Life Experiences in MATHEMATICS

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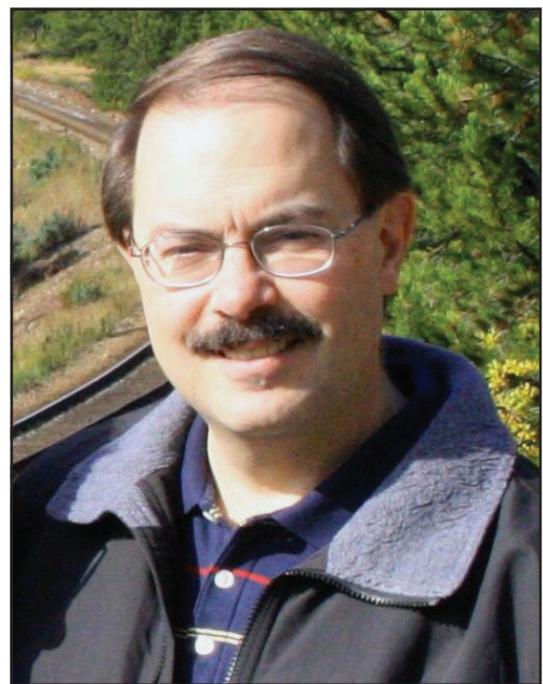
Lognormal Distributions and their Application to Exploring for Oil and Gas

One of the inherent aspects of exploring for oil and gas is accurately determining the size and nature of an exploration target before the first well is drilled. With an inventory of several exploration targets, it is incumbent on the explorationist (geologists and geophysicists) to drill the best exploration targets for the risk and money spent to drill the well. However, the explorationist often allows emotion and his own scientific biases cloud his judgment as to which projects are the best ones to drill. Because of these biases, the results of drilling a several well exploration program are often not in line with expectations. Pre-drill estimates of the size of a specific exploration objective can vary widely and can be inaccurate by as much as an order of magnitude. Since target size forecasts tend to be significantly over-optimistic, it is reasonable to assume that explorationists have drilled many wells that should not have been drilled in the first place.

In an effort to remove bias from the decision-making process in drilling oil and gas wells, oil and gas exploration companies have embraced the use of lognormal distribution analysis to better predict the outcome of an exploratory project. Lognormal distributions of the size of existing oil and gas fields, the size (in acres) of a project, the thickness of the hydrocarbon-bearing reservoir in the project area, and the hydrocarbon recovery factor of the project can give the explorationist a more realistic expectation of the size of any hydrocarbon accumulation. Applied evenly throughout a portfolio of exploration projects, this relatively simple process does remove most the bias that can infect an exploration portfolio. It also gives the explorationist a viable tool to determine which projects will best add value to a company while also reducing the risk of financial failure.

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