

United States Department of the Interior

Geological Survey

Airborne gamma-ray spectrometry and aeromagnetic survey
of the Freer area
in Duval, Live Oak, McMullen, and Webb Counties, Texas

by

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This report is preliminary and has not been edited or reviewed for conformity with U. S. Geological Survey standards and nomenclature.

Contents

	Page
Introduction	1
Purpose.	1
System	1
Survey	2
Preliminary observations	2

List of Illustrations

Figure 1. Area of airborne survey Freer, Texas

- 81 X 42 Plate I. Airborne gamma-ray spectrometry base map for Freer area in Duval, Live Oak, McMullen and Webb Counties, Texas. Scale = 1:50,000
- 22 X 36 Plate II. Contour map, ratio of bismuth ²¹⁴ to thallium ²⁰⁸, Freer area, Duval, Live Oak, McMullen, and Webb Counties, Texas. Scale = 1:50,000
- 22 X 36 Plate III. Contour map of bismuth ²¹⁴ for the Freer area in Duval, Live Oak, McMullen, and Webb Counties, Texas. Scale = 1:50,000
- Plate IV. Profiles for map line 1 of airborne 4-channel spectrometry, altitude, and magnetic data for the Freer area in Duval, Live Oak, McMullen, and Webb Counties, Texas.

Introduction

The topographic base map (Plate I), ratio bismuth ²¹⁴ to thallium ²⁰⁸ (Plate II), bismuth ²¹⁴ (Plate III), and the profiles for map line 1 (Plate IV) described in this report were obtained from an airborne gamma-ray spectrometry and aeromagnetic survey conducted by Geodata International on December 7-9, 1974 of the Freer area in Duval, Live Oak, McMullen, and Webb Counties, Texas. Map line 1 (Plate IV) is included in this report to demonstrate the type of data offered for every flightline.

Purpose

The Freer survey is part of a U. S. Geological Survey program of geophysical investigation of the South Texas uranium district. The gamma-ray spectrometry data were obtained to monitor the radioactive signatures of known ore-bearing geological units in a portion of the South Texas coastal plain. The units range from the Jackson (Eocene) coastward to the Goliad (Pliocene). The Freer area includes typical roll-front deposits between oxidized and reduced geochemical cells and also sand channel deposits in primarily reduced ground, with some known deposits localized along faults.

Aeromagnetic data were acquired in order to examine the spatial distribution of both shallow and deep contributions to the local magnetic field.

System

The data were collected utilizing a high sensitivity gamma-ray spectrometer with nine 11½ dia. by 4" thick NaI detectors, each having

a volume of 415 cubic inches. A ± 0.5 gamma proton precision magnetometer was used to measure the earth's magnetic field once every second. Corrections were made for altitude, airspeed, and cosmic radiation.

Survey

A total of 52 flightlines covering 1300 square miles were flown at one-mile spacing in the Freer area shown in Figure 1. Each flightline is approximately 25 miles long and was flown perpendicular to the strike of the geological units. Two tie-lines approximately 51 miles long were flown perpendicular to the survey lines.

Preliminary observations

Examination of the two contour maps, bismuth²¹⁴ and ratio bismuth²¹⁴ to thallium²⁰⁸, and also of the profiles for each flightline shows several positive uranium anomalies. When plotted on a topographic map, the anomalies are generally associated with an escarpment within the Catahoula Formation. The anomalies occur in an elongated trend from approximately 28°N: 98°25'W south to 27°N: 98°40'W. Magnetic anomalies of slight positive amplitude appear to occur in conjunction with some of the uranium anomalies along the trend.

