SUMMARY AND CONCLUSIONS

Umm Alawi area, covering 500 km^2, occupies an important portion of the basement rocks of South Sinai. During the field study, the rock units of this area could be subdivided into seven prominent divisions; Viz, metagabbro and gneissose diorite, quartz diorite-granodiorite- adamellite association, quartz monzonite, pegmatitic granite (these rocks represent the pre-ring dyke), Rutig volcanics, ring dykes (rhyodacite, porphyritic quartz syenite with syenite and medium grained quartz syenite) and alkali feldspar granite (these rocks represent the ring-dyke).

The metagabbro and gneissose diorite are the oldest rock units; they are coarse grained, grey to black in colour and form low hills in the landscape . They exhibit both gradational contact relation and sharp, fault contacts with the surrounding rocks.

As regardsto the quartz diorite-granodiorite-adamellite association, the quartz diorite is grey, medium to coarse grained, speckled with black amphibole crystals which usually show preferred orientation grading laterally to a pronounced foliation.Contacts between quartz diorite and surrounding rocks are sharp, gradational and sometimes fault contacts. The granodiorite and adamellite have very coarse and medium grained textures; and are reddish white to whitish grey in colours. They form low hills closely associated with the metagabbro, quartz diorite and quartz monzonite. The outcrops

of these rocks exhibit marked exfoliation weathering with well developed boundring.

Quartz monzonite is medium to coarse grained, grey to reddish grey in colour and form low, highly weathered hills with some altered zones. Contacts with the surrounding rocks mostly exhibit sharp relations and are frequently delineated by faults.

The pegmatitic granite is very coarse grained, leucocratic and form low, highly weathered hills which commonly dissected by dyke swarm; specially in the north and northeastern parts of the study area.

The Rutig volcanics represent the base of Gebel Katherina. They are medium to fine grained, grey to reddish grey and black, acid to intermediate and assciated with pyroclastic sediments. They show angular and subhorizontal contacts with the granitoid rocks.

The ring dykes are composed of rhyodacite, porphyritic and micrographic quartz syenite and syenite. They invade the above mentioned rocks in the study area and have a greyish black, red and whitish red colours. The contact between the ring dykes and surrounding rocks are mostly fault contact.

The alkali feldspar granite is medium to coarse grained and vary in colour from pink , buff to pinkish yellow. It's boundary with the other rocks is always sharp. This rock unit intrudes all the above mentioned rock units and pertain to the younger granites or the Late Orogenic granites of the Eastern Desert.

Most of the granitoid rocks exhibit some sort of alteration. Therefore, the use of the major and some trace

elements will be geochemically insignifcant for the interpretation of tectonic setting. The Y, Nb and Th as well as some other trace elements have indicated that the studied rocks fall mainly in the field of " within plate granite "and partially in " volcanic arc granite " which are of different tectonic setting. The diversity of tectonic interpretation may be attributed to mixing in the upper mantle during intrusion.

The Rb/Y+Nb diagrams, include both fields of within plate and volcanic arc origins favouring mixing of magma during the formation of the present granitoid rocks.

Umm Alawi area is highly dissected by a great number of faults, of which 125 true and inferred faults were examined and statistically plotted on rose diagrams. Eight fault sets were distinguished in the study area ; E-W, ENE-WSW, NE-SW, NNE-SSW, WNW-ESE, NW-SE, NNW-SSE and N-S in decreasing order of age.

The dykes which invade the various rock units in the study area were recorded, statistically analyzed and plotted on a rose diagram. The results of this analysis show that the first phase of volcanicity (which followed the extrusion of Rutig volcanics) is mostly acidic and alternates with the basic and intermediate dykes (rejuvenation along NE-SW). They have the following trends; NNE-SSW, NE-SW and E-W . The second phase has the following trends ; NNW-SSE, NW-SE, ENE-WSW and WNW-ESE in a decreasing order of abundance. The third phase (Late Neogene dykes) has only a N-S trend and is represented by basalts and dolerites. Some sandstone outcrops with characteristics of Nubia facies were recorded filling the N-S fractures.

The field radiometric measurements and the laboratory analyses have revealed that there is a relationship between radioactivity and faults affecting the different rock units in the studied area. It was observed that some faults have radiometric values higher than that of the country rocks they intersect. This is because these faults are idealchannles for either passing or enriching of any magmatic or hydrothermal mineralizers. It was also revealed that there are three main fault sets controlling the enrichment of the radioactivity. The first set is the NE-SW which is intersected by NW-SE and recorded at Wadi El Kasis, where five spotted radioactive anomalies were recorded. The second set is the NW-SE Wadi Umm Gorierate which is intersected by N-S fault of Wadi Isbaiya. The third set is the ENE-WSW which is intersected by a NW-SE trend and both of them are dissected by NE-SW and N-S faults. This could be seen at the northern side of Gebel Umm Alawi along the contact between porphyritic quartz syenite and pegmatitic granite where four radioactive anomalies were recorded. Moreover, most fault sets which have N-S, NE-SW or ENE-WSW trends show higher radioactivity at the intersections with faults of other trends.

Most of the rock units in the study area have radioactivity and radioelements which agree well with the known world averages of these rock units, except along the faults, shear zones and some contacts which commonly have higher radioactivity.

As stated above, the geochemical results showed that there is an upper mantle mixing of the magma that has formed

these rocks. The same conclusion could be arrived from the results of the eU/eTh and $U_{content}/Th_{content}$ ratios which show that most granitic rocks were originated from mantle derived magmas and mixed with older cratonic crusts. Most of the rock units in the study area have standard deviations and variation coefficients higher than the corrosponding means. In a minority of them the variation coefficient exceeds 100% . These results indicate the presence of more than one statistical population ; a fact which confirms that these were derived from more than one magma .

The U content was found to be generally higher than the eU ,which may be attributed to the leaching of the highly mobile U under disequilibrium conditions.