CAN THE AMERICAN SECURITIES AND EXCHANGE COMMISSION (SEC) AND THE CENTRAL LIMIT THEOREM (CLT) EVER BECOME FRIENDS? A PRACTICAL PROPOSAL FOR RECONCILIATION FROM OMV'S SAWAN RESERVES ESTIMATION EXERCISE

Paul Fink[1], Markus Schuh[1], Dr. Nadeem Ahmad[1], and Robert Koehazy[2]

[1]OMV (Pakistan) Exploration, UBL Building, Floor 8, Jinnah Avenue, Blue Area, Islamabad, Pakistan.

Tel : +92 51 2273620-33; Fax : +92 51 2273643-44; Email: paul.fink@omv.com.pk

[2]OMV (UK), London.

Recent technical publications about Shell's proved reserves downgrade have one observation in common: Something is ambiguous about the SEC definitions. The Economist [1] calls them "needlessly murky".

"Most estimators of proved reserves break the law on a regular basis. None go to jail", warned the eminent physicist [2] in his SPE paper in 1996. He did not explore criminal behavior of oil company executives, but basic laws of mathematics: The Central Limit Theorem leads to the conclusion that hydrocarbon reserves are distributed log - normally. Adding proved reserves to obtain total proved reserves is illegal. Rolling up individual field reserves for the total company reserves base is mathematically only correct for the Mean figures.

This paper is a practical case study of how both the SEC "law" and the mathematical laws can be obeyed. The focus is on clear accountability for reserves estimation rather than on another engineer's definition of SEC's "reasonable certainty" condition. After all, shareholders want to deal with numbers, not fuzzy definitions. To that end the most important contribution is the correct estimation of the entire reserves distribution function. Although a relatively straightforward and well documented process in principle [2], many practical challenges with regard to how the all important reserves distribution function is generated in practice , do remain. This paper attempts to make a useful contribution by outlining the approach taken in OMV (Pakistan) for the Sawan Gas field.

Sawan is a complex stratigraphic field with subsurface and gas marketing uncertainties. OMV is the operator on behalf of PPL, ENI, MND and GHPL. The GIIP distribution is established through stochastic modeling based on seismic and geological interpretation models. Once transferred into reservoir simulation, the number of discrete full field reservoir simulation realizations is limited for practical purposes. This deficiency is mitigated by "experimental modeling". Sensitivities such as permeability, residual saturations, flow units, surface developments etc. are individually simulated and fed into a combined Monte Carlo scheme to obtain the complete reserves distribution and hence possible actual scenarios.

Once this distribution is established, the rest is easy. Investors can pick whatever level of uncertainty they feel comfortable with and consider as "reasonable" within SEC definitions. Estimators can be accounted for by real numbers. A company with a good and large portfolio could choose a 90% certainty for individual fields. By adding P90 figures the P99 level is quickly reached for the total company reserves.