

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

RECONNAISSANCE FOR RADIOACTIVE ROCKS
IN THE PAULO AFONSO REGION, BAHIA, BRAZIL*

By

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ABSTRACT

Ground and air traverses were made to the northwest, north and northeast of Paulo Afonso, Bahia, Brazil, covering Precambrian crystalline rocks and sedimentary rocks of the Jatobá series of Jurassic or Cretaceous age. No important radioactivity anomalies were found; samples from the two strongest anomalies had an equivalent uranium-oxide content of 0.002 percent and 0.006 percent.

INTRODUCTION

In September and October 1957 geologists Max G. White, Charles T. Pierson, Henry Mau and Donald D. Haynes, and geologic assistant Arnaldo Girotte of the official Brazil-United States group made several air and ground traverses for radioactivity in the Paulo Afonso region, Bahia. Precambrian igneous and metamorphic rocks and sedimentary rocks of the Jatoba series of Jurassic or Cretaceous age were checked for radioactivity. Special attention was given to the occurrences of coal and silicified wood.

The authors wish to thank the many officials of the São Francisco Hydroelectric Company (CHESF) for the cooperation and assistance extended, including making available the use of an airplane and a helicopter.

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GEOLOGY

The Paulo Afonso region is crossed by the Rio São Francisco (fig. 1) which meanders through a wide valley to Itaparica Falls where it enters a canyon 80 kilometers long cut into granites and gneisses.

The rocks exposed in the Paulo Afonso region are granites and gneisses of Precambrian age, and continental sedimentary rocks of the Jatoba series of Late Jurassic or Early Cretaceous age (Pinto and Sanguinetti, 1957). There are local occurrences of phyllites, quartzites and limestones similar to the Minas series of Precambrian age found in south Brazil (Alves and Morais, 1952).

The Precambrian rocks consist predominantly of rose granite, gray porphyritic granite, and veins of aplite and pegmatite. The Precambrian rocks were extensively peneplaned before the deposition of the Jatoba series.

The Jatobá series, which lies directly upon the peneplaned Precambrian granites and gneisses, consists of sandstone, shale and limestone that range from 150 to 200 meters in thickness. The rocks of the Jatoba series form "taboleiros" or mesas that are limited by abrupt escarpments which descend to a plain formed on the granites and gneisses.

The Jatobá series is fossiliferous, containing crustaceans and fish. Numerous fossilized tree trunks and some thin coal seams occur in the sandstone beds.

The Jatobá series, as well as the underlying Precambrian rocks, is cut by many faults which have produced graben-and-horst structures that exist today, in some places, as flat-topped mesas of sedimentary rocks overlying granite.

RADIOACTIVITY INVESTIGATIONS

Ground

A preliminary reconnaissance was made northeast of Paulo Afonso to locate the areas best adapted for aerial prospecting and the occurrences of coal and silicified wood which were to be checked later by an airborne radioactivity survey. The two coal occurrences that were located could not be examined in detail, one because of the high water level of the river and the other because of flooding of some open-cut mine workings.

A new underground power plant being built by the São Francisco Hydroelectric Company (CHESF) in the granite was also checked, the principal attention being given to the pegmatites.

About 250 kilometers of road traverse was done using a quarter-ton jeep and hand scintillation counters (fig. 1). The various traverses made are as follows:

Paulo Afonso-Gloria
Gloria-Volta do Moxoto-Caraibeiras-Tacaratu
Petrolândia-Gloria
Gloria-Brejo dos Burros
Gloria-Petrolândia (by the new road)
Paulo Afonso-Caiçara
Petrolândia-Barrinha-Icó-Campinho

Aerial

An airborne scintillation counter, mounted in a four-place airplane of the CHESF, was used for about two hours of flying the more accessible

outcrops of sedimentary rocks. The nature of the topography did not permit the use of the airplane except in the areas near Petrolândia and west of Tacaratu. A four-place helicopter, also owned by the CHESF, was used for about four hours of flying in the areas northwest, north and northeast of Paulo Afonso (fig. 1).

The more important sites of aerial coverage were: (1) mesas, which include Tacaratu, Caraiqueira, Quixaba and Cole, of sedimentary rocks, mostly sandstone, on the northeast margin of the Rio São Francisco; (2) the mesas to the southeast of the Rio São Francisco from Paulo Afonso to about 20 kilometers north of Gloria; (3) the Petrolândia plain northeast to Ico; and (4) the area around Caiçara (fig. 1).

Results

Several weak radioactive anomalies were found, while using the helicopter, at the contact of the Precambrian rocks and the sedimentary rocks of the Jatobá series. The two strongest anomalies (fig. 1) were checked on the ground with hand scintillation counters, and two samples, one of weathered gneiss and one of weathered granite, were collected. The gneiss contained 0.002 percent equivalent uranium oxide, and the granite contained 0.006 percent equivalent uranium oxide.

No anomalies were found in the sedimentary rocks of the Jatobá series either by airborne work or by the traverses made by jeep. Several coal samples, which were said to have been collected from the northeast bank of the Rio São Francisco six kilometers north of Petrolândia, were checked but were not radioactive.

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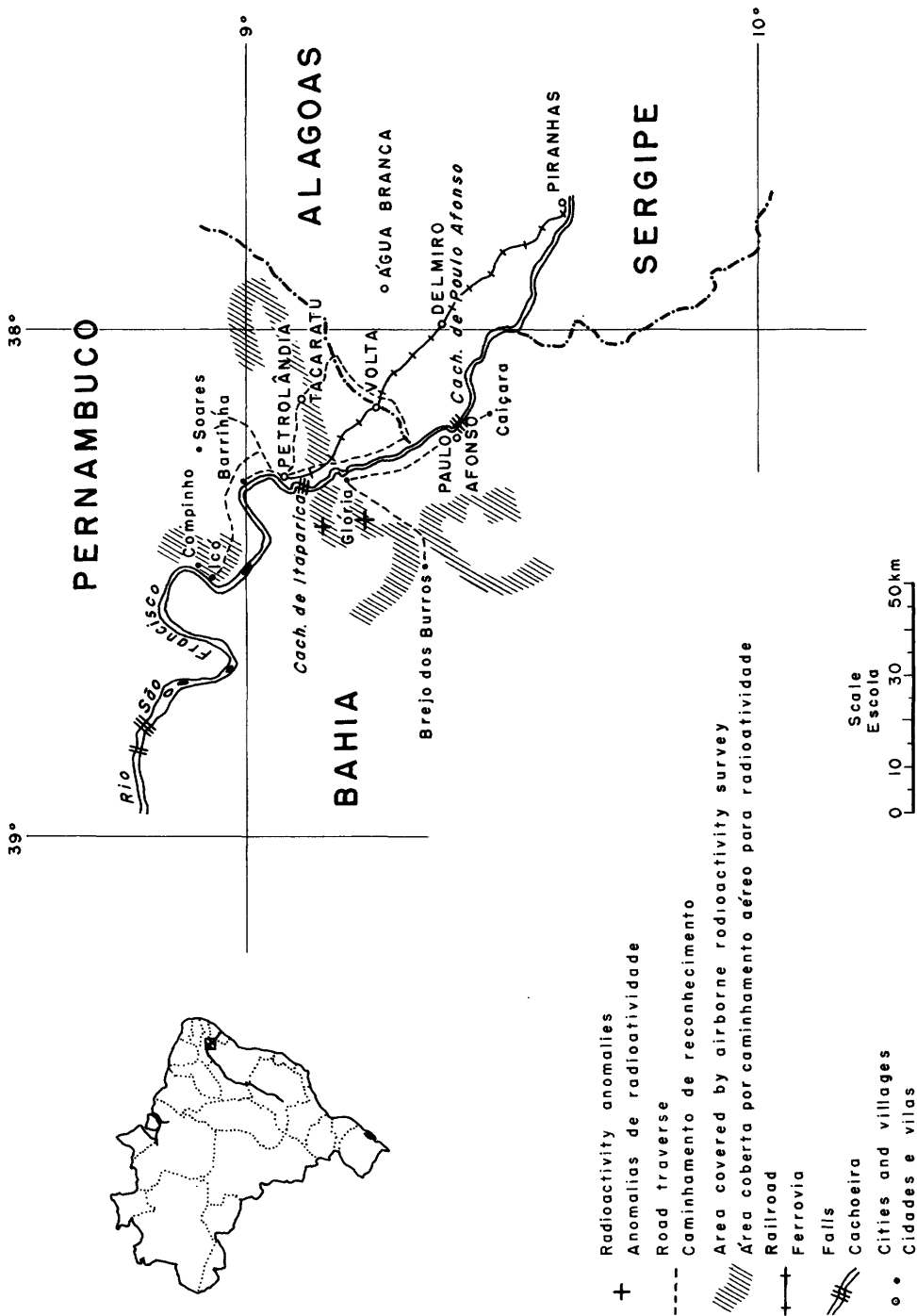


Figure 1 Sketch map of the Paulo Afonso, Bahia region showing areas covered by ground and air radioactivity traverses and radioactivity anomalies found by air.

Figura 1 Mapa esquemático da região de Paulo Afonso, Bahia, mostrando as áreas abrangidas por caminhamentos terrestres e aéreos para radioatividade e as anomalias verificadas por ar.

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