The Ten Habits of Highly Successful Oil Finders*

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Abstract

Approximately 15% of the world’s geoscientists are highly successful explorationists, that being that they have exploration drilling success rates between 25-50%. Company studies combined with years of observation have shown that those highly successful geoscientists share ten habits. The focus of this presentation is on those ten habits and how they contribute to an individual’s success.
The Ten Habits of Highly Successful Oil Finders

D. J. Tearpock and R. C. Shoup

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The primary objective of petroleum geoscientists and engineers is to discover and develop oil and gas resources and reserves.

AND WE MUST DO SO PROFITABLY
• Generate accurate subsurface interpretations and maps

• Make accurate resource and reserve estimates

• Increase our drilling success rates
Exploration, Development and Production Success is a direct result of the application of 10 Key Geoscience and Engineering habits.

The 10 habits can be utilized by individuals, by integrated teams, by divisions and by companies to improve their exploration and development success rates, as well as more accurate resource and reserves estimates.
Successful oil finders ensure that their interpretations are geologically and geometrically valid in three dimensions.
APPLICATION OF IMPLIED FAULT STRIKE IN A PRODUCING FIELD TO FIND A SCREW FAULT ON A MAP

ZERO DISPLACEMENT

IMPLIED FAULT ROTATING ABOUT THIS LOCATION

IMPOSSIBLE INTERPRETATION

Requires a redo of the geology before conducting reserves estimate
Successful oil finders must have a classic background in geology, and thorough knowledge of the tectonic setting (structural geology) and depositional environments for the area in which they are working.
HANGING WALL:
A discovery has been made in various zones including the UNIT F

PROPOSED WELL:
Designed to provide more drainage for the hanging wall zones and to penetrate the upturned footwall play.

QUESTIONS:
1. Is the geological interpretation valid?
2. What would be the most likely result of the footwall UNIT F?
LINE LENGTHS OF DIFFERENT UNIT TOPS

TOP OF C

TOP OF D

TOP OF E

TOP OF F
GEOLOGICALLY AND GEOMETRICALLY BALANCED CROSS SECTION-FPF (Line Length and Bed Thickness Balanced -Constant Bed Thickness)

No change in stratigraphic thickness
THOROUGH KNOWLEDGE OF THE DEPOSITIONAL ENVIRONMENT

Net Pay
CI = 20'

0 - 19
20 - 39
40 - 59
60 - 79
80 - 99

APIDE Class

DPA Playmakers Forum - January 24, 2013

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Successful oil finders plan their time and their work in order to ensure accurate interpretations and maps.
Poor planning on your part does not constitute an emergency on my part.

POOR PLANNING DOES RESULT IN DRY HOLES

LOTS OF THEM
PLAN AND PRIORITIZE YOUR WORK

Begin with the end in mind. What information is needed for the decision?

How much data needs to be evaluated?

What type and quality of data are available?

How complex is the geology?

When is the decision due?

What is the impact of the decision?
Successful oil finders use all of the data to ensure that they have a 3 dimensionally valid subsurface geological interpretation and accurate subsurface maps.

The two most common causes of dry holes are the failure to use all the data and the failure to use the data correctly!
Submarine Fan Water Flood

PROPOSED WATER FLOOD

B Field Well Locations

Producer

Well #

Non-Producer

Well #

Proposed Re-Completions

Well #

Proposed Injector

Well #

Depth Structure Map
Seismic Marker at Top Fan
(all depths are ss)

Feet
0  1,000  2,000  3,000  4,000

Flt'd

Well Locations

Well #

Submarine Fan Water Flood
Channel Sand actually a Gorge or Submarine Canyon
Is it in Communication with the Lobe?
PROPOSED WATER FLOOD

Depth Structure Map
Seismic Marker at Top Gorge
(all depths are ss)

Well #
Gorge Sand
Net Pay

LKO
Well 11: -12133-85 = 12218
Well 13: -12168-43 = 12211

Interrogate the Data
Dip cross-section shows LKO for Gorge Sand is -12218
Successful oil finders ensure that their seismic and well correlations are **loop-tied** and accurate. This means correlating shales, sands, carbonates, faults, unconformities, etc.
CORRELATE and LOOP TIE ALL SEISMIC DATA

Auto-picking delegates the interpretation to the workstation.

"It is people, not workstations that find oil and gas,"
quoted by Mr. Dan Tearpock
LOOP TYING

Not Loop Tied

Main Fault mapped as a Bifurcating Fault trap

Loop Tied

Main Fault mapped as 2 En Echelon Faults
Successful oil finders know which methods, tools, and techniques are needed to accurately interpret and map the subsurface and accurately estimate the resources or reserves.
You are drilling a critical well. The required pay for an economic reservoir is 153 ft. The well is being drilled directionally into a dipping structure. The data for the well and structure are provided below.

Data:

- Wellbore Angle = 35°
- Borehole Compass Direction = N 80° E
- Formation Dip = 42°
- Formation Dip Compass Direction = N 80° W
- Measured Log Thickness of Pay = 142 ft

Question: Is the well an economic success or do we sell the discovery or P&A the well?
<table>
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<tr>
<th>Value</th>
<th>Description</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>MLT</td>
<td>No Correction Factor</td>
<td>142’</td>
</tr>
<tr>
<td>TVDT</td>
<td>Corrected Thickness</td>
<td>116’</td>
</tr>
<tr>
<td>TVT</td>
<td>Corrected Thickness</td>
<td>185’</td>
</tr>
<tr>
<td>TST</td>
<td>Corrected Thickness</td>
<td>137’</td>
</tr>
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</table>
WHY MUST WE USE TRUE VERTICAL THICKNESS?

Mapped Extent of Reservoir

Area = 100’ X 500’ = 50,000 sqft
Area = 100’ X 354’ = 35,400 sqft
Area = 141.25’ X 354’ = 50,000 sqft

Fig. 14-22; page 753
Successful oil finders map all relevant geological surfaces including:

- Faults
- Horizons
- Unconformities
- Sequence Boundaries
- Salt
- other
WHAT IS NEEDED TO MAP FAULT TRAPS?

Structure Maps needed:
- Fault Surface
- Top of Reservoir
- Base of Reservoir

Isochore Maps needed:
- Net Sand
- Net Pay
Successful oil finders map multiple horizons to develop reasonably correct, three-dimensional interpretations.
STRUCTURE MAP – 7000’ SAND
OVERLAY OF FAULT MAP AND STRUCTURE MAPS

Line of Termination of Fault B & Fault A

Scale
Successful oil finders document their work.
In generating geoscience interpretation and maps, along with estimating resources and reserves, significant amounts of data are collected and evaluated by both geoscientists and engineers.

Good, accurate recording of data and descriptions of procedures and methods make the work more efficient and more accurate.

Thorough documentation of all your work will hold up to any reviews or audits.
Successful oil finders seek out mentors and experienced individuals with knowledge and expertise who serve as mentors to those seeking experience.
Finding Mentors

Sources

• Your Company
• Professional Associations
  - Join
  - Be Active
• Consulting Companies

Ask

Most professionals are happy to mentor individuals who want to learn and improve
Know your Expertise

• Regional Expertise
• Skills
  - Subsurface Discipline (e.g., Structure, sequence strat, etc.)
  - Technical Skills

Offer

• If you see someone struggling, offer to help
• Give talks or lunch and learns
1. Generate viable, high-quality, three dimensionally valid subsurface interpretations, maps and prospects.

2. Provide more accurate estimates of resources and reserves.

3. Reduce cycle time.

4. Increase the effectiveness of the integrated process.

5. Find more than the average amount of oil and gas found by individuals, thereby adding value to the bottom-line of an exploration or development program.

THE BOTTOM LINE – FEWER DRY HOLES/MORE SUCCESS
EXCELLENCE THAT RUNS DEEP

STARTS WITH US & ENDS WITH YOU!

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