Petroleum Technology Development Journal

## Editor's Comment

This is the tenth issue of Petroleum Technology Development Journal (PTDJ) and it contains eight papers. The first paper *Sand Production and Its Control in Oil and Gas Wells: A Case Study of Egypt Nile Delta Oilfields* by Professor Dr. A. A. Elgibaly, Professor Dr. S. Kamel[1] and A. S. Elhawary[2] is based on a study and evaluation of sand production and its control with particular emphasis on production activities in Egypt Nile Delta oilfields. The aim is to come up with a complete control system for protecting sub-surface and surface equipment by mechanical or chemical means while adjusting operating parameters to fit site situations. The essence in the main, is to identify the source of sand migration and follow its course to the nearest station for a local intervention (evaluation) before it culminates into a major damage to equipment and the environment in the subsequent stations.

The study follows through a complete control system from the pay zone to the last point in the plant process and the proposed solutions will further deepen the knowledge of combating the menace of sand intrusion in oil production process. It also institutes comparisons between well performance in different wells scattered over the entire area with or without on site control equipment with the ultimate aim of minimizing damage.

This study is particularly useful especially in situations when petroleum industry operators have to grapple with the challenges posed by sand, particularly in unconsolidated formations during the production process. If not properly managed, as suggested in this study, sand and fines can result in damage to surface and downhole equipment (which can lead to a major well intervention), flow line or vessels with the attendant environmental implications, not to mention huge sand disposal costs.

The second paper - *Delineation and Optimization of Hydrocarbon Potential Zones in Bobsaa Field, Onshore Niger Delta, Nigeria, Using Sequence Stratigraphy* is by Oyedele, Oladele, and Bakare,[3] They present results from combined seismic, well logs (from BK-1 and BK-2 wells), paleo-bathymetric and bio-stratigraphic tools in the evaluation of Bobsaa field in the swampy onshore Niger Delta of Nigeria. They did this to determine the litho-stratigraphy, chrono-stratigraphy, possible reservoir sands, age and depositional environments of the study area for opportunities that will support an exploration program. Different formations, lithologies, lithofacies, sediment types, depositional sequences and their environments of deposition were identified from log signatures of the two wells. High resolution bio stratigraphic data consisting of microfaunal abundance and diversity chart aided in the delineation of the maximum flooding surfaces (MFSs), paleo bathymetric interpretation and in age determination. The locally recognized cycles were correlated with the globally recognized eustatic cycle chart. Depositional sequences, systems tracts, sequence boundaries and candidate MFSs were identified based on their diagnostic characteristic log patterns in the

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studied wells and age-dated with marker faunal species. Sequence boundaries (SBs) were recognized from logs, age-dated where possible, and constrained by age control sensu. Interpretation showed that the lithology is dominated by alternating sand and shale, occurring approximately in a ratio 70:30 within the logged intervals. From the log successions, prograding delta deposits and channel deposits were interpreted. Four MFSs and four SBs were recognized from BK-1 well while two MFSs and three SBs were recognized from BK-2 well. All the MFSs and SBs fall between Late Miocene to Middle Miocene age interval. Biostratigraphy analysis showed four foraminiferal zones:

1. Globorotalia merotumida/plesiotumida/Ammobaculites agglutinans Zone
2. Globorotalia acostaensis/Uvigerina subperegrina Zone
3. Globorotalia mayeri/Spirosigmoilina oligocaenica Zone
4. Globigerinoides subquadratus/Uvigerina sparsicostata Zone

The results suggest sediment deposition within the coastal deltaic and shallow marine environments for the two wells. The integrated interpretation of different data sets in the study area has enabled the subdivision of the stratigraphic column of the wells into sequences, systems tracts and sedimentary cycles. The authors conclude that these sequences may contain source rocks and seals.

In the third paper - *Determination of Thickness of Sedimentary Cover in the Nigerian Sector of the Chad Basin Using High Resolution Aeromagnetic Data,* Goni,[4] Yusuf,[5] Musami[6] and Zarma[7] explained how they used source parameter imaging (SPI) technique to analyze high resolution aeromagnetic data over the Nigerian sector of the Chad Basin. First order polynomial fitting was used for Regional-Residual separation and thereafter, all analyses were carried out on the residual data. The results show three well-defined sub-basins named the Baga, Gubio and Damboa. Sedimentary thicknesses vary widely between and within these sub-basins. However, profiles across these sub-basins, revealed average thickness range of 2-5 km, which is considered fairly good for hydrocarbon generation. They conclude that the Damboa sub-basin could also be prospective as an outcrop of the Gombe Sandstone considered a suitable reservoir rock in the basin has been observed during field mapping.

In the paper *Environmental Restoration Challenges of Seismic Exploration in Parts of East Africa and West Africa,* Madu observes that seismic exploration in West Africa (Nigeria case history) and in East Africa (with Sudan as case study) have had negative impact on the environment, though successful in hydrocarbon discovery. The challenges range from survey cutting of seismic lines, to clearance for GPS measurements, cutting of Source Lines (SL's) and Receiver lines (RL's). Survey line cutting along traverses with line width of 1.0 meter in West African vegetation. They note that re-plantation of mangroves was carried out in mangrove swamps where natural re-vegetation was not possible. 7m width of seismic lines was practiced in the bulldozed terrain of East Africa and adjoining western Saharan terrain due to width of drilling Shatuo rigs and vibrators on source lines, both for surface energy source and dynamite energy source.

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They also observed that drilled holes for dynamite and detonators (energy source), gave rise to blowouts and craters when the shot holes were not properly tamped before shooting in marshy or soft swampy terrain. This, according to them resulted in formation of craters of diameters from 1.0 to 2.0 meters depending on the softness of the near-surface sediments of that part of Niger delta area.

They note that 75% to 90% restoration performance was achieved in seismic challenges cases in West Africa involving re-vegetation, and empty explosive cartons and used cap wires, while closing of waste pits has been achieved to 80% to 100% in the East Africa and West Africa. Suitable closure of up holes and sealing of boreholes has remained a challenge, achieving 40% to 50% respectively in both regions. It was in the pursuit of compliance to standards, regulations and legislations that seismic operators were constrained by contractual obligations to restore sites negatively impacted during execution of project to the condition prior to start of seismic operation.

*Iron Removal from Local Bentonitic Clay and Its Effect on Clay Rheology* is examined by Dewu, Oladipo, Arabi, Tukur, Funtua, Bilal and Muhammed-Dab[8]. They observe that the performance of treated clays (Bentonite) in oil and gas well drilling is affected at high temperature and pressure to some extent by level of concentration of iron present in the drilling mud. The study is aimed at improving the quality of clay from Pindiga Formation in north eastern Nigeria through iron (Fe) content reduction without compromising its structural, rheological and other physical properties. They intended the Pindiga Bentonitic clay for beneficiation for use in oil well drilling. They removed iron from the clay using oxalic and hydrochloric, the effects of the procedure on clay structure having been investigated. The results indicate that the optimum iron removal with mild structural effects was obtained using 1M hydrochloric acid at 70°C. This is indicated by slight change on the infrared Al-O-Al peak intensity (36.49 and 33.07) of the Fourier Transformed Infra-Red (FTIR) spectra and the change in iron concentration (4.57% and 2.54%) observed from results Instrumental Neutron Activation Analysis (INAA), analysis conducted before and after the iron removal, respectively. Their use of hydrochloric and oxalic acid produced the most effective iron removal procedure using 1M and 1.8M, respectively, at 70°C, and less effect on the clay structure than obtainable using more concentrated acid solution at lower temperature. This showed that the use of 1M hydrochloric acid at 70°C can effectively reduce the iron contents in clays with little effect on the crystal structure as indicated by the IR spectrum, especially when iron concentration in such clay is less than 15% above what is obtainable in the API grade Bentonite as is the case of the studied clay.

In *Kinetics and Modeling of Jatropha Curcas Biodiesel Reaction at 32°C,* Akhihiero[9]*,* Audu and Aluyor[10] - affirm that *Jatropha* curcas seed oil is a viable feedstock for biodiesel production. They note that biodiesel can be produced by transesterification of the seed oil with alcohol in the presence of a catalyst. They experimented on the reaction of *Jatropha* curcas seed oil with methanol in the presence of sodium hydroxide catalyst in an improvised batch reactor (500ml beaker) at 32°C. Molar ratio of methanol to oil used was 8:1. The free fatty acid of the oil was 0.8%, hence a one step transesterification reaction was sufficient to achieve the desired conversion. Aliquots of the reaction mixture were withdrawn at every 15 minutes' interval of time for Gas chromatographic analysis.

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Percentage fatty acid methyl ester formed at 30 minutes was 83.85% and 69.45% at 75 minutes. The reaction order was determined and found to be first order with a reaction rate constant of 0.112 wt%$min^{-1}$. A first order linear regression model was developed. The model was validated with Durbin-Watson test statistics. The authors conclude that the tests show that the errors have positive serial correlation and are generated by a first order autoregressive process.

The last paper, National Participation in Nigerian Oil and Gas Industry: Prospects and Challenges by C. J. S. Azoro[11] considers the concept of national participation and development of Nigerian content in the country's oil and gas industry. It analyzes the state of the oil and gas industry in Nigeria. An attempt was made to succinctly elucidate on the otherwise illusory concept of national participation. The various policies and legal framework for the realization of Nigerian content in the development of the industry is considered. The author also discussed the prospects and challenges attendant to such initiatives. While the paper concludes that significant progress has been recorded in the development of local content in the industry, it makes adequate recommendations towards addressing some of the key challenges to such development.

We have been able to publish this issue of our journal on time and as scheduled due to contributions and interest of the authors of the articles, the invaluable contribution of our anonymous assessors and technical advisers and the editorial input of members of our Editorial Board. We deeply appreciate your indispensable roles.

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