GEOCHEMISTRY OF TRENTON/BLACK RIVER GASES IN THE APPALACHIAN BASIN

## A PRELIMINARY REPORT



## ACKNOWLEDGEMENTS

#### COMPANIES

- Isotech Laboratories
- Triana Energy and CNR
- Fortuna Energy Inc.
- Hay Exploration
- K Petroleum
- CGAS
  Exploration/Enervest

#### Colleagues

- Dick Beardsley and Ed Rothman (Triana)
- Jeff Bowers (Fortuna)
- Monte Hay (Hay Petroleum)
- Bill Grubaugh (Enervest)
- Katharine Lee Avery (WVGS)
- Dave Harris (KGS)
- Larry Wickstrom (OGS)
- Dennis Coleman and Martin Schoell
- (Isotech)

# OUTLINE

- Utility of isotope geochemistry in natural gas exploration and development
- Purpose of Trenton/Black River natural gas study
- Natural gas sample distribution
- Results to date
- Preliminary conclusions and future work



#### UTILITY OF ISOTOPE GEOCHEMISTRY IN NATURAL GAS EXPLORATION AND DEVELOPMENT

Genetic Information
 Recognize and Quantify Gas Mixing
 Reservoir Identification
 Fault Block Mapping

#### UTILITY OF ISOTOPE GEOCHEMISTRY IN NATURAL GAS EXPLORATION AND DEVELOPMENT

Natural gases vary in chemical and isotope composition as a function of their formation and migration history. Individual gas components ( $CH_4$ ,  $C_2H_6$ , etc.) can be characterized by their stable carbon ( $^{13}C/$   $^{12}C$ ) and hydrogen ( $^{2}H/^{1}H$ ) isotopic compositions

 $\delta^{13}C \text{ (permil)} = [(1^{13}C/1^{2}C)_{\text{sample}} / (1^{13}C/1^{2}C)_{\text{PDB}} - 1] 1000$ 

 $\delta D$  (permil) = [ (D/H)<sub>sample</sub> / (D/H)<sub>SMOW</sub> - 1 ] 1000

# **GENETIC INFORMATION (**Schoell, 1983)



#### **GENETIC INFORMATION (Schoell, 1983)**



#### **RECOGNIZE AND QUANTIFY GAS MIXING**



Jenden and others, 1994

### RESERVOIR COMPARTMENTALIZATION AND FAULT BLOCK MAPPING



Schoell, 2003 personal communication

#### PURPOSE OF TRENTON/BLACK RIVER NATURAL GASES STUDY

 Source Rock and Thermal Maturation Data
 Recognize and Quantify Gas Mixing
 Recognize Reservoir

Compartmentalization

Fault Block Mapping

# Natural Gas Sample Distribution

Glodes Corners Field, Steuben Co., NY: 5 samples

- Muck Farm Field, Steuben Co., NY: 1 sample
- Wilson Hollow Field, Steuben and Chemung Co., NY: 1 sample
- County Line Field, Chemung Co., NY: 1 sample
- Terry Hill South Field, Chemung Co., NY: 1 sample
- #1 Andrews well, Steuben Co., NY: 1 sample



# Natural Gas Sample Distribution

 York Field, Ashtabula Co., OH: 6 samples
 Cottontree Field, Roane CO., WV: 2 samples
 Homer Field, Elliott Co., KY: 2 samples
 Clay Co., KY: 1 sample



#### **RESULTS TO DATE**

Clay County, KY.