Abstract

Subsurface Core and Analogous Outcrop Characterization of the Muddy/Newcastle Formation for the Bell Creek Oil Field, Powder River County, Montana

Regional Subsurface Stratigraphy

Bell Creek Outcrop Stratigraphy

Muddy Formation

Mowry Shale

Laminated and Bedded Bell Creek Sand

Massive Bell Creek Sand

Rozet Member

Skull Creek Shale

The Plains CO2 Reduction (PCOR) Partnership led by the Energy & Environmental Research Center (EERC) conducted several field trips while developing the associated 3-D geologic models. The investigation has shown good sedimentological correlation between outcrop and subsurface core. Three formations and five horizons in the outcrop and subsurface core had poor recovery; thus only 25 cores were available to prepare for a carbon dioxide (CO2) enhanced oil recovery project. The Plains CO2 Reduction (PCOR) Partnership led by the Energy & Environmental Research Center (EERC) conducted several field trips while developing the associated 3-D geologic models. The investigation has shown good sedimentological correlation between outcrop and subsurface core. Three formations and five horizons in the outcrop and subsurface core had poor recovery; thus only 25 cores were available to prepare for a carbon dioxide (CO2) enhanced oil recovery project. 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**Outcrop**
- Features observed in outcrop correlate well to those present in field core, those formations and outcrop.  
- No extensive lateral or vertical barriers to flow were recognized; all features described in nature were conformable with one another.

**Subsurface Core**
- Three formation and five facies of the Mowry Formation were described in core.  
- The facies evolved laterally and vertically, and were conformable with one another.

**Massive Bell Creek Sand**
- Massive (monofacial) and laminated (poorly sorted) Bell Creek sands will act as one flow unit.  
- Thick sands are present throughout the outcrop, and are well to moderately sorted, and should have high porosity and permeability in the flow unit.  
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**Laminated Bell Creek Sand**
- Laminated Bell Creek sand as seen in outcrop section near New Haven, WY.

**Bioturbated Bell Creek Sand**
- Bioturbated Bell Creek sand as seen in outcrop section near New Haven, WY.

**Rozet Member**
- Rozet Member as seen cropping out below the Bell Creek sand, near New Haven, WY.

**Skull Creek Shale**
- Skull Creek Shale as seen cropping out from a large landslide, near New Haven, WY.  
- The Skull Creek Shale outcrop forming the hillside slopes under the cliff forming Muddy Sandstone, near New Haven, WY.

**Mowry Shale**
- Mowry Shale outcrop near New Haven, WY.

**Rozet Member**
- Rozet Member outcrop, near New Haven, WY.

**Observations**
- Features observed in outcrop correlate well to those present in field core, those formations and outcrop.
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