# بسم الله الرحمن الرحيم


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# التوثيق الالكتروني والميكروفيلم

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# قسم

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# Mineralization Significance of Airborne Gamma Ray Spectrometric and Magnetic Data of Gabal Umm Naggat Area, Central Eastern Desert, Egypt

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**Salem Othman Mustafa Bourgieaa**

# ABSTRACT

The area under study lies in the Central Eastern Desert of Egypt. It covers about 1417 $Km^2$ in surface area and is located between Lat. 25° 10' 48" and 25° 32' 56" N and Long. 33° 56' 27" and 34° 18' 7" E.

The study area is characterized by both gentle and rough topography. It is traversed by many wadis (dry valleys) as W. EL Miyah, W. Umm Gheig, W. Umm Bisilla and W. El Jundi. The topographic values range from 404-1286 meters. The study area is primarily occupied by basement rocks that include various volcano-sedimentary rock associations and ophiolitic mafic-ultramafic rock associations. Quaternary sediments in the mapped area represented by wadi sediments are composed of detritus, sands, pebbles and rare boulders that are generally created by weathering of previously-existing basement rocks. The general structural setting of the area under investigation could be summarized to dominant trends of surface structural lineament in two main trends ENE-WSW and NNW-SSE and miner trends in NE- SW and NW- SE directions.

The radiometric gamma ray spectrometric data are in the forms of total counts (TC) in unit of (Ur), potassium (K) in (%), equivalent uranium (eU) and equivalent thorium (eTh) in (ppm). In addition of the ratios of eU/eTh, eU/K and eTh/K, these seven variables are then gridded, colored, and contoured for better qualitative interpretation of the radioelement distributions through the different surface exposed rock units. Zonation maps of TC, eU, eTh and 3D view of TC clearly demonstrate the contact and dimensions of alteration zone of albite granite of Umm Naggat pluton in terms of radiometric point of view. TC values range is from 28.3 to 75 in Ur, eU values range is from 11 to 38.1 ppm and eTh values range from 29 to 56 ppm and the dimensions is represented by two locality on oval shape. Both locality has E-W direction. Albite granite anomalous zone it could be considered as a primary target.

Factor analysis technique are used for carrying out the quantitative interpretation, with seven variables of TC, eU, eTh, K%, eU/eTh, eU/K and eTh/K to generate three factors F1, F2, F3, where those factors could facilitate the spatial correlation of features in the various data sets, and at the same time displayed variations which difficult to be determined. These factor scores are multiplied by 100 and then gridded, colored and contoured. Factor1

can be identified as the factor of integrated radioactivity or factor of uranium exploration. Factore2 used to different the rock type. Factor 3 refers to rock basicity.

Outlining uraniferous provinces zones was carried out in three ways according to Saunders and Potts (1976). Way one by compare the average of each rock unit with the published crustal average value. Way two construct point anomaly map and way three examining profiling over anomalous zones. The first way of defining anomalies is by calculating the average uranium values for each of the various rock units and comparing them with the published crustal average value for each rock type involved to find uranium-enriched units. A comparison of the calculated uranium average for each rock unit with its corresponding crustal average shows that the younger granites of the three plutons Umm Naggat , Umm Bisilla and El Unayji have uranium a values exceed the crustal average of acidic rocks. Second way in outlining the uraniferous anomalous zone based on calculation for properties where their data differ significantly from the mean background of the data. The high anomalous values are considered as the values equaling or exceeding at least two standard deviations from the calculated arithmetic mean values (X+2S) & (X+3S) for eU measurements, for a single point in each rock unit. This acceptable technique was chosen for distinguishing between the normal and abnormal measurements, which could be considered as anomalous values according to (Saunders & Potts, 1976) technique for calculating the significant factor of each gamma-ray spectrometric variable in each rock unit. Thirdly, stacked profiles construction along selected flight lines for outlined uranium anomaly enrichment in order to facilitate the follow up of the response of anomalous zones on the different spectrometric channels plus the topographic channel. These profiles have been shown in flight lines , L2390, L2400, L2570, L2580, L2600, and L2610. Most of these lines show high eU, eU/eTh and eU/K channels. The result of these three ways highlight to the location of three anomalous zones. These anomalies are considered to represent the first priority for ground follow-up. It was evident throughout this work that, most of the identified gamma-ray spectrometric anomalies was found to be closely related to the surface faulting directions prevailing in the region.

The airborne magnetic data obtained from the survey over the mapped 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. Three techniques of magnetic depth

calculation as the Source Parameter Image (SPI), Analytic Signal (AS) and Euler Deconvolution were applied. The deduced depth maps show that results are much closed to each other. The integration of all these techniques has been resulted in the construction of the interpreted magnetic basement tectonic map for the study area.

The constructed tectonic basement map shows that deep-seated structure of the study area oriented in NNW (Atalla trend) and WNW (Najd trend) as primary trends while the ENE to nearly E-W ranked as secondary trend, while the near surface structure of the study area oriented in NNW (Atalla trend) and N-S (East-African) as primary while the NE (Trans-African) to nearly NNE (Agaba) ranked as secondary trend.

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