

BURLINGTON RESOURCES
Geological Summary
Basin-Fruitland Coal Infill Pilot Project
Case # 12651

Burlington Resources, along with the other operators of Fruitland Coal wells in the San Juan Basin, has long recognized there are distinct differences in reservoir behavior between coals that were originally overpressured (known as Fairway coals) and coals that were originally underpressured (known internally at Burlington as UPE coals). Production differences between the two reservoir types are manifested in various degrees as the percentage of produced CO₂, dry vs. wet produced gases, BTU of produced gas, amount of initial and cumulative water production, initial reservoir pressures, maximum production rates, cumulative production and expected ultimate recoveries, initial reservoir permeability measurements, and the early production profiles showing initial gas inclining vs. a flat rate or immediate decline. These changes in production parameters can also be reasonably matched with observable differences in the geological character of the coal.

The majority of Fairway coals have higher vitrinite reflectance values which are used to measure coal rank and thermal maturity of the rocks. The higher rank coals are more prone to fracturing or cleating which directly affects reservoir permeability. They also have an increased capacity to generate and store hydrocarbons which lead to a higher initial gas content than the shallower and less thermally mature coals found outside the Fairway. Detailed, basin-wide stratigraphic mapping of nine coal packages by Burlington has indicated that placement within the original depositional environment had a direct impact on coal formation and initial quality or ash content. Additional studies indicate that it was maximum depth of burial and the current structural setting within this basin that controlled the degree of thermal maturity or rank achieved by the individual Fruitland coal seams.

Depositionally, the UPE coals were deposited on the updip, landward side of the coal forming peat swamps. They generally thin to the southwest and thicken towards the paleo shoreline to the northeast. Individual coal formation was increasingly affected on the landward side of these swamps by active fluvial systems which disrupted peat formation by preventing plant growth and periodically dumping clastic material during flood events into the peats. This environment affected initial coal quality (ash content) as well as the present day stratigraphic relationships between the individual seams. It caused some coals to become more discontinuous and less permeable than others thereby reducing their ability to produce gas or communicate equally throughout the reservoir.

In addition to depositional placement, these UPE coals achieved a shallower depth of maximum burial which caused them to be of lesser rank than Fairway coals and therefore less brittle and not as prone to fracturing and cleating. They are found structurally on what is known as the Chaco slope which is a gently dipping, monoclinical surface and were subjected to little structural flexure both during the formation of this Basin and at present time. This further reduces the likelihood of cleat formation and ultimately, diminishes reservoir permeability. The primary source of structural flexure found in this area is due to differential compaction of the coals and surrounding clastics during their burial phase. Some of the individual coal seams are locally draped over thicker, relatively non-compactable clastic deposits which may enhance individual seam permeability leading to unequal layered communication and production characteristics.

These observable changes in reservoir parameters, production characteristics, structural setting and geological character have led Burlington to believe that, while the current 320-acre proration units are adequate in the Fairway, the underpressured or UPE coals may be draining less than 320 acres in some areas. Burlington has therefore proposed to drill one additional pilot well per 320-acre spacing unit at five locations throughout the UPE area. These five locations were selected with the intention of capturing a representative sampling of the geological and productive variation observed within the UPE. The five pilot wells will be drilled where the majority of mapped coal seams show good development and represent areas of high, medium and low gas production relative to UPE coals. The stratigraphic complexity and grouping relationships observed in each pilot area will dictate the number of layers that are tested and ultimately modeled separately for coal quality, isotherm development, current level of depletion, gas content and productive potential.

Individual Pilot Well Summaries

Davis 505S SE 12, T31N-R12W

Expected to encounter 48 feet total net coal thickness in all seams combined. High degree of stratigraphic complexity in area with numerous small seam pinchouts and associated seam group splits. Expected to test 6 individual layer packages. Good representation for majority of mapped coal seams in area of low production rates (0 – 88 Mcfd).

Turner Federal 210S NW 13, T30N-R10W

Expected to encounter 55 feet total net coal thickness in all seams combined. Relatively low degree of stratigraphic complexity in area with fairly uniform seam group associations and only occasionally encountering small seam pinchouts. Expected to test 4 individual layer packages. Good representation for majority of mapped coal seams in area of low production rates (0 – 97 Mcfd).

San Juan 28-6 Unit 418S NW 28, T28N-R06W

Expected to encounter 60 feet total net coal thickness in all seams combined. Relatively low degree of stratigraphic complexity in major seams with fairly uniform seam group associations. High degree of discontinuity only found in upper coals (Blue sequence on type log). Expected to test 4 individual layer packages. Good representation for majority of mapped coal seams including upper coals (Blue sequence on type log) in area of moderate production rates (22 – 265 Mcfd).

San Juan 28-5 Unit 201S NW 15, T28N-R05W

Expected to encounter 77 feet total net coal thickness in all seams combined. Relatively high degree of stratigraphic complexity in all seams with varying seam group associations and localized discontinuities present in most layers. Expected to test 5 individual layer packages. Good representation for majority of mapped coal seams including upper coals (Blue and Yellow sequences on type log) in area of moderate production rates (5 – 117 Mcfd).

Huerfano Unit 258S NE 36, T27N-R10W

Expected to encounter 48 feet total net coal thickness in all seams combined. Relatively low degree of stratigraphic complexity in all seams with uniform seam group associations very rare localized discontinuities present. Expected to test 4 individual layer packages. Good representation for majority of mapped coal seams in area of good production rates (141 – 416 Mcfd).

Schematic Cross Section
 Fruitland Formation
 San Juan Basin

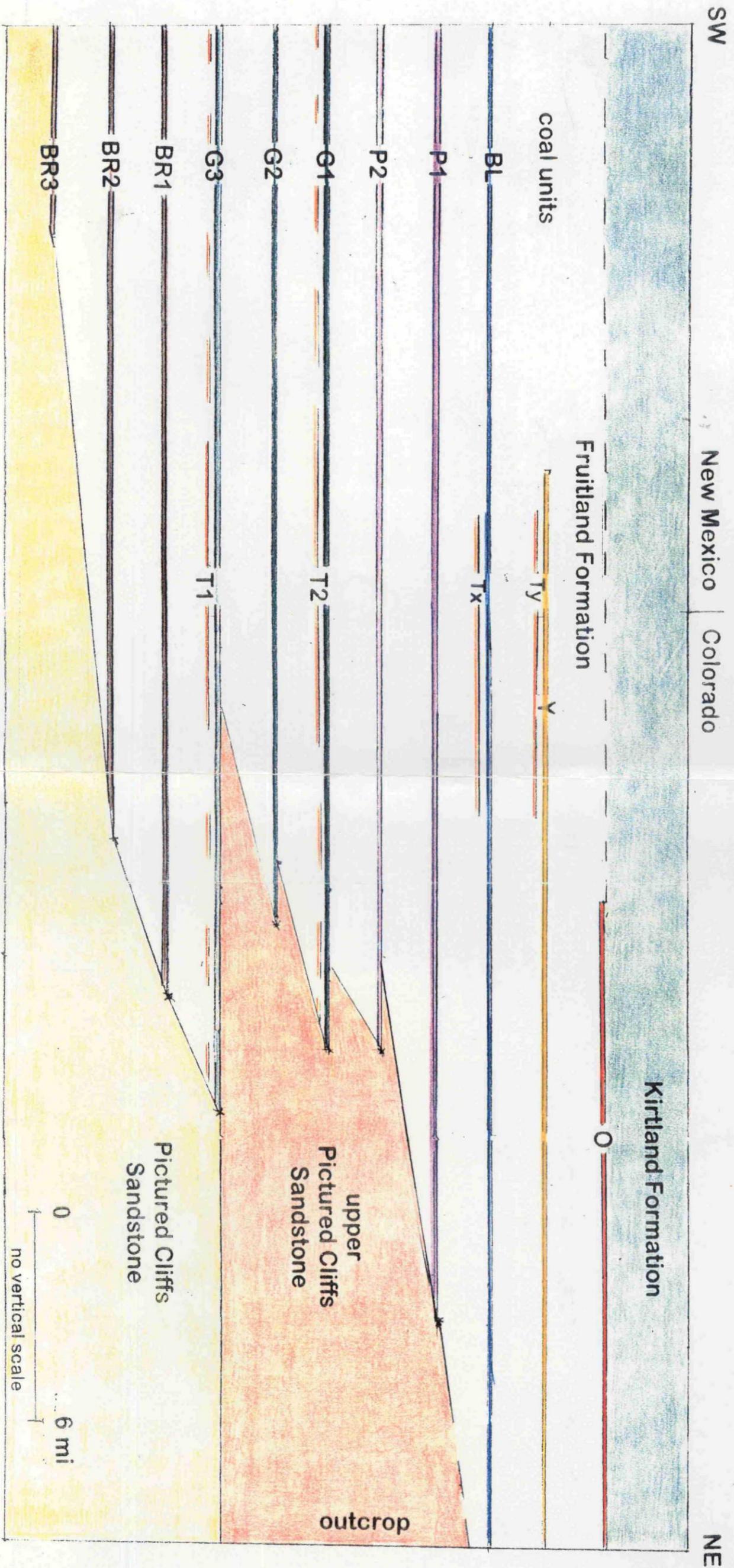


Figure CARTOON

CUMULATIVE PRODUCTION FROM P2000