

Geology and Mineralogy

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

URANIUM IN THE MARINE PHOSPHATE DEPOSITS
NEAR RECIFE, STATE OF PERNAMBUCO,
NORTHEAST BRAZIL^a

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January 1957

Trace Elements Memorandum Report 952

^aThis report concerns work performed by the Brazilian National Nuclear Energy Commission and the United States Geological Survey (on behalf of the United States Atomic Energy Commission), and it is published with the permission of these Agencies.

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INTRODUCTION

A marine phosphate deposit is located about five kilometers north of the port area of Recife, Pernambuco, near a suburban area known as Olinda. Locally it is referred to as the Forno da Cal deposit and is owned by Fosforita Olinda, S. A., Domingos Azevedo, President, with headquarters in Recife. (See figure 1.)

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URANIUM CONTENT

Determinations made on several samples of beneficiated phosphate indicate a probable average content of 0.02 percent U_3O_8 . Commonly individual samples may contain as much as 0.03 percent U_3O_8 . The maximum content of samples examined to date is 0.036 percent U_3O_8 .

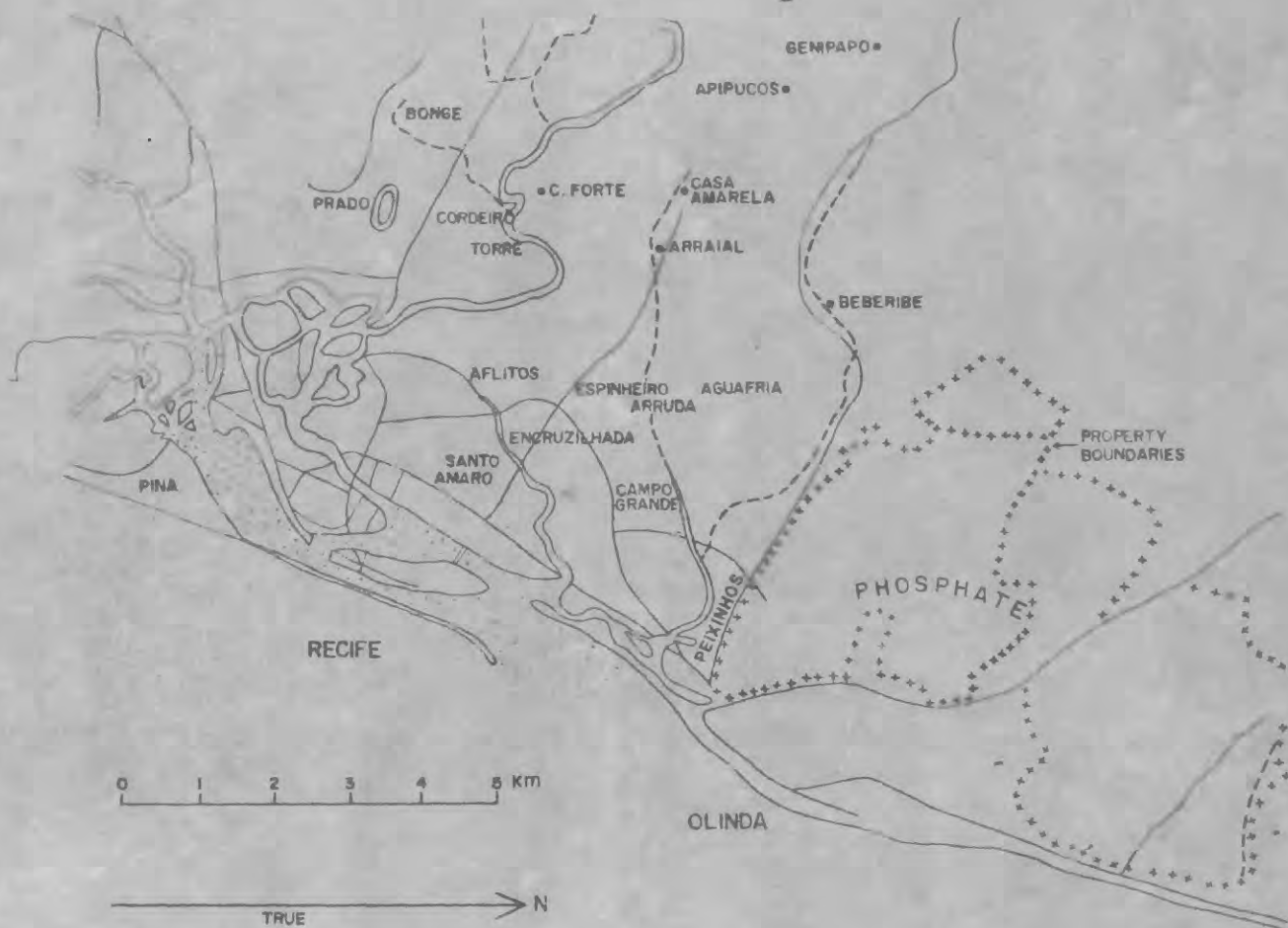


FIGURE 1 — City of Recife and environs showing location of phosphate areas.

FIGURA 1 — Cidade do Recife e vizinhanças mostrando a localização das áreas de fosfato.

GEOLOGY

The phosphate is found at the base of the Gramame formation, immediately overlying the Itamaracá formation, both of Late Cretaceous age.

The Gramame formation is a gray argillaceous limestone that is about 20 meters thick.

The Itamaracá formation is composed of gray to yellowish hard calcareous sandstone and friable sandstone which is rarely calcareous. Its thickness is probably more than 200 meters and it lies on Precambrian crystalline rocks. The friable sandstone is locally conglomeratic and contains carbonized plant remains. The hard or compacted sandstone is of marine origin, whereas the friable sandstone is of fresh-water continental origin. The two types of sandstones are interfingering facies of the same formation. (See cross section on figure 2.)

CHARACTERISTICS OF PHOSPHATE

The thickness of the phosphate zone at the base of the Gramame formation is variable, rarely more than four meters but as thin as 20 centimeters. The producing layer is one to four meters thick. The phosphate is yellowish-white, yellow, and gray. In general, the yellowish-white type is more granular, and the gray is more compact and hard. Apatite is the principal mineral of the phosphate which occurs in small nodules and fills the interior of fossils, including Foraminifera and coprolites.

Grade of the material is as much as 30 percent P_2O_5 (65 percent B.P.L.)^{1/} or higher after beneficiation. Samples of material ready to ship collected from the present washing plant contain 22 to 24 percent P_2O_5 . It is believed that these values are only slightly lower than the average grade of beneficiated phosphate material, which is said to average 26 percent P_2O_5 . Both friable and hard phosphate are found. The friable variety overlies the friable continental sandstone facies of the Itamaracá formation, and the hard variety overlies the compacted sandstone facies. The friable phosphate is higher in grade than the hard. (See cross section on figure 2.)

The deposit was drilled by the owners of the property in collaboration with the Departamento Nacional de Produção Mineral. It is reported that a reserve has been blocked out in the magnitude of 45 million tons of phosphate, under an overburden of 8 to 15 meters.

Present beneficiation facilities will only concentrate the phosphate up to 24 to 26 percent P_2O_5 (55 percent B.P.L.). A new plant soon to be opened is designed to produce 400,000 tons of phosphate a year of finely ground material containing 28 to 30 percent P_2O_5 (65 percent B.P.L.) to be used as fertiliser. A small amount of material containing 35 percent P_2O_5 will be produced.

^{1/} B.P.L. is bone phosphate of lime, an expression used by commercial companies to represent tricalcium phosphate as an artificial product. It is computed by multiplying percent P_2O_5 by the factor 2.18.

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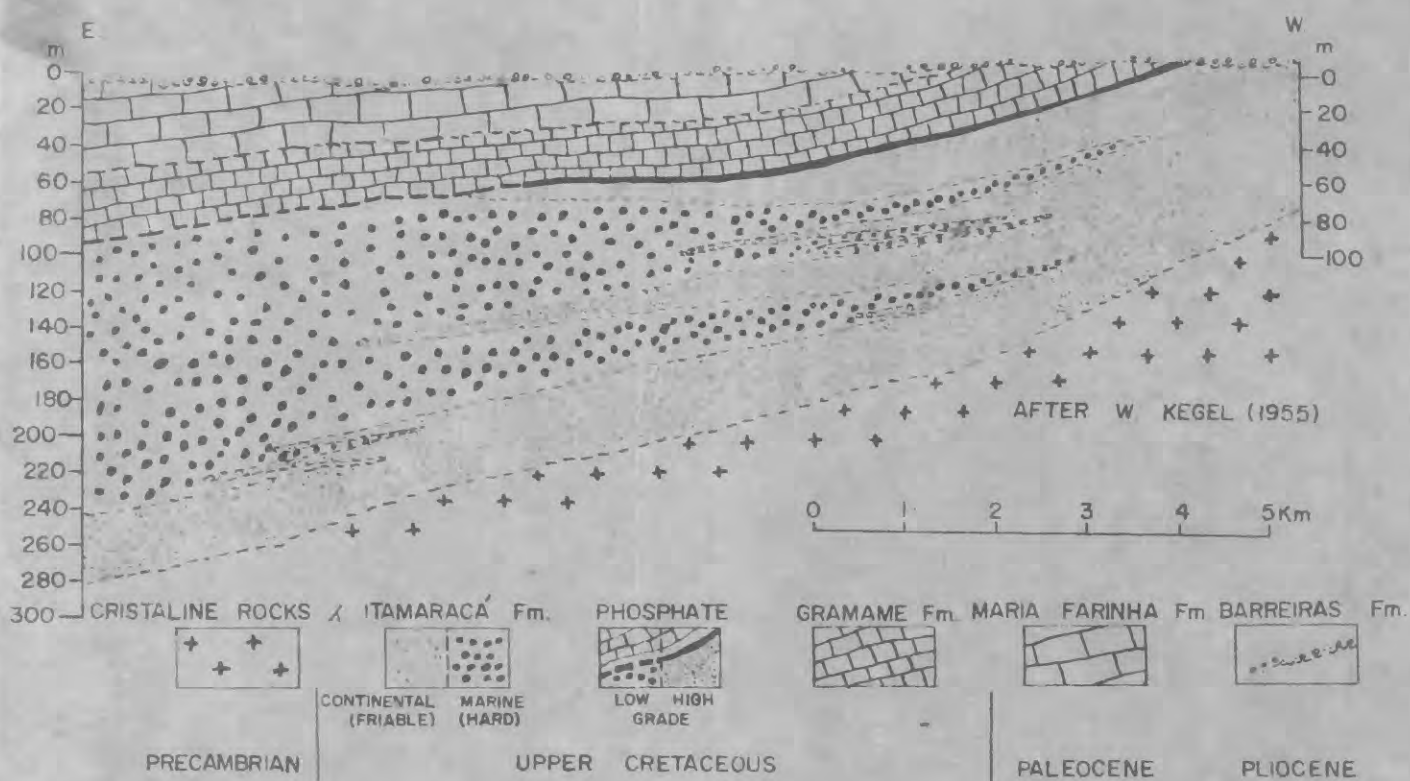


FIGURE 2 — Generalized stratigraphic cross section of sedimentary rocks north of Recife showing position of phosphate rocks.

FIGURA 2 — Secção estratigráfica generalisada das rochas sedimentares ao norte do Recife mostrando a posição das rochas fosfáticas.