ASPHALTITE OF THE OUACHITA MOUNTAINS

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ABSTRACT

There about 20 known deposits of grahamite in the Ouachita Mountains of southeastern Oklahoma, one in Cotton County; and one known deposit of impsonite in the Ouachita Mountains and one in the Arbuckle Mountains.

General mode of occurrence of asphaltite deposits throughout the world is in steeply dipping masses or veins, most of which cut across bedding planes of the rocks in which they are found. With few exceptions, the veins are very irregular in outline. Most notable exceptions are the gilsonite veins of Utah, the West Virginia grahamite vein, and the grahamite vein in Cotton County, Oklahoma. These veins extend for considerable horizontal distances with less erratic differences in thickness than in most other known deposits. One of the Utah veins is 7 or 8 miles long, with a thickness of 8 to 12 feet for 4 miles.

The grahamite deposits in the Ouachita Mountains that have been explored are irregular in thickness and extent. The largest known grahamite deposit in the world, and one of the most extensively mined, is known as the Jackfork Creek deposit, near Sardis, Pushmataha County, Oklahoma. This vein was about a mile long, with a maximum thickness of 30 feet, and stretches of almost barren ground separated the thick parts of the vein. In some instances the vein was said to have been no more than a few inches thick. The same type of condition prevailed at the Jumbo mine, also in Pushmataha County, with the grahamite even more definitely localized in thick pockets, reportedly up to 30 feet thick, connected by thin stringers of grahamite. The veins have been explored to depths of about 200 feet.

It is generally conceded that the asphaltites and related bitumens were derived from petroleum. Many questions may be raised regarding the history of events that connected petroleum to these solid, brittle, fairly hard substances.

In the process of uplift, folding, and faulting, there is a probability that a fracture may develop in the rocks overlying an oil reservoir. When this happened, the oil under high pressure was forced upward through any minute crevice that developed. This high fluid pressure, transmitted from below but exerted closer to the surface where rock pressure was much less, is believed to have supplied the force which widened the fissures and made possible the accumulation of thick bodies of bitumen. Expansion in this manner continued until lowering pressure in the reservoir below was equalized with that required further to expand the fissure.

The hypothesis that faults cut the oil reservoirs and permitted escape of the oil along the fault plane cannot be supported for all deposits. Long veins which have been mined extensively in West Virginia and southwestern Oklahoma reveal little or no displacement of rocks along side walls other than spreading apart.

Of special interest regarding the Ouachita Mountain asphaltites is the large number of deposits concentrated in a particular segment of the mountains. A study of location of deposits reveals that most of them are along the belt between the Octavia and the Ti Valley fault zones, many of them concentrated in the western part of the region south of the Winding Stair fault.

An explanation for the large number of deposits in this region may be due to more than one factor in the geologic history of the region. The Winding Stair and Ti Valley fault zones are near the northern border of what is now regarded as the true Ouachita facies of rocks. This may have contributed to accumulation of oil in that portion of the region during an earlier stage of its history.

Most of the rocks of the Ouachita Mountain region are slaty shales, quartzitic sandstones, novaculite, and cherts. Such rocks are more brittle and therefore more readily fractured and jointed by moderate folding than are the general average of sedimentary rocks. Such a region having accumulations of petroleum overlain by a series of hard brittle rocks would offer the greatest chances for joint cracks or fracture zones to permit upward escape of part of the petroleum during early stages of folding. Reservoirs from which the oil may have come to form the Ouachita Mountain deposits are unknown.