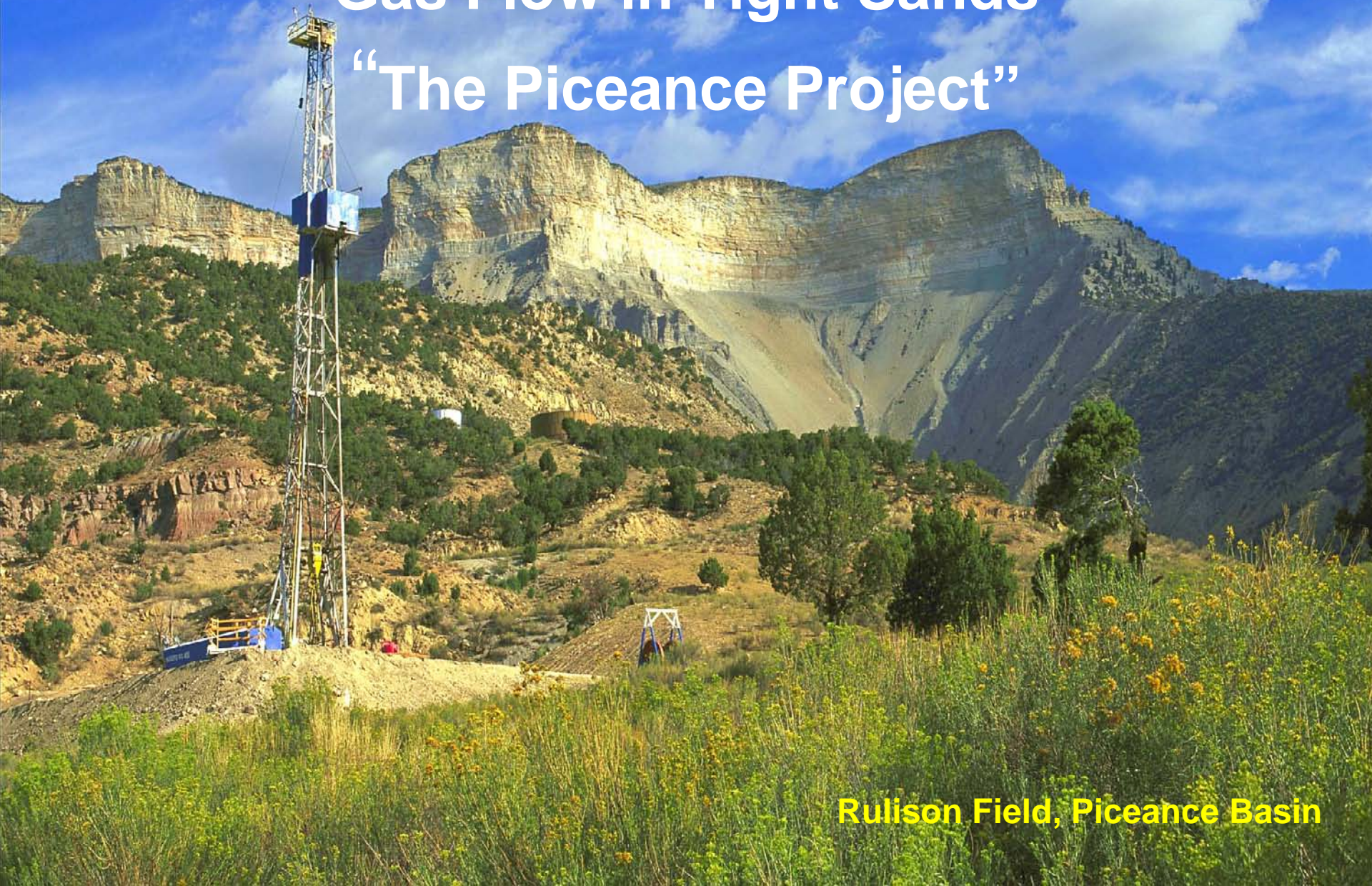


Reservoir Connectivity and Stimulated Gas Flow in Tight Sands “The Piceance Project”



Rulison Field, Piceance Basin

The Piceance Basin Project Team

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Rex Cole
Mesa State University, Grand Junction, CO

Dag Nummedal
Colorado School of Mines, Golden

Data and Cash Contributions

Bill Barrett Corporation

Geology: Image logs (7) through 3000 ft of pay. More than 1500 well logs across the basin

Geophysics: 3D multi-component reflection seismic data set (from 2005) for an area of 25.6 mi². Microseismic data Cross-well tomographic data sets.

Whiting Petroleum

2D VSP surveys, image logs, and thin sections from 70 rotary sidewall cores from the Boies Ranch field in the northern Piceance basin, for a total value of \$319,000.

Seitel - Regional seismic lines

Whiting Petroleum

2D VSP surveys, image logs, and thin sections from 70 rotary sidewall cores

TGS-Nopec, Noble, others – Wireline logs

IHS-Petra, Landmark, Schlumberger – Software support

Project cost-share consortium members – Antero Resources, Bill Barrett, Antero, Berry Petroleum, ConocoPhillips, EnCana, ExxonMobil, Marathon, Noble Energy, Whiting, Williams

Reservoir Connectivity and Stimulated Gas Flow in Tight Sandstones

PI: Dag Nummedal, Colorado Energy Research Institute Colorado School of Mines, Golden, CO

A. The rock framework – basin and reservoir models

Basin-wide stratigraphy: A regional, predictive stratigraphic model for the Mesaverde Group in the Piceance basin: Co-PI Paul Weimer (CU)

* ***Static reservoir models:*** Models of lithology, architectural elements, and petrophysical properties of reservoir sand bodies (analogs from outcrops and reservoirs at chosen fields): Co-PI Matt Pranter (CU)

Regional tectonics, structure and natural fractures: Establish the fundamental evolutionary history of the basin, its basic structure, stress and fracture framework for the Mesa Verde Group across the Piceance basin from all available data: Co-PI Bruce Trudgill (CSM)

* ***Role of anisotropic methods in characterization of tight sands:*** Co-PI Ilya Tsvankin (CSM)

B. The fluid flow

Reservoir flow simulation tied to rock properties: Mamm Creek field reservoir simulation: Co-PIs Jim Gilman and Reinaldo Michelena (iReservoir)

Stochastic joint inversion for petrophysical parameters to characterize the top of the continuous gas interval (porosity, salinity, S_w , cation exchange capacity, Archie's exponents): Co-PI Andre Revil, Ph.D. student William Woodruff

Fracturing of rocks in theory (and the field): Modeling of fracture and deformation in geomaterials using discrete element methods: Co-PI John Berger, Ph.D. student Scott Buechler

Micro-earthquake location by wave-equation interferometric imaging and probabilistic microseismic imaging: Co-PIs Paul Sava and Roel Snieder

Piceance Basin Project Review

April 8th, 2010, 8:30 a.m. – 4:30 p.m. @ EnCana, Denver

9:00 **Don McClure and Ira Pasternack**, EnCana, Welcoming remarks

9:20 **Dag Nummedal**, Colorado Energy Research Institute, CSM: The RPSEA Piceance basin project

9:30 **Roel Snieder**, Department of Geophysics, CSM: Seismic interferometry, who needs a seismic source?

9:50 **Paul Sava**, Department of Geophysics, CSM: Probabilistic microseismic imaging

10:10 **Rex Cole**, Department of Science, Mesa State College: Stratigraphic and sedimentologic framework of the Williams Fork and Iles Formations, as expressed in the outcrop belt of the southeast Piceance Basin, with implications for Mamm Creek field

10:50 **Reinaldo Michelena**, iReservoir.com: Facies probabilities from seismic data in Mamm Creek field

11:10 **Alicia Hewlett**, Department of Geological Sciences, University of Colorado, Boulder: Overview of Williams Fork Formation parasequences, architectural elements, and fractures, Mamm Creek Field

11:30 **Jim Gilman and Huabing Wang**, iReservoir.com: Dynamic Simulation of detailed geologic models

1:00 **Jennifer Aschoff**, Department of Geology and Geological Engineering, CSM: Stratigraphic controls on tight-gas sands: preliminary results and future directions

1:20 **Dag Nummedal**, Colorado Energy Research Institute, CSM: The origin of the Cretaceous Piceance basin by dynamic subsidence

1:40 **Paul Weimer**, Department of Geosciences, CU-Boulder: Regional stratigraphic and structural studies in the Piceance basin

2:00 **Andre Revil and William Woodruff**, Department of Geophysics, CSM: Stochastic joint inversion of borehole data and application to the determination of the top gas in the Piceance basin

2:20 **Mark Moyer and Piret Plink-Bjorklund**, Department of Geology and Geological Engineering, CSM: Importance of detailed Upper Williams Fork stratigraphy in the northern Piceance Basin: Potential implications of depositional system and stacking pattern changes on tight gas reservoir properties

3:00 **Scott Buechler, John Berger and Graham Mustoe**, Division of Engineering, CSM: Modeling of fracture and deformation in geomaterials using discrete element methods.

3:20 **Bruce Trudgill**, Department of Geology and Geological Engineering, CSM: Structural evolution and natural fracture patterns of the Divide Creek Anticline and Mamm Creek areas, Piceance Basin, Colorado