Natural Gas Assessment of the Arkoma Basin, Ouachita Thrust Belt, and Reelfoot Rift

Introduction & Methodology Overview

Dave Houseknecht
U.S. Department of the Interior
U.S. Geological Survey

Some Pertinent Directives Included in These Laws

• These acts of Congress direct the Secretary of the Interior to conduct an inventory of oil and natural gas resources beneath onshore Federal lands.

• The EPCA Phase III inventory includes the entire onshore United States.

• USGS Responsibility: the inventory shall identify the USGS estimates of oil and gas resources underlying these lands.

• Methodology: the Secretary of the Interior shall use the same assessment methodology across all geological provinces, areas, and regions in preparing and issuing national geological assessments to ensure accurate comparisons of geological resources.

• Updates: the USGS estimates of oil and gas resources shall be regularly updated and made publicly available.
Chris Schenk, Project Chief

Standing Groups

Methodology

Petroleum Engineering

Assessment Review

GIS, Database, & Internet Support

Arkoma Basin Task

Dave Houseknecht, task chief
Jim Coleman, geologist
Bob Milici, geologist
Stan Paxton, geologist
Lyle Mars, geologist
Marvin Abbott, geologist
Chris Garrity, GIS cartographer
Bryant Fulk, summer geologist

~2.5 FTE Total
USGS Role in Assessing Petroleum Resources

- **Discovered (Identified) Resources**
  - Proved Reserves
  - Probable Reserves
  - Possible Reserves

- **Undiscovered Resources**
  - Undiscovered Resources

**INCREASING ECONOMIC VIABILITY**

**INCREASING GEOLOGIC CERTAINTY**

*modified from McKelvey, 1972*
Conventional Accumulations

**Fundamental Characteristics**

- Occupy limited, discrete volumes of rock defined by traps, seals, and down-dip water contacts.
- Depend on buoyancy of oil or gas in water for their existence.

**Map View**
- Discrete
- Little or no expansion in area after initial development

**Production History**
- Rapid identification of most known petroleum volume
- Modest additions with additional effort

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*Boyd, 2002*
Conventional Accumulations – Assessment Methodology

USGS Methodology

• **Estimates of SIZES and NUMBERS of undiscovered accumulations**
• **Relies heavily on discovery history trends, including exploration maturity**
• **Geologic analysis focuses on new reservoirs and new concepts**

Example of discovery history trend:
*Michigan Basin Middle Devonian Carbonates AU (Klett, in press)*
Continuous Accumulations - *Fundamental Characteristics*

**Continuous Accumulations**
- Consist of large volumes of rock pervasively charged with oil or gas.
- Do NOT depend on buoyancy of oil or gas in water for their existence.

**Map View**
- Extensive accumulations
- Expansion in area during development

**Production History**
- Known petroleum volume grows with effort (wells, knowledge, technology)
- Significant additions through time with additional effort
Continuous Accumulations – *Main Assessment Steps*

1. Geologic definition of assessment unit

2. Estimation of drainage area

3. Number of potential cells in AU

4. EUR distribution based on historical production

5. Estimate success ratio based on historical data
Summary of USGS Assessment Methodology

Conventional Accumulations
  • *SIZES* and *NUMBERS* of undiscovered accumulations

Continuous Accumulations
  • *CELLS* and *EURs*

Documentation & AAPG Reviews of USGS Methodologies

Numerous published examples of USGS assessments
  • *Publication list: [http://energy.cr.usgs.gov/oilgas/noga/products.html](http://energy.cr.usgs.gov/oilgas/noga/products.html)*
Assessment Schedule

August 2009: USGS internal geology review meeting
November 2009: Public geology review meeting hosted by OGS
January 2010: USGS final assessment meeting

Release of products to follow as soon as possible:
- USGS Fact Sheet (spring 2010)
- Results & GIS added to online National database (spring 2010)
- USGS publications summarizing all aspects of the assessment will be released online and/or on cd-rom later in 2010
- External papers summarizing certain aspects of the assessment will be published over the next few years
Schedule for Arkoma – Ouachita – Reelfoot Workshop

1. Introduction and Overview of USGS Assessment Methodology (*Houseknecht*)

2. Regional Geologic Framework (*Houseknecht*)

3. Arkoma “Fairway” Resources (*Houseknecht*)
   - Arkoma Shelf AU
   - Arkoma Deep Basin Conventional AU
   - Arkoma-Ouachita Foredeep Continuous AU

4. Shale-Gas Resources (*Paxton, Milici, & Houseknecht*)
   - Woodford Shale Gas AU
   - Chattanooga Shale Gas AU
   - Fayetteville Shale Gas AU
   - Caney Shale Gas AU

5. Arkoma Coalbed Gas Resources (*Milici*)
   - Arkoma Coalbed Gas AU

6. Frontier Gas Resources (*Coleman*)
   - Ouachita Thrust Belt AU
   - Arkansas Novaculite AU
   - Post-Ouachita Successor Basin AU
   - Reelfoot Rift Elvins Shale Gas AU

6. Poster Session (*USGS*)
   - Spectrum of topics on geologic framework of the assessment
Contact Information

Dave Houseknecht, USGS, Reston, Virginia
Geologist
dhouse@usgs.gov (703) 648-6466

Jim Coleman, USGS, Reston, Virginia
Geologist
jlcoleman@usgs.gov (703) 648-6400

Bob Milici, USGS, Reston, Virginia
Geologist
rmilici@usgs.gov (703) 648-6541

Stan Paxton, USGS, Oklahoma City, Oklahoma
Geologist
spaxton@usgs.gov (405) 810-4405

Lyle Mars, USGS, Reston, Virginia
Geologist
jmars@usgs.gov (703) 648-6302

Chris Garrity, USGS, Reston, Virginia
GIS
cgarrity@usgs.gov (703) 648-6426