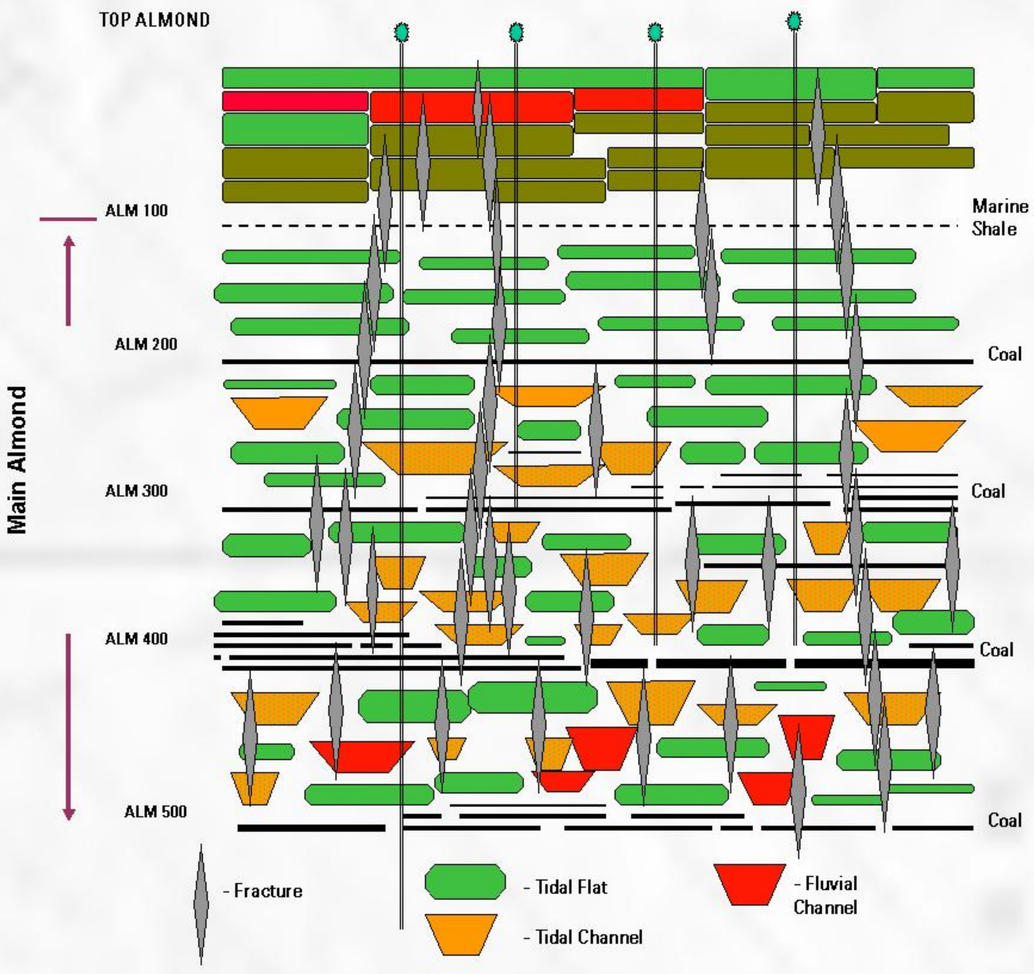
Click here to go to fifth poster.

# Matrix Characterization

Figure 1 - Schematic Almond Cross Section




## Upper Almond Facies

Detailed sedimentological, stratigraphic and petrophysical characterization identified two distinct, northeast-trending tidal channel complexes that dissect shoreface deposits in the field (figure 5). Comparative analysis of reservoir characteristics in shoreface and tidal channel sandstones indicate that grain size, volume of dolomite cement, and secondary porosity are primarily responsible for differences in reservoir quality (figure 6) .

Petrographic and petrophysical data indicate that tidal channel sandstones are relatively coarser grained, are silica and clay cemented, and are subjected to dissolution of unstable rock fragments resulting in secondary porosity. In contrast, shoreface sandstones are finer grained and contain high volumes of dolomite cement.

The Almond Formation can be divided into two genetic units, the Main and Upper Almond (figures 1 and 2). The division between these two units is typically defined by the initial occurrence of a correlatable transgressive marine shale above the continental Main Almond interval.

The Almond 100 thru Almond 700 or Main Almond is approximately 450 ' thick and is composed of 40-70' 'depositional sequences' dominated by lenticular, tidal flat and tidal channel sandstones encased within bayfill and estuarine shales. Individual sequences are bounded by continuous coal beds and carbonaceous shales. These sequences become increasingly marine upwards. Sandstones in the Main Almond are dominated by tidal facies which are highly compartmentalized and have limited connectivity. Drainage area or radius generally falls below well spacing.

The composite sandstone at the top of the sequence is commonly referred to as the Almond 'bar' and is the primary pay zone. Within Siberia Ridge Field, the Upper Almond is 30-50' thick. This sandstone is composed of amalgamated shoreface and tidal channel sandstones, and is laterally continuous. Permeability ranges from 0.001 to < 0.1md, average kh is 0.263md-ft and porosity ranges from 6-12% (average 10.3%), figures 3 and 4.

Figure 2 - Siberia Ridge Type Log

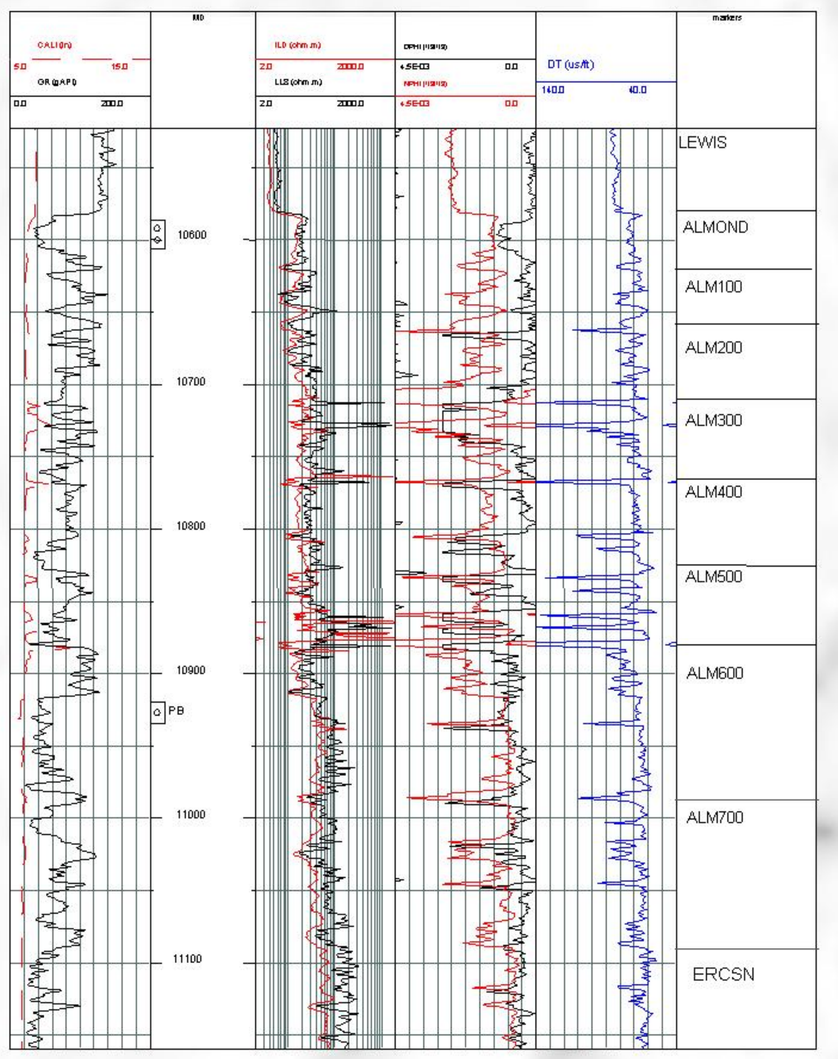



Figure 3 - Average Petrophysical Properties by Interval

| INTERVAL NAME | Average Interval Thickness (feet) | Average Net Thickness ($h$) (feet) | Average Net Porosity ($\phi$) (%) | Average Net $\phi h$ (porosity feet) | Average Net Permeability ($k$) (MD) | Average Net $kh$ (MD feet) |
|---|---|---|---|---|---|---|
| UPPER ALMOND | 34.8 | 12.8 | 10.3 | 1.3 | .032 | .414 |
| ALM 100 | 40.7 | 2.6 | 9.7 | .25 | .019 | .063 |
| ALM 200 | 60.8 | 4.3 | 9.8 | .43 | .026 | .097 |
| ALM 300 | 62.9 | 4.9 | 9.8 | .48 | .024 | .120 |
| ALM 400 | 54.5 | 4.3 | 9.7 | .41 | .034 | .116 |
| ALM 500 | 62.5 | 5.9 | 9.7 | .58 | .033 | .154 |
| ALM 600 | 95.9 | 11.6 | 9.2 | 1.05 | .021 | .254 |
| ALM 700 | 93.1 | 13.3 | 9.8 | 1.29 | .039 | .369 |

Figure 4 - Upper Almond kh Map

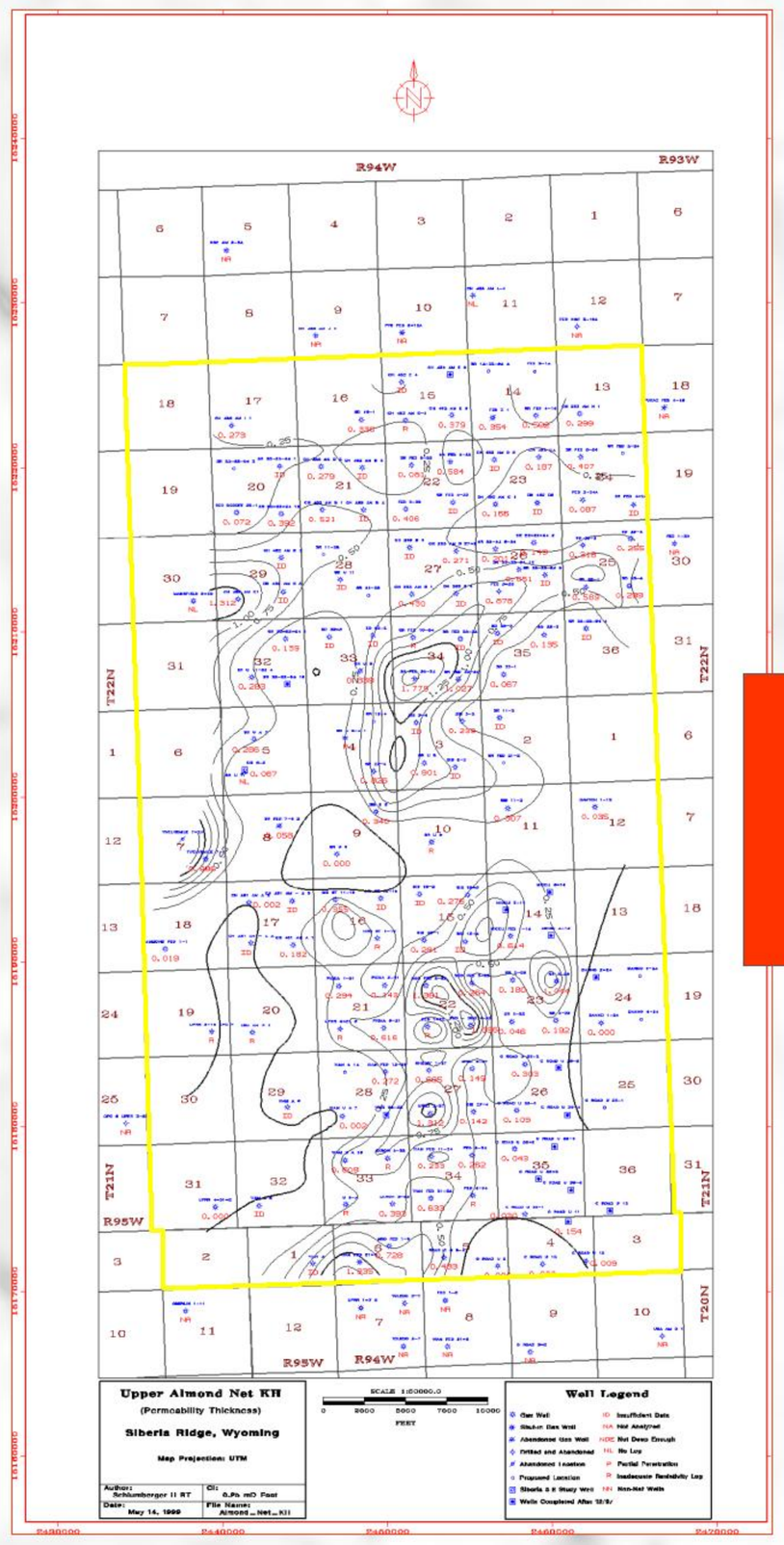



Figure 5 - Almond Bar Depositional Facies Map

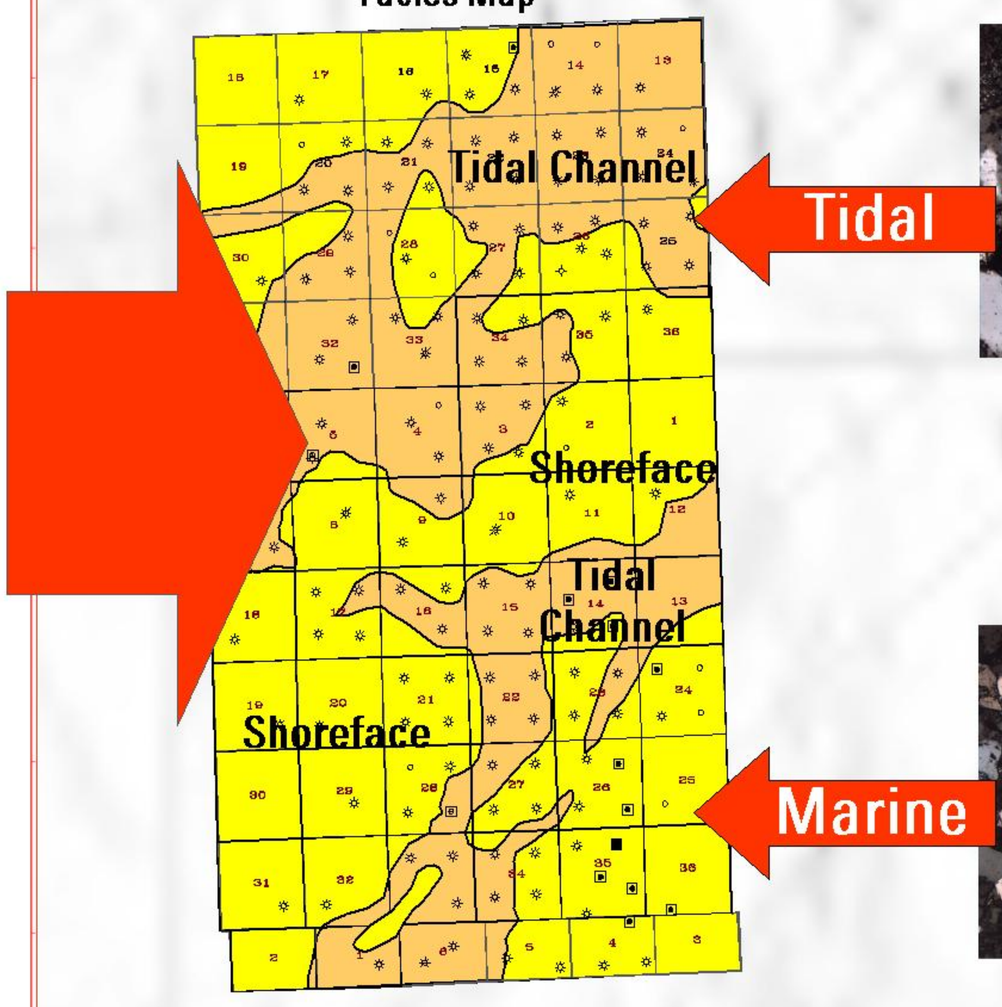
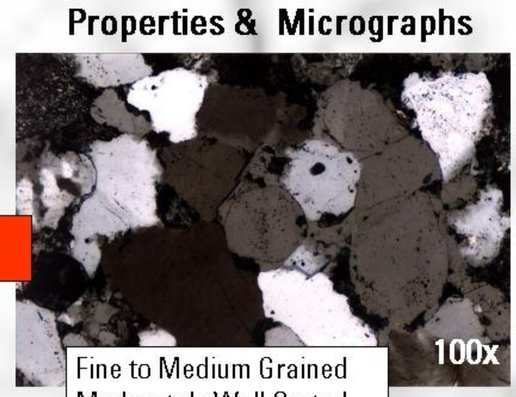
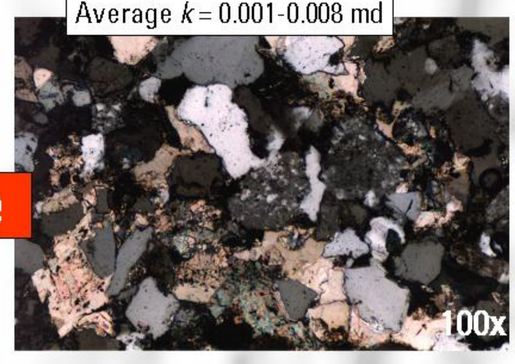



Figure 6 - Matrix Petrophysical Properties & Micrographs




Fine to Medium Grained
Moderately Well Sorted
Average $\phi$ = 8-12%
Average $k$ = 0.02-0.05md

Very Fine to Fine Grained
Well Sorted
Average $\phi$ = 2-9%
Average $k$ = 0.001-0.008 md




*Photos courtesy of IER, University of Wyoming*

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