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PROGRAMME AND ABSTRACTS

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OIL and GAS RESOURCES (STRATIGRAPHY & SEDIMENTOLOGY)

(1)

THE BTEX TRANSPORT IN A SEMI PERVIOUS CLAY LAYER (CASE STUDY AT EL KANATER GAS STATION-CAIRO, EGYPT)

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Organic compounds and mineral oils can create serious pollution problems in the groundwater basins. One of the most common sources of these organic compounds is the BTEX group (Benzene, Toluene, Ethyl benzene, Xylene) spilled from petrol stations. Therefore, this case study deals with the transport of the BTEX organic compounds in the groundwater at El Kanater gas station site which is a part of Qalyubia Governorate. For that purpose, many observation wells were drilled to monitor both water levels and contaminants concentrations at that site. The drilling program revealed that the site is underlain by a semi pervious clay layer extending to a depth of about 18 meters below ground surface and about 100 meters of sand and gravel layer making up the main aquifer. The results of the water quality analysis data showed high levels of BTEX contaminants few meters beneath the site. Based on the results of the field investigation, the MODFLOW/RT3D was applied using the following packages regarding advection, dispersion, chemical reaction and biodegradation for the upper clay zone to evaluate the feasibility of the contaminants to be transported to the groundwater in the main aquifer. The general conclusion of the study revealed that the transport of BTEX in the semi pervious clay layer is limited and controlled by the low hydraulic conductivity of the clay.

(2)

INVESTIGATIONS OF NANO-PROPERTIES OF PORE-SPACE IN SEDIMENTARY ROCKS

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The interaction between fluids and pore walls depends on the morphology of mineral surface and on surface wetting properties, down to nanoscale. In order to enhance tertiary oil and gas exploitation and to improve the storage potential of hydrocarbons in reservoirs, surfaces of mineral grains (e.g. quartz, feldspar, micas, carbonates) and surfaces of various cement minerals facing the pore space, are analysed by REM and AFM subsequently to microscopical - petrographic investigations. The nano-morphology of the pore space as a function of mineralogy and the adhesion properties of the fluids can be described quantitatively. The

morphology of the pore space determines the size of the contact area between the rock and fluid. Thus, it also determines the adhesion and friction forces between gases or fluids and the pore wall. The dispersion, migration, adhesion and reactivity of fluids in geological bodies depends not only on the nanomorphology of the mineral surfaces, but also on their wetting ability and surface tension and on pressure and temperature conditions. This behaviour influences the absorption of ground water and pollutants on mineral surfaces and the migration and adsorption of oil and gas in the pore space. In the oil industry, EOR measures allow only for the recovery of a maximum of about 30% of the oil in a deposit. Fluids weakening the adhesion of hydrocarbons to pore walls are injected to the deposits in order to enhance recovery. To allow for modelling of the reactions between such fluids and the minerals, experimental data are crucial and detailed knowledge of the nanomorphology of the mineral surfaces is indispensable.

(3)

GEOLOGIC HISTORY AND PETROLEUM SYSTEM OF BAKR OILFIELD, GULF OF SUEZ

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Bakr oilfield is located at the western coast of the central Gulf of Suez sub-province. It was discovered by the General Petroleum Company in 1958. Three stratigraphic domains form the penetrated succession: (1) pre-rift sequences (Paleozoic to Eocene), (2) syn-rift sequences (Late Oligocene to Miocene), and (3) post-rift sequences (Pliocene to Recent).

The geologic history was dealt with through outcrops and subsurface well data. Iso-depth facies maps and paleogeographic maps were constructed to investigate the tectono-sedimentary relationship. Several fault trends are elucidated and chronologically ordered.

The Pliocene to Recent sediments were unnamed or referred to as "Post-Miocene". The present study distinguished them into rock units that can be raised to formations rank.

The key elements necessary to assess the petroleum system are revisited to formalize the relationship between the geologic elements in time and space. This provided additional rooming for further development wells to replace the produced oil reserves and maximize oil production, since eight formations are oil producers. Nubia Sands and Hammam Faraun reefal limestone are first order reservoirs. Ultimate oil reserves of Bakr field can be boosted regarding smart development plans and implementing modern techniques to recover the remaining reserves.

It was thought that trapped oil was only received from mature source rocks located to the east and northeast offshore sub-basin. However recent observations focus on the chance that oil was also received from west Bakr fetch areas that may add probable reserves to the west of Bakr and Ras Gharib oilfields. As Bakr and surrounding fields act one and the same petroleum system though variable oil-water contacts and pressure regime, the mid-term exploration and FDP will hopefully raise the ultimate oil reserves into a giant oilfield rank.