SUMMARY AND CONCLUSIONS

October oil field is located in the north part of the Gulf of Suez. It is discovered in May., 1977, by Gulf of Suez Petroleum Company (GUPCO).

The October oil field lies 150 kilometers southeast of the Suez city and represents the northern giant field in the Gulf of Suez, where the diameter of the Gulf of Suez is 350 kms in length and covers an area of 25000 kms.

The startigraphic column of October area consists of a thick clastic section overlaying the basement rocks and underlies a thick evaporite section. The clastic section extends throughout the geologic time from Carboniferous to middle Miocene (Kareem Formation). The evaporite section is an excellent cap rock. The available data obtained for interpretation are well log data and some seismic lines distributed in the study area. These wells are OCT-D1(173-1), OCT-D4, OCT-D3A, OCT-D3A, OCT-D5A ,OCT-F1(160-3) and OCT-F2 well.

The well logging analysis has been carried to determine shale content, matrix lithology, porosity, water and fluid saturation as follow:

Correction of log data due to the effect of the borehole, lithology, mud weight and formation temperatures.

Shale analysis is very important to determine shale parameters and shale content. The volume of shale is important because it largely influences the porosity and hydrocarbon saturation determination. Shale parameters determine by using frequency crossplots, where these parameters including GR_{CL}(clean bed) and GR_{Sh} (shaly bed), the resistivity of shale bed (Rt_{Sh}), sonic transit time (ΔT_{Sh}), density of shale(ρb_{Sh}) and the neutron reading of shale (ΦN_{sh}).

The Volume of shale have been estimated using the single curve and two-curve indicators. Gamma ray method gives minimum values of shale

volume than other methods so, the gamma ray methods are representative of shale.

The lithology studies and matrix parameters determine by using :

a) Mono-porosity crossplots of resistivity logs and porosity tools are used to estimate matrix parameters (ΔT_{ma}, ρb_{ma} and ΦN_{ma}).

b) Dia-porosity and tri-porosity crossplots (sonic-neutron and density-neutron) are used to identify the mineralogical components.

Porosity (total and effective) were determined from porosity tools, sonic, density and neutron. The average total porosity ranging from 16% to 25%,and average effective porosity from 8% to19.8%.

Quick look methods are applied to present well-log data to identify zones that warrant a more detailed analysis. The overlays used for lithology, porosity and hydrocarbon are neutron porosity with density porosity and total porosity with sonic porosity. Total porosity overlay indicated that the study formation are fractured formations. ΦN-ΦD overlay illustrates the gas zones in the Nukhul Formation in the study area.

Fluid saturation determination is an estimation of the fraction pore volume occupied by the fluid. This fluid can be distinguished into water or hydrocarbons. Water saturation can be estimated by using Poupan and Leveaux equations (1971). The hydrocarbon saturation determined by using simple equations and can be distinguished into residual and movable hydrocarbons. It is noticed that the maximum average water saturation is about 0.67 in OCT-F1 well while the maximum hydrocarbon saturation is about 0.627 in OCT-D3A well. It is found that the residual hydrocarbon have highest value in OCT-D1, OCT-F1 and OCT-F2 wells. While movable hydrocarbon have highest values in OCT-D3A, OCT-D4 and OCT-D5A wells.

The evaluation and interpretation of hydrocarbon potentialities can be represented vertically or horizontally.

Vertical distribution of the petrophysical parameters were represented by a number of litho-saturation crossplots of Nukhul Formation to show the vertical variation of the lithology, porosity and their hydrocarbon contents. They are consist of mainly Carbonates, sandstone and shale.

Lateral distributions of the petrophysical parameters were represented by a number of iso-parameteric maps to illustrate the fluids saturating pore spaces. Iso-pach map shows that the thickness ranges from 292 ft in OCT-D1 to 644 ft in OCT-F2 well indicating thickness increase toward the east ditection.

The iso-porosity map showed that the effective porosity increase toward the east direction in the F platform and decrease toward east in the D platform. Shale volume distribution map reveal that shale increase in the east direction in the D platform and decrease in the F platform.

The average water saturation map show increasing associated with decrease of hydrocarbon toward west direction in the F platform and decreasing toward west direction in D platform. The distribution of hydrocarbon saturation is strongly affected by effective porosity of the formation and the structural setting of the study area.

The average Carbonate and sandstone distribution map are drown for Nukhul Formation.

The depositional environment of the minerals forming Nukhul Formation are studied by constructing ratio maps (sand/shale ratio and clastic/non-clastic ratio), which reflects shallow marine to fluvio-marine environment in the central part of the study area and deep marine in the other parts.

Source rock possibilities of Nukhul Formation are carried out by using well logging data (resistivity, density, sonic and gamma ray)in the form of a number of two dimensional plots to:

(1) the estimation of the discrimination function separating source from non-source rocks,

(2) calculation of total organic carbon (TORG)

(3) determination of vertical distribution of estimated total organic content (TOC).

Organo-source analysis of Nukhul Formation illustrate that, this formation shows a considerable amount of organic carbon content. The discriminate function shows negative separation allover the formation indicating non-source rock in the most of study wells.

The total organic carbon and the total organic matter distribution maps are drawn to illustrate their distribution in the study area.)

The total organic carbon distribution map of Nukhul Formation. shows a considerable increase toward the north, northeast and southwest parts of the map.

The hydrocarbon potentiality of the study area is considerable especially at OCT-D1, OCT-F1 and OCT-F2 wells

Seismic investigation study gives an idea about the structural setting in the study area. The seismic available data used to construct the interval and average velocities plots and maps to define the seismic sequence boundaries.

The subsurface structural of the study area interpreted by isochronous maps for top of Nukhul Formation and confirmed by another one for top of Eocene Formation. The area is affected by major and minor faults trend to NW-SE directions while the other faults trend to the NE-SW direction.

Development of compressional feature (gentle anticlines) is shown in the central part of the area.

Based on structural, stratigraphical and hydrocarbon content analysis, it is recommended to explore in the northeast and southwest parts of study area.