

Abnormal Pressure Analysis in the Bakken Formation, Williston Basin, a Key to Future Discoveries

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Productive areas in the Bakken Formation in the U.S. part of the Williston Basin are associated with abnormal pressure and mature Bakken source rocks. The cause of the abnormal pressure is related to hydrocarbon generation. Drill stem tests (DST's) are the most abundant and accurate source of subsurface pressures in the Bakken. Pressures recorded on the tests can be interpreted for the original formation pressure, permeability, producibility, flow capacity, transmissibility, well bore damage, barriers near the wellbore, and reservoir size. The type of reservoir fluid present can also be sampled and analyzed.

DST's analyzed for the Bakken help delineate the extent and amount of overpressuring in the Bakken. An analysis of the pressure data also reveals the presence of matrix and/or fracture permeability. Knowledge of the type of permeability present is a key to the development of fields and determining proper well spacing. DST data can also reveal areas of pressure depletion during the course of field development.

Formation damage is common attribute in the Bakken formation which results from mud filtrate invasion. Formation damage can result in poor DST fluid recoveries and poor pressure buildup data. Low fluid recovery on DST's is very common in the low permeability Bakken reservoirs. DST's in the Bakken require long final shut-in periods so pressure build-ups can be accurately projected for original formation pressures. The interpretation of pressure data in the Bakken may aid in the discovery and development of new fields in the basin.