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Abstracts of Papers

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Exploration Techniques in the Lower Greybull Sandstone of the Bighorn Basin

The search for oil in the Lower Cretaceous Greybull sandstone of the Bighorn Basin has been an ongoing process for almost a century. Exploration is difficult due to the elusive meanderbelt pattern and the complicated structural problems of the area. The economics, however, are generally good, and the estimated reserves make exploration efforts worthwhile.

To locate hydrocarbons in an alluvial system such as the Greybull, one must set up certain internal and external guideline criteria and then apply the existing surface and subsurface stratigraphic details, the first of which is the source. In the case of the Greybull, petrographic studies of heavy mineral content have determined that the Greybull channels source from a Craton dispersal system in the region of the Sioux uplift to the east of the Bighorn Basin. This is a reversal of current directions from most of the other Lower Cretaceous fluvial systems which source from the west.

Other necessary data include: channel thickness and width, vertical and lateral boundaries, and sedimentary structures such as crossbedding which may be observed on outcrop. The sleuthing does not stop there, however. Due to the complicated tectonic history of the Bighorn Basin, the faulting and water resistivities must also be carefully calculated and mapped.

The Greybull field in Bighorn County, Wyoming is an example of using the above criteria in exploration. Although the field is nearly depleted, it is a textbook example of locating the porosity boundaries in an alluvial channel and mapping the separate fault blocks. It then becomes an exercise in the economics of tertiary recovery.

By looking at trapping mechanisms in fields such as Greybull, Elk Basin, and Golden Dome, one can hope to apply the same exploration techiques to areas of lesser control, and then continue on with the search for the elusive Greybull.