Analysis and Interpretation of Airborne Gamma- ray Spectrometry and Magnetic data for evaluation of Radioactive minerals and surface and subsurface magnetic bodies of Alm Agayeb area , West Dakhla Oasis , Central Western Desert , Egypt.

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B.Sc.

A THESIS SUBMITTED TO THE

Geophysics Dept., Faculty of Science, Ain Shams University

For The Degree Of

Master of Science

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GEOPHYSICS DEPARTMENT

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Analysis and Interpretation of Airborne Gamma- ray Spectrometry and Magnetic data for evaluation of Radioactive minerals and surface and subsurface magnetic bodies of Alm Agayeb area , West Dakhla Oasis , Central Western Desert , Egypt.

A Thesis Submitted for Partial Fulfillment for the Requirements of the Degree of Master of Science (M.Sc.) in Geophysics

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Note

The present thesis is submitted to the Faculty of Science, Ain Shams University in partial fulfillment for the requirements of the Master degree of Science in Geophysics.

Beside the research work materialized in this thesis, the candidate has attended ten post-graduate courses for one year in the following topics:

1) Geophysical field measurements.
2) Numerical analysis and computer programming.
3) Magnetic method.
4) Gravity methods.
5) Electromagnetic methods.
6) Radiometric methods
7) Electrical methods.
8) Geophysical exploration.
9) The shape of the earth.
10) Plate Tectonics.

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In fulfillment of the language requirement of the degree, he also passed the final examination of a course in the English language.

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ABSTRACT

The study area is located at 120 km at the west of the Dakhla Oasis, Central Western Desert of Egypt. The study area of this survey is bounded by latitudes 25° 23' 55” and 26° 31' 16" N and longitudes 26° 15' 24" and 27° 30' 9”. The sedimentary rocks occupy most of the study area and ranging from Jurassic age to Quaternary.

In Sep 24, 2014, Airborne Geophysics Department (AGD) of the Nuclear Materials Authority conducted a high resolution multi-channel gamma-ray spectrometric and magnetic survey covering an area of approximately 19,625 km^2 with 29,540 line kilometer over West Dakhla area, Central Western Desert, Egypt. The data were acquired along flight lines oriented in N-S direction using 4000 m line spacing and along tie lines oriented in E-W direction using 10000 m line spacing. Nominal flying elevation was used to be 100 m above ground floor.

The aim and purpose of this study is to analysis and interpret the airborne magnetic and spectrometric data for geologic mapping, locating the radioactive element anomalies. Application of composite image technique has been developed to interpret qualitatively airborne gamma - ray spectrometric survey data. The integrated results gained from these methods are illustrated in the interpreted radiometric lithologic unit map (IRLU) . The airborne magnetic data obtained from the survey over the study area has been analyzed by various techniques such as the reduction to the north magnetic pole (RTP), isolation of the regional and residual magnetic components using Gaussian filtering technique, calculation of the magnetic depth calculation. The integration of all these

techniques has been resulted in the construction of the interpreted magnetic basement tectonic map for the study area.

Three techniques of magnetic depth calculation were applied in the study area. The depth maps show that results are much closed to each other. These methods are the Source Parameter Image (SPI), Analytic Signal (AS) and Euler method.

The basement tectonic shows that the main affected system is NW -SE. Tectonic map also shows that there are another systems affect the area in NE-SW, E-W and NNE-SSW trends. Magnetic modelling profiles were constructed to confirm the interpreted basement structural relief of the study area.

These maps of the depths help us very much in delineating the general structures of basement surface. To confirm the interpreted magnetic basement tectonic framework of the studied area, a magnetic profile was modeled using three 2D- modeling technique. Close examination of this profile shows an excellent fit between the observed and calculated anomalies with an errors reach 0.942 nT, 0.837 nT and 0.891 nT .

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