CHAPTER - VIII
SUMMARY AND CONCLUSION

Nuweibi area is located in the Central Eastern Desert, 30 km north of Marsa Alam and about 33 km east of the Red Sea coast. It lies between latitudes $25^\circ\ 10'\ 30''$ and $25^\circ\ 15'\ 15''$ N and longitudes $34^\circ\ 29'\ 00''$ and $34^\circ\ 38'\ 29''$ E, covering an area of about 135 km^2. It is mainly composed of metasediments, serpentinites, metagabbros, grey granites, albite granites, post and pre-albite granite dykes.

Nuweibi area is drained by two main wadis, the first one is Wadi El-Nabi located at the north while the second is Wadi El-Nuweibi at the south. The two wadis run through the concerned area from west to eastward and drained their load from the surrounding country rocks. The downstream of the two wadis is intersecting and consequently poured their weathered product in the Wadi Dubur which runs to the east toward the Red Sea coast.

Weathering processes plays a major role in accumulation of the stream sediments through three essential stages which are weathering, transportation and deposition stages. The placers deposits of Nuweibi area have been formed under short torrential showers and mud flows. It is restricted to the central part of the wadi floor as well as the lower parts of the loose sediments. Consequently, the stream sediments of the Nuweibi area are considered the natural trap for the surrounding country rocks. Moreover, they act as reservoir for the accessory and some radioactive minerals.

The albite granite massif was subjected to high temperature multi stages metasomatism and belonged to be final stage of the Gattarian intrusive. This granite appears to be formed along the fault plane of N-S direction which in turn divides the massif into two main blocks eastern and western parts. It displays intermediate position between normal and subalkaline albite granite. This granite is magmatic origin and crystallized from magma through four steps. It considered the main host ore for columbite-tantalite recorded in the Nuweibi granite.

Recently, the studied area displays relatively economic importance due to the presence of some rare metal mineralization at Gabal Nuweibi granite which represented by fine disseminations of columbite-tantalite with subordinate cassiterite and other accessory minerals. Generally, columbite is the most widespread niobium mineral and makes for an important ore of the industrially useful metal. Niobium is used in alloys for improved strength.

The grain size distribution of the sediments of Wadi E-Nabi and Wadi El-Nuweibi displays heterogeneity nature where it revealed that they are mainly composed of pebbles, granules, sand and the size less than the very coarse silt, the spot surface sample mainly composed of sand beside the size less than very coarse silt.

The ternary diagram revealed that the sediments of Wadi El-Nabi are a mixture of gravelly sand and sandy gravel, it was of about 52.38% and 47.62% respectively, while Wadi El-Nuweibi sediments is gravelly sand, about 85.72%. Therefore the sand size fraction in concerned sediments is abundant and relatively exceeds the gravel size fraction.

The pebbles frequencies in Wadi EL-Nabi varies from 14.90 % to 33.23 % with an average 21.44 %, While in Wadi EL-Nuweibi it varies from 6.36 % to 24.12 % with an average of about 17.16 %. The granules frequencies in Wadi El-Nabi varies from 6.31 % to 12.50 % with an average of about 9.40 %, While in Wadi El-Nuweibi it ranges from 5.92 % to 12.07 % with an average of about 9.46 %. The pebbles size and granules are absent in the surface samples of both wades.

The sand frequencies in Wadi El-Nabi ranges from 55.59 % to 77.44 % with an average of about 68.58 % and the spot surface sample in the same wadi ranges from 85.87 % to 95.25 % with an average of about 91.80 %. In Wadi El-Nuweibi the sand sizes varies from 62.46 % to 85.13 % with an average of about 72.02 % and in the spot surface sample in the same wadi it ranges from 56.63 % to 97.12 % with an average of about 86.71 %.

The size less than the very coarse silt in Wadi El-Nabi varies from 0.16 % to 1.45 % with an average of 0.50 % and the spot surface sample in the same wadi it ranges from 0.19 % to 0.87 % with an average about 0.58 %. Wadi El-Nuweibi comprise size less than the very coarse silt varies from 0.45 % to 5.11 % with an average of about 1.36 % while in the spot surface sample it varies from 0.09 % to 4.17 % with an average of about 1.16 %.

The histograms represent Wadi EL-Nabi are bimodal class except sample No. Na3 that exhibit unimodal character and attains modal class lies in the coarse sand size. The primary modal class for samples No. Na5, Na6, Na7, Na8, Na9, Na10, Na11, Na12, Na13, Na15, Na19, Na20 and Na21 lies in the coarse sand size, while it lies in the medium sand size for samples No. Na1, Na2, Na4, Na14, Na16, Na17 and Na18. The secondary modal classes lie in the pebble size. On the other hand, the alluvial sediments of Wadi El-Nuweibi are generally bimodal except samples No. Nu7, Nu11, Nu12 and Nu13, which considers unimodal and their modal class, fall in the coarse sand size. The primary modal class lies in the coarse sand size except sample No. Nu14 which falls in the very coarse sand size. The secondary modal class lies in the pebble size.

The histograms represent the surface samples are bimodal distribution with the exception of sample No. S4 whish displays unimodal distribution and its modal class lies in medium sand size. On the other hand, the primary modal class of the rest samples alternate between the coarse sand size and medium sand size. The secondary modal class is lies in the size less than the very coarse silt. Generally, the bimodality of the studied sediment may be reflects the different sources from which the concerned sediments were contributed.

The Gaphic Mean values (Mz) in Wadi El-Nabi, ranging from -0.83ϕ to 0.31ϕ with an average of about -0.12ϕ, which mean that about 61.90 % of the studied samples lies in the very coarse sand and about 38.10 % lies in the coarse sand classes. On the other hand, the Graphic Mean values in the spot surface samples varies from 1.36ϕ to 1.92ϕ with an average of about 1.69ϕ, Which revealed that the spot samples lies in medium sand class.

In Wadi El-Nuweibi, the Graphic Mean values ranging form -0.28ϕ to 0.33ϕ with an average of about -0.01ϕ, which reflected that about 64.29 % of the concerned samples lies in the very coarse sand and about 35.71 % lies in the coarse sand classes. On the other hand, the graphic mean values in the spot surface samples in this wadi varies from 0.66ϕ to 1.17ϕ with an average of about 0.97ϕ, Which mean that about 33.33% lies in coarse sand and about 66.67% lies in medium sand classes. These results revealing that the trench samples coarser than that of the surface samples.

The values of inclusive graphic standard deviation (σ_I) in Wadi El-Nabi ranging from 1.82 ϕ to 2.37 ϕ with an average of 2.06ϕ, which mean that about 57.14 % of sediments are very poorly sorted and about 42.86 % of the sediments are poorly sorted. In the spot surface sample of Wadi El-Nabi the σI values varies from 0.91ϕ to 1.65ϕ with an average of about 1.26ϕ, which reflected that about 75.00% and 25.00% of sediments are poorly sorted and moderately sorted respectively.

In contrast, the σI values in Wadi El-Nuweibi, ranging from 1.29ϕ to 2.64ϕ with an average of about 1.93ϕ, which revealed that about 42.86 % of the sediment are very poorly sorted and about 57.14 % of the sediment are poorly sorted while in the spot surface samples the σI values ranges from 0.78ϕ to 0.90ϕ with an average of about 0.83ϕ, which mean that the spot sediment samples are moderately sorted.

Generally, the poorly sorted and very poorly sorted characters reflect the proximity of the sediments from their source country rocks, beside the similarity in the prevailing conditions. The poorly sorted character of the concerned sediment reflects the lack of effectiveness of stream action or the stream influence in not sufficient enough. Furthermore, the poor sorting is associated with the coarser sizes (Tucker, 1982) and may be subjected to the strong weathering and rapid deposition. On the other hand, the spot surface samples displays moderately sorting, this may be attributed to the long distance of transportation and interpreted as reworked sediments. In the present study it reflect the proximity of the source rocks where it derived from the neighbored country rocks, transported, mainly through stream running through valley course during rainy periods.

In Wadi El-Nabi the skewness values ranges from -0.30 to 0.01 with an average of -0.22, which mean about 4.76 %, 90.48 % and 4.76 % are very coarse skewed, coarse skewed and nearly symmetrical respectively while the fine skewed is absent. In contrast the spot surface sample of Wadi El-Nabi, the SK_I values varies from 0.26 to 0.31 with an average of about 0.28, which revealed that the fine skewed and very fine skewed are dominant and equally distributed.

On the other hand, the skewness values in Wadi El-Nuweibi ranges from -0.30 to 0.02 with an average of about -0.18, which mean about 14.29 %, 71.42 % and 14.29 % are a very coarse skewed, coarse skewed and nearly symmetrical respectively while the fine skewed is absent. On contrary, in the spot surface samples of Wadi El-Nuweibi the SK_I values ranging from 0.02 to 0.13 with an average of about 0.06, which reflected that about 66.67% and 33.33% are nearly symmetrical skewed and fine skewed respectively while the coarse skewed is absent. Therefore the skewness change from coarse skewed to fine skewed through the stream sediment samples and the spot surface samples respectively.

In Wadi El-Nabi the graphic kurtosis values varies from 0.76 to 1.07 with an average of 0.90, which mean about 57.14 % and 42.86 % are platykurtic and mesokurtic respectively. In the spot surface samples the graphic kurtosis values ranging from 0.85 to 1.54 with an average of about 1.20, which mean that it is equally distributed between the platykurtic, mesokurtic, leptokurtic and very leptokurtic. The graphic kurtosis values in Wadi El-Nuweibi varies from 0.86 to 1.27 with an average of about 1.04, which reflected that about 14.29 %, 57.14 % and 28.57 % are distributed between platykurtic, mesokurtic and leptokurtic respectively while in the spot surface samples the graphic kurtosis values ranging from 0.85 to 1.20 with an average of about 1.04, which revealed that half of studied samples is leptokurtic while the rest samples are equally distributed between the platykurtic, mesokurtic.

The relation between the Graphic Mean (Mz) and the Inclusive Graphic Standard Deviation revealed that, the sediment of Wadi El-Nabi and Wadi El-Nuweibi falls in the river zone suggested by Moiola and Weiser (1968). Most of the studied samples in Wadi El-Nabi falls in very poorly sorted and poorly sorted zones with respect to that found in Wadi El-Nuweibi which most of the studied samples falls in poorly sorted and very poorly sorted zones with Mz falls in the very coarse sand and coarse sand classes for both wadis. The relation between the Graphic Mean (M_Z) and the Inclusive Graphic Skewness (SK_I))showed that, the studied samples of Wadi El-Nabi and Wadi El-Nuweibi are mostly coarse skewed.

The relation between the Graphic Mean (M_Z) and the Graphic Kurtosis (K_G) showed that, the studied samples in Wadi El-Nabi are falls in the fields of platykurtic and mesokurtic while in Wadi El-Nuweibi are falls in the fields of the mesokurtic, leptokurtic and the platykurtic.

The relation between the Inclusive Graphic Standard Deviation (σ_I) and the Inclusive Graphic Skewness (SK_I) showed that, all studied samples of Wadi El-Nabi and Wadi El-Nuweibi are fall in the river zone according to the boundaries given by Friedman (1967) and Moiola and Weiser (1968). Consequently, the sediments of Wadi El-Nabi and Wadi El-Nuweibi displays river characters that deposits in fluviatile environment.

Petrographically, Nuweibi area characterized by different rock unites represented by serpntinites, metasediments, metagabbros, grey granites, pre-albite granite dykes, albite granite and post-albite granite dykes.

Metagabbros are dominated by hornblende metagabbros with local occurrence of quartz metagabbro. This rock composed of plagioclase, hornblende, biotite and quartz with accessory minerals such as titanomagnetite, sphene, zircon and epidote.

Albite granite composed of albite, quartz, mica and microcline with accessory minerals represented by sphene and fluorite. The action of hydrothermal solution represented by two ways,

a) taxobiokilitic texture which show two phase of formations, the first phase is represented by the fine anhedral crystals of plagioclase giving indication for magmatic origin and the second one is represented by large phenocrysts of quart giving indication for hydrothermal solution.

b) plagioclase show two phases of formation, the first phase includes small euhedral crystals giving indication of magmatic origin included in large subhedral to anhedral plagioclase which giving indication of hydrothermal solution.

The distribution of total heavy minerals in Wadi El-Nabi shows that, the fine sand size display relatively high content of the total heavy minerals. Also, their distribution dose not show regular trend along the stream where it fluctuate in the mid area, it slightly enriched in downstream than upstream and reflects the dominating violent current in the concerned area beside the slope nature of the wadi. On contrast the distribution of total heavy minerals in Wadi El-Nuweibi are slightly enriched in upstream than downstream and this is may be due to the velocity of the stream current is slow or normal.

This distribution show that, in Wadi El-Nabi about 48% of the studied samples in medium sand size displays total heavy minerals vary from 20% to 25%, about 43 % of the studies samples in fine sand size displays total heavy minerals vary from 30% to 35% and about 33% of the studied samples in very fine sand size displays total heavy minerals vary from 20% to 25%. In Wadi El-Nuweibi about 43% of the studied samples in medium sand size displays total heavy minerals vary from 30% to 35%, about 50% of the studied samples in fine sand size displays total heavy minerals vary from 30% to 35% and about 43% of the studied samples in very fine sand size displays total heavy vary from 20% to 25%.

The obtained data reflected that, the spot surface samples attain total heavy minerals greater than that in trench samples, this may be attributed to their natural occurrence. In both Wadis, they are more concentrated in fine sand size than medium and very fine sand size.

This distribution shows that, in Wadi El-Nabi about 48% of the studied samples in medium sand size displays magnetite varies from 0.2% to 0.4%, about 34% of the studied samples in fine sand size displays magnetite varies from 0.6% to 0.8% and about 38% of the studied samples in very fine sand size displays magnetite varies from 0.4% to 0.6%. In Wadi E-Nuweibi about 50% of the studied samples in medium sand size displays magnetite vary from 0.2% to 0.4%, about 36% of the studied samples in fine sand size displays magnetite vary from 1.0% to 1.2% and about 36% of the studied samples in very fine sand size displays magnetite vary from 0.6% to 0.8%.

The concentration of magnetite in Wadi El-Nuweibi and its spot surface samples are greater than that in Wadi El-Nabi and its spot surface samples and this agree with the country rock composition of both wadis. In Wadi El-Nabi, the concentration of magnetite shows gradual increasing with decreasing of grain size. In Wadi El-Nuweibi, the minimum and the average concentration of magnetite shows gradual increasing with decreasing of grain size while the maximum concentration shows random variations with grain size. In the spot surface samples of both wadis the concentration of magnetite shows gradual increasing with decreasing of grain size

Wadi El-Nabi display magnetite in medium sand sizes ranges from 0.07% to 0.51% with an average of about 0.24%, in fine sand sizes it varies from 0.12% to 0.99%

with an average of about 0.47% and in very fine sand sizes range from 0.81% to 1.07% with an average of about 0.51%. On the other hand, Wadi El-Nuweibi magnetite content in medium sand sizes ranges from 0.14% to 1.41% with an average of about 0.46%, in fine sand sizes it varies from 0.25% to 1.13% with an average of about 0.74% and in very fine sizes it ranges from 0.38% to 1.34% with an average of about 0.76%. This means that the average magnetite content in Wadi El-Nabi is nearly a half of its content in Wadi El-Nuweibi in the three fraction sizes. Rounded to subrounded magnetite in the spot surface samples reflected the long distance of transportation. In the spot surface samples of Wadi El-Nabi, it ranges from 0.06% to 0.29% with an average of about 0.18% in medium sizes, from 0.12% to 0.51% with an average of about 0.35% in fine sizes and from 0.16% to 0.57% with an average of about 0.38% in very fine sizes. In the spot surface samples of Wadi El-Nuweibi, it ranges from 0.18% to 0.34% with an average of about 0.27% in medium sizes, from 0.66% to 1.60% with an average of about 1.05% in fine sizes and from 1.14%to 1.96% with an average of about 1.47% in very fine sizes. This means that the average magnetite content in the spot surface sample in Wadi El-Nabi about one third of its content in Wadi El-Nuweibi in the three fraction sizes

Due to the average total heavy as well as the magnetite content in increase in the three sand size of wadi El-Nuweibi than Wadi El-Nabi, there for strong positive direct relation between magnetite and total heavy minerals were recorded, the result revealed that the magnetite considered as good indicator of the total heavy minerals particularly in fine sizes. The heavy minerals were recorded in the area represented by opaque minerals such as magnetite, ilmenite, hematite, goethite, leucoxene, chromite, tantalite, columbite, pyrite and barite. Non opaque minerals represented by rutile, garnet, cassiterite, sphene and epidote beside radioactive minerals such as autunite, zircon, monazite, allanite, fluorite, apatite and atacamite.

The opaque minerals

1- Magnetite: was recorded as single euhedral to subhedral grains. The ESEM revealed the presence of different characteristic features represented by zoned structure, parallel fine lamellae of ilmenite-magnetite intergrowths, thick parallel trellis of ilmenite in host magnetite, sandwich texture of ilmenite in host magnetite, ilmenite usually occurs as internal or external granules in early magnetite which referred as composite type, myrmekitic texture, hematite–magnetite intergrowths which formed due to oxidation of magnetite to hematite (martite) by weathering, these intergrowths indicate metagabbro source rock. Zircon and almandine garnet inclusions in titanomagnetite.

2- Ilmenite was recorded as thick tabular, angular to subangular grains and rounded. The ESEM revealed the presence of cracked ilmenite in some grains, clearly striations in ilmenite, rounded ilmenite exhibits heavy metals and baddeleyite zircon inclusions, ilmenite partially replaced by sphene in different parts of grain whether in the peripheries or along the cracks and the mottled texture was recorded where the sphene randomly distributed in the altered ilmenite particle. This alteration to sphene reveals metamorphic source rocks.
3- Hematite was occurs as a reddish brown to black color. It occurs as either non crystalline forms or as alteration product of many Fe-bearing minerals especially pyrite and so called hematite after pyrite or pseudomorphic pyrite. The ESEM revealed the presence of successive growth of hematite and heavy metals inclusions in hematite.
4- Goethite was recorded as massive forms or crystals or aggregate habits are very common. The ESEM revealed the presence of colloform structure.
5- Chromite usually occurs as well formed octahedron crystals and its grains appears as cracked in polished section.
6- Leucoxene displays rounded and subrounded habits and smooth or pitted surface. Leucoxene is not a mineral but it represents the transitional phase during the alteration of ilmenite to form the secondary rutile. It has yellowish brown and dark brown color under binocular stereomicroscope.
7- Tantalite-columbite minerals were recorded in albite granite of Nuweibi area but absent in stream sediment samples, they are recorded as small black, flattened, short prismatic crystal habit with smooth surface. they exhibit grain size ranges from 0.03 mm to 0.05 mm. The ESEM revealed the presence of well crystallized flattened tantalite and coltan grains, columbite and coltan grains, short prismatic-

tantalite grains, tabular mangano coltan grains and REE bearing noncrystallized mangano tantalite grain.

8- Molybdinite occurs as accessory mineral in some granites and pegmatite.

9- Pyrolusite displays Mn-oxide constituting growth on fracture surface of rocks or as rounded patches in granitic rocks.

The non opaque minerals

10- Zircon is a common accessory mineral in the studied sediments as well as the albite granites. It has grain size lies in the different sand sizes, their color varies from colorless, pale yellow, reddish yellow and honey with vitreous luster. Zircon is recorded as bipyramidal (mudy zircon), short prismatic to long prismatic with pyramid termination, some grains were recorded as subrounded to rounded. The slight modificated in the shape of the recorded zircon may be due to the abrasion during transportation. The examination of the studied zircon under the polarizing transmitting light microscope revealed the presence of parallel twined zircon, parallel growth zircon exhibits doubly terminated, multiple-growths zircon and outgrowth zircon. Zoned zircon exhibits large core, euhedral grain with one pyramidal termination, oscillatory zoned zircon displays high interference colors, sector zoned zircon, highly fractured zircon with very strong relief and opaque inclusions in zircon. Stubby zircon crystal and irregular habit like worm structure, furthermore the presence of thorite, uranothorite, ilmenite, garnet and silica as inclusions in zircon grains.

11- Rutile is a common accessory mineral in stream sediments of Nuweibi area, occurring as prismatic, elongated tabular or needle-like crystals. It is more frequent in the very fine sand than in the fine sand sizes. The ESEM revealed the presence of elbow shape Varity of rutile and monazite inclusion within rutile grain.

12- Epidote occurs as rounded and oval-shaped grains. It ranges from transparent to translucent. The ESEM revealed the presence of heavy metals bearing epidote.

13- Garnet was recorded as euhedral grains but the anhedral ones are very rare. Its color varies with its chemical composition and ranges from pale pink, honey to deep honey, yellowish and colorless. The ESEM revealed the presence of ilmenite and zircon as inclusion within garnet.

14-Cassiterite habit ranges from subangular to subrounded, massive, thin acicular needles or blades grains. Some grains shows euhedral outlines. It was concentrated in fine and very fine sand sizes. The ESEM revealed the presence of zircon inclusions within cassiterite.

15-Monazite occurs as accessory mineral in fine and very fine sand size fractions of stream sediment samples. Some recorded particles in the present study exhibits blade-like grains.

16-Fluorite is common in the medium sand size. Its color varies from colorless to violet and ranges from transparent to translucent. The ESEM shows abundant of rare earth elements and thorite inclusions in violet fluorite.

17- Sphene is more common in stream sediments as well as the country rocks of the studied area. The ESEM revealed the presence of inclusions such as zircon, ilmenite, cassiterite and rare earth elements.

Beside, other opaque minerals, pyroxenes and amphibole minerals group recorded.

Geochemistry of some source rocks, all major oxides of metagabbros shows (-ve relationships) with D.I. except SiO_2, Al_2O_3, Na_2O and K_2O which shows (+ve relationships). The variation diagrams of the major oxides of albite granite with the D.I. half of major oxides shows (+ve relationships) with D.I. represented by SiO_2, Al_2O_3, Na_2O and K_2O and the rest of major oxides shows (-ve relationships).

The variation diagrams of the trace elements of metagabbros with the D.I. half of trace elements shows (-ve relationships) with D.I. represented by Cr, Ni, Cu, Ba, Sr and V and the rest of trace elements shows (+ve relationships). The variation diagrams of the trace elements of albite granite with the D.I. all trace elements shows (+ve relationships) with D.I. except Sr and Ba which shows (-ve relationships).

Normative An-Or-Ab ternary diagram and SiO_2-(Na_2O+K_2O) binary diagram diagrams revealed that, according to Streckeisen (1976a) and Wilson (1989), all studied metagabbro samples plot in the gabbro field. The albite granite of Nuweibi area plot in the fields of alkali feldspare, syenogranite and monzogranite and this may be due to the presence of high albite content. The studied granites and metagabbros samples have subalkaline nature.

The analyzed metagabbros plot mainly in the tholeiitic field on AFM diagram of Irvine and Baragar (1971) and Miyashiro (1978).

The studied albite granite are plot in the subalkaline to calc-alkaline fields on the above mentioned diagrams but in the alkalinity ratio diagram after Wright (1969) it plot in the field of alkaline. They are plot in the metaluminous to peraluminous filed on the diagram of Maniar and Piccoli (1989).

The tectonic setting relations revealed that the studied metagabbros plot in the island arc filed of Miyashiro (1975) and Miyashiro and Shido (1975). They are also plot in island arc and calc-alkaline fields of Pearce and Cann (1973) and this type of magma associated with island arc and active continental margins tectonic settings (Wilson., 1989).

The analyzed albite granite plot in the post orogenic granite field of Maniar and Piccoli (1989). They are also plots in within plate granites fields.

Geochemically, The comparison between the average chemical composition of stream sediments of major oxides of Wadi El-Nabi and Wadi El-Nuweibi shows that; the average of Si_2O, Al_2O_3, CaO, Na_2O and K_2O are more or less equals in both wadis. The average values of TiO_2 and Fe_2O_3 in Wadi El-Nuweibi are higher than that found in Wadi El-Nabi. This is due to the presence of ultramafic rocks in the course of Wadi El-Nuweibi. The average value of MgO in Wadi El-Nabi is higher than that found in Wadi El-Nuweibi.

According to Log (Na_2O/K_2O) versus Log (SiO_2/Al_2O_3) variation diagram the studied samples plot in the greywacke field. On the (Fe_2O_3 + MgO) – Na_2O – K_2O ternary diagram the studied stream sediments samples plot in sodic field with high concentration of (Fe_2O_3 + MgO). The high concentration of (Fe_2O_3 + MgO) related to the high concentration of iron minerals such as ilmenite, magnetite, leucoxene, hematite after pyrite (pseudomorphic pyrite), hematite and goethite which occurs in both wadis.

According to the two discrimination functions diagrams, the source of the studied stream sediments are mafic igneous provenance and intermediate igneous provenance.

These results agree with the geological background of the area which made up of metagabbro, metasediments, tonalite and albite granite with regarded to the predominant rock is metagabbro.

For all the studied stream sediment samples Y, Pb, Ni and Zn shows more or less the same average distribution, the total abundance of Cr, Cu, Zr, Ba, Ga and V elements shows remarkable high concentration in Wadi El-Nabi especially in samples (Na9:Na21) than that found in Wadi El-Nuweibi due to this part of wadi entirely made up of metagabbros, while samples (Na1:Na7) in Wadi El-Nabi have more or less the same distribution, which measured in Wadi El-Nuweibi. The total abundance of Rb and Sr elements shows remarkable high concentration than that found in Wadi El-Nabi, the total abundance of Rb element in Wadi El-Nabi especially in samples (Na9:Na21) equal to zero.

Radiometrically, The main purpose of this work is to integrate the available airborne geophysical (airborne gamma-ray spectrometric and aeromagnetic) and Landsat Thematic Mapper (TM) remote sensing data with the ground geological and radiometric and magnetic investigation in order to evaluate potentiality of Ta mineralization in the Nuweibi albite granite complex

From airborne geophysical data, The airborne geophysical (gamma-ray spectrometry and magnetic) data produced in 1984 was conducted along parallel flight lines that were oriented in a NE-SW direction at one km spacing, while the tie lines were flown in a NW-SE direction at 10 km intervals. This airborne gamma-ray survey provided important information about the distribution of K, U and Th in the area.

From airborne gamma-ray spectrometry data analysis, Radioelements contour maps (K%, eU ppm and eTh ppm) as well as ratio maps (eU/eTh, eU/K and eTh/K) were prepared. They are superimposed on the geological map of the area to determine the geochemical characteristics and evaluate the litho-structural features for the different rock exposures; this may help in delineation of potential uranium targets, as well as for the purpose of identification and registration of the most important radioactive localities in this region.

The obtained maps revealed that the western central parts are the most promising zones for uranium potentiality.

The Nuweibi granite is discriminated by their high radioactivity and the superimposed contour lines have two specific trends (NNE-SSW, NW-SE and E-W). These granites delineated carefully by total-count level of 42 Ur and increases gradually towards the inner zone of the pluton. Contour line values of 22 Ur are associated mainly with Metagabbro.

Potassium map illustrates the spatial distribution of the relative potassium concentration in the study area. The K-anomaly zone is aligned along NNE-SSW, NW-SE and E-W. They controlling by the regional structural trends. Generally, the potassium content decrease toward northeast. Serpentinite and quartz-mica schist have the lowest potassium contents (less than 1 %); while the Nuweibi granite possesses the highest content of potassium (2.6 %).

The eU contour map reflects the distribution of equivalent uranium in the study area. This map shows that the Nuweibi granite pluton has the highest eU content. It varies from 3 ppm and reaches up to 4 ppm as a maximum concentration value encountered toward the inner zone of the western part. Serpentinite and quartz-mica schist have the lowest have the lowest eU contents, ranging from 0.2 to 0.6 ppm, and from 0.2 to 0.8 ppm respectively.

The eTh content contour map shows that the Nuweibi granite pluton have high eTh content ranging between 10 and 16 ppm encountered at the inner zone of the western part of Nuweibi granite pluton. Serpentinite and quartz-mica schist have eTh contents, ranging between 1 and 2 ppm.

The eU / eTh ratio have an average value of about 0.28 in areas occupied by younger granitic rocks that are characterized by uranium enrichment. Many eU/eTh anomaly zones are aligned along NNE-NSW and E-W trends. The highest eU/eTh anomalies, which reached 0.7, trending in the E-W direction and coincide with the younger granites.

The eTh/K ratio less than 7 over the Nuweibi granite pluton. This Thorium specialized rocks are identified with tin, tungsten, rare-earth, and rare-metal deposits .

The eU/K ratio contour map shows that the younger granites are characterized by a low range of the eU/K ratio due to increase in eU with a simultaneous increase in K concentrations.

the uranium migration map of the only granitic rock exposures in the studied area. The arrow symbol points to leaching direction and the length of the arrow depends on the magnitude or the degree of leachability. Generally, the uranium leachability increases toward the western portion of granitic mass which indicates its high probability of uranium potentiality.

From aeromagnetic survey, Regional geological structural information may be obtained by simultaneously collecting airborne magnetometer data along with gamma-ray spectrometric data. Such data are useful in determining the gross structural patterns and broad variations in composition of the crystalline basement.

Regional-local separation was achieved by bandpass wavelength filtering after defined the cut-off wavelengths from energy power spectrum curve. To highlight local anomalies, the regional component magnetic anomaly field was subtracted from the data, generating the residual magnetic map anomaly. The residual maps exhibits the local anomalies which reflect the near-surface structures, while the regional maps reflects the broad anomalies related to the deep-seated changes in the structures of the basement rocks.

The inspection of this magnetic analytical signal amplitude map, together with the landsat image and geological map as well as the other magnetic maps (residual and regional), indicates that Nuweibi albite granite mass has been affected by a right lateral major fault striking in NNE-SSW direction. There are much alteration processes as albitization, greisenization, kaolinization and fluoritization related to this faults.

Generally, alteration processes increase toward the northern part of the pluton. This NNE-SSW major fault divided the pluton into eastern and western- zones from the magnetic response point of view. Analytical signal map shows some intra-rock unit differentiation rather than the RTP map.

Magnetic Interpretation map shows that this area has been subjected to multiply fault during various stages of its evolution. The oldest sets of faults trend E–W during granite emplacement. This earliest fault are cut by NNE and NNW-SSE faults related to red sea rift.