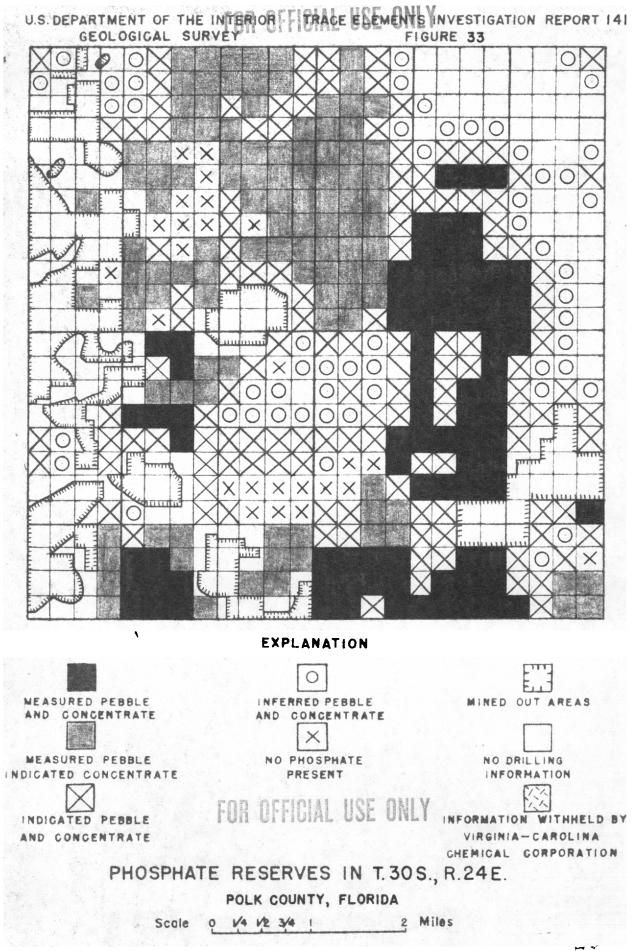
1 OFFICIAL USE OMLY

39,626,200 18,567,100

1/ Short tons

2

2/ P.P.L. = Bone Phosphate of Lime = percent P205 x 2.18



Phosphate Reserves in T. 30 S., R. 24 E. 1/

Polk County, Florida

Phosphate	Measured	reserves	Indicated	reserves	Inferred	reserves	Tot	als
content (percent B.P.L. 2/)	Pebble fraction (f14 Mesh)	Flotation concentrate (-14 /150 Mesh)	(714	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (f14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 %esh)	Flotation concentrate (-14 /150 Mesh)
75	1,380,100	6,944,300	400,000	4,900,000	200,000	3,100,000	1,980,100	14,944,300
70-75	11,988,700	12,109,300	6,300,000	14,500,000	2,000,000	5,300,000	20,288,700	31,909,300
65-70	26,800,400	2,032,100	10,700,000	31,500,000	3,600,000	1,200,000	41,100,400	34,732,100
60-65	3,463,500.	52,600	1,600,000	4,200,000	200,000	100,000	5,263,500	4,352,600
60 Content	505,700		100,000	500,000	100,000		705,700	500,000
unknown	1,344,500		300,000	2,300,000			1,644,500	2,300,000
Subtotal	45,482,900	21,138,300	19,400,000	57,900,000	6,100,000	9,700,000		

Grand total Measured, Indicated, and Inferred reserves

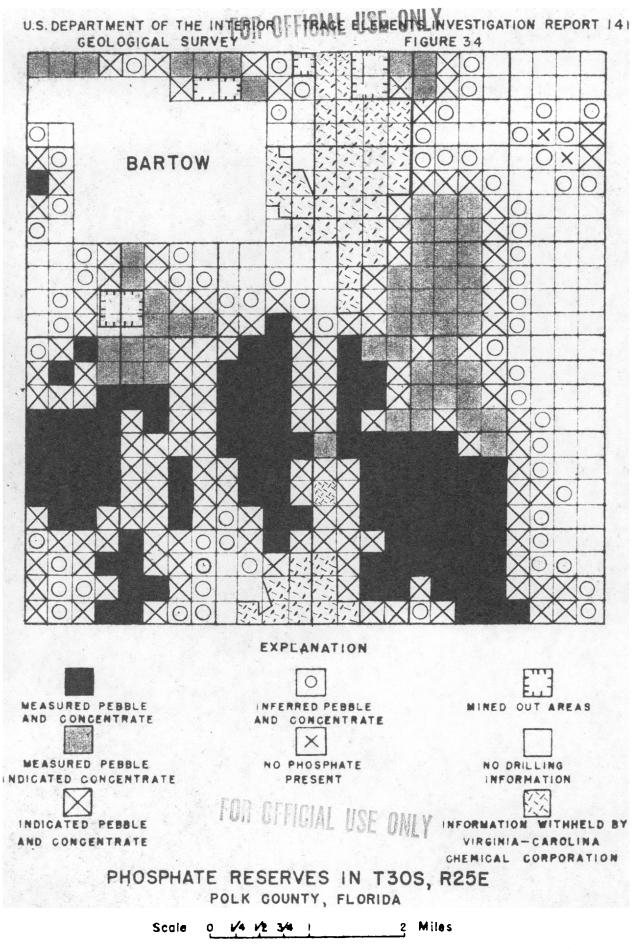
70.982.900 88.738,300

/ Short tons

2/ B.P.L. = Bone Phosphate of Lime = percent P205 x 2.18

As of November 1, 1950

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Phosphate Reserves in T. 30 S., R. 25 E. 1/

Polk County, Florida

Phosphate	Measured	reserves	Indicated	reserves	Inferred	reserves	Tot	als
content (percent B.P.L. 2/)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 #150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)
75	2,495,500	18,600,000	1,300,000	18,100,000	500,000	6,100,000	4,295,500	42,800,000
70-75	8,833,200	17,600,000	5,700,000	26,600,000	3,400,000	10,700,000	17,933,200	54,900,000
65-70	3,544,700	600,000	2,800,000	4,600,000	1,600,000	2,700,000	7,944,700	7,900,000
60-65	676,000		400,000	1,100,000	100,000	200,000	1,176,000	1,300,000
60 Content	293,000		200,000	200,000		100,000	493,000	300,000
unknown	506,400		. 300,000	1,600,000			806,400	1,600,000
Subtotal	16,348,800	36,800,000	10,700,000	52,200,000	5,600,000	19,800,000		

Grand total Measured, Indicated, and Inferred reserves

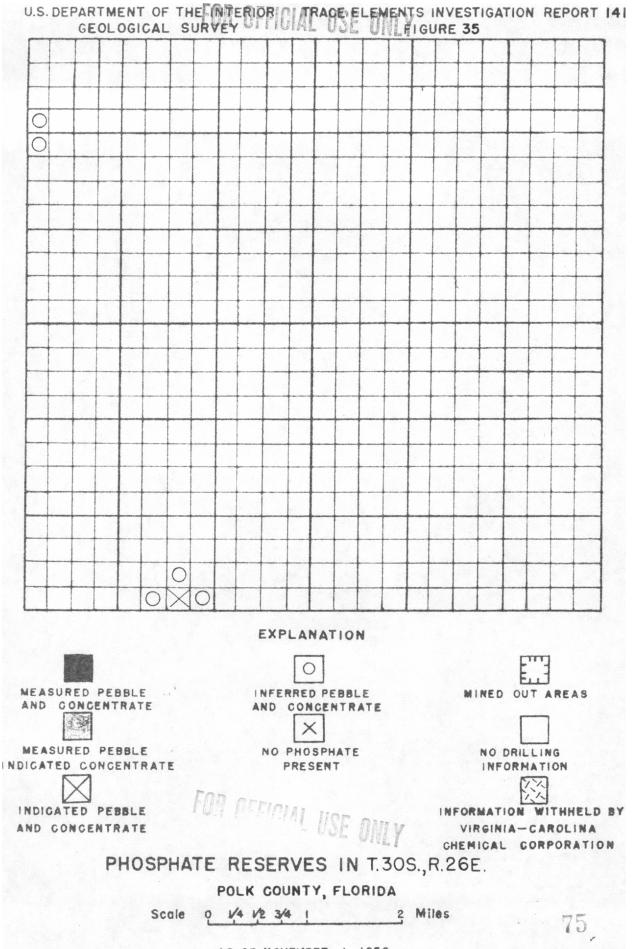
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32,648,800 108,800,000

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15

/ Short tons / F.P.L. = Bone Phosphate of Lime = percent P205 x 2.18



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FOR OFFICIAL USE ONLY

Table 35

Phosphate Reserves in T. 30 S., R. 26 E. 1/

Polk County, Florida

Phosphate	Measured	reserves	Indicated	reserves	Inferred :	reserves	Tota	als
content (percent B.P.L. 2/)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 #150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Lesh)	Flotation concentrate (-14 /150 Mesh
75			1					
70-75	·					100,000		100,00
65-70		de la constante		· · · · ·	200,000		200,000	
60-65								
60 Content unknown					50,000		50,000	
Subtotal					250,000	100,000		

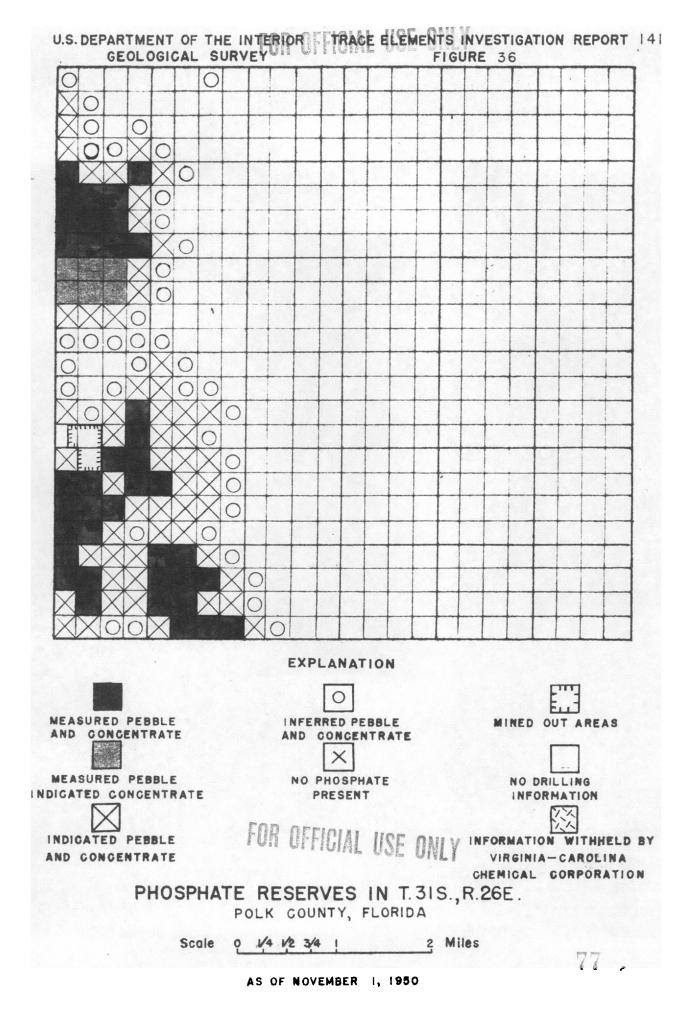
250,000 100,000

Grand total Measured, Indicated, and Inferred reserves

FOR OFFICIAL USE ONL

Short tons B.P.L. = Bone Phosphate of Lime = percent $P_2O_5 \ge 2.18$

1,



Phosphate Reserves in T. 31 S., R. 26 E. 1/

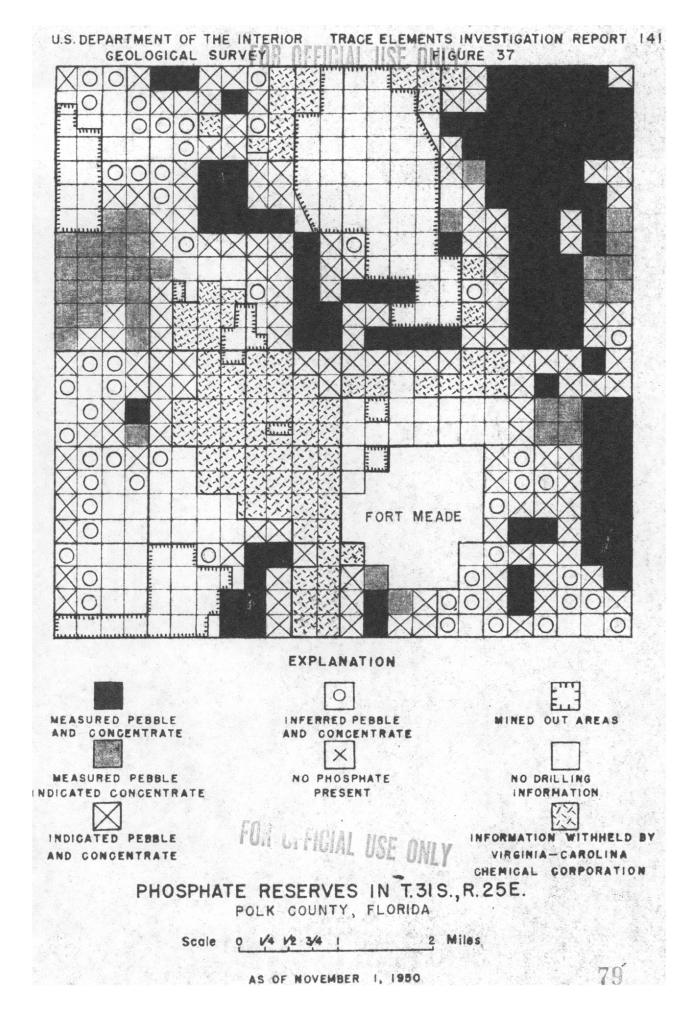
Polk County, Florida

Phosphate	Measured	reserves	Indicated	reserves	Inferred	reserves	Tot	als
content (percent B.P.L. 2/)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)						
75	323,100	1,459,700	200,000	2,100,000	200,000	800,000	723,100	4,359,700
70-75	2,371,000	4,415,600	1,100,000	2,800,000	600,000	1,500,000	4,071,000	8,715,600
65-70	2,069,200	208,300	1,900,000	900,000	700,000	400,000	4,669,200	1,508,300
60-65	103,600	5,600	300,000		300,000		703,600	5,600
60 Content	16,800		200,000		100,000		316,800	
unknown	191,900		.200,000	100,000			391,900	100,000
Subtotal	5,075,600	6,089,200	3,900,000	5,900,000	1,900,000	2,700,000		

Grand total Measured, Indicated, and Inferred reserves

14,689,200 10,875,600

Short tons E.P.L. = Bone Phosphate of Lime = percent P205 x 2.18 HAL USE ONLY



FOR OFFICIAL USE ONLY .

Table 37

Phosphate Reserves in T. 31 S., R. 25 E. 1/

Polk County, Florida

Phosphate	Measured	reserves	Indicated	reserves	Inferred :	reserves	Tot	als
content (percent B.P.L. 2/)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 #150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (f14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Lesh)	Flotation concentrate (-14 /150 Mesh)
75	1,322,700	7,337,700	1,400,000	9,200,000	700,000	2,900,000	3,422,700	19,437,700
70-75	4,086,900	16,176,200	4,000,000	13,300,000	1,400,000	5,000,000	9,486,900	34,476,200
65-70	4,295,200	1,285,800	3,000,000	5,000,000	1,200,000	300,000	8,495,200	6,585,800
60-65	637,300	44,800	800,000	1,200,000	100,000	62,000	1,537,300	1,306,800
60 Content	315,800		200,000	900,000	43,000		558,800	900,000
unknown	2,330,200		1,300,000	6,300,000			3,630,200	6,300,000
Subtotal	12,988,100	24,844,500	10,700,000	35,900,000	3,443,000	8,262,000		

Grand total Measured, Indicated, and Inferred reserves

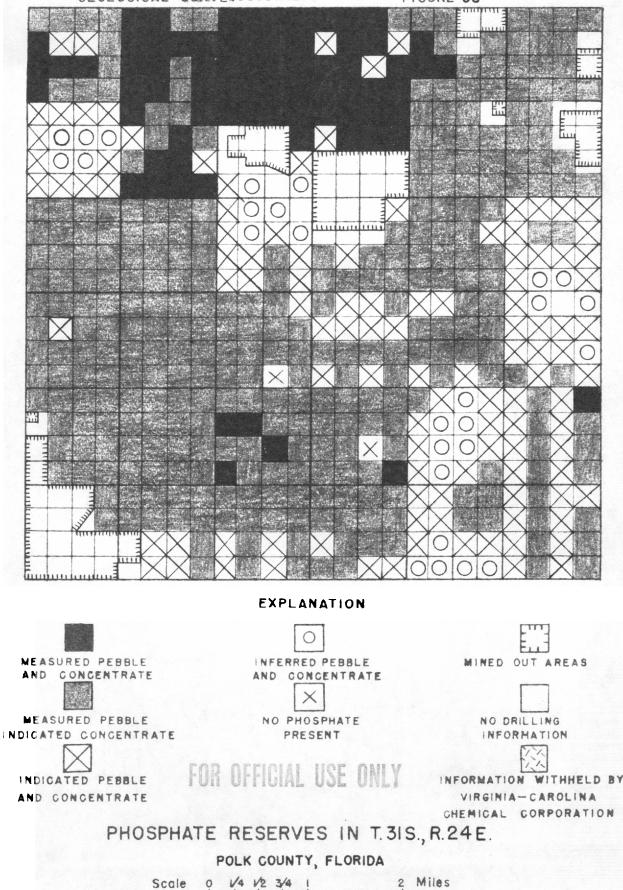
27,131,100 69,006,500

V Short tons 2/

80

FOR OFFICIAL USE ONLAs of November 1, 1950 P.P.L. = Bone Phosphate of Lime = percent $P_2O_5 \times 2.18$

U.S. DEPARTMENT OF THE INTERIOR TRACE ELEMENTS INVESTIGATION REPORT 141 GEOLOGICAL SURVEYTIGUAL USE FIGURE 38



AS OF NOVEMBER 1, 1950

GIAL USE ONLY Table 38

Phosphate Reserves in T. 31 S., R. 24 E. 1/

Polk County, Florida

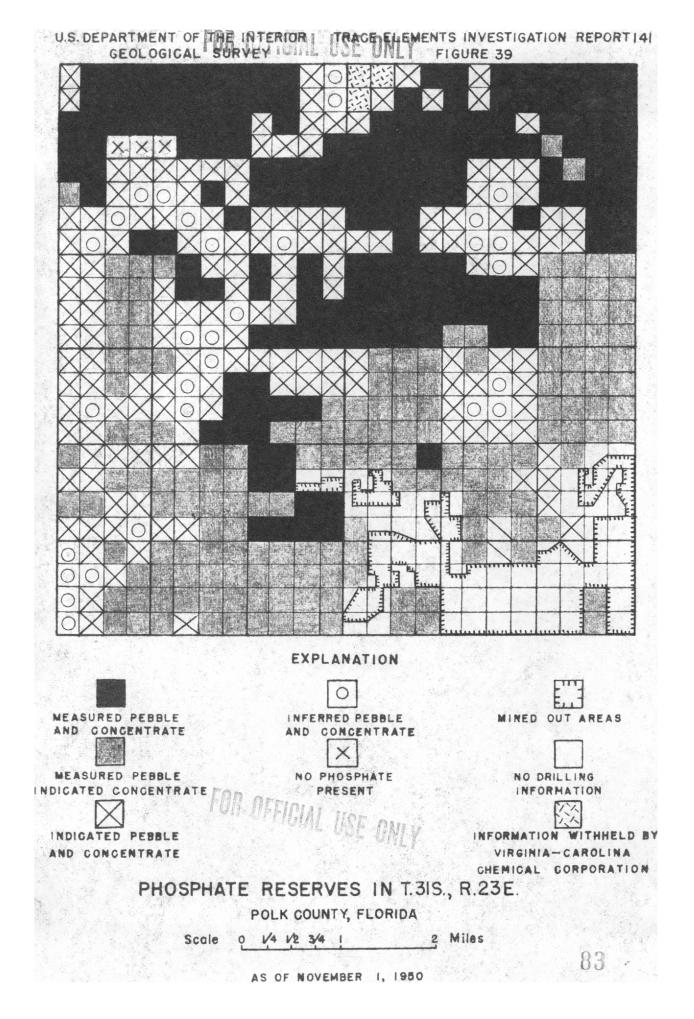
Phosphate	Measured	reserves	Indicated	reserves	Inferred	reserves	Tot	als
content (percent B.P.L. 2/)	Pebble fraction (f14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)
75	266,600	206,100	13,000	100,000	12,000	25,000	291,600	331,100
70-75	10,987,800	7,686,900	900,000	15,500,000	100,000	500,000	11,987,800	23,686,900
65-70	51,644,800	1,382,600	9,900,000	68,600,000	2,000,000	2,900,000	63,544,800	72,882,600
60-65	2,409,300		700,000	3,700,000	100,000	100,000	3,209,300	3,800,000
60 Content	96,300		200,000	72,000			296,300	72,000
unknown	7,227,100		3,400,000	14,000,000			10,627,100	14,000,000
Subtotal	72,631,900	9,275,600	15,113,000	101,972,000	2,212,000	3,525,000		

Grand total Measured, Indicated, and Inferred reserves

114,772,600 89,956,900

1/2/

Short tons P.P.L. = Bone Phosphate of Lime = percent P205 x 2.18 FOR OFFICIAL USE ONLY As of November 1, 1950



FOR OFFICIAL USE ONLY

Table 39

Phosphate Reserves in T. 31 S., R. 23 E. 1/

Polk County, Florida

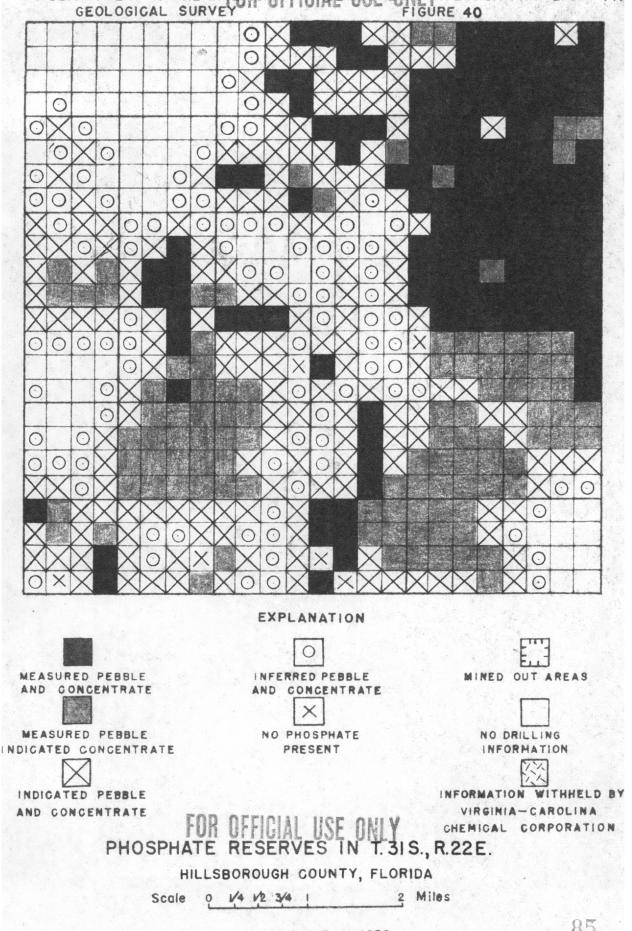
Phosphate	Measured	reserves	Indicated	reserves	Inferred	reserves	Tot	als
content (percent. B.P.L. 2/)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	(714	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Nesh)	Flotation concentrate (-14 /150 Mesh)
75	386,400	632,800	41,000	100,000	12,000		439,400	732,800
70-75	16,851,400	19,717,600	6,400,000	12,400,000	1,200,000	1,500,000	24,451,400	33,617,600
65-70	24,771,000	4,984,600	7,100,000	11,000,000	1,400,000	700,000	33,271,000	16,684,600
6 06 5	533,100	56,000	300,000	14,000	56,000		889,100	70,000
60 Content	123,400		48,000	100,000	12,000		183,400	100,000
unknown	5,736,000		1,400,000	5,400,000			7,136,000	5,400,000
Subtotal	48,401,300	25,391,000	15,289,000	29,014,000	2,680,000	2,200,000		

Grand total Measured, Indicated, and Inferred reserves

66,370,300 56,605,000

Short tons P.P.L. = Bone Phosphate of Lime = percent P205 x 2.18 FOR OFFICIAL HEF ONLYAS of November 1, 1950 2/

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85

U.S. DEPARTMENT OF THE INTERIOR FRADE ELEMENTS INVESTIGATION REPORT 141 GEOLOGICAL SURVEY FIGURE 40

FOR OFFICIAL USE ONLY Table 40

Phosphate Reserves in T. 31 S., R. 22 E. 1/

Hillsborough County, Florida

Phosphate	Measured reserves		Indicated	Indicated reserves		Inferred reserves		Totals	
content (percent B.P.L. 2/)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)							
75	514,700	322,000	500,000	2,600,000	71,000	600,000	1,085,700	3,522,000	
70-75	17,598,900	7,712,900	4,300,000	14,500,000	1,200,000	2,500,000	23,098,900	24,712,900	
65-70	6,866,700	3,336,500	3,000,000	3,300,000	1,300,000	1,300,000	11,166,700	7,936,500	
6 06 5	408,500	56,000	400,000	700,000	400,000	700,000	1,208,500	1,456,000	
60 Content	218,400		300,000	200,000	100,000	100,000	618,400	300,000	
unknown	3,008,500	8,400	1,800,000	6,800,000			4,808,500	6,808,400	
Subtotal	28,615,700	11,435,800	10,300,000	28,100,000	3,071,000	5,200,000			

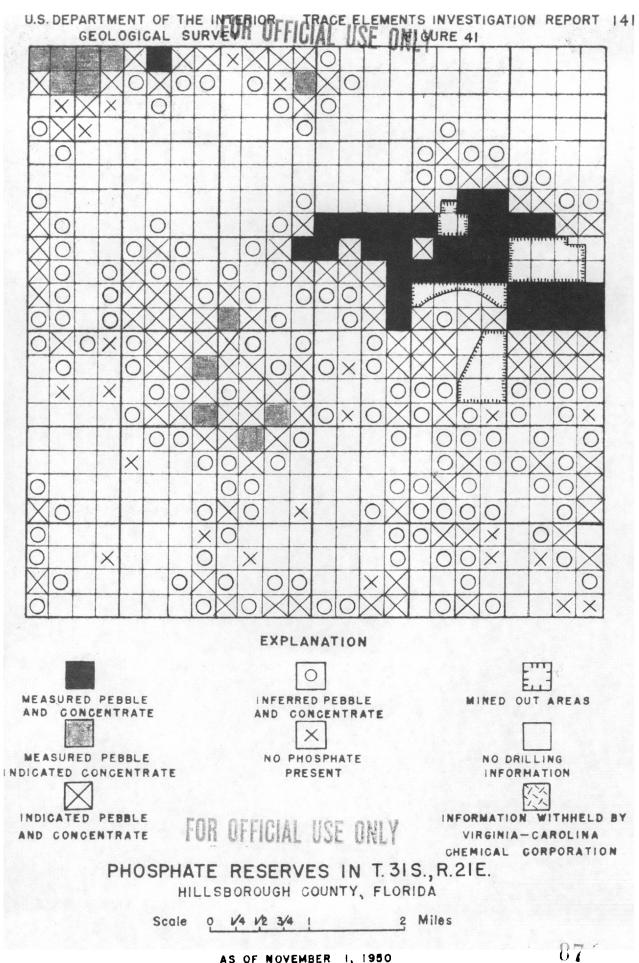
Grand total Measured, Indicated, and Inferred reserves

41,986,700 44,735,800

1 2/

Short tons E.P.L. = Bone Phosphate of Lime = percent $P_2O_5 \ge 2.18$

FOR OFFICIAL USE ONLY As of November 1, 1950



FOR OFFICIAL USE ONLY.

Table 41

Phosphate Reserves in T. 31 S., R. 21 E. 1/

Hillsborough County, Florida

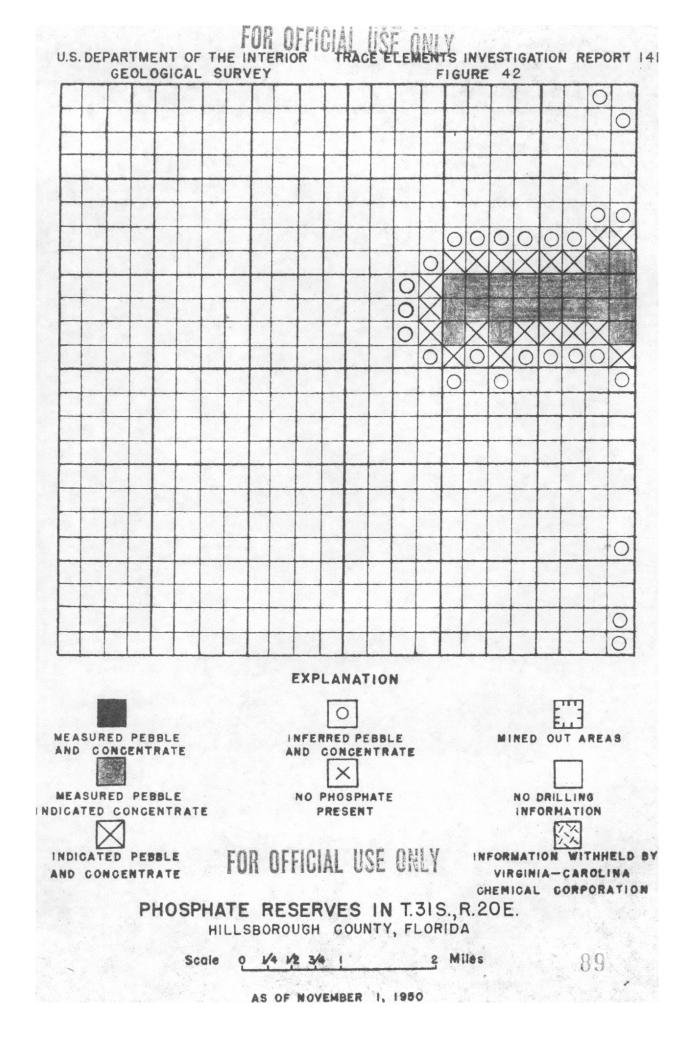
Phosphate	Measured	reserves	Indicated reserves		Inferred reserves		Totals	
content (percent B.P.L. 2/)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 #150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 #150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 fl50 Mesh)
75	1,483,700	2,007,500	600,000	2,100,000	800,000	1,500,000	2,883,700	5,607,500
70-75	2,386,400	1,715,300	2,900,000	2,600,000	1,700,000	1,800,000	6,986,400	6,115,300
65-70	737,400	250,100	2,800,000	. 700,000	3,900,000	900,000	7,437,400	1,850,100
60-65	381,900	15,700	600,000	300,000	800,000	300,000	1,781,900	615,700
60 Content unknown	137,200 44,800	•	400 ,000 . 100 ,000		800,000	100,000	1,337,200 144,800	278,400 100,000
Subtotal	5,171,400	4,067,000	7,400,000	5,900, 0 00	8,000,000	4,600,000		

Grand total Measured, Indicated, and Inferred reserves

14,567,000 20,571,400

000

Short tons B.P.L. = Bone Phosphate of Lime = percent P205 x 2.18 1/2/ OFFICIAL USE ONLYs of November 1, 1950 1 iK



FICIAL USE CLIENT

Table 42

Phosphate Reserves in T. 31 S., R. 20 E. 1/

Hillsborough County, Florida

Phosphate content (percent B.P.L. 2/)	Measured	reserves	Indicated reserves		Inferred reserves		Totals	
	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)						
75	267,100		100,000	300,000	82,000	82,000	449,100	382,000
70-75	542,200		400,000	700,000	300,000	300,000	1,242,200	1,000,000
65-70	53,500		17,000	100,000	34,000	34,000	104,500	134,000
60-65	21,900		18,000	33,000	20,000	20,000	59,900	53,000
60 Content	12,400		9,000	18,000	5,000	5,000	26,400	23,000
unknown	38,700		38,000	88,000			76,700	000,88
Subtotal	935,800		582,000	1,239,000	441,000	441,600		

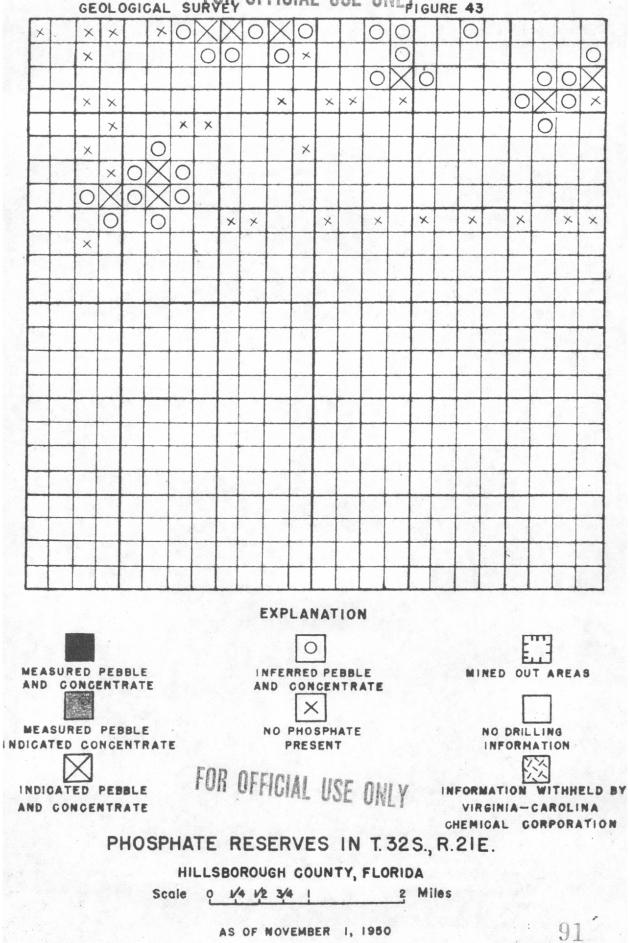
Grand total Measured, Indicated, and Inferred reserves

1,958,800 1,680,000

1/2/

90

Short tons P.P.I. = Bone Phosphate of Lime = percent P205 x 2.18 FOR OFFICIAL USE DNIV As of November 1, 1950



U.S. DEPARTMENT OF THE WRENDER CHARGE ELEMENTS INVESTIGATION REPORT 141 GEOLOGICAL SURVEY

FUR UFFICIAL USE DALL Table 43

Phosphate Reserves in T. 32 S., R. 21 E. 1/

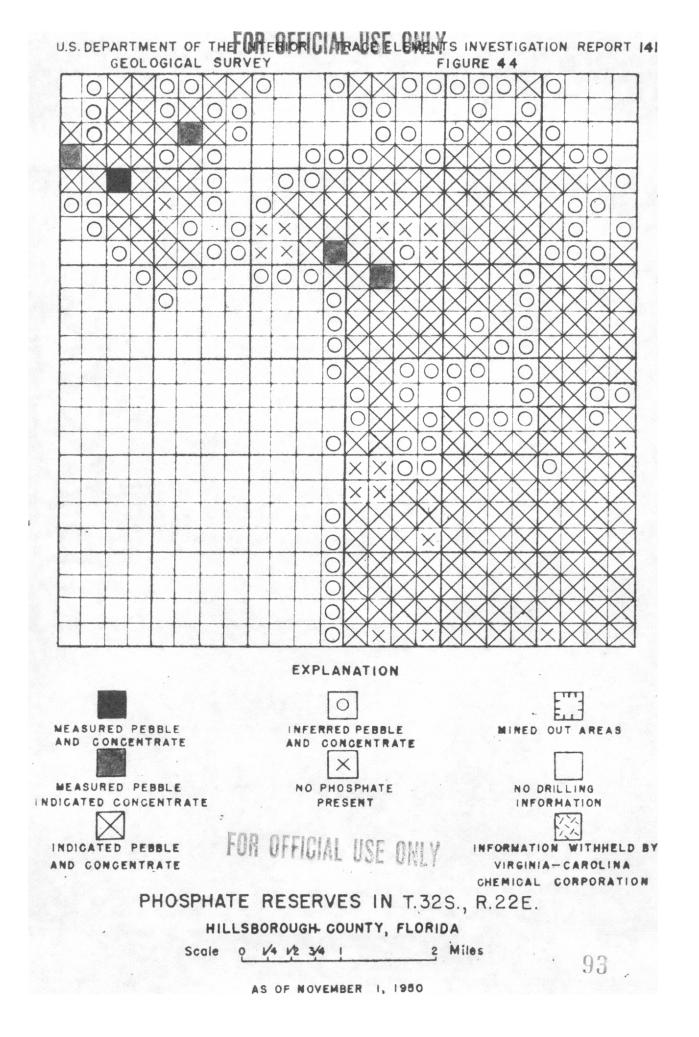
Hillsborough County, Florida

Phosphate	Measured	reserves	Indicated	reserves	Inferred reserves		Totals	
content (percent B.P.L. 2/)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (A14 Mesk)	Flotation concentrate (-14 /150 Mesh)
75								
70-75		Carden and						
65-70			700,000	34,000	1,200,000	100,000	1,900,000	134,000
60-65		1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	123,000		200,000		323,000	
60 Content			26,000		47,000		73,000	
unknown			.560,000	42,000			560,000	42,000
Subtotal			1,409,000	76,000	1,447,000	100,000		

Grand total Measured, Indicated, and Inferred reserves

2,856,000 176.000

FOR OFFICIAL USE ONLY As of November 1, 1950 Short tons B.P.L. = Bone Phosphate of Lime = percent P205 x 2.18 1/2/



Phosphate Reserves in T. 32 S., R. 22 E. 1/

Hillsborough County, Florida

Phosphate	Measured	reserves	Indicated reserves		Inferred reserves		Totals	
content (percent B.P.L. 2/)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	(714	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (A14 Nesh)	Flotation concentrate (-14 /150 Mesh)
75					a saina a			
70-75	78,400		2,000,000	1,700,000	600,000	600,000	2,678,400	2,300,000
65-70	991,200		19,100,000	10,000,000	6,000,000	3,900,000	26,091,200	13,900,000
6 06 5	67,200		5,000,000	1,800,000	700,000	300,000	5,767,200	2,100,000
60 Content	22,400		2,000,000	700,000	400,000	100,000	2,422,400	800,000
unknown	190,400		2,600,000	1,000,000			2,790,400	1,000,000
Subtotal	1,349,600		30,700,000	15,200,000	7,700,000	4,900,000		

Grand total Measured, Indicated, and Inferred reserves FOR UFFICIAL USE ONLY

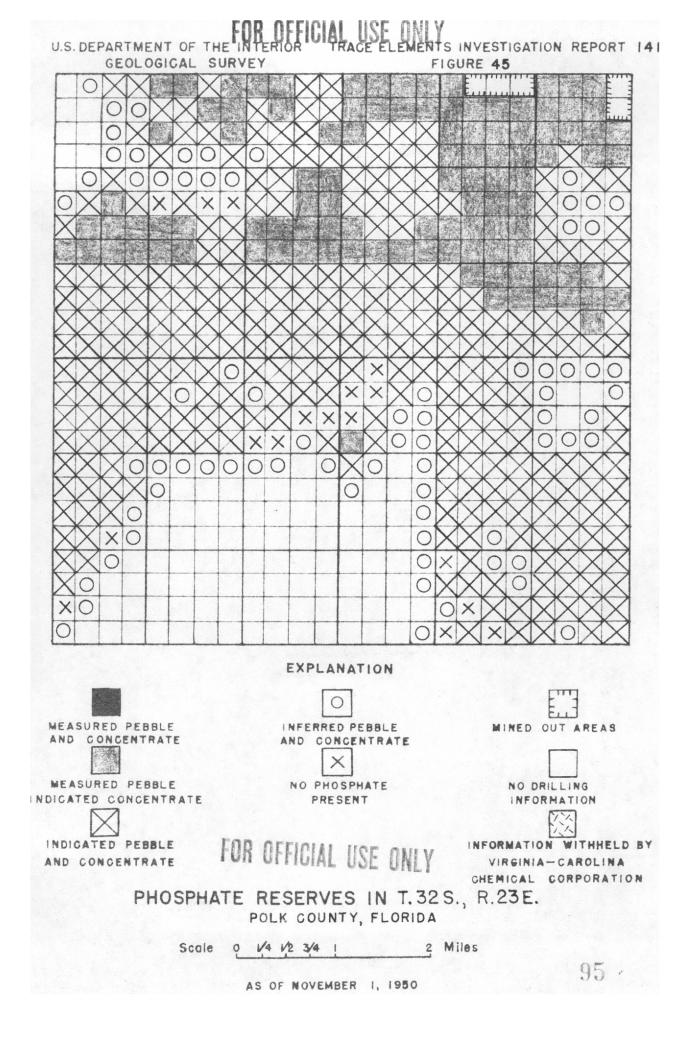
39,749,600 20,100,000

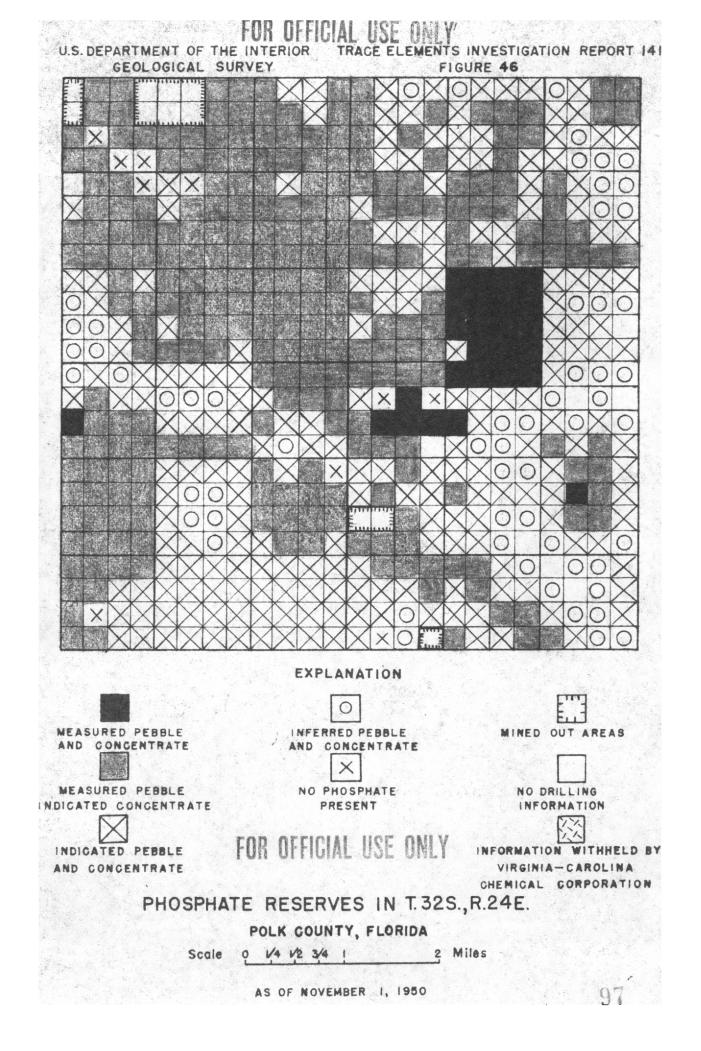
1

Short tons P.P.L. = Bone Phosphate of Lime = percent $P_2O_5 \propto 2.18$

As of November 1, 1950

34





FOR OFFICIAL USE ONLY

Table 46

Phosphate Reserves in T. 32 S., R. 24 E. 1/

Polk County, Florida

Phosphate	Measured	reserves	Indicated	reserves	Inferred :	reserves	Tot	als
content	Pebble	Flotation	Pebble	Flotation	Pebble	Flotation	Pebble	Flotation
(percent B.P.L. 2/)	fraction (714	concentrate $(-14 + 150)$	fraction (/ 14	concentrate $(-14 + 150)$	fraction (714	concentrate (-14 \neq 150	fraction (714	concentrate (-14 / 150
D.I.e.D /	Mesh)	Mesh)	Mesh)	Mesh)	Mesh)	(-14 71)0 Mesh)	Mesh)	Mesh)
75			50 ,000				50,000	
70-75	2,550,800	1,227,200	1,100,000	1,100,000	600,000	300,000	4,250,800	2,627,200
65-70	21,501,000	848,000	16,500,000	6,000,000	3,000,000	700,000	41,001,000	7,548,000
60-65	514,000	67,600	1,100,000	200,000	700,000	85,000	2,314,000	352,600
60 Content	385,200			17,000			385,200	17,000
unknown	14,661,800		5,000,000	4,800,000			19,661,800	4,800,000
Subtotal	39,612,800	2,142,800	23,750,000	12,117,000	4,300,000	1,085,000		

Grand total Measured, Indicated, and Inferred reserves

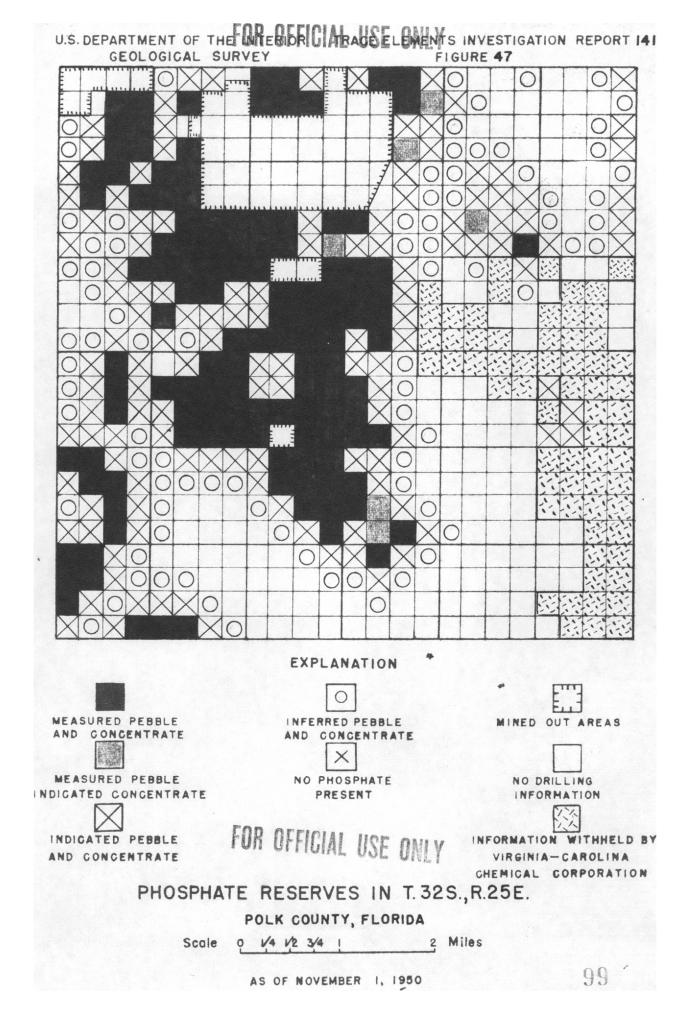
67,662,800 15,344,800

FOR OFFICIAL USE ONLY

Short tons P.P.L. = Bone Phosphate of Lime = percent P205 x 2.18

36

1/2/



Phosphate Reserves in T. 32 S., R. 25 E. 1/

Polk County, Florida

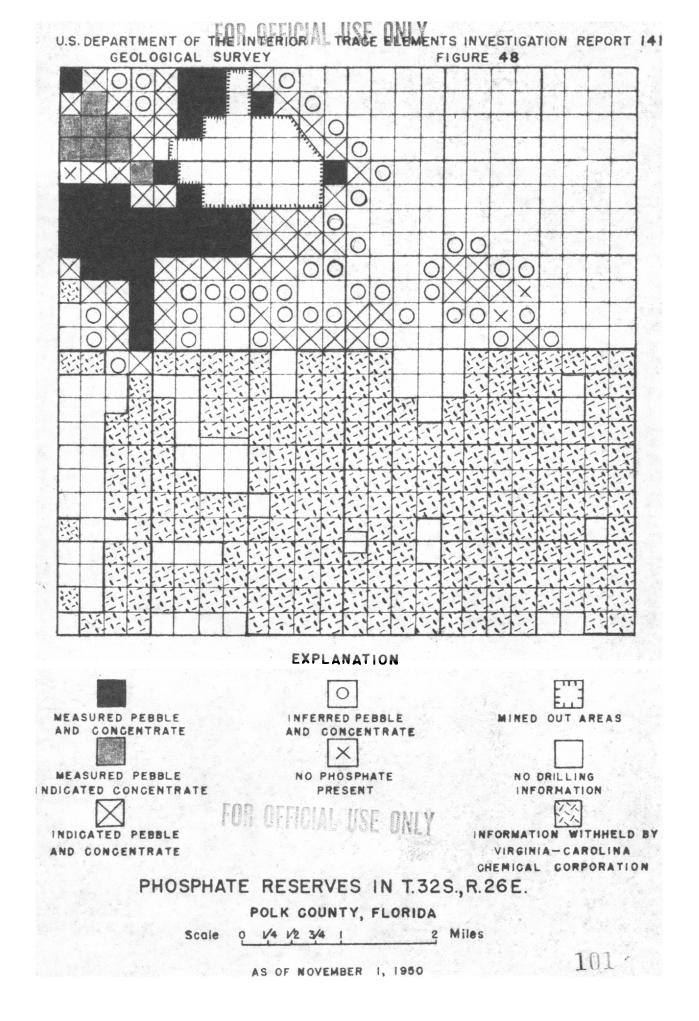
Phosphate	Measured	reserves	Indicated	reserves	Inferred	reserves	Tot	als
content (percent B.P.L. 2/)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 / 150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (A14 Mesh)	Flotation concentrate (-14 /150 Mesh)
75	225,700	4,086,300	58,000	1,200,000	4,000	500,000	287,700	5,786,300
70-75	3,890,500	11,092,000	2,500,000	7,700,000	1,600,000	4,400,000	7,990,500	23,192,000
65-70	9,655,100	3,105,000	8,600,000	2,900,000	4,200,000	1,300,000	22,455,100	7,305,000
60-65	1,215,200	18,000	1,800,000	100,000	900,000	42,000	3,915,200	160,000
60 Content	286,700		200,000		100,000		586,700	
unknown	502,900		500,000	1,600,000	5		1,002,900	1,600,000
Subtotal	15,776,100	18,301,300	13,658,000	13,500,000	6,804,000	6,242,000		

Grand total Measured, Indicated, and Inferred reserves

36,238,100 38,043,300

12

FOR OFFICIAL USE ONI Short tons P.P.L. = Bone Phosphate of Lime = percent $P_2O_5 \ge 2.18$



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Table 48

Phosphate Reserves in T. 32 S., R. 26 E. 1/

Polk County, Florida

Phosphate	Measured	reserves	Indicated	reserves	Inferred	reserves	Tot	als
content (percent B.P.L. 2/)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 #150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 / 150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)
75	170,200	1,092,600	100,000	900,000	100,000	700,000	370,200	2,692,600
70-75	1,757,000	2,925,200	900,000	2,400,000	500,000	800,000	3,157,000	6,125,200
65-70	743,700	637,900	2,900,000	1,300,000	600,000	1,500,000	4,243,700	3,437,900
60-65	68,100	11,200	700,000	300,000	600,000	300,000	1,368,100	611,200
60 Content unknown	33,600	11,200	60,000	4 ,000	60,000	3,000	153,600	18,200
Subtotal	2,772,600	4,678,100	4,660,000	4,904,000	1,860,000	3,303,000		

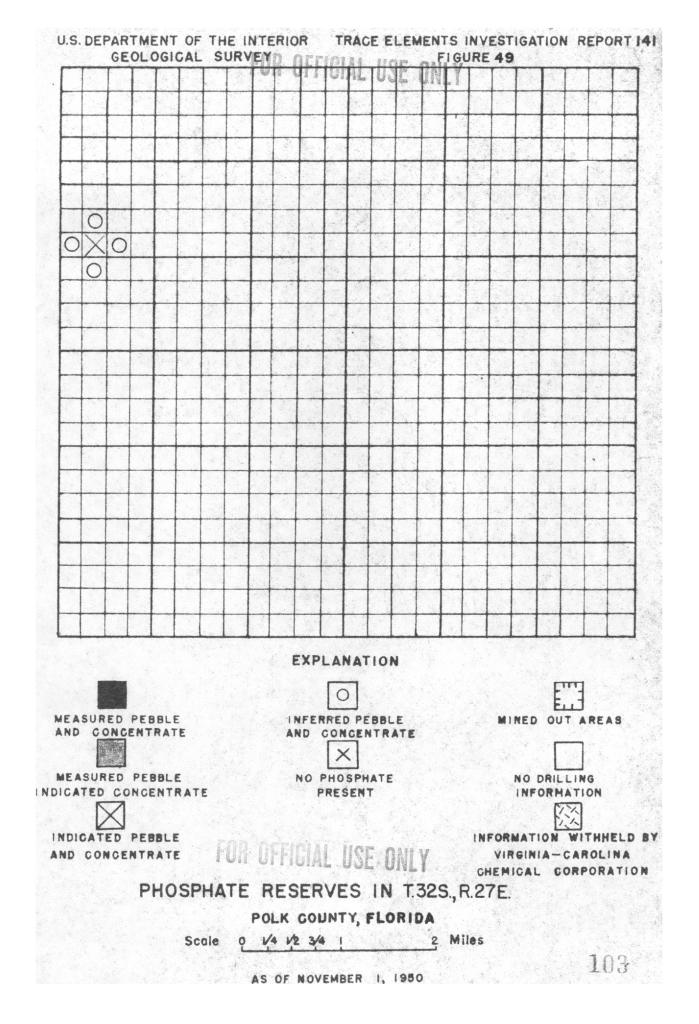
Grand total Measured, Indicated, and Inferred reserves

9,292,600 12,885,100

1/ Short tons

102

2/ B.P.L. = Bone Phosphate of Lime = percent $P_2O_5 \times 2.18$



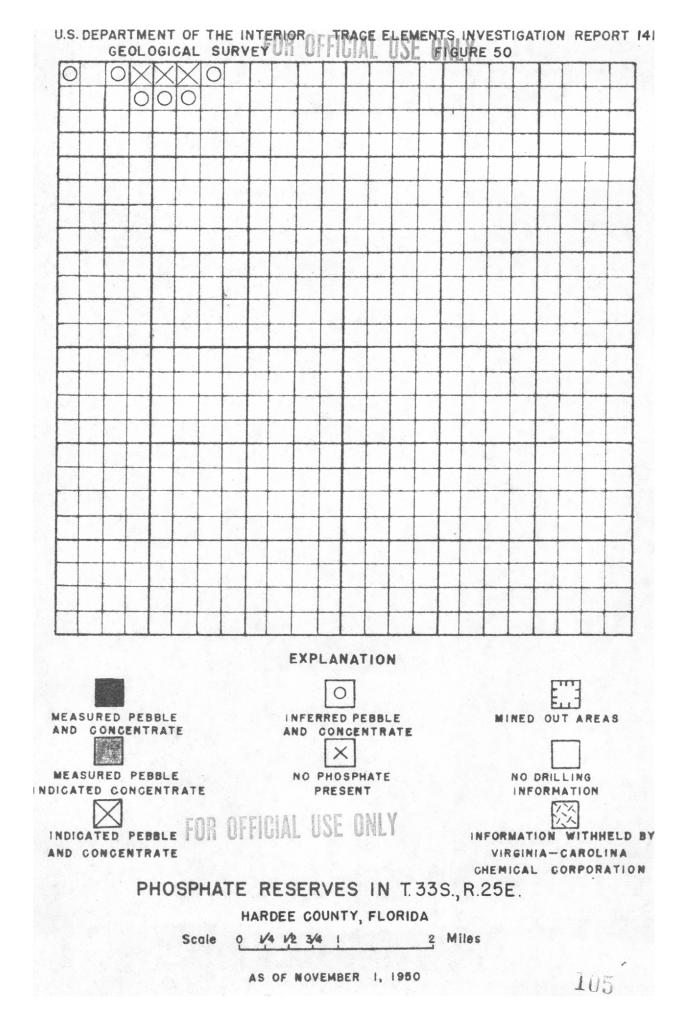
Phosphate Reserves in T. 32 S., R. 27 E. 1/

Polk County, Florida

Phosphate	Measured	reserves	Indicated	reserves	Inferred	reserves	Tot	als
content (percent B.P.L. 2/)	Peoble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	(714	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (A14 L'esh)	Flotation concentrat (-14 fl50 Mesh
75								
70-75				1.1				
65-70								1
60-65			22,000		100,000		122,000	
60 Content unknown		•						
Subtotal			22,000		100,000			
		Grand to	tal Measured	, Indicated,	and Inferre	d reserves [122,000	Г

2/2/

Short tons P.P.L. = Bone Phosphate of Lime = percent P205 x 2.18



Phosphate Reserves in T. 33 S., R. 25 E. 1/

Hardee County, Florida

Phosphate	Measured	reserves	Indicated	reserves	Inferred :	reserves	Totals		
content (percent B.P.L. 2/)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (fl4 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 L'esh)	Flotation concentrate (-14 /150 Mesh)	
75									
70-75				100,000	25,000	200,000	25,000	300,000	
65-70			400,000	. 100,000	100,000	100,000	500,000	200,000	
60-65			600,000		100,000		700,000		
60 Content unknown									
Subtotal	18		1,000,000	200,000	225,000	300,000			

total Measured, Indicated, and Inferred reserved Grand

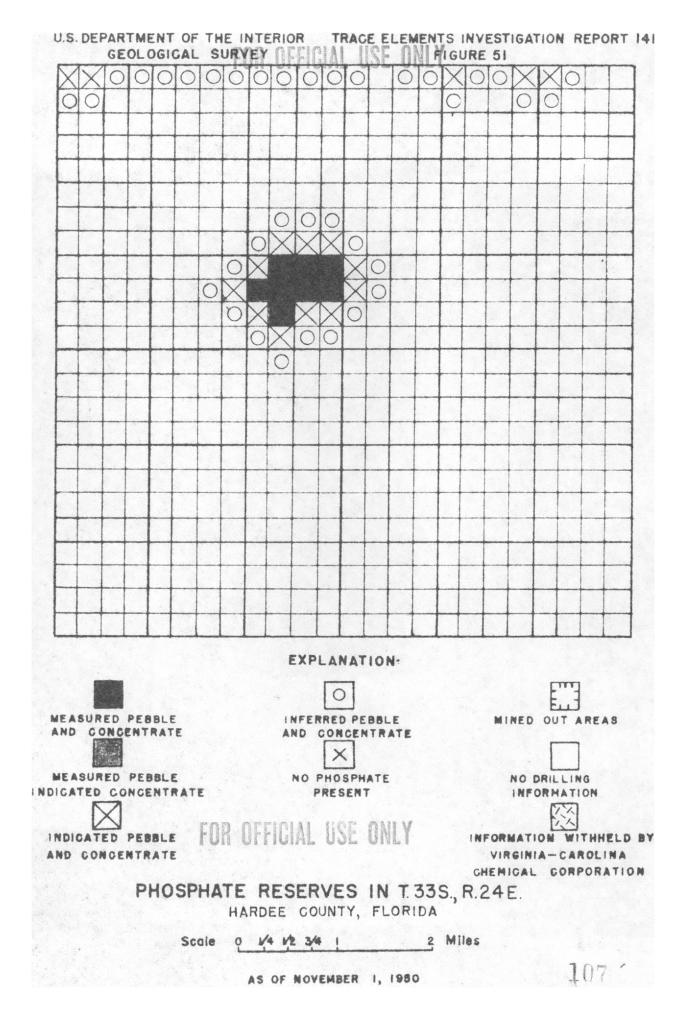
1,225,000 500,000

USE: ONLY

106

2/2/

Short tons E.P.L. = Bone Phosphate of Lime = percent P205 x 2.18



Phosphate Reserves in T. 33 S., R. 24 E. 1/

Hardee County, Florida

Phosphate	Measured	reserves	Indicated	reserves	Inferred 1	reserves	Tot	als
content (percent B.P.L. 2/)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (f14 Mesh)	Flotation concentrate (-14 #150 Mesh)
75								
70-75	. 119,900	254,100	300,000	400,000	400,000	500,000	819,900	1,154,100
65-70	587,800	625,600	700,000	700,000	2,600,000	800,000	3,887,800	2,125,600
60-65	370,300		500,000	energi estatu est	1,000,000		1,870,300	
60 Content				·				
unknown		1	100,000	46,000	1. J. J. 1998	1.1.1	100,000	46,000
Subtotal	1,078,000	879,700	1,600,000	1,146,000	4,000,000	1.300.000		

Grand total Measured, Indicated, and Inferred reserves

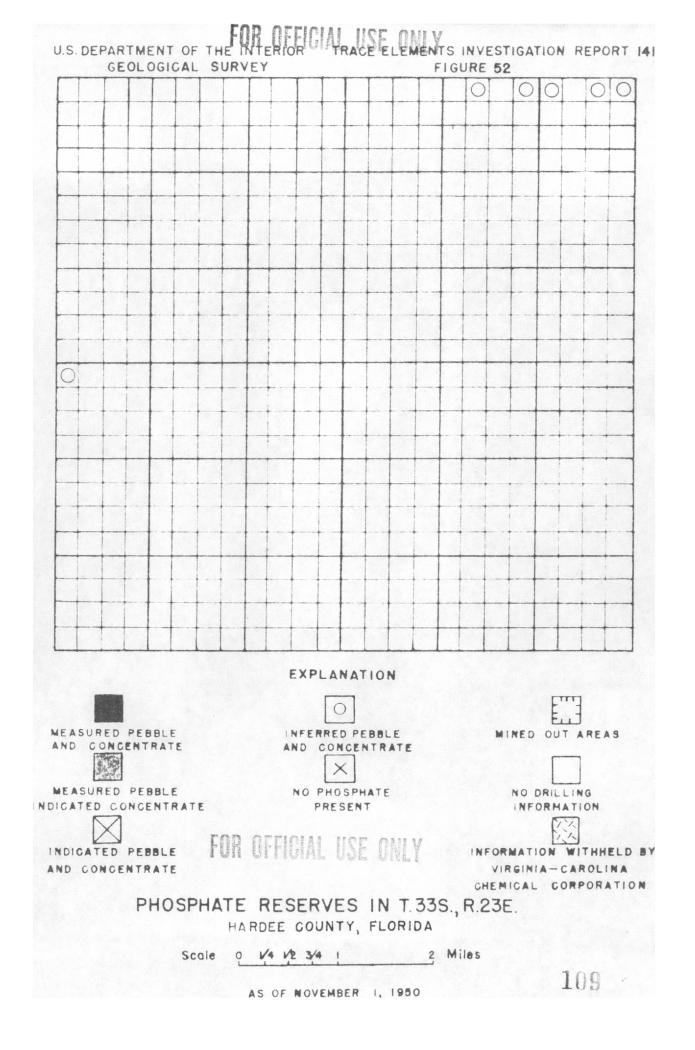
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6,678,800 3,325,700

12

108

Short tons P.P.L. = Bone Phosphate of Lime = percent $P_{2.5} \propto 2.13$



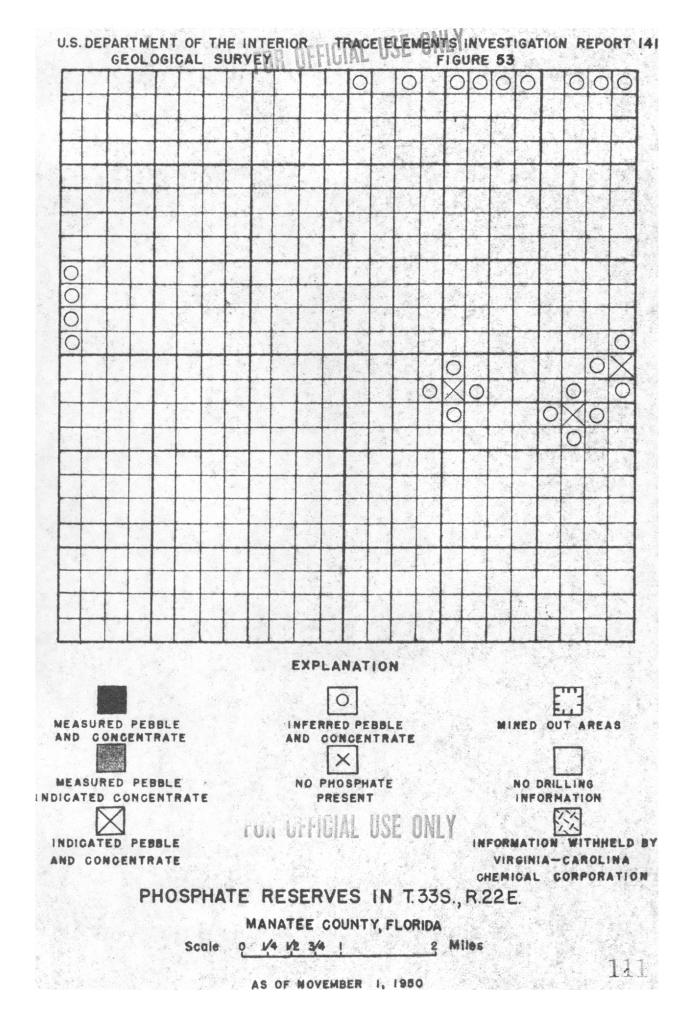
Phosphate Reserves in T. 33 S., R. 23 E. 1/

Hardee County, Florida

Phosphate	Measured	reserves	Indicated	reserves	Inferred	reserves	Tot	als
content (percent B.P.L. 2/)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrat (-14 /150 Mesh
75			Sec.					
70-75					17,000		17,000	
65-70					100,000		100,000	
6065								
60 Content unknown								
Subtotal					117,000			

1/2/

Short tons P.P.L. = Bone Phosphate of Lime = percent $P_2O_5 \ge 2.18$



Phosphate Reserves in T. 33 S., R. 22 E. 1/

Manatee County, Florida

Phosphate	Measured	reserves	Indicated	reserves	Inferred	reserves	Totals		
content (percent B.P.L. 2/)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (A14 Mesh)	Flotation concentrate (-14 /150 Mesh)	
75									
70-75				,		· ·			
65-70					900,000	300,000	900,000	300,00	
60-65			500,000		1,700,000	100,000	2,200,000	100,00	
60 Content unknown									
Subtotal			500,000		2,600,000	400,000	199		

Grand total Measured, Indicated, and Inferred reserves

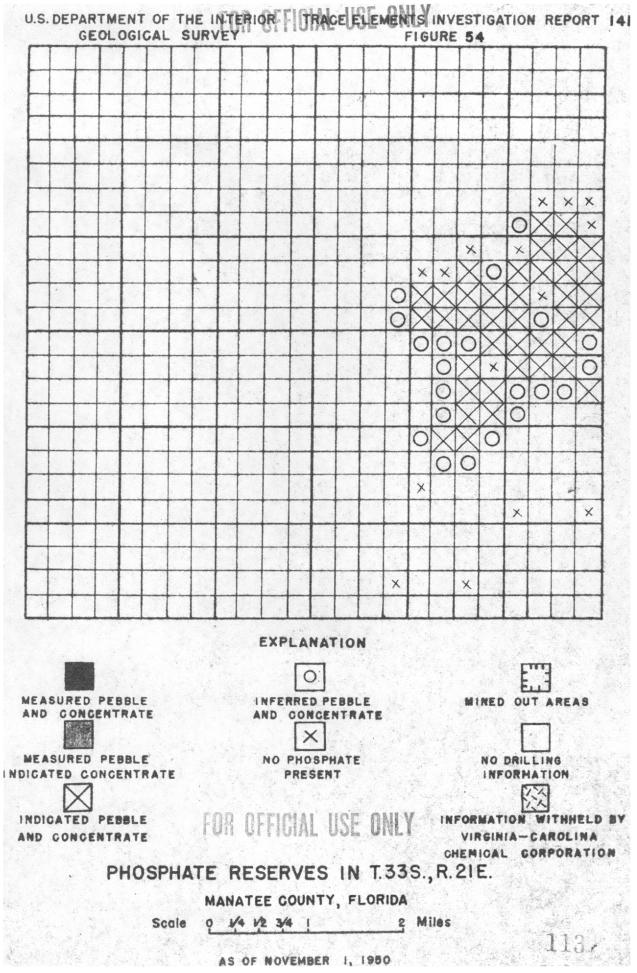
1/2/

FOR OFFICE Short tons P.P.I. = Bone Phosphate of Lime = percent P205 x 2.13

As of November 1, 1950

400,000

3,100,000



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Table 54

Phosphate Reserves in T. 33 S., R. 21 E. 1/

Manatee County, Florida

Phosphate	Measured	reserves	Indicated	reserves	Inferred	reserves	Tot	als
content (percent B.P.L. 2/)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 / 150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)
75			(Self)					
70-75			Provense.	1 10				
65-70				300,000		500,000		800,000
60-65			300,000		200,000		500,000	
60 Content					200,000		200,000	
unknown	-		5,100,000	3,600,000			5,100,000	3,600,000
Subtotal			5,400,000	3,900,000	400,000	500.000		

Grand total Measured, Indicated, and Inferred reserves

5.800.000 4.400.000

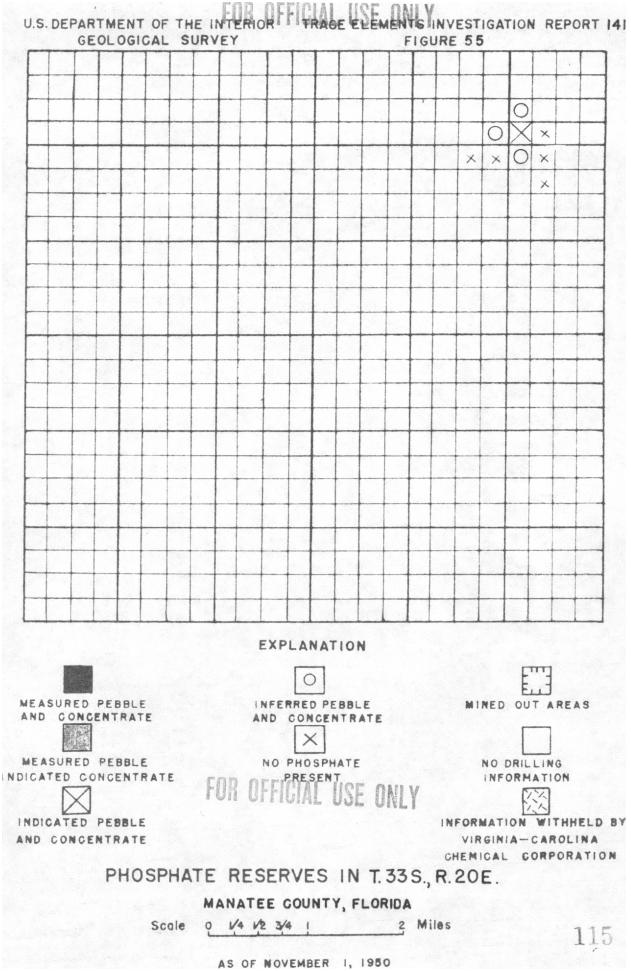
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1/2/ P.P.L. = Bone Phosphate of Line = percent $P_20_5 \times 2.18$

hand hanning

15-1

Short tons



Phosphate Reserves in T. 33 S., R. 20 E. 1/

Manatee County, Florida

Phosphate	Measured	reserves	Indicated	reserves	Inferred	reserves	Totals		
content (percent B.P.L. 2/)	Peoble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Megh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Lesh)	Flotation concentrate (-14 /150 Mesh	
75									
70-75				27,000		100,000		127,00	
65-70									
6065			100,000		100,000		200,000		
60 Content unknown									
Subtotal			100,000	27,000	100,000	100,000			
		Grand to	tal Measured	, Indicated,	and Inferre	d reserves	200,000	127,00	

2/ F.P.I. = Bone Phospilate of Lime = percent P₂O₅ x 2.18



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UNITED STATES DEPARTMENT OF THE INTERIOR GEOLOGICAL SURVEY WASHINGTON 25, D. C.

AEC - 214/2

SEP 1 2 1951

Dr. Phillip L. Merritt, Assistant Director Division of Raw Materials U. S. Atomic Energy Commission P. O. Box 30, Ansonia Station New York 23, New York

Dear Phil:

Transmitted herewith are eight copies of each of 40 revised pages and six new pages for Trace Elements Investigations Report 141, "Reserves of Phosphate in the Land-Pebble Phosphate Field, Hardee, Hillsborough, Manatee, Osceola, Pasco, and Polk Counties, Florida," by J. B. Cathcart, C. G. Tillman, and H. B. Dutro, January 1951. These revised pages are for insertion in the eight copies of this report that were sent to you on February 26, 1951. Please destroy the pages they replace, and add the six new pages at the end of the report. Also, on all figures not replaced in the report, the wording and symbol in the explanation showing "Information withheld by Virginia-Carolina Chemical Corp.," should be deleted.

These revisions were prepared chiefly as a result of the receipt, by the Geological Survey, of data from the Virginia-Carolina Chemical Corp.

Other copies of the enclosed pages are being given the distribution indicated in the original report.

Sincerely yours,

13 U.C. Mikelver

W. H. Bradley Chief Geologist

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	50.	Phosphate	reserves,	Τ.	33	s.,	R.	25	E,	•	•	•	o	•	•	•	•	106
	51.	Phosphate	reserves,	T.	33	s.,	R.	24	E.	•	•	•	•	a	•	•	•	108
	52.	Phosphate	reserves,	T.	33	s.,	R.	23	E,	•	•	0	•	•	•	•	•	110
	53.	Phosphate	reserves,	т.	33	s.,	R.	22	E.	•		•	•	•	•	•	•	112
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RESERVES OF PHOSPHATE IN THE LAND-PEBBLE PHOSPHATE FIELD HARDEE, HILLSBOROUGH, MANATEE, OSCEOLA, PASCO, AND POLK COUNTIES,

FLORIDA

by

J. B. Cathcart, C. G. Tillman, and H. B. Dutro

ABSTRACT

Investigations of the land-pebble phosphate deposits of Florida by the Geological Survey began in November 1947. This report presents the computation of reserves of phosphate rock in the northern part of the district. Reserves were computed from company data, and are broken down into measured, indicated, and inferred classes. Each class of reserves is further broken down into various grade categories. Total reserves of phosphate rock of all grades and all classes are 2,017,449,700 short tons.

INTRODUCTION

Investigations of the land-pebble phosphate deposits of Florida by the Geological Survey began in November 1947. Computations of reserves have been an important phase of the work to date, and this report represents the final computation of the reserves in the northern part of the district. Prospecting data are so meager in the southern part of the district, in Hardee and Manatee Counties, that the computation of reserves was done for the northern tier of townships only.

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-2-

We gratefully acknowledge the courtesy of various mining companies, without whose cooperation this report could not have been prepared. Seven companies are actively engaged in mining phosphate at the present time, and all companies have supplied reserve data to the Geological Survey. The American Cyanamid Co., the American Agricultural Chemical Co., Coronet Phosphate Co., Davison Chemical Corp., International Minerals and Chemical Corp., Swift and Co., and Virginia-Carolina Chemical Corp., turned over full information as to their reserves of phosphate; in addition, the Polk Phosphate Co., Independent Chemical Co., U. S. Phosphoric Co., the Atlantic Coast Line Railroad, and Wayne Thomas, independent consultant, gave us reserve data. Cores and logs of holes drilled by the Tennessee Valley Authority were also examined and sampled.

NATURE OF THE DATA

Company prospecting

All seven operating companies, three inactive companies, and Wayne Thomas turned over to the Geological Survey all prospecting information in their possession. This information included maps or logs showing hole locations, thickness of phosphate-bearing strata, grade in percent BPL, and tons of product per acre.

Prior to the introduction of flotation methods, about 1934, all prospecting was for coarse material, and only rock that was retained on a 14-mesh screen was saved. Since 1934, company prospecting has taken into account phosphate of flotation size as well as the pebble. Much of the land prospected for coarse phosphate previous to 1934 has not yet been re-prospected for the flotation-size material.

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Measured ore

The rock on 40-acre tracts on which 4 or more holes were drilled is classed as measured. For areas drilled prior to 1934, where only pebble data are available, the reserves of pebble are classed as measured, and flotation tonnages, where computed, are classed as indicated.

Indicated ore

The rock on 40-acre tracts where the drilling density is 1 to 3 holes, and on 40-acre tracts with no drilling, but which are adjacent to measured tracts, is classed as indicated ore.

Inferred ore

The rock on 40-acre tracts with no drilling, but which are adjacent to areas of indicated reserves, is classed as inferred. Areas which have not been drilled, but which are surrounded by areas of indicated or inferred reserves, have not been considered as reserves in the report because of several factors; (1) these areas may be broken up into small privately owned farm land, or town lots, and can not be purchased; or (2) these areas may have been drilled recently or are to be drilled in the future, so that further company information may add considerable to the computed reserves.

-6-

GRADE CATEGORIES

Each class of reserves has been broken down into grade categories on an arbitrary basis, but following closely the practice of the companies. The category greater than 75 percent B.P.L. corresponds closely to the company designation of high-grade ore, 70-75 percent to mediumgrade ore, and 65-70 percent to low-grade ore. Grades below 65 percent are considered by the companies to be non-economic, but are included in this report for completeness. Phosphate content unknown is used for those areas where tonnage was computed, but where no chemical assays were reported. Probably most of this tonnage can be divided proportionately among the various grade categories.

SUMMARY OF RESERVES

Table 1 summarizes data concerning tonnage and grade. This table was computed from the detailed figures given in tables 2-58.

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Table 1

Total Phosphate Reserves 1/

in the Land-Pebble Phosphate Area

Hardee, Hillsborough, Manatee, Osceola, Pasco and Polk Counties, Florida

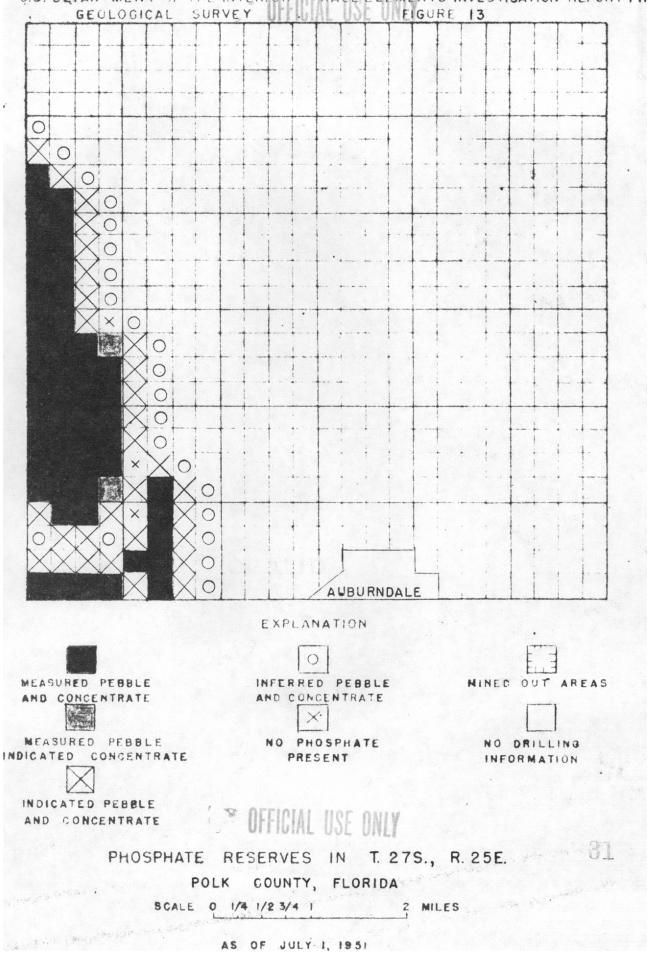
	13	Tota	'es irves	Inferred a	reserves	Indicated	reserves	Phosphate	
	Flotation concentrate (-14 /150 Mesh)	Pebble Fraction (/ 14 Nash)	Flotation concentrate (-14. / 150 !!esh)	Peoble Traction (/14 Mesh)	Flotation concentrate (-14 #150 Nesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-1/ /150 Nesh)	Petble fraction (AL4 Nesh)	content (percent P.P.L. 2/)
0	173,334,500	62,819,400	28,382,000	11,829,000	64,100,000	17,191,000	80,862,500	33,799,400	75
0	421,411,400	298,283,500	60,600,000	37,842,000	174,727,000	76,700,000	186,084,400	183,741,500	70-75
0	268, 504, 200	485,810,900	35,534,000	64,334,000	192,334,000	167,317,000	40,636,200	254,159,900	65-70
0	24,958,800	92,985,200	4,905,000	24,176,000	18,347,000	42,699,000	1,706,800	26,110,200	·0-65
ю	5,961,200	29,564,100	1,855,000	6,114,000	3,815,000	14,283,000	291,200	9,167,100	60 Content
0	62,984,400	90,832,100	100,000	200,000	62,876,000	30,598,000	8,400	60,034,100	ra known
			131.376.000	144.495.000	516,199,000	348,788,000	309.589.500	567,012,200	Subtotal

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Scort tons

1/2/ F.P.I. = Bone Phosphate of Line = percent P205 x 2.12.

As of July 1, 1951



U.S. DEPARTMENT OF THE INTERIOR TRACE ELEMENTS INVESTIGATION REPORT 141 GEOLOGICAL SURVEY FIGURE 13

Phosphate Reserves in T. 27 S., R. 25 E. 1/

Polk County, Florida

Phosphate	Measured	reserves	Indicated	reserves	Inferred	reserves	Totals		
content (percent B.P.L. 2/)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 f 150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	
75	591,000	2,180,100	200,000	600,000	· 400,000	600,000	1,191,000	3,380,100	
70-75	3,743,100	2,432,000	1,400,000	900,000	900,000	400,000	6,043,100	3,732,000	
65-70	1,017,000	89,600	300,000	100,000	100,000	100,000	1,417,000	289,600	
60-65	49,400	44,800	100,000				149,400	44,800	
60 Content	16,800						16,800		
unknown	296,800		100,000				396,800		
Subtotal	5,714,100	4,746,500	2,100,000	1,600,000	1,400,000	1,100,000			

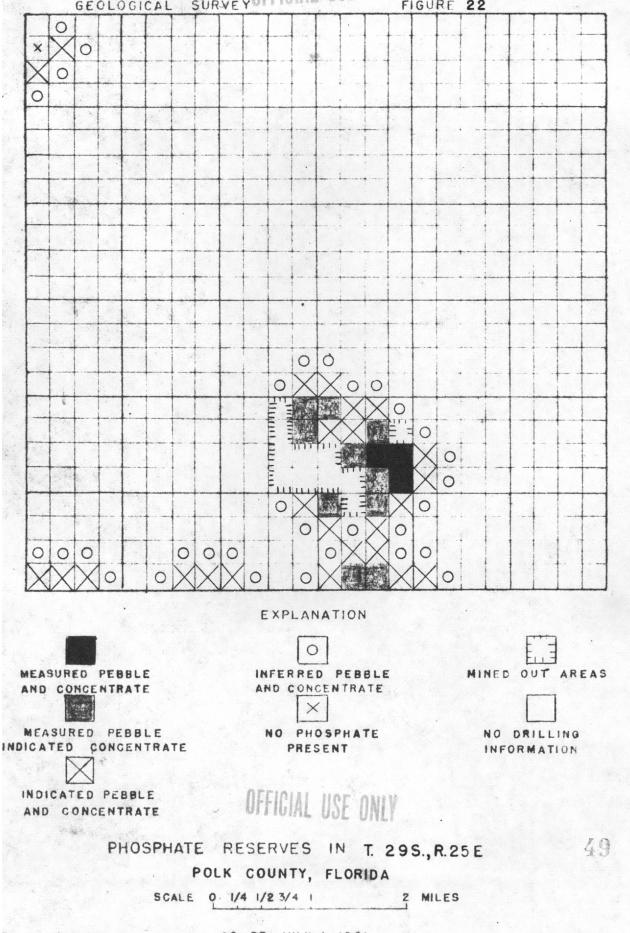
Grand total Measured, Indicated, and Inferred reserves

9,214,100 7,446,500

1/2/

Short tons B.P.L. = Bone Phosphate of Lime = percent $P_20_5 \times 2.18$.

As of July 1, 1951



U.S. DEPARTMENT OF THE INTERIOR TRACE ELEMENTS INVESTIGATION REPORT 141 GEOLOGICAL SURVEY FIGURE 22

AS OF JULY 1, 1951

Phosphate Reserves in T. 29 S., R. 25 E. 1/

Polk County, Florida

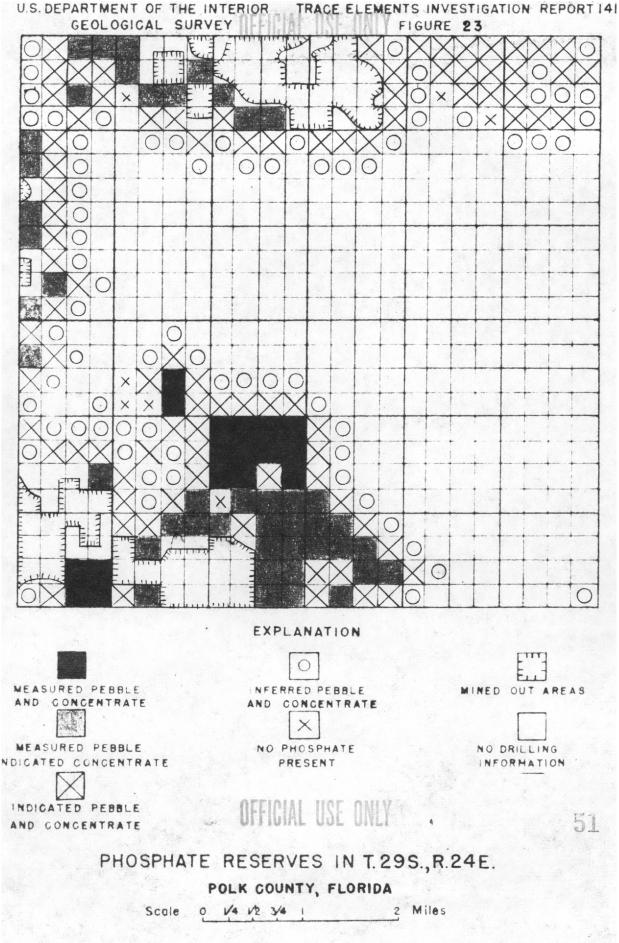
Phosphate	Measured	reserves	Indicated	reserves	Inferred :	reserves	Totals		
content	Pebble	Flotation	Pebble	Flotation	Pebble	Flotation	Pebble	Flotation	
(percent B.P.L. 2/)	fraction (14	concentrate (-14 / 150	fraction (/1 4	concentrate (-14 / 150	fraction (/14	concentrate (-14 /150	fraction (/14	concentrate	
D.1.10 - /	Mesh)	(-14 /1)0 Mesh)	Mesh)	Mesh)	Mesh)	Mesh)	Mesh)	Mesh)	
75 .			400,000	500,000	200,000	200,000	600,000	700,000	
70-75	153,500	40,700	1,000,000	1,100,000	1,000,000	1,000,000	2,153,500	2,140,700	
65-70	135,500	283,000	300,000	200,000	400,000	200,000	835,500	683,000	
60-65	108,000	22,200	100,000		300,000	100,000	508,000	122,200	
60 Content	107,700		100,000				207,700		
unknown		-	100,000	100,000			100,000	100,000	
Subtotal	504,700	345,900	2,000,000	1,900,000	1,900,000	1,500,000		1	

Grand total Measured, Indicated, and Inferred reserves

4,404,700 3,745,900

Short tons B.P.L. = Bone Phosphate of Lime = percent $P_2O_5 \ge 2.18$. 1/2/

As of July 1, 1951



AS OF JULY 1, 1951

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Phosphate Reserves in T. 29 S., R. 24 E. 1/

Polk County, Florida

Phosphate	Measured	reserves	· Indicated	reserves	Inferred	reserves	Totals		
content (percent B.P.L. 2/	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 / 150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Nesh)	Flotation concentrate (-14 /150 Mesh)	
75	1,246,300	168,100	900,000	1,200,000	600,000	1,500,000	2,746,300	2,868,100	
70-75	4,305,500	735,100	2,600,000	2,700,000	2,200,000	1,800,000	9,105,500	5,235,100	
65-70	7,092,700	847,300	4,100,000	3,000,000	3,700,000	1,700,000	14,892,700	5,547,300	
60-65	1,059,000	168,000	1,100,000	200,000	500,000	100,000	2,659,000	468,000	
60 Content	17,400		200,000				217,400		
unknown	520,800		100,000		*		620,800		
Subtotal	14,241,700	1,918,500	9,000,000	7,100,000	7,000,000	5,100,000			

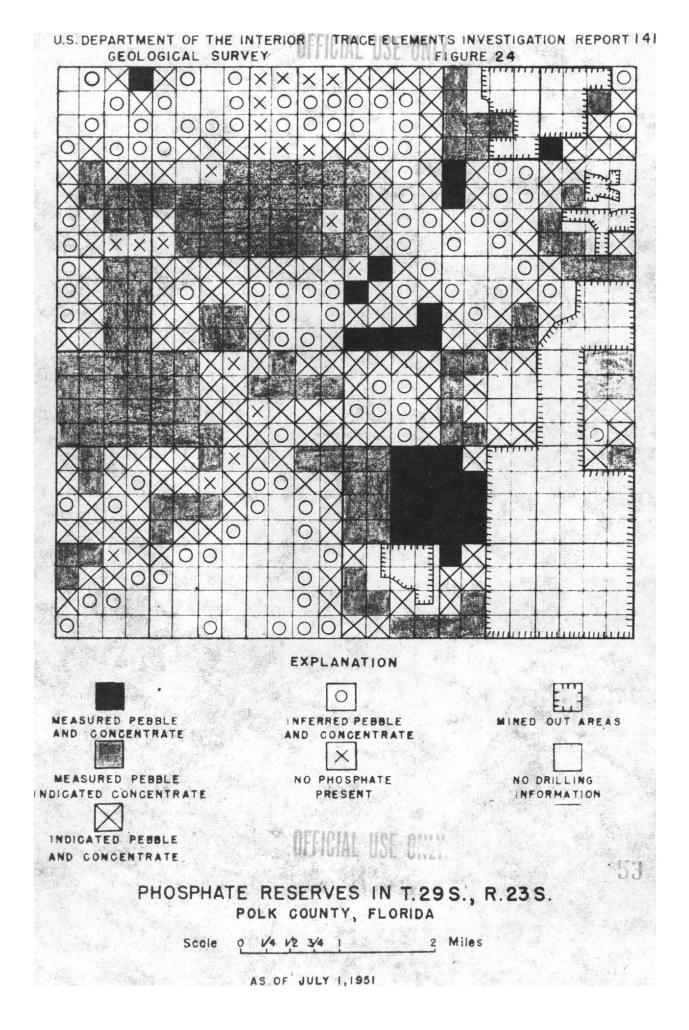
Grand total Measured, Indicated, and Inferred reserves

30,241,700 14,118,500

Short tons

1/2/ B.P.L. = Bone Phosphate of Lime = percent $P_20_5 \times 2.18$.

As of July 1, 1951



Phosphate Reserves in T. 29 S., R. 23 E. 1/

Polk County, Florida

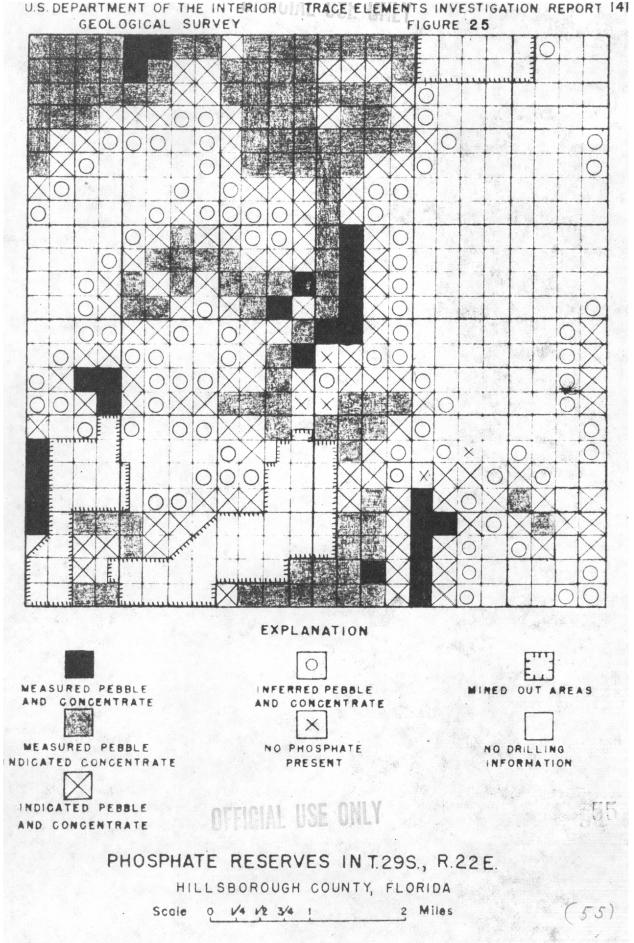
Phosphate	Measured	reserves	Indicated	reserves	Inferred	reserves	Totals		
content (percent B.P.L. 2/	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Kesh)	Flotation concentrate (-14 /150 Mesh)	
75	1,025,600	412,700	500,000	1,500,000	300,000	500,000	1,825,600	2,412,700	
70-75	3,119,400	925,800	2,000,000	4,000,000	800,000	1,600,000	5,919,400	6,525,800	
65-70	3,644,800	262,400	1,300,000	2,200,000	1,000,000	600,000	5,944,800	3,062,400	
60-65	150,500	67,200		200,000	100,000		250,500	267,200	
60 Content	129,100		100,000	300,000	200,000	1,000,000	429,100	1,300,000	
unknown	2,736,500		1,600,000	2,600,000			4,336,500	2,600,000	
Subtotal	10,805,900	1,668,100	5,500,000	10,800,000	2,400,000	3,700,000			

Grand total Measured, Indicated, and Inferred reserves

18,705,900 16,168,100

Short tons B.P.L. = Bone Phosphate of Lime = percent P205 x 2.18. 1/2/

As of July 1, 1951.



AS OF JULY 1, 1951

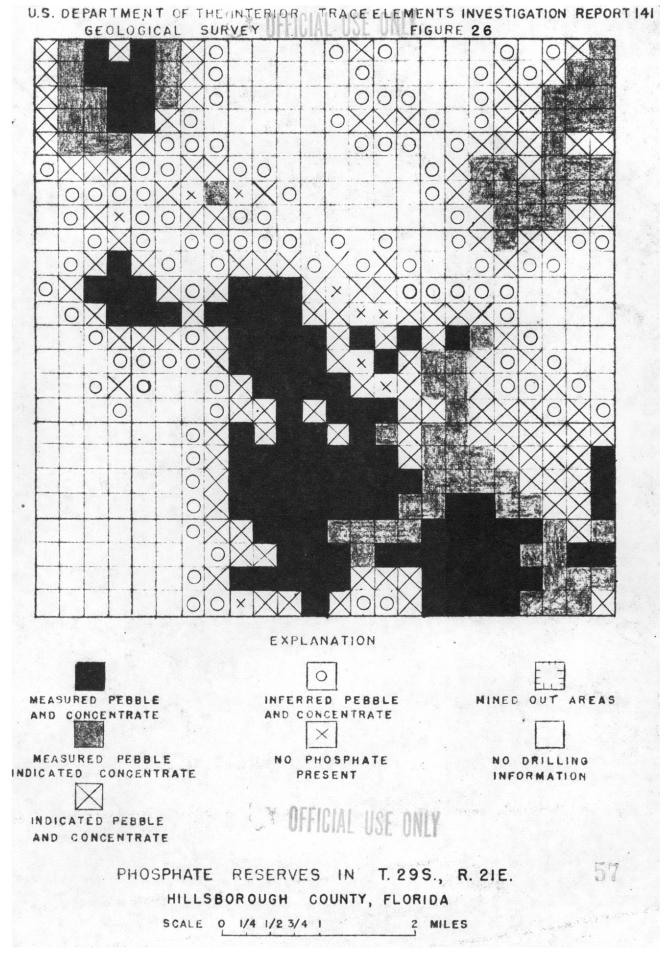
Phosphate Reserves in T. 29 S., R. 22 E. 1/

Hillsborough County, Florida

Phosphate	Measured	reserves	Indicated	reserves	Inferred	reserves	To	tals
content (percent B.P.L. 2/)	Pebble fraction (/ 14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Nesh)	Flotation concentrate (-14 /150 Mesh)
75	3,145,500	987,100	1,500,000	4,100,000	1,100,000	1,200,000	5,745,500	6,287,100
70-75	4,656,600	1,185,600	2,600,000	5,800,000	1,900,000	1,800,000	9,156,600	8,785,600
65-70	1,450,900	141,600	1,900,000	2,200,000	1,400,000	1,300,000	4,750,900	3,641,600
60-65	229,200	3,400	500,000	500,000	300,000	300,000	1,029,200	803,400
60 Content	70,700	a second				1. S. M. S.	70,700	See State
unknown	859,300		600,000	1,300,000			1,459,300	1,300,000
Subtotal	10,412,200	2,317,700	7,100,000	13,900,000	4,700,000	4,600,000		- Comp

Grand total Measured, Indicated, and Inferred reserves 22,212,200 20,817,700

1/ Short tons 2/ E.P.L. = Bone Phosphate of Lime = percent P205 x 2.18. As of July 1, 1951



AS OF JULY 1, 1951

Phosphate Reserves in T. 29 S., R. 21 E. 4

Hillsborough County, Florida

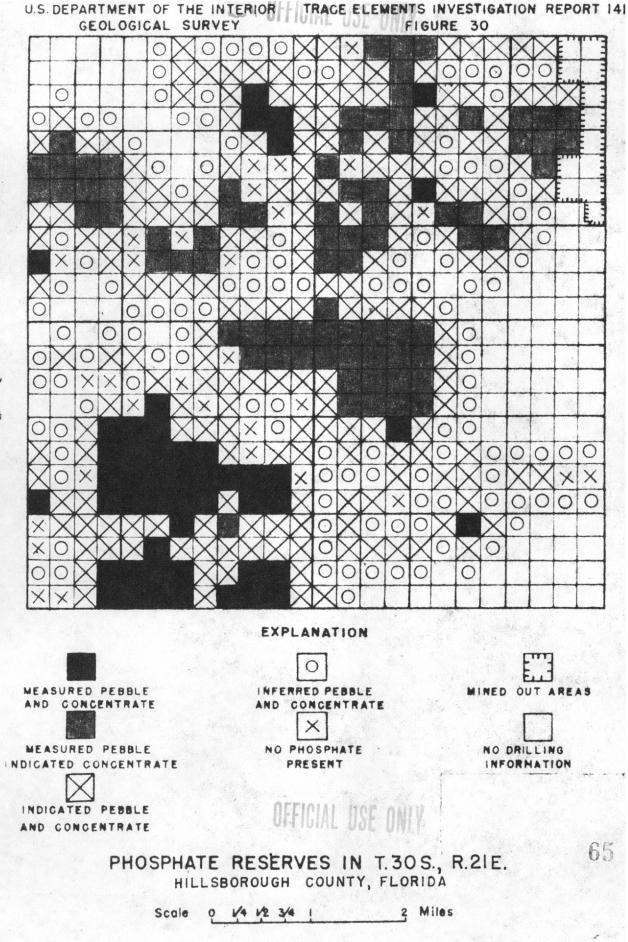
Phosphate	Measured	reserves	Indicated	reserves	Inferred	reserves	Tot	als
content (percent B.P.L. 2/	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Nesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble Fraction (/14 Nesh)	Flotation concentrate (-14 /150 Mesh)
75	5,732,200	4,873,800	2,600,000	3,100,000	1,700,000	1,300,000	10,032,200	9,273,800
70-75	5,387,800	3,570,500	3,500,000	3,100,000	1,900,000	1,600,000	10,787,800	8,270,500
65-70	1,501,600	199,300	1,400,000	800,000	100,000	200,000	3,001,600	1,199,300
60-65	444,100	19,000	400,000	100,000	200,000		1,044,100	119,000
60 Content	496,300	16,800	200,000	100,000	200,000		896,300	116,800
unknown	762,200		400,000	500,000			1,162,200	500,000
Subtotal	14,324,200	8,679,400	8,500,000	7,700,000	4,100,000	3,100,000		

Grand total Measured, Indicated, and Inferred reserves

OFFICIAL USE ONLY

26,924,200 19,479,400

1/ Short tons 2/ B.P.L. = Bone Phosphate of Lime = percent $P_2O_5 \times 2.1S$.



AS OF JULY 1, 1951

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Phosphate Reserves in T. 30 S., R. 21 E. 1/

Hillsborough County, Florida

Phosphate	Measured	reserves	Indicated	reserves	Inferred	reserves	Tot	als
content (percent B.P.L. 2/)	Peoble fraction (#14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)
75	1,276,400	1,809,600	800,000	1,800,000	200,000	300,000	2,276,400	3,909,600
70-75	2,438,600	880,900	2,300,000	3,100,000	1,000,000	1,300,000	5,738,600	5,280,900
65-70	972,400	204,400	1,600,000	1,600,000	400,000	600,000	2,972,400	2,404,400
60-65	97,900	11,200	600,000	600,000	200,000	200,000	897,900	811,200
60 Content	87,900	39,200	600,000	100,000	100,000		787,900	139,200
unknown	2,261,500		1,100,000	2,700,000			3,361,500	2,700,000
Subtotal	7,134,700	2,945,300	7,000,000	9,900,000	1,900,000	2,400,000		

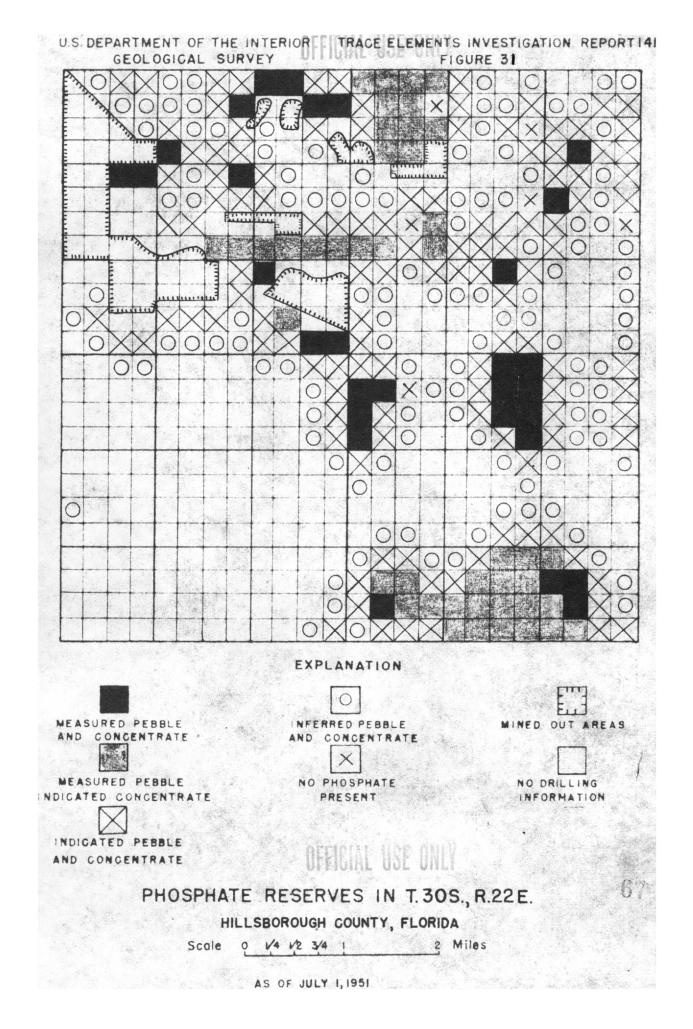
Grand total Measured, Indicated, and Inferred reserves

16,034,700 15,245,300

OFFICIAL USE ONLY

Short tons

E.P.L. = Bone Phosphate of Lime = percent $P_20_5 \times 2.13$. 2/



Phosphate Reserves in T. 30 S., R. 22 E. 1/

Hillsborough County, Florida

Phosphate	Measured	reserves	Indicated	reserves	Inferred	reserves	Tot	als
content (percent B.P.L. 2/)	Pebble fraction (#14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Lesh)	Flotation concentrate (-14 /150 Mesh)
75	1,032,100	611,500	1,200,000	2,100,000	800,000	1,400,000	3,032,100	4,111,500
70-75	4,120,000	1,002,400	2,700,000	5,300,000	2,100,000	2,500,000	8,920,000	8,802,400
65-70	2,571,000	564,500	2,500,000	3,700,000	2,200,000	2,100,000	7,271,000	6,364,500
60-65	266,600	16,800	500,000	100,000	300,000	100,000	1,066,600	216,800
60 Content	132,200		200,000		200,000		532,200	
unknown	56,000		100,000				156,000	
Subtotal	8,177,900	2,195,200	7,200,000	11,200,000	5,600,000	6,100,000		

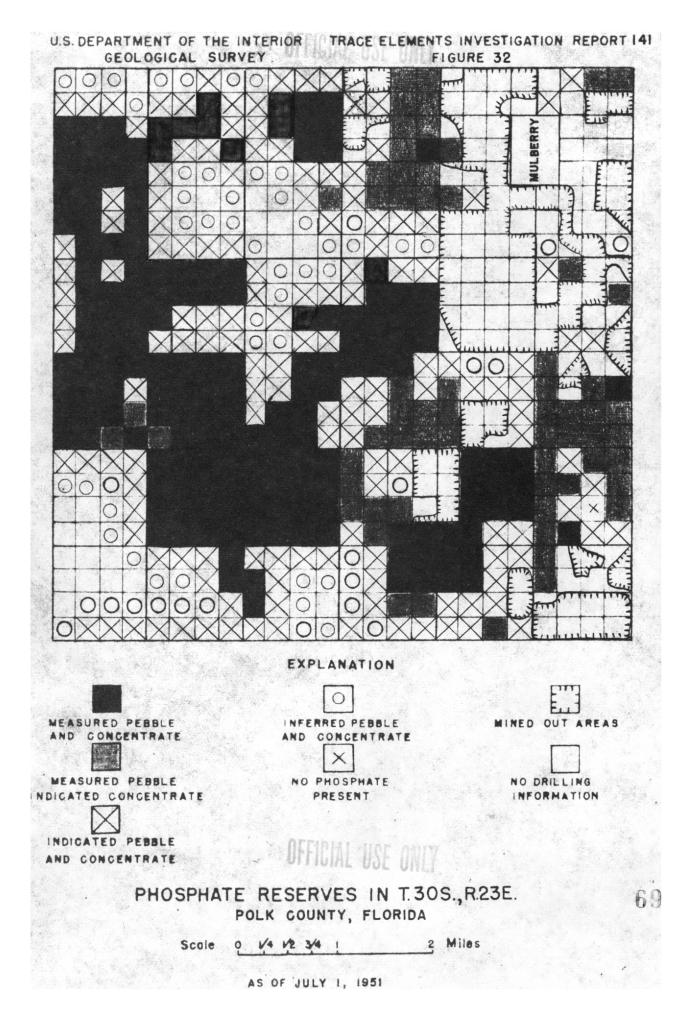
Grand total Measured, Indicated, and Inferred reserves

20,977,900 19,495,200

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OFFICIAL USE ONLY

1/ Short tons 2/ B.P.I. = Bone Phosphate of Lime = percent $P_2O_5 \times 2.18$.



Phosphate Reserves in T. 30 S., R. 23 E. 1/

Polk County, Florida

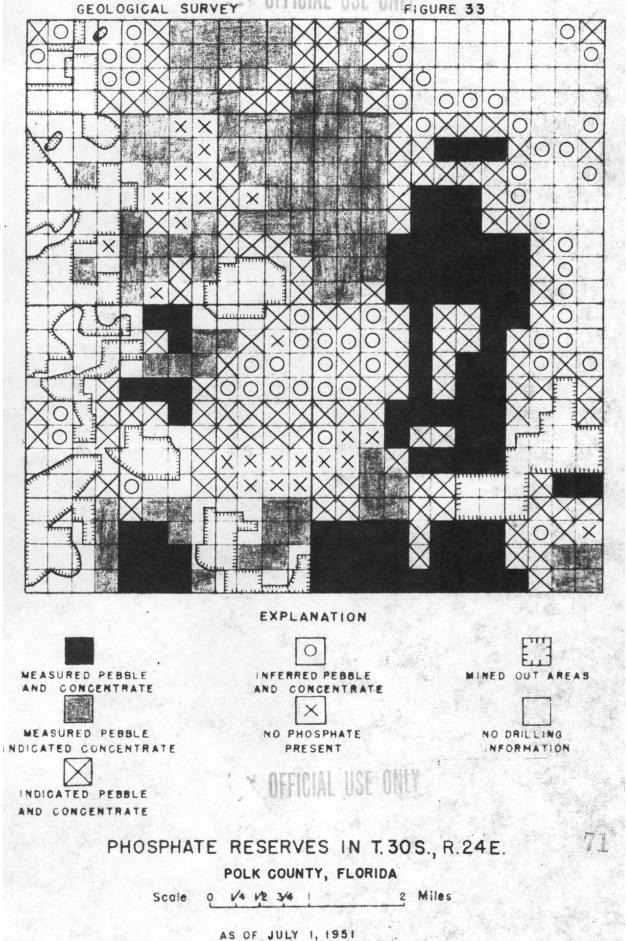
Phosphate	Measured	reserves	Indicated	reserves	Inferred	rescrves	Tot	als
content (percent B.P.L. 2/)	Pebble	Flotation concentrate (-14 /150 Mesh)	(714	Flotation concentrate (-14 / 150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)
75	398,500	61,700	200,000	200,000			598,500	261,700
70-75	5,920,200	6,764,300	3,800,000	5,100,000	1,600,000	2,200,000	11,320,200	14,064,300
65-70	32,643,700	5,057,700	16,300,000	7,600,000	6,500,000	1,900,000	55,443,700	14,557,700
60-65	2,995,400	621,000	1,900,000	1,500,000	1,000,000	200,000	5,895,400	2,321,000
60 Content	3,118,200	117,600	800,000	200,000	100,000	1.1	4,018,200	317,600
unknown	1,942,000		1,200,000	1,300,000	200,000	100,000	3,342,000	1,400,000
Subtotal	47,018,000	12,622,300	24,200,000	15,900,000	9,400,000	4,400,000		

Grand total Measured, Indicated, and Inferred reserves

80,618,000 32,922,300

OFFICIAL USE ONLY

1/ Short tons 2/ B.P.L. = Bone Phosphate of Lime = percent $P_2O_5 \ge 2.18$.



U.S. DEPARTMENT OF THE INTERIOR . TRACE ELEMENTS INVESTIGATION REPORT 141

Phosphate Reserves in T. 30 S., R. 24 E. 1/

Polk County, Florida

Phosphate	Measured	reserves	Indicated	reserves	Inferred	reserves	Tot	als
content (percent B.P.L. 2/	Peoble fraction (/14 Mesh)	Flotation concentrate (-14 / 150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mosh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Nesh)	Flotation concentrate (-14 /150 Mesh)
75	1,383,900	6,855,900	400,000	4,500,000	200,000	3,000,000	1,983,900	14,355,900
70-75	11,257,300	14,464,400	6,000,000	14,400,000	2,000,000	5,400,000	19,257,300	34,264,400
65-70	26,908,000	3,348,000	10,800,000	32,400,000	3,600,000	1,300,000	41,308,000	37,048,000
6 0-6 5	3,656,700	187,200	1,600,000	4,200,000	200,000	100,000	5,456,700	4,487,200
60 Content unknown	559 ,100 1,344,500	-	100,000 300,000	500,000 2,300,000	100,000		759,100 1,644,500	500,000 2,300,000
Subtotal	45,109,500	24,855,500	19,200,000	58,300,000	6,100,000	9,800,000		

Grand total Measured, Indicated, and Inferred reserves

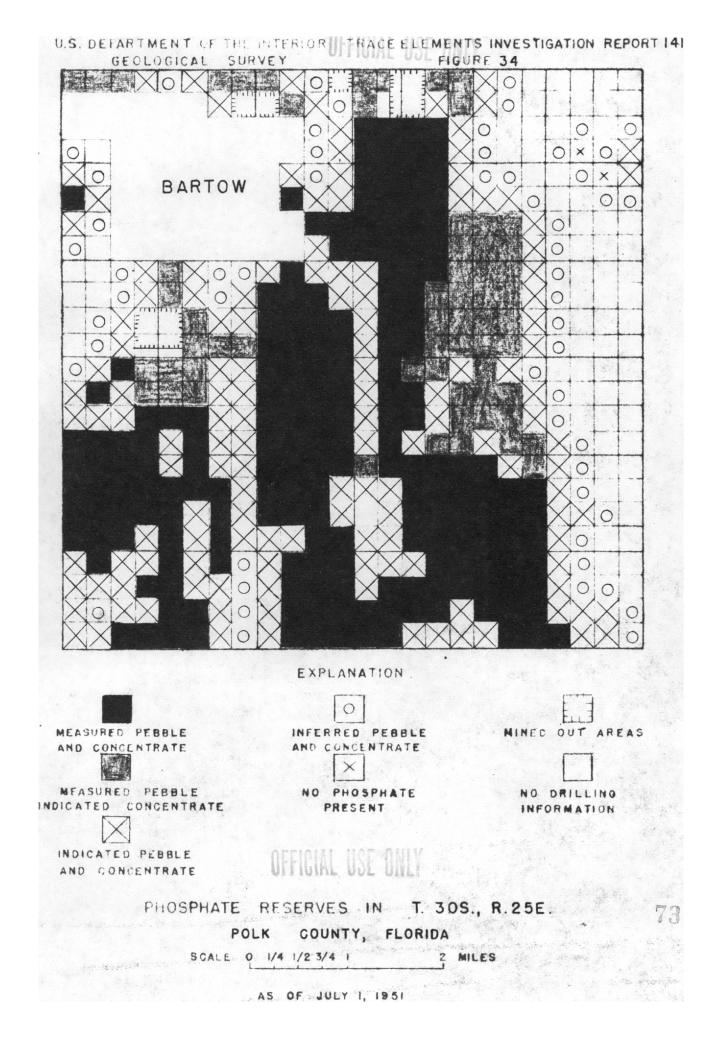
70,409,500 92,955,500

1/2/

Short tons B.P.L. = Bone Phosphate of Lime = percent $P_2O_5 \times 2.18$.

As of July 1, 1951

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Phosphate Reserves in T. 30 S., R. 25 E. 1/

Polk County, Florida

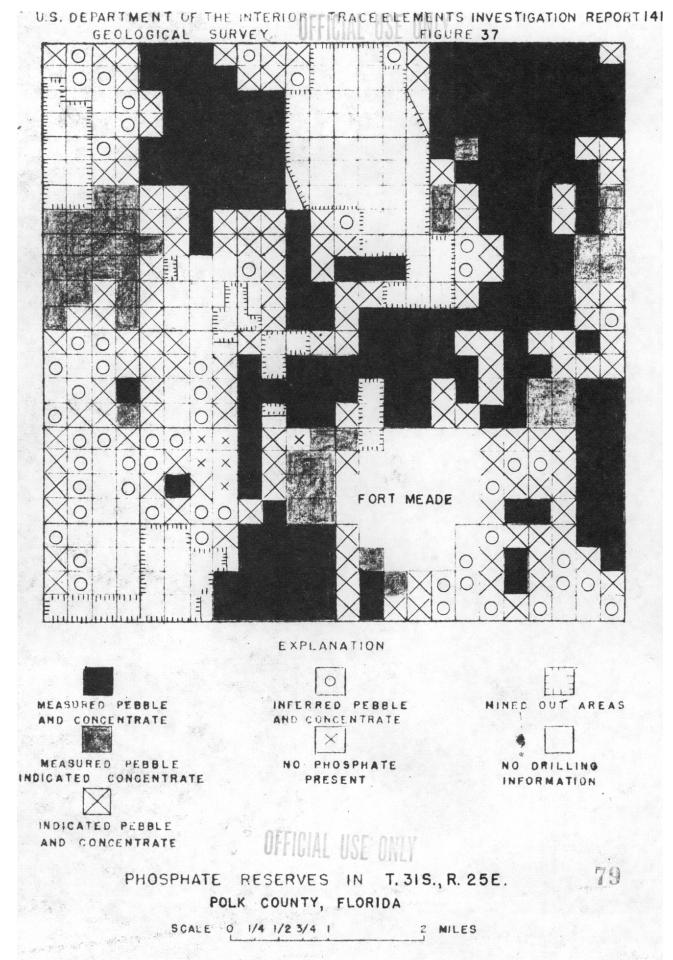
Phosphate	Measured	reserves	Indicated	reserves	Inferred	reserves	Tot	als
content (percent B.P.L. 2/)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Nesh)	Flotation concentrate (-14 /150 Mesh)
75	3,641,600	21,887,100	1,500,000	15,500,000	400,000	4,400,000	5,541,600	41,787,100
70-75	13,705,900	32,034,200	5,300,000	27,200,000	3,300,000	9,400,000	22,305,900	68,634,200
65-70	7,354,500	3,119,100	3,000,000	5,300,000	1,400,000	2,500,000	11,754,500	10,919,100
60-65	1,541,600	38,800	500,000	1,000,000	100,000	100,000	2,141,600	1,138,800
60 Content	767,200	14,000	800,000	200,000		200,000	1,567,200	414,000
unknown	510,800		200,000	1,800,000			710,800	1,800,000
Subtotal	27,521,600	57,093,200	11,300,000	51,000,000	5,200,000	16,600,000		

Grand total Measured, Indicated, and Inferred reserves

44,021,600 124,693,200

1/2/

Short tons B.P.L. = Bone Phosphate of Lime = percent $P_2O_5 \times 2.1S$.



AS OF JULY 1, 1951

Phosphate Reserves in T. 31 S., R. 25 E. 1/

Polk County, Florida

Phosphate	Measured	reserves	Indicated	reserves	Inferred	reserves	Tot	als
content (percent B.P.L. 2/)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)						
75	1,462,800	12,311,600	1,300,000	6,800,000	700,000	2,500,000	3,462,800	21,611,600
70-75	7,123,200	29,677,800	2,900,000	12,200,000	1,700,000	4,200,000	11,723,200	46,077,800
65-70	11,242,200	2,865,400	4,600,000	5,300,000	1,800,000	500,000	17,642,200	8,665,400
60-65	5,595,100	94,200	1,900,000	1,200,000	700,000	100,000	8,195,100	1,394,200
60 Content	600,000		500,000	900,000	100,000		1,200,000	900,000
unknown	2,330,200		1,000,000	6,000,000			3,330,200	6,000,000
Subtotal	28,353,500	44,949,000	12,200,000	32,400,000	5,000,000	7,300,000		

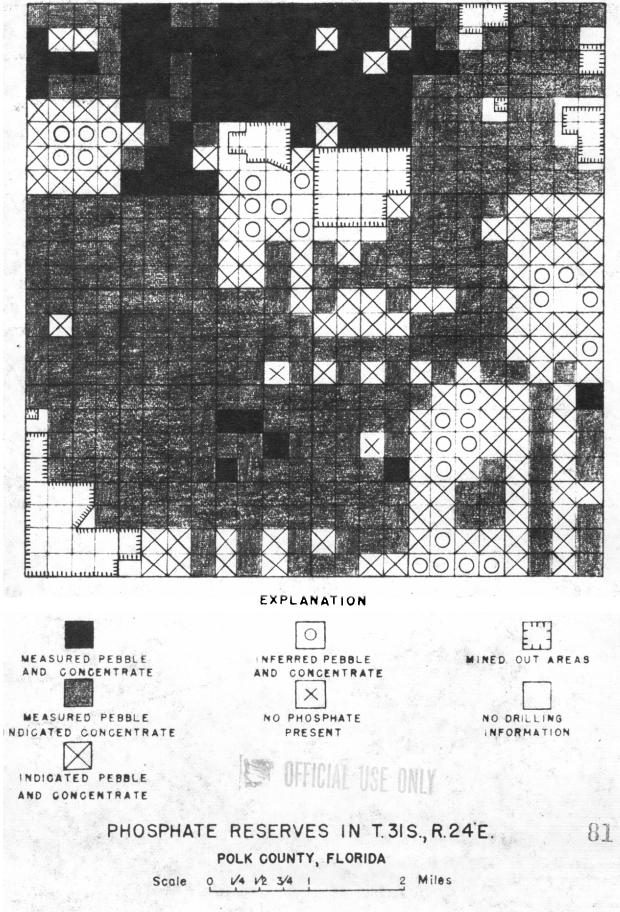
Grand total Measured, Indicated, and Inferred reserves

45,553,500 84,649,000

Short tons 1/2/

B.P.L. = Bone Phosphate of Lime = percent $P_20_5 \ge 2.18$.

U.S. DEPARTMENT OF THE INTERIOR TRACE ELEMENTS INVESTIGATION REPORT 141 GEOLOGICAL SURVEY



AS OF JULY 1, 1951

Phosphate Reserves in T. 31 S., R. 24 E. 1/

Polk County, Florida

Phosphate	Measured	reserves	Indicated	reserves	Inferred	reserves	Tot	als
content (percent E.P.I. 2/)	Peoble fraction (/14 Nesh)	Flotation concentrate (-14 /150 Lesh)	Pebble fraction (/14 Nesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flatation concentrate (-14 /150 Hesh)	Pebble Fraction (/14 Hesh)	Flotation concentrate (-14 /150 Mesh)
75	266,000	183,700		100,000			266,000	283,700
70-75	10,500,600	8,516,300	900,000	15,500,000	100,000	500,000	11,500,600	24,516,300
65-70	51,020,000	2,718,300	9,900,000	68,600,000	2,000,000	2,900,000	62,920,000	74,218,300
60-65	2,347,300		700,000	3,700,000	100,000	100,000	3,147,300	3,800,000
60 Content	132,000		200,000	100,000			332,000	100,000
unknown	7,227,100		3,400,000	14,000,000			10,627,100	14,000,000
Subtoțal ·	71,493,000	11,418,300	15,100,000	102,000,000	2,200,000	3,500,000		

Grand total Measured, Indicated, and Inforred reserves

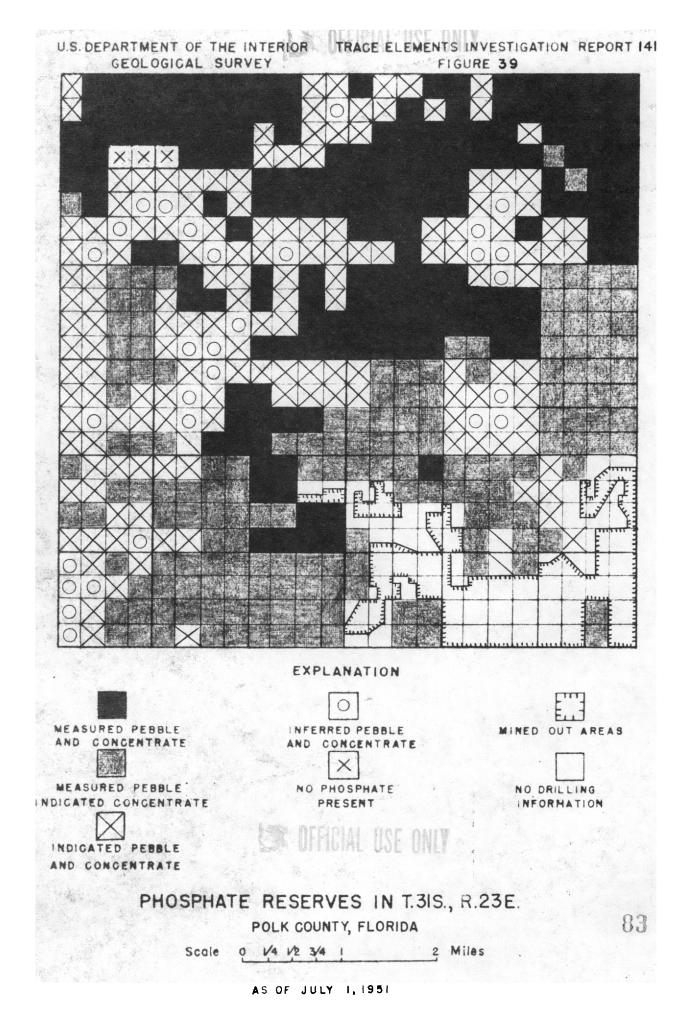
88,793,000 116,918,300

1/2/

Short tons E.P.L. = Bone Phosphate of Lime = percent $P_2O_5 \times 2.1C$.

As of July 1, 1951

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Phosphate Reserves in T. 31 S., R. 23 E. 1/

Polk County, Florida

Phosphate	Meastred	reserves	Indicated	reserves	Inferred	reserves	Tot	als	٦
content	Pebble	Flotation	Pebble	Flotation	Pebble	Flotation	Pebble	Flotation	7
(percent	fraction	concentrate	fraction	concentrate	fraction	concentrate	fraction	concentrate	
(percent B.P.L. 2/) (714	(-14 +150	(714	(-14 +150	(714	(-14 +150	(714	(-14 +150	
	Mesh)	Mesh)	Mesh)	Mesh)	Mesh)	Mesh)	Mesh)	Mesh)	C
75	386,400	632,800		100,000			386,400	732,800	M
70-75	16,930,200	19,762,100	6,600,000	12,400,000	1,000,000	1,500,000	24,530,200	33,662,100	
65-70	24,974,800	4,990,300	7,500,000	11,000,000	1,300,000	700,000	33,774,800	16,690,300	
60-65	533,100	56,000	300,000		100,000		933,100	56,000	
60 Content	123,400			100,000			123,400	100,000	
unknown	5,736,000		1,400,000	5,400,000			7,136,000	5,400,000	
Subtotal	48,683,900	25,441,200	15,800,000	29,000,000	2,400,000	2,200,000			1

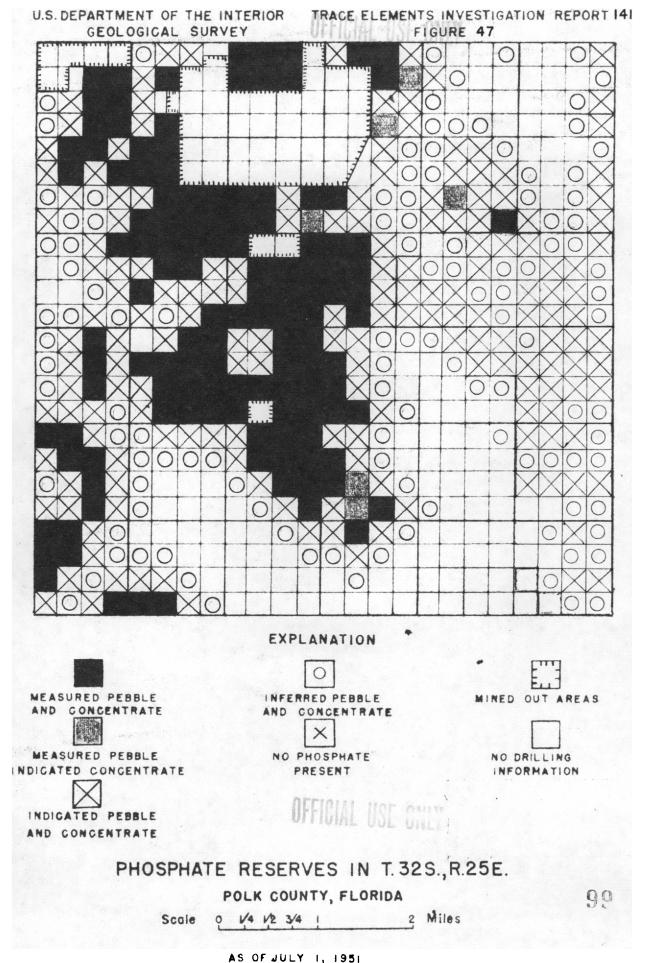
Grand total Measured, Indicated, and Inferred reserves

66,883,900 56,641,200

OFFICIAL USE ONLY

Short tons

1/ Short tons 2/ B.P.L. = Bone Phosphate of Lime = percent $P_2O_5 \ge 2.18$. As of July 1, 1951



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Phosphate Reserves in T. 32.5., R. 25 E. 1/

Polk County, Florida

Phosphate	Measured	reserves	Indicated	reserves	Inferred	reserves	To	tals
content (percent B.P.L. 2/	Pebble fraction) (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 'Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (#14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (714 Mesh)	Flotation concentrate (-14 /150 Mesh)
75	225,700	4,086,300		1,000,000		500,000	225,700	5,586,300
70-75	3,991,700	11,205,600	2,900,000	9,400,000	1,800,000	5,300,000	8,691,700	25,905,600
65-70	9,841,400	3,161,900	11,500,000	6,400,000	5,400,000	3,500,000	26,741,400	13,061,900
60-65	1,228,600	18,000	7,500,000	100,000	5,100,000		13,828,600	118,000
60 Content	286,700		1,500,000		900,000		2,686,700	
unknown	502,900		500,000	1,600,000			1,002,900	1,600,000
Subtotal	16,077,000	18,471,800	23,900,000	18,500,000	13,200,000	9,300,000		

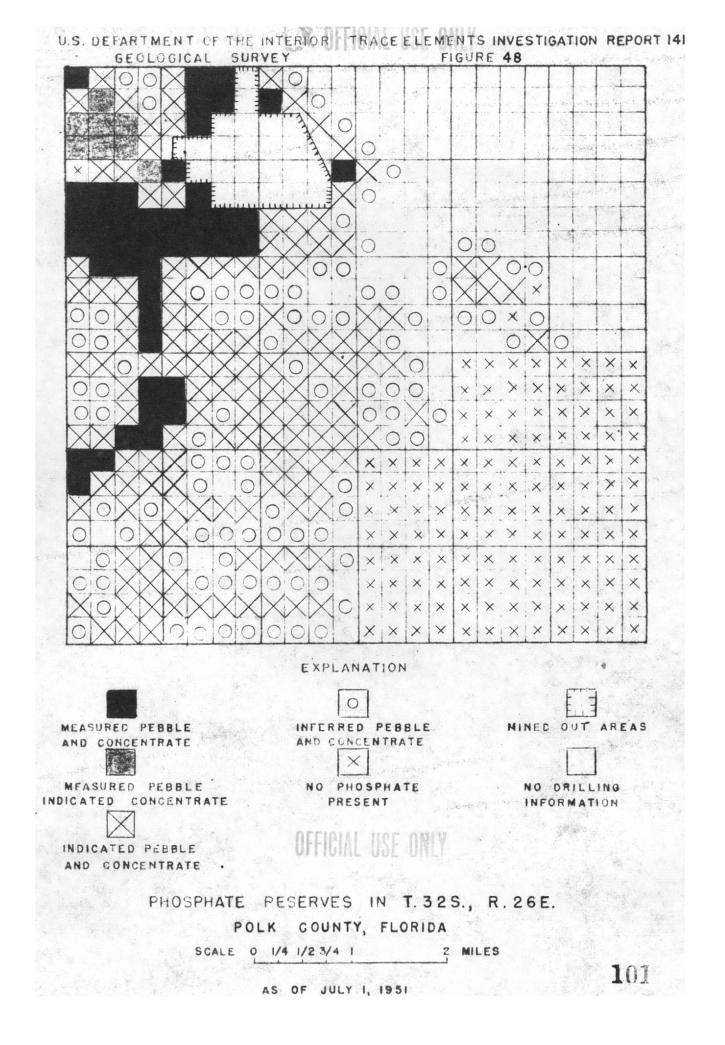
Grand total Measured, Indicated, and Inferred reserves

OFFICIAL USE ONLY

53,177,000 46,271,800

2

Short tons B.P.L. = Bone Phosphate of Lime = percent P205 x 2.18.



Phosphate Reserves in T. 32 S., R. 26 E. 1/

Polk County, Florida

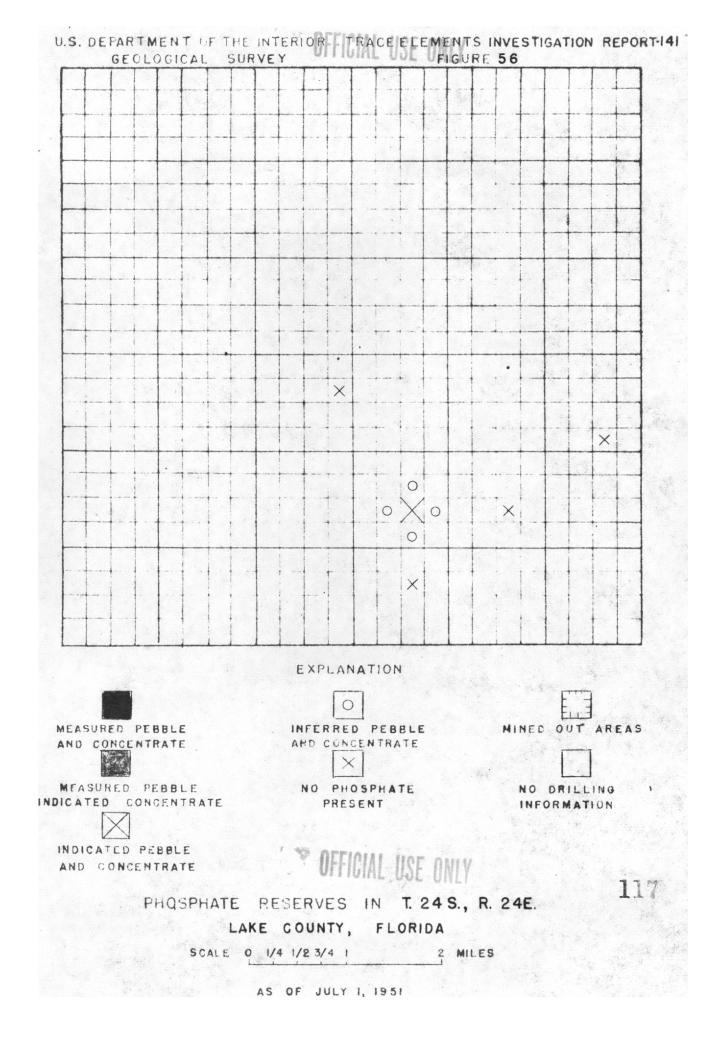
Phosphate	Measured	reserves	Indicated	reserves	Inferred	reserves	To	tals
content (percent B.P.L. 2/)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)						
75	170,200	1,092,600	100,000	900,000	100,000	700,000	370,200	2,692,600
70-75	1,757,000	3,011,000	1,000,000	3,000,000	600,000	1,400,000	3,357,000	7,411,000
65-70	1,124,400	1,609,200	8,400,000	5,700,000	3,300,000	2,800,000	12,824,400	10,109,200
60-65	2,061,000	77,100	9,500,000	1,400,000	5,600,000	700,000	17,161,000	2,177,100
60 Content unknown	499,000	11,200	4,200,000	100,000	1,800,000		6,499,000	111,200
Subtotal	5,611,600	5,801,100	23,200,000	11,100,000	11,400,000	5,600,000		

Grand total Measured, Indicated, and Inferred reserves

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40,211,600 22,501,100

Short tons B.P.L. = Bone Phosphate of Lime = percent $P_20_5 \ge 2.18$. 1/2/



Phosphate Reserves in T. 24 S., R. 24 E. 1/

Lake County, Florida

Phosphate	Measured reserves		Indicated reserves		Inferred	reserves	Totals	
content (percent B.P.L. 2/)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)						
75								
70-75								
65-70								
60-65			20,000	15,000	60,000	60,000	80,000	75,000
60 Content unknown		- 44 -	20,000	15,000	60,000	60,000	80,000	75,000
Subtotal			40,000	30,000	120,000	120,000		

Grand total Measured, Indicated, and Inferred reserves

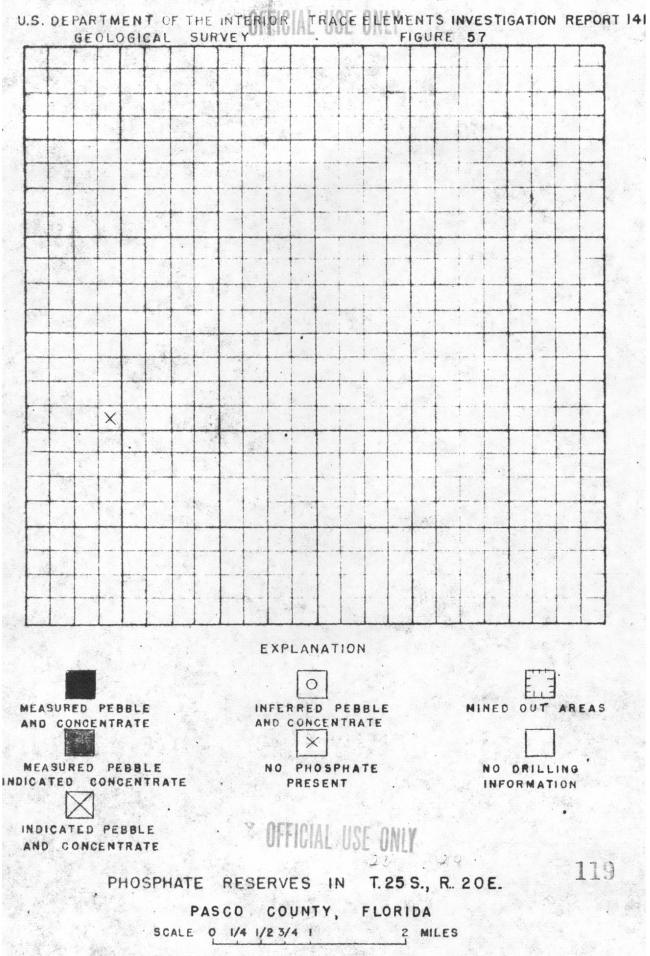
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160,000 150,000

110

1/ Short tons

2/ B.P.L. = Bone Phosphate of Lime = percent P205 x 2.18.



AS OF JULY I, 1951

Phosphate Reserves in T. 25 S., R. 20 E. 1/

Pasco County, Florida

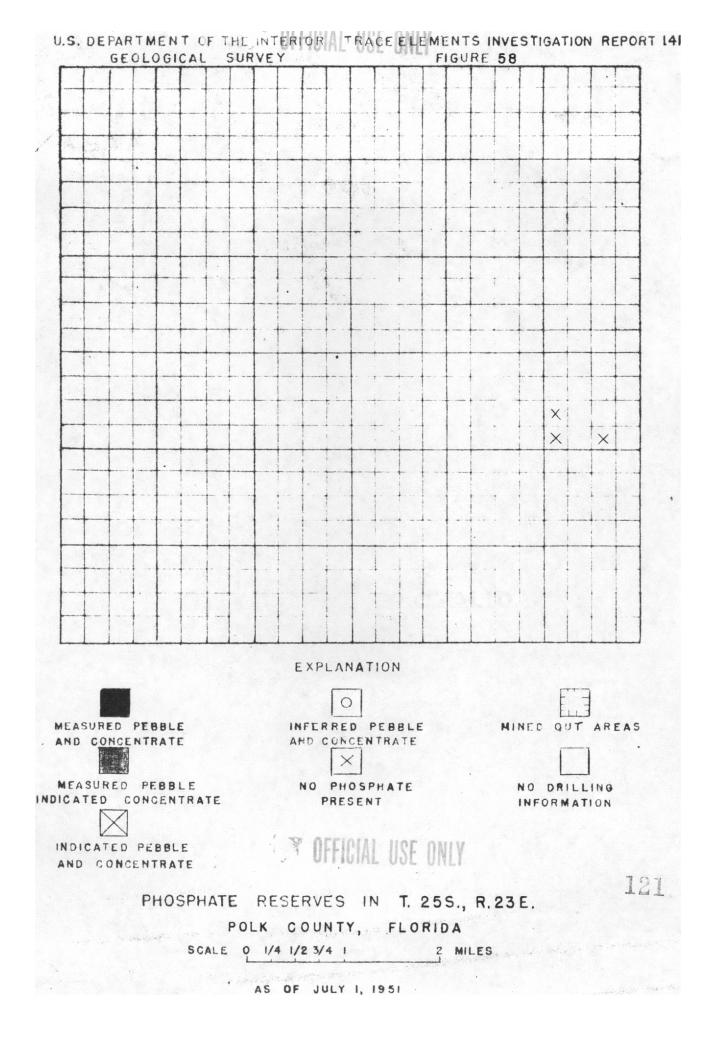
Phosphate content (percent B.P.L. 2/)	Measured reserves		Indicated reserves		Inferred reserves		Totals	
	Pebble fraction (A14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 / 150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)
75			-					
70-75 ·								
65-70		NO PHOSPH	TE REVEALEI	BY URILLING				
60-65								
60 Content unknown								
Subtotal	and the second sec	1 1			it is still	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		

Grand total Measured, Indicated, and Inferred reserves

AL

USE

Short tons B.P.L. = Bone Phosphate of Line = percent $P_2O_5 \times 2.18$. 1/2/



Phosphate Reserves in T. 25 S., R. 23 E. 1/

Polk County, Florida

Meas red machins		Indicated reserves		Inferred reserves		Totals	
Pebble fraction (/14 Nesh)	Flowaulon concent. the (-14 #130 Test)	Pebble fraction (/14 Wesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)	Pebble fraction (/14 Mesh)	Flotation concentrate (-14 /150 Mesh)
19 - 19 - 19 - 19 - 19 - 19 - 19 - 19 -				17 - 17 - 17 - 17 - 17 - 17 - 17 - 17 -			
	NO PHOSPH	TE REVEALER	BY DRILLING				1.3.25
							1
A DESCRIPTION OF A DESC	Peoble fraction (/14	Pebble Floration fraction concentrate (/14 (-14 /130 Mesh) Nest)	Pebble Flosaulon Pebble fraction concent: Le fraction (/14 (-14 / 100 (/14 Mesh) Nest) Nesh)	PebbleFlocationPebbleFlotationfractionconcentratefractionconcentrate(+14(-14(-14(-14	Pebble Flowaulon Pebble Flowaulon Pebble fraction concentrate fraction concentrate fraction (/14 (-14 /150 (-14 /150 Mesh Nesh Mesh Mesh Mesh	Pebble Flotation Pebble Flotation Pebble fraction fra	Pebble Floration Pebble Flotation Pebble fraction concentrate fraction fraction <th< td=""></th<>

1/ Short tons 2/ B.P.L. = Bone Phosphate of lime = percent $P_2O_5 \propto 2.18$.

