

How Did Tremendous Oil Deposits Get Under Prudhoe Bay?

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How did oil get 8,000 feet below the tundra and lake covered lands of the ancient Eskimo hunting grounds at Prudhoe Bay in northern Alaska?

The forces involved are not so well defined and understood that they can be explained in a few short paragraphs. To oversimplify the complex processes of nature that are necessary for the formation of a major oil field, at least three events are generally considered essential.

First: insects, animals, fish, sea plants, or some type of life in truly tremendous numbers must live and die in an area over a period of thousands and possibly even millions of years. As this once living matter decays and is buried, pressure, heat, and other not entirely understood factors convert the organic matter into petroliferous or carbonaceous products.

The zones where the decay and alteration of the once living matter occurs are called, "source beds." The source beds of the Prudhoe Bay fields apparently were deposited in a huge ocean that covered northern Alaska for over 200 million years, during periods of time that geologists

call the late Paleozoic and early and middle Mesozoic eras.

Second: if a great oil field is to be formed, after the oil has been formed it must be contained within a relatively small area. The formation where the oil is stored and later discovered by man is called a "reservoir." Sands that have open spaces between the grains, or limestones with interconnecting pores or holes make good pools to hold oil and gas.

Oil in the Prudhoe area is found in different types of reservoir rocks. The oil in the Lisbourne pool at Prudhoe is contained in a limestone, while the shallower and more extensive pools produce from sand reservoirs.

Oil and gas is not necessarily stored in the same rock or formation in which it was formed. In many cases it has probably been moved by the forces of nature from the source bed to the reservoir where it is discovered by the oil geologist and driller tens or hundreds of millions of years later.

Third: the oils and gases in the reservoir must be prevented from escaping if they are to accumulate in sufficient quantities to make a major oil field.

If there is a rock lid that holds the oil in the reservoir this cover is called a cap or cap-rock. When the oil is contained in buried structures that might be likened to covered hills or ridges with an impervious cap-rock, petroleum engineers refer to this as a structural type oil field. Sometimes the process of holding the oil in the reservoir is much more complex, and the petroleum is confined by changes in the size of the very small holes or pores of the sand or limestone formation. When this occurs scientists call the pool a stratigraphic type oil field.

The first published information on the Prudhoe discovery indicates that this largest single oil resource in North America is essentially a structural type field. The oil is said to be trapped in reservoirs that are formed by sloping beds and long arched underground hills that geologists call anticlines.

How and when did the three basic requirements for the accumulation of oil occur in Arctic Alaska? A short discussion on the happenings beneath the North Slope which is called Historical Geology will be discussed in the Tundra Times two weeks from today, April 29.