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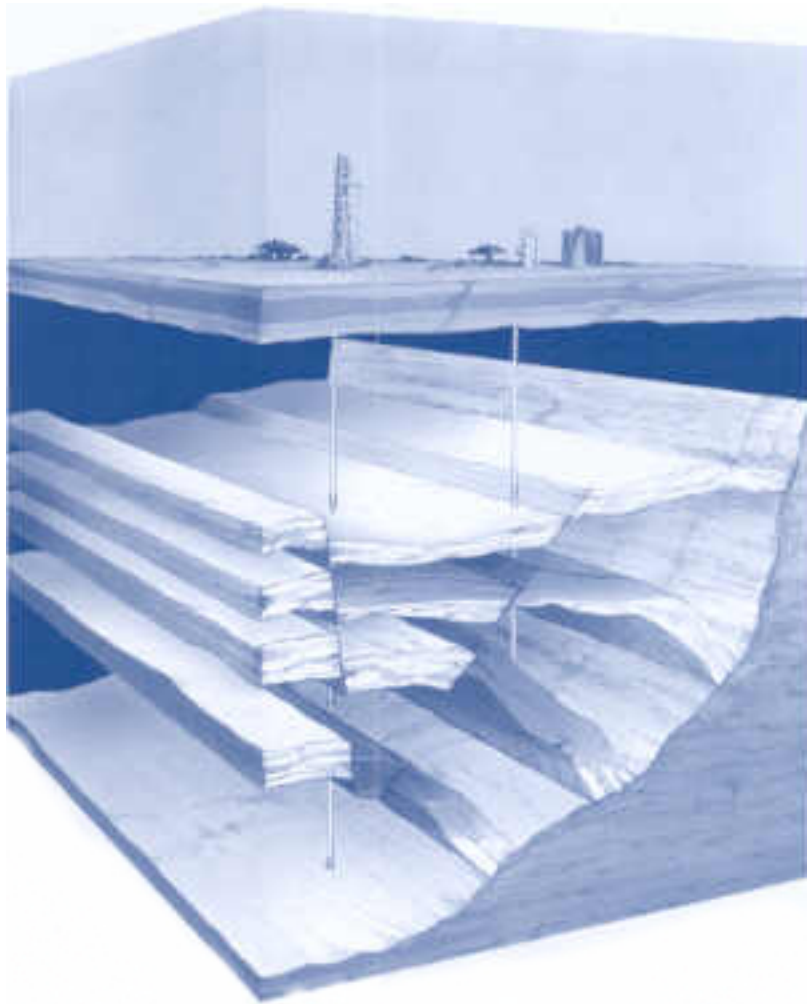
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THE TEN COMMANDMENTS OF QUALITY INTERPRETATION AND MAPPING

by: *Daniel J. Tearpock*

Have you ever wondered what makes the difference between a great/successful oil and gas prospector and one who is mediocre or below average? have you ever wondered why one geoscience team has a much greater success rate than others working within the same area? When you place your investment dollars into exploration or development prospectects or in the purchase of a producing field, do you ask or even consider what methodology or philosophy was used by the generating geoscientist or team? Is the methodology or philosophy an important factor? Well, decades of research, observation and analysis indicate that the primary reason why individuals, teams or companies are more successful than others is the direct result of the philosophy and methods used. It is not serendipity, luck or guesswork that finds hydrocarbon. It is solid scientific work.

The Philosophical Doctrine (The Ten Commandments) shown here presents the best Proven Process for finding and developing hydrocarbons. It requires common sense, a certain technical background, experience, logic and the applicaiton of proven scientific methods.



The Ten Commandments

1. All subsurface interpretations must be geologically and geometrically valid in three dimensions.

Subsurface data are either one - dimensional (well log) or two-dimensional (well log sections and conventional seismic sections); however, these data are used to generate a three dimensional picture. Even though it is intuitive that all interpretations must be valid in three dimensions, too often subsurface structure maps, cross sections, and seismic interpretations are made without much consideration given to establishing a three-dimensional framework or verifying that the interpretation is even possible in three dimensions.

2. An interpreter must have a sound background in structural geology for the tectonic setting being worked. When an interpretation is made in a particular tectonic setting, the interpreter must know as much about the structural geology of the area as possible, so that the interpretation represents geology that is known to fit the structural style of the area. A limited understanding of structural geology is one of the shortcomings in numerous geologic interpretations that results in unrealistic or even impossible interpretations in three dimensions.

3. All subsurface data must be used to develop a reasonable and accurate subsurface interpretation.

The data available for interpretation are limited, and are typically one and two-dimensional. A body of data itself can be confusing with respect to true subsurface relationships. For example, cross sections and seismic sections can misrepresent true three-dimensional subsurface relationships by the simple nature of their orientations. All data, (well log, seismic, production, paleo, etc.) must be integrated into an interpretation if it is to be considered sound and viable.

4. All important and relevant geologic surfaces must be mapped and the maps integrated to arrive at a reasonable and accurate subsurface picture. These include surfaces such as formations, faults, unconformities, and salt. For example, in faulted areas, it is typically the faults that form the structures (e.g., rollovers, fault bend folds, and fault propagation folds). Therefore, to develop a good understanding of any faulted structure, one must analyze and map the faults. We cannot overemphasize the importance of mapping faults and integrating them with the structure to arrive at an accurate interpretation. If you want to drill more than your share of dry holes, don't map faults.

5. The mapping of multiple horizons is essential to develop reasonable correct, three-dimensional interpretations of complexly faulted areas. The mapping of multiple horizons allows the mapper to establish a reasonably correct three-dimensional structural prospect. The mapping of multiple horizons (at least three: shallow, intermediate, and deep) provides the mapper with an interpretation that is plausible and fits at all levels from shallow to deep horizons. Remember, almost any set of fault and structural data can be forced to fit on one horizon. The true test of the interpretation is to have the data fit at all structural levels.

6. Accurate correlations (well log and seismic) are required for reliable geologic interpretations. An interpretation that properly integrates all data, such as well log, seismic, and production, is always more accurate than an interpretation that ignores one of these sources (Tearpock and Bischke 1961). Likewise, the correlations must be accurate, because geologic interpretations have their foundation in correct correlations. Consider that all aspects of subsurface mapping and prospecting are based on correlations. Some of these are the preparation of cross sections, fault, unconformity, salt, structure, and isopach/isochore maps. Eventually, a mapper's correlations, right or wrong, are incorporated into the final interpretation. Incorrect correlations can be costly; they can result in a dry hole, an unsuccessful workover or recompletion, the purchase of an uneconomic property, or the sale of a producing property that has significant, unrecognized potential.

7. The use of correct mapping techniques and methods is essential to generate reasonable and correct subsurface interpretations. The most accurate geologic interpretations are prepared by mappers who have a good understanding of the mapping methods applicable in the area of study. There is no substitute for correct mapping techniques. A poor understanding of mapping techniques can result in incorrect procedures, unjustified short cuts and inaccurate interpretations.

8. Interpretive contouring is the most acceptable method of contouring subsurface features (Margaret Bishop, 1960). Unlike other contouring methods, interpretive contouring allows the mapper to use knowledge of the structural and depositional style in the tectonic setting being worked, the ability to think in three dimensions, experience, imagination, and geologic license to generate an interpretation that is geologically sound.

9. All work should be documented. Significant volumes of data are collected, evaluated, used and manipulated during a project. The documentation of these data makes everyone's work go more smoothly and accurately.

10. Sufficient time and detail are required to generate reliable, prospects. Haste makes waste. Do not be

too anxious to drill that next dry hole. There are not many shortcuts to good prospecting. With limited time available to complete a project, alternate solutions may not be analyzed, all the data may not be used, unjustified shortcuts might be taken, or incorrect techniques may be applied. When you consider the cost of a dry hole, an unsuccessful exploration program or the loss of investor confidence, the time taken to do it right is time well spent. Remember Murphy's Law - "If something can go wrong, it will". SCA teaches this philosophy in our geoscience and engineering courses. More importantly, we practice what we teach. This is the philosophy that SCA uses in its consulting services.

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