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RECONNAISSANCE FOR URANIUM IN THE
PROVINCES OF AYABACA AND HUANCABAMBA,
DEPARTMENT OF PIURA, PERU

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and

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JUNTA DE CONTROL DE ENERGIA ATOMICA DEL PERU

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CONTENTS

	<u>Page</u>
ABSTRACT	5
INTRODUCTION	5
Geography	5
Location and accessibility	5
Topography, vegetation and climate	7
Acknowledgements	7
GENERAL GEOLOGY	7
Paleozoic rocks	10
Jurassic to Triassic volcanic rocks	10
Cretaceous to Tertiary intrusive rocks	11
Structure	11
RESULTS OF RADIOMETRIC RECONNAISSANCE	12
REFERENCES	12

ILLUSTRATIONS

Figure 1. Map showing location of Ayabaca and Huancabamba, Department of Piura, Peru	6
2. Generalized geologic map of Ayabaca region	8
3. Generalized geologic map of the Huancabamba region	9

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ABSTRACT

In 1957 a radiometric examination of rock outcrops in the Ayabaca and Huancabamba areas of northwestern Peru was made in conjunction with a geologic search for structures favorable for the occurrence of uranium minerals. No anomalous radioactivity was detected, and the geologic setting is believed to be generally unfavorable for uranium mineralization.

INTRODUCTION

The purpose of this reconnaissance was to determine whether the rocks and structures in the areas of investigation were favorable for the occurrence of uranium. The areas were selected through study of the generalized geologic map of Peru (Bellido et al., 1956).

The work was done during one month of the Peruvian winter from August to September 1957. Scintillation and Geiger counters were used for radiometric examinations. Rock formations and their contacts were mapped on a more detailed scale than that of the geologic map of Peru (Bellido et al., 1956).

GeographyLocation and accessibility

The areas investigated lie in northwestern Peru, largely in the Department of Piura but partly in the adjacent Department of Cajamarca to the east and south (fig. 1). Ayabaca is at latitude 4° 40' S., longitude 79° 45' W.; Huancabamba is at 5° 15' S., 79° 20' W. The towns of Ayabaca and Huancabamba, the capitals of their respective provinces, are situated in the Cordillera Occidental, and can be reached by motor vehicle over dirt roads which are in fair condition during the dry season but are virtually impassable during the rainy season. Huancabamba can be reached by following the dirt road to the east at Kilometer 969 on the North Panamerican Highway, and continuing for 149 kilometers to the town. To reach Ayabaca the dirt road going east from the town of Sullana, at Kilometer 1072 on the North Panamerican Highway, is followed for 71 kilometers to Las Lomas, and then an additional 105 kilometers on the Ayabaca road to the town. Neighboring communities and the areas investigated can be reached by a system of trails from both Ayabaca and Huancabamba.

Topography, climate and vegetation

Relief in the area ranges from low to high, with altitudes ranging from about 400 to 3500 meters above sea level. The mountains are generally rugged, with steep slopes and youthful, V-shaped valleys. Vertical to near-vertical precipices exist in many places making access to rock exposures limited and difficult.

Topographic maps of the area (1953 edition; scale 1:100,000) were available from the Instituto Geografico Militar, Lima.

In the Huancabamba area the average daily temperature during the dry season from May to October, is high, but the evenings are cool. Ayabaca's daily temperature is lower than that of Huancabamba, and the nights are considerably cooler. During the rainy season from November to April rains are frequent and heavy, and most of the roads and trails in both regions are impassable.

Vegetation in both regions is lush and thick, and includes many varieties of tropical plants and cacti. Uncultivated coffee plants are abundant in the Huancabamba region. In many places the dense vegetation and thick soil mantle hinder prospecting and geologic mapping.

Rock exposures are scarce in both regions because of the thick soil cover and dense vegetation. The best exposures are in road cuts and along small tributary streams. The cliffs and precipices with good rock exposures are difficult to reach except by an experienced mountain climber.

Huancabamba has an abundant supply of water in the river of the same name, but the town has neither a water-supply system nor a sewage-disposal system. Ayabaca, although many kilometers from the Río Quiroz, the principal source of water in the region, has a water-supply system but no sewage disposal.

Acknowledgments

The authors are grateful for the assistance rendered by the police forces of the towns of Huancabamba and Ayabaca. They were instrumental in acquiring saddle horses and pack animals for trips into the interior. The friars of the Order of San Francisco also gave information and assistance, and various individuals in the area contributed to the progress of the field work.

GENERAL GEOLOGY

The western part of the Huancabamba region contains Paleozoic schists, gneisses and quartzites intruded by Cretaceous to Tertiary igneous rocks; the eastern part has Jurassic to Triassic volcanic rocks with sedimentary facies, which also are intruded by Cretaceous to Tertiary igneous rocks near their western edge. In the Ayabaca region Jurassic to Triassic volcanics with sedimentary facies include small Cretaceous to Tertiary intrusives (figs. 2 and 3).

Figure 2
GENERALIZED GEOLOGIC MAP OF AYABACA REGION

- 6 -

Figure 3

GENERALIZED GEOLOGIC MAP OF THE HUANCABAMBA REGION

Paleozoic rocks

These consist of schists, quartzites and a small amount of highly altered gneiss, soapstone and phyllite. The quartzite is the only rock in this group that is fairly resistant to the severe weathering conditions; it has a relatively fresh appearance, with color variations from light gray to black. In general it is massive, and contains well-developed joint and fracture systems, which are not extensive and display tight joints. Some banding is present. Quartz veinlets cut the rock in many places, but have no regular pattern. Bedding can be observed at some localities but is not common. Very small amounts of pyrite are present in a few outcrops.

Several types of schists occur, the most prevalent being a talc schist which crops out in numerous places. These talc schists range from white to gray or green, and brown to black, and their schistosity varies widely in direction and foliation. Soapstone is intermixed with the talc schist in many places. Some mica and chlorite schists are found in a few outcrops; these are green to black, and are harder and more durable than the talc schist.

Phyllite crops out at a few places in thin beds intercalated with talc schist, soapstone and quartzite; it ranges in color from dark gray to black.

Jurassic to Triassic volcanic rocks

Several distinct rock types are present in this group, including andesite, andesite porphyry, dacite, trachyte, trachyte porphyry, rhyolite, volcanic breccia, agglomerate and tuff.

The andesite and andesite porphyry show considerable variation in appearance due to the different stages of decomposition and disintegration in which they are found. Some are fresh and usually black, while others are so altered that the original rock scarcely may be recognized. The more compact of these rocks have some shallow, tight fractures which are mostly unmineralized; some contain quartz or calcite veinlets, and there is much iron oxide staining. Chloritization and kaolinization are well developed in places, and some of the feldspars are completely altered to clay.

The small amount of dacite is generally compact and slightly chloritized. At one place the dacite has a well-developed system of shallow joints and cross-joints. The predominant colors are light and dark gray. Some quartz veinlets are present.

Trachyte and trachyte porphyry are scarce; they are thin and commonly associated with andesite, andesite porphyry and tuff. Some of these rock types are fresh, but generally they are highly altered and contain much iron oxide. The usual color is dark gray and no favorable structures are visible.

Rhyolite crops out in several localities. It is usually white to light gray, but a few pink and light-red exposures were observed. The rock outcrops normally are fresh in appearance, and flow structure is visible in several places. Bedding and distortion are sometimes present and small, shallow fractures are common. The rhyolite resists weathering; only very slight alteration was observed.

The volcanic breccias and agglomerates have sparse and scattered outcrops, and their appearance varies greatly from place to place due to differential weathering. Some are fresh and show little or no alteration, while others are highly altered. Fragments of jasper, chalcedony and chert are found in some breccias; the particle size and degree of cementation are variable. Some of the fragments are embedded in an ash matrix, others in a tuff matrix. The agglomerates consist principally of pebbles of andesite in an ash or tuff matrix, and some show the effects of mechanical disintegration.

Tuff outcrops are more numerous than those of any other rock type in this group. The tuffs range in color from white to a deep purple, weathering to buff and brown; cementation is good to poor. Some are highly silicified and resistant to erosion, while others are greatly altered and stained with iron oxide. Agglomerates are often intercalated with the tuffs. Veinlets of calcite are sometimes visible in the more compact tuffs. Banded tuffs were observed at a few places, at times intercalated with bands of chalcedony.

Cretaceous to Tertiary intrusive rocks

The principal intrusive rocks are granodiorite, granite and diorite which intrude both the Paleozoic and the Jurassic to Triassic rocks. There are minor amounts of monzonite and quartz diorite. At some places the granodiorite is interfingering with quartzite. The granodiorite and diorite show little alteration, but the granite is highly weathered. Well-developed joints and fractures occur in the granodiorite and diorite. The granodiorite is light in color, and the diorite medium to dark gray; the granite is gray to pink and crumbly.

Structure

No major geologic structures were seen. There is some minor faulting and folding, and some of the rocks show well-developed joint and fracture systems. One set of well-developed joints in granodiorite strikes N. 60° E., with an average dip of 35° NW., but the joints are tight and shallow, with only limited lateral extension. Exfoliation and spalling have produced "cannonball" weathering at several places.

RESULTS OF RADIOMETRIC RECONNAISSANCE

No significant anomalies were detected during this field project. Radioactivity of twice the background count was recorded over: (1) highly chloritized volcanic rocks; (2) small, shallow unmineralized fractures in rhyolite and volcanic breccia; (3) phyllite; and (4) two local faults in talc schist. A small joint in granodiorite registered three times background. The average background on scintillation counters ranged from 0.01 to 0.05 mr/hr.

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