

SUMMARY OF CONTENT

This issue of the journal contains eight articles. The first paper¹ is on *Maximization of the Run Life of Electrical Submersible Pump through Effective Analysis of its Operational Problems in Egyptian Oil fields* examine the problems that have been encountered due to premature Electrical Submersible Pump (ESP) failure in Egyptian oil fields to identify the reason and potential solutions for these challenges. An ESP surveillance and diagnosis model which uses the ESP operational data presented, like sensor and surface parameters to diagnose degradation in the ESP performance due to effects, such as wear, deposition, plugging, gassy, spinning diffusers or even wrong pump rotation was presented. As well as quantifying the amount of pump degradation, the model determines the amount of lost production (gross and net) and validates the well IPR. The implementation of the ESP Surveillance model and the results of such analysis were presented for different cases. Based on the results obtained by the authors, they conclude that the use of this model across wells will show a positive impact on proactively managing a large quantity of ESPs, resulting in the identification of changes to regain production and prolonging ESP run life.

The second paper² examines the *Influence of Salinity on CO₂ Sequestration by Direct Flue Gas Injection into Gas Hydrate Reservoirs*. This research here was geared towards analyzing the Influence of Salinity on CO₂ Sequestration using direct Flue Gas Injection Method into Gas Hydrate Reservoirs. The method used for the experiment was the absolute introduction of flue gas into a mimicked gas hydrate body. The results of the experiments showed that because of the kinetic inhibition of the crystallization of CO₂ hydrate by NaCl, the measure of CO₂ that was captured reduced to 44.5% and 21.8% for systems with Experiments 2 and 3 mass% respectively for the aqueous phase. An increase in the consumption of CO₂ with salinity was observed which indicated that the reduction in the amount of CO₂ in the 5 and 10 mass% NaCl systems was as a result of the formation of CO₂ precipitates in the system. From the analysis gotten, it was observed that saline environment which are rich in water could be gotten in marine sediment and deep saline aquifers and poses as very suitable candidates for the implementation of CO₂ sequestration in hydrate form and other available forms.

*Reservoirs of Hydrocarbons with Signs of Biodegradation, in Parts of Eastern Niger Delta, Case Study: Alaoma-Omerelu-Iheoma-Ohaji Area of Imo State, Nigeria*³ is the third paper. The authors observe that the Niger Delta has a stepwise progradation of sediments with structural zones which mature to depobelts bounded by mega-structural growth faults. They also assert that the litho-stratigraphic subdivisions existing in the Niger Delta subsurface comprises the sandy Benin formation, a middle layer of alternating sand and shale sequences known as Agbada Formation, and the underlying shale deposit known as Akata Formation. These formations, according to them were laid down under continental, transitional and marine environments respectively. They explain that Benin Formation, Agbada Formation and Akata Formation, noting that only the hydrocarbons generated in Akata migrate into the Agbada through faults. Expulsion of oil from deeper parts of the Akata has not been proved in view of the likely absence of fractures in the shales. Similarly, the faults in overlying formations serve as medium of flushing water from the overlying sand into trapped hydrocarbons in lower reservoirs, which results in biodegradation of the crudes, provided there is availability of bacteria.

¹ Ahmed El-Gibaly et al

² Rita U. Onolemhemhen, Queendarlene A. Nwabueze and Kingsley E. Abbulimen

³ Anthony J. C. Madu and Adedeji Awujoola

The Alaoma prospect the authors conclude is associated with the sealing shale member of the main fault at deeper levels, and the flushing and biodegradation of hydrocarbons above the base of the freshwater, which may extend as deep as ± 6500 ft. Through the fault systems, there occurs freshwater flushing, penetration into the shallow crude oil bearing reservoirs thus, stimulating biodegradation of crudes in deeper reservoirs yielding poor or long chain hydrocarbons.

*Reservoir Navigation in Njaba Field – Challenges, Procedure and Results*⁴ comes next. The authors observe that the application of reservoir navigation services, in the placement of high angle and horizontal (HAHZ) wells in the sweet spot of reservoirs, has aided the production cost reduction efforts of Exploration and Production (E&P) companies, while at the same time improving hydrocarbon recovery. Using four wells for this study, the paper describes the challenges, procedures and results of geosteering in Njaba Field located on-shore Niger-Delta. Geosteering in Njaba field involved a comprehensive pre-well planning, discussions, documentation and management approved decision-tree. From different entry points, wells NJX1, NJX2, and NJX3 were planned to drain the same reservoir and optimize hydrocarbon recovery within the reservoir. Some of the challenges encountered include geosteering the wellbore above a pre-determined production TVD hardline while simultaneously avoiding drilling into an overlying undulating shale cap rock, vertical seismic uncertainty and undulating formation boundaries.

In *Right of Host Communities to The Benefits of Nigeria's Oil Industry: An Appraisal Based on International Legal Standards*⁵ the authors are concerned about the environmental challenges in the oil and gas production areas of the Niger Delta, examining the consequences of government and exploration and production companies soured relationship with the host communities (HCs). They observe that the spate of agitations by HCs are coming on the heels of surfeits of policies and laws mostly drawn by government and oil companies in reactions to communities' displeasures. In view of the continuing dissatisfaction of HCs with prevailing oil industry's arrangements for assuaging their anxieties, the paper argues for a return to acceptable best practices and international standards, the aim being to first ascertain whether international law recognizes HCs' links to the oil industry and secondly, the forms that benefits and social corporate responsibilities of the oil industry to HCs can take. They draw data from international legal documents, law reports, case laws and internet sources in exploring the solutions to the challenges and the reaction of HCs. Analytical and historical methods were deployed in the analysis of the data collected. Their findings show that various sections of international law recognize HCs and gives detailed forms benefits (both intangible and tangible) to host communities can take like participation in decision making, consultation, protection of their environment, revenue distribution, infrastructural development etc. They conclude that HCs keep agitating because government applies the law on community benefits haphazardly, like giving tangible benefits leaving out the intangible noting that the two ought to go together.

The sixth paper on *Optimizing Gas Production Strategy in Offshore Niger Delta Gas Condensate Field Using Dynamic Simulation Model*⁶ focuses on optimizing gas production strategy in an offshore Niger Delta gas condensate field. Sensitivity analysis

⁴ Ajisafe Isaac, Inenemo Abdulwahab, Ndokwu Chidi, Amadi Kenneth, Toyobo Oluwaseun, and Okowi Victor

⁵ Dr. Florence U Masajuwa and Dr. Simon Imoisi

⁶ Bashir Umar Shehu, Muhammad Bashir Abdullahi and Enobakhare Osarugue

was implemented on well level through optimizing well parameters such as tubing sizes, wellhead pressures and skin factors using PROSPER simulation program in order to select best well model construction that promote high gas deliverability and low condensate production. The reservoir GIIP has been estimated to 370Bscf. The authors conclude that from the dynamic nodal analysis result, 5.5-inch tubing size promotes the optimum gas rate and low condensate production based on the investigated parameters.

In *Economics of Local Materials as Base Fluids in The Formulation of an Oil Based Mud*⁷ the authors investigate the properties and economic analysis of the use of non-toxic, biodegradable locally obtainable oil from the palm kernel seed (Oil X) and coconut (Oil Y) as base fluid in the formulation of an Oil Based Mud. The rheological and filtration properties of the mud samples were evaluated using the API Recommended Standard, while the economics analysis was performed using the Net Present Value (NPV) and discounted profit to investment ratio (DPI) models. The results of the rheological, filtration and physiochemical properties for both X-OBM and Y-OBM, showed the possibility of the use of oil X or Y as base fluid as against No. 2 diesel. The result from the NPV model showed that the use of oil X or Y provided a higher NPV compared to those of No. 2 diesel mud even though the cost of No. 2 diesel was lower than those of X and Y oils. Also the discounted profit to investment ratio (DPI) was also better for mud formulated from the vegetable oil muds. Although the initial cost of formulating mud samples using oil X or Y compared to No. 2 diesel Oil Base Muds (OBM) seems higher, consideration of their fire capacity resistance, nonimpact on the environmental and the cost of disposal of OBM the application of vegetable oil X or Y is more viable than No. 2 diesel in the industry.

The paper on *Gas Hydrate Formation Promoted by Additives for Gas Storage Application: A Review*⁸ provides a detailed account of the various research performed towards enhancing hydrate formation to foster the ease for gas storage and transportation applications. The review identifies several studies conducted using several promoters particularly surfactants, plus several innovative approaches or processes which were adequately utilized to better hydrate formation and enhance gas storage capacity.

Editor

⁷ Sarah A. Akintola and E. B. Atere

⁸ W. C. Okologume, et al