Abstract

The Bighorn Mountains and the western portion of the Powder River Basin are divided into four structural provinces based on a structure contour map drawn on top of the “Massive” Member of the Bighorn Dolomite. The Northern Province stretches from Muddy Creek on the Crow Reservation in Montana south to Little Goose Creek in Wyoming and is dominated by west-directed thrusting. The west flank of the Powder River Basin consists of homoclinal beds dipping at rates of 10 to 35 degrees on average. Depth to the Bighorn Dolomite is roughly -7,000 to -9,000 feet. The Central Province stretches from Little Goose Creek south to North Fork Crazy Woman Creek and is dominated by east-directed thrust-faulting. Dips along the west flank of the Powder River Basin are very steep to slightly overturned. Depth to the Bighorn Dolomite is between -10,000 and -11,500 feet. The Transition Province extends from North Fork Crazy Woman Creek south to Middle Fork Crazy Woman Creek and contains both east and west-directed thrusting. West-directed thrusting is confined to the west flank of the Powder River Basin. East-directed thrusting is best exemplified by the Buffalo Deep Thrust. Depth to the Bighorn Dolomite is roughly -11,500 feet. The Southern Province runs from Middle Fork Crazy Woman Creek southeast to the terminus of the Powder River Basin. It is dominated by west-directed thrusting. The west flank of the Powder River Basin is again dominated by homoclinal dips of 10 to roughly 35 degrees. Depth to the top of the Bighorn Dolomite is roughly -12,000 feet. At present horizontal production from the Niobrara Shale is confined to the Transition and the Southern structural provinces.
WHY?

• 2014 COUGAR DOME’S ENTIRE RESEARCH STAFF (ALL 3 OF US) WERE MAPPING GLACIAL DEPOSITS IN THE NORTHERN BIG HORN MOUNTAINS

• NOTICED SOME VERY LARGE STRUCTURES EXPOSED IN THE BIGHORN DOLOMITE
HOW?

• PREPARED BEDROCK GEOLOGIC MAP (IN PROGRESS) OF BIGHORN MOUNTAINS
• FOCUSED PRIMARILY ON THE BIGHORN DOLOMITE
• DONE WITH QGIS GIS SOFTWARE AND VERY GOOD EXISTING GEOLOGIC MAPS
• DREW STRUCTURE CONTOUR MAP OF BIGHORN DOLOMITE BASED ON GEOLOGIC MAP AND USGS DIGITAL TOPOGRAPHIC SHAPE FILES
BEDROCK GEOLOGIC MAP - BIGHORN MOUNTAINS

• IN PROGRESS
EXTENDED STRUCTURE CONTOUR MAP INTO POWDER RIVER BASIN

• SO FAR HAVE OPENED ABOUT 26,637 WELL FILES FROM WYOMING SERVER

• POSTED TOPS FROM 2,353 TENSLEEP/MINNELUSA SANDSTONE WELLS

• ASSUME THE TENSLEEP/MINNELUSA TO BIGHORN/WHITEWOOD UNIT WILL DEFORM MORE OR LESS AS ONE UNIT

• ESTIMATE TOP OF BIGHORN/WHITEWOOD FROM INTERVAL THICKNESS AND CONTOUR DATA
POWDER RIVER BASIN
TYPE LOG - TENSLEEP/BIGHORN
SECTION
LITTLE GOOSE CREEK THRUST SYSTEM
DEVONIAN/MISSISSIPPIAN FAIRWAY

- OUTRAGEOUS SUPPOSITION - IS THERE BAKKEN SHALE IN THE DEEPER PARTS OF THE POWDER RIVER BASIN?
A POSSIBILITY
SUMMARY

• BIGHORN MOUNTAINS/WESTERN POWDER RIVER BASIN CAN BE DIVIDED INTO 4 STRUCTURAL PROVINCES

• AT PRESENT, NO GOOD MODEL EXPLAINS THE ENIGMATIC NATURE OF THE THRUSTING IN THE BIGHORN MOUNTAIN PORTIONS OF THE WYOMING FORELAND PROVINCE

• POTENTIAL EXISTS FOR BAKKEN AND/OR MADISON PRODUCTION IN THE POWDER RIVER BASIN
QUESTIONS?

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