

QUANTIFYING MULTIPLE WORKING HYPOTHESES GEOLOGY AND COMPETITIVE OFFSHORE LEASE BIDDING

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ABSTRACT

The establishment and application of multiple working hypotheses has been basic to the scientific method and is a standard preliminary to interpretive petroleum exploration. Such assumptions, requiring original conceptuality and final thoughtful selection, are emphasized in the present competitive bidding environment of the federal waters of the Gulf of Mexico, south of Louisiana.

The usual judgment procedure for bid determination, directed at the acquisition of exploration prospects, includes factors involving description, techniques, operations, economics and theory. Critical parameters range from precise measurements of costs and physical characteristics through a reconstruction of the trap, its cause, extent, and reservoirs. A final ingredient is the assignment of credibility values to the derived quantities. Such a chain proceeds from the absolute to the least known, and in this order of increasing variance, geology and geological assumptions can effectively dictate the decision.

The geologic hypotheses used emerge from measured data, primarily geophysical, and are refined by the application of the basic theory of our profession. Their final form and the assignment of numerical values of quantity and probability rest heavily on specific analogies and inference.

In the near future an assessment may be possible of how well the "state-of-the-art" and our professional capabilities answered these demands of quantification. Analyses of statistical probabilities and mathematical models have been applied to the bidding procedure but the isolation of geological judgments from such efforts is difficult. A number of relationships from the December 1970 general sale can be tabulated now and these are presented for consideration. They are, for the most part, empirical and thus are bases for additional comparison. The patterns shown have both rough similarities and definite divergencies. The similarities show the contribution of the more absolute ingredients including general geologic agreement in qualitative description. The divergencies, critical to the result, are believed to be a result of the spread in quantified hypotheses.

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In lieu of a paper several illustrations (Figs. 1-5) are submitted along with the abstract.

Parameters Controlling Exploratory Offshore Bid Judgement in Order of Increasing Variance *

- I Cost of drilling, production, and operations
- II Revenue
 - A) Price per marketable quantity
 - B) Rate of extraction
- III Reservoir Recovery Efficiency
- IV Collection and entrapment history, present configuration and area of accumulation
- V Sedimentary history, environment and functional reservoir thickness
- VI Hydrocarbon characteristics, liquid and/or gas
- VII Individual and group credibility of all of these

* The broadest financial and political factors are not contemplated (e.g., inflation, international energy relationships, difference in financial objectives, etc.)

FIGURE 1—Parameters controlling exploratory offshore bid judgment in order of increasing variance.

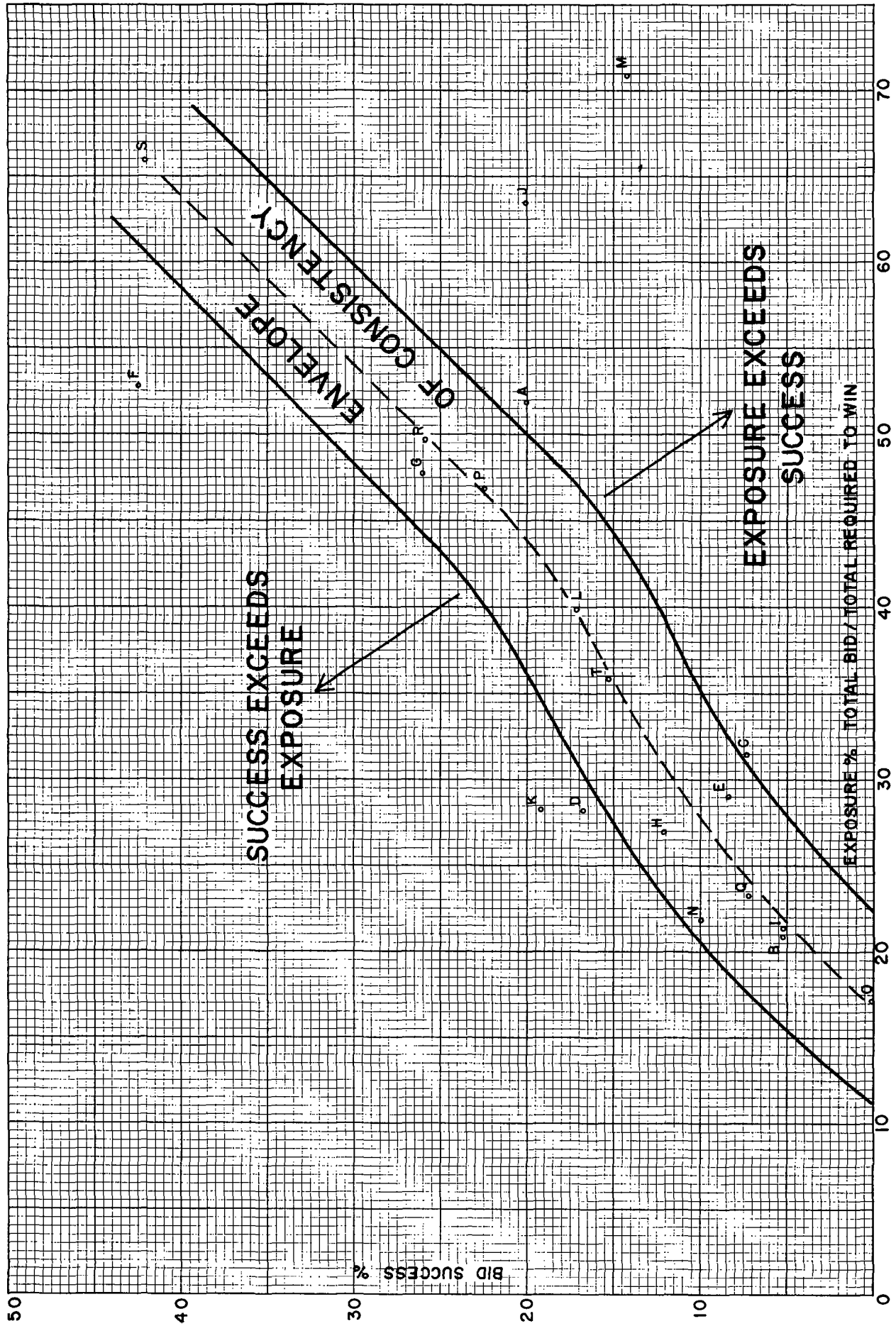


FIGURE 3—Relationship of success to proportional exposure in 1970 bid results.

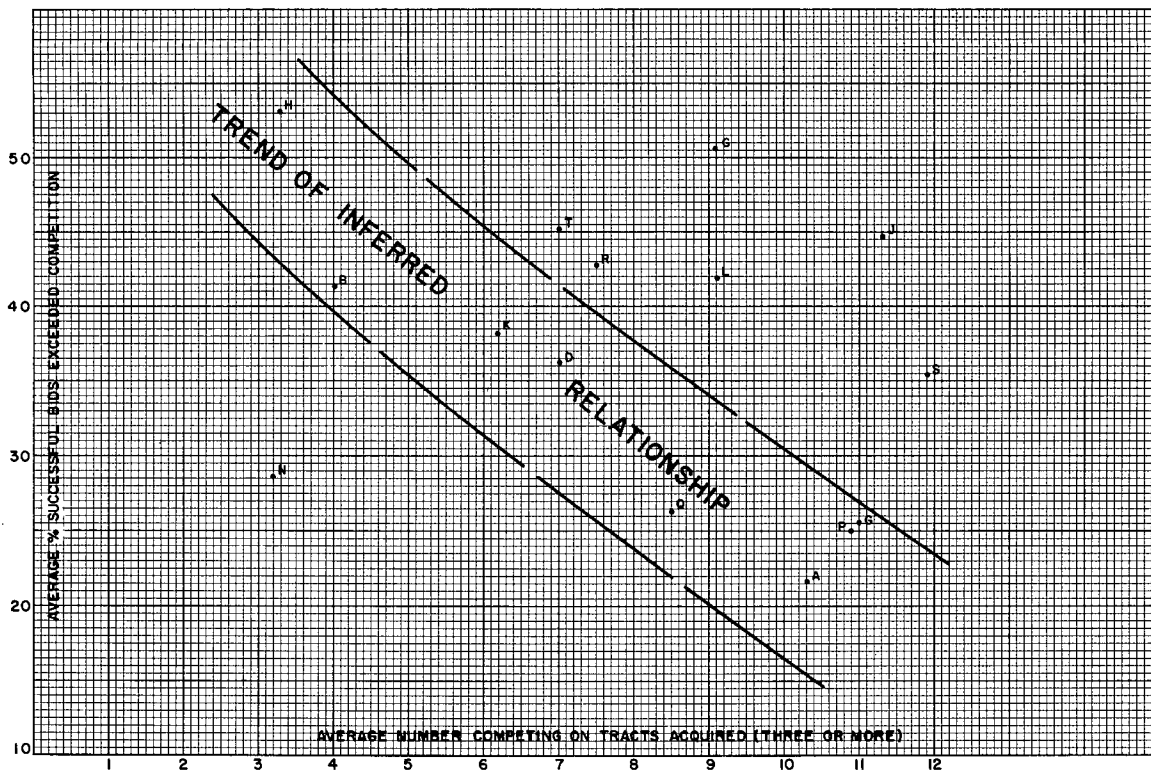


FIGURE 4—Prospect desirability (number competing) as a control of common value assessment (excess bid) in 1970 Western Louisiana Federal Offshore Sale.

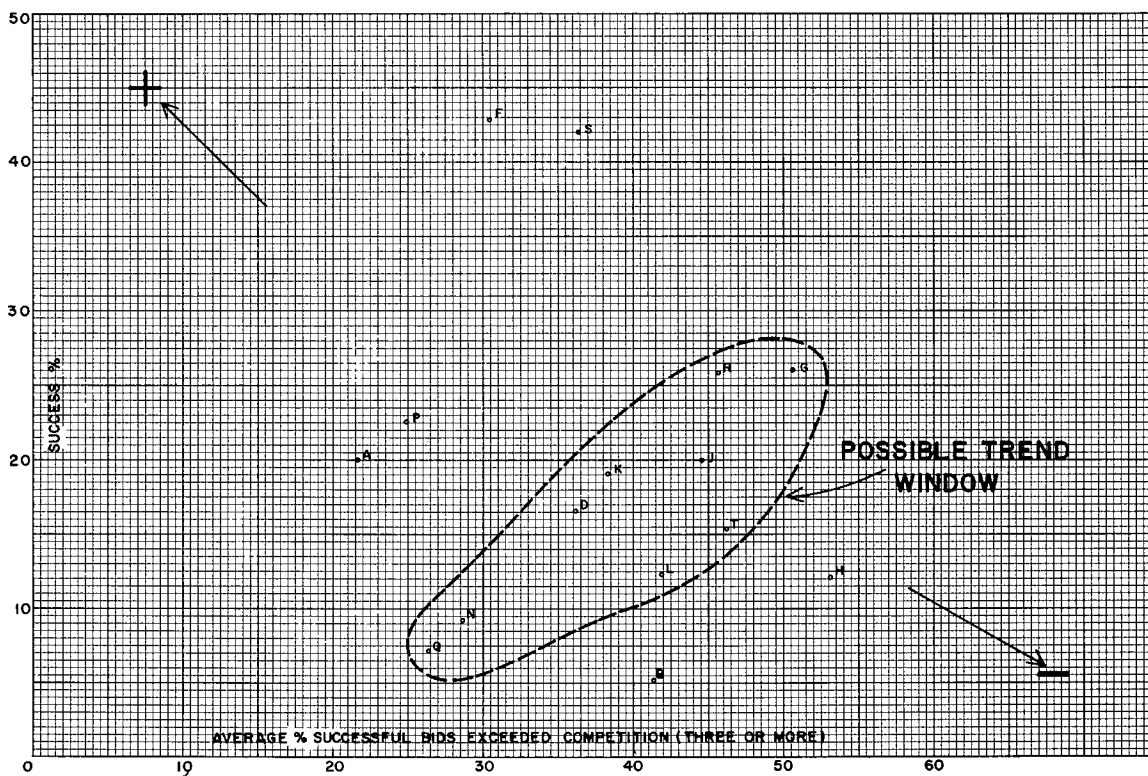


FIGURE 5—A plot of success related to "Money Left on the Table" in 1970 Western Louisiana Federal Offshore Sale.