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So, You Want to Drill Your Own Oil Well? - An Oil and Gas Drilling Primer

Frank N. Cusimano, III

Author Contact Information:

Frank N. Cusimano, III

Attorney-at-Law

Houston, TX

fcusimano@comcast.net

281.615.4902

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By: Frank N. Cusimano, III

1. INTRODUCTION

Overview. The purpose of this paper is to give a lawyer who might be new to the oil-and-gas industry a broad overview of the process of drilling and producing an oil and gas well. It is written from the perspective that a person is thinking about drilling an oil well. Thus, what follows are some of the steps that such a person would need to take to drill and produce that well.

Technical. As such, this topic is somewhat technical in nature. Accordingly, this paper might be best written by someone with a technical background, such as a geologist or an engineer. Instead, however, it is written by a lawyer who has decades of experience in the oil and gas industry.

The Plan. This paper will begin with a broad and simplified discussion of what geologists do. It will then move into the process of drilling an oil and gas well and bringing the oil, gas, and water to the surface. It will then discuss the process of selling the oil and gas and disposing the water. Periodically, the paper will discuss some of the types of agreements that are needed to accomplish the tasks at hand.

Assumptions. In discussing this topic, this paper makes several assumptions about the hypothetical well that is being drilled in this instance: it is onshore (as opposed to offshore); it is an oil and gas well (as opposed to a gas-only well); it is a vertical well (as opposed to a horizontal well). However, this paper will briefly mention a few things about horizontal drilling and hydraulic fracturing (“fracking”). Another assumption is that the well is being drilled on privately-owned minerals (as opposed to government-owned).

Basic. This paper is conceived and written with the idea that the reader is a new-to-the-oil-and-gas-industry lawyer. Therefore, any readers who have substantial experience in this industry, or a technical background, may find this material to be rather basic.

2. ACKNOWLEDGEMENT

The author thanks Mr. Berry Simpson who provided much of the technical content of this paper. An additional source of information is Van Dyke, Kate - Fundamentals of Petroleum, Fourth Edition, 1997; Petroleum Extension Service; Division of Continuing Education; The University of Texas at Austin, Austin, TX.

3. BASIC GEOLOGY AND WHAT GEOLOGIST DO (SIMPLIFIED)

3.1 Basic Geology

Where and How Deep? So, you want to drill your own oil well? The first question you must ask yourself is where in this wide world are you going to drill it. The second question probably is - how deep are you going to drill it. Well, a geologist can tell you those two things.

Oversimplification. What follows next is an oversimplification of what geologist do. For that simplification, the author apologizes to any geologist readers. However, please understand that this oversimplification is done for the sake of expediency and is in no way a reflection of the

author's view of geologists. In fact, the author greatly admires the knowledge, intelligence, and steadfastness of those who endeavor in the geology field.

3.2 What Geologist Do

Data. The first thing geologists do is collect data on the area where the well is to be drilled. They will collect seismic data, well logs, core samples, perhaps even reference material or sources regarding the subject “basin” (more on that later), and numerous other types of data. Then they will take that data and use them to attempt to create maps of the underground. They will then study those maps, searching for likely oil and gas-bearing formations, and traps and seals which likely trapped the oil and gas in place in sufficient enough quantities to make it economic to drill for and produce that oil and gas.

Porous and Permeable Rock. Regarding an oil and gas-bearing formation, what the geologist is looking for is porous and permeable rock. Porosity and permeability will be defined and discussed in more detail later. In the underground, there are no “caverns” full of oil and gas. The oil and gas are embedded in the rock. In fact, the English word, “petroleum” comes from the Greek word meaning “rock oil”.

3.3 Geology – Origin of Oil and Gas

To understand more about what oil and gas-bearing formations are, one must first understand the origin of oil and gas. What follows is called the “organic theory” of the origin of oil and gas.

Organic Theory. In the ancient time (200 to 300 million years ago), there had to have been a warm shallow sea, or bay, or “basin”. This bay was fed by rivers which bring organic material into the shallow sea. Also in the bay are coral reefs and other marine life. In other words, there are sources of copious amounts of organic material.

Organic Material. Marine organisms and plant and animal remains fell to the bottom of this basin. These remains formed thick deposits of organic rich sludge at the bottom of the bay. Overlying sediments buried these organic remains along with mud and saltwater so deeply that they eventually turned into solid rock. Heat, pressure, and chemical reactions transformed the sludge into oil and gas. This organic material was protected from ordinary decay. (There was no oxygen or sunlight, plus the salt from the saltwater helped prevent decay.)

3.4 Geology – Rock Properties

Porosity. Oil and gas migrated into reservoir rock which must have plenty of room inside to trap oil, like a sponge. This characteristic of the rock is referred to as its porosity. Oil and gas are lighter than water; they therefore will migrate toward the surface. The hydrocarbons are also under pressure; therefore, they will migrate to areas of low pressure, i.e., also toward the surface. If they are not trapped in place, the oil and gas will eventually work their way to the surface. The location at the surface where the oil and gas express is called a “seep”.

Oil Seeps. If you are familiar with the old American TV show called “The Beverly Hillbillies”, then you know that one day, “Uncle Jed was out “shootin’ at some food, and then up through the ground came a bubblin’ crude.” That scene at the beginning of the show contains a depiction of an oil seep.

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