RE-EVALUATING THE POTENTIAL OF OLD PLAYS

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The inspiration for this paper comes from two quotations. The first is by Wallace Pratt. “Oil is first sought in our minds.... One indispensable attribute of the successful oilfinder is vision...discovery must wait on our mental visualization — our imagination” (Pratt, 1942, 1952). The second is by Parke Dickey: “We usually find oil in new places with old ideas. Sometimes, also, we find oil in an old place with a new idea, but we seldom find much oil in an old place with an old idea. Several times in the past we have thought that we were running out of oil, whereas actually we were only running out of ideas” (Dickey, 1989).

At first glance, the distance between these philosophical observations on petroleum exploration and a practical discussion on the use of computerized geological data in evaluating the potential of known productive plays may seem impossibly large. However, these observations provide a context that can facilitate some of the most effective uses of such data. That context can be summarized as follows:

1. Successful exploration is the result of creative hypotheses that have been carefully evaluated and competently implemented.

2. Petroleum exploration should always be oriented to the new, whether these are ideas about new plays or new ideas about old plays.

3. Because new plays are becoming increasingly rare, the primary focus for domestic exploration must be on rethinking old plays.

The paper outlines a procedure for the systematic re-evaluation of old plays. The procedure incorporates three steps:

1. **Description** — understanding known accumulations within a play and reconstructing the exploration concept(s) that guided their discovery;

2. **Correlation** — relating known accumulations and exploration failures within a play to the geological controls of petroleum occurrence in that play; and

3. **Interrogation** — examining where possibilities may still exist in the play.

The procedure corresponds to several stages of the process of creative exploration as described by Norm Foster (1989). The first two steps flesh out what he has termed the **saturation** stage. The third step incorporates much of what he includes in his **illumination** and **verification** stages.

The procedure is based on the extensive use of computerized geologic data, primarily a field/reservoir data base. The use of computerized geologic data is proposed not as a substitute for thinking and imagination, but as an aid to them. Besides providing information that is organized to facilitate evaluation, good data bases make their most useful contribution by eliminating one of the most common excuses for not thinking. (“I didn’t have time to think it through. I had to spend too much time collecting the data!”)

The procedure is oriented toward the evaluation of known exploration plays. The play is used as the basic unit of analysis because it usually corresponds to a single exploration concept. (A play is normally defined as a geologically related group of accumulations and prospects.) Plays thus provide a coherent basis for developing and evaluating exploration hypotheses.

The first step — **description** — focuses on understanding known accumulations in a play and reconstructing the exploration concept(s) that led to their discovery. The primary information resource used in this step is a field/reservoir data base that has the following characteristics:

- it incorporates or permits play definitions with each major reservoir assigned to a play;
- it provides field and reservoir discovery histories;
- it contains field and reservoir size data;
- it provides field and reservoir characteristics; and
- it indicates field and reservoir location.

In our own play evaluations, we use our Significant Oil and Gas Fields of the United States data base, which covers more than 10,000 known oil and gas fields in the U.S. (all those with one million BOE or more known recovery). Every major reservoir in those fields is assigned to one of approximately 475 plays. A sample description of one of these plays is shown in Table 1.

Such a description summarizes key information about a play — its location, reservoir(s), depth range, trap type, hydrocarbon type, and amounts discovered to date. More detailed information can be obtained by creating distributions of various characteristics. The information provided in either the summaries or the printed distributions can also serve as useful screening guides to determine whether the play merits further scrutiny.

This basic description and characterization of the play is one aspect of reconstructing the exploration concept underlying the play. The other aspect is the examination of the discovery history of the play. Three elements of the discovery history are particularly useful: **timing, duration** and **cycliclicity.** The **time period** in which discovery occurred indicates the state of geologic knowledge and the capabilities of the exploration, drilling, and completion technology used in the discovery process. It also indicates whether or not there have been any recent discoveries in the play and thus whether new concepts are currently being pursued successfully in it. The **duration** of the discovery process indicates both the complexity of the exploration concept and the capabilities of exploration technology relative to the characteristics of accumulations within the play. The