

Appendix 1. Input parameters for the Marcellus Foldbelt Assessment Unit (50670467), Devonian Shale-Middle and Upper Paleozoic Total Petroleum System, Appalachian Basin Province. [bcfg, billion cubic feet of gas; mmcfcg, million cubic feet of gas; cfcg, cubic feet of gas; mmbo, million barrels of oil; bo, barrel of oil; bliq, barrel of liquid; bngl, barrel of natural gas liquids; m, meters; A.U., assessment unit]

FORSPAN ASSESSMENT MODEL FOR CONTINUOUS ACCUMULATIONS--BASIC INPUT DATA FORM (NOGA, Version 9, 2-10-03)

IDENTIFICATION INFORMATION

Assessment Geologist:	<u>J.L. Coleman and R.C. Milici</u>	Date:	<u>17-Mar-11</u>
Region:	<u>North America</u>	Number:	<u>5</u>
Province:	<u>Appalachian Basin</u>	Number:	<u>5067</u>
Total Petroleum System:	<u>Devonian Shale-Middle and Upper Paleozoic</u>	Number:	<u>506704</u>
Assessment Unit:	<u>Foldbelt Marcellus</u>	Number:	<u>50670467</u>
Based on Data as of:	<u>State data (West Virginia and Pennsylvania)</u>		
Notes from Assessor:	<u> </u>		

CHARACTERISTICS OF ASSESSMENT UNIT

Assessment-unit type: Oil (<20,000 cfcg/bo) or Gas (≥20,000 cfcg/bo), incl. disc. & pot. additions Gas

What is the minimum total recovery per cell? 0.02 (mmbo for oil A.U.; bcfg for gas A.U.)

Number of tested cells: 9?

Number of tested cells with total recovery per cell ≥ minimum:

Established (discovered cells): Hypothetical (no cells): X

Median total recovery per cell (for cells ≥ min.): (mmbo for oil A.U.; bcfg for gas A.U.)

1st 3rd discovered	<u> </u>	2nd 3rd	<u> </u>	3rd 3rd	<u> </u>
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Assessment-Unit Probabilities:

<u>Attribute</u>	<u>Probability of occurrence (0-1.0)</u>
1. CHARGE: Adequate petroleum charge for an untested cell with total recovery ≥ minimum.	<u>1.0</u>
2. ROCKS: Adequate reservoirs, traps, seals for an untested cell with total recovery ≥ minimum.	<u>1.0</u>
3. TIMING: Favorable geologic timing for an untested cell with total recovery ≥ minimum.	<u>1.0</u>

Assessment-Unit GEOLOGIC Probability (Product of 1, 2, and 3): 1.0

NO. OF UNTESTED CELLS WITH POTENTIAL FOR ADDITIONS TO RESERVES

- Total assessment-unit area (acres): (uncertainty of a fixed value)

calculated mean	<u>12,200,000</u>	minimum	<u>11,590,000</u>	mode	<u>12,200,000</u>	maximum	<u>12,810,000</u>
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- Area per cell of untested cells having potential for additions to reserves (acres): (values are inherently variable)

calculated mean	<u>149</u>	minimum	<u>80</u>	mode	<u>128</u>	maximum	<u>240</u>
uncertainty of mean:	minimum	<u>120</u>	maximum	<u>180</u>			
- Percentage of total assessment-unit area that is untested (%): (uncertainty of a fixed value)

calculated mean	<u>100</u>	minimum	<u>100</u>	mode	<u>100</u>	maximum	<u>100</u>
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Assessment Unit (name, no.)
 Foldbelt Marcellus, 50670467

**NO. OF UNTESTED CELLS WITH POTENTIAL FOR ADDITIONS TO RESERVES
 (Continued)**

4. Percentage of untested assessment-unit area that has potential for additions to reserves (%):
 (a necessary criterion is that total recovery per cell \geq minimum; uncertainty of a fixed value)

calculated mean 5 minimum 0.5 mode 3 maximum 10

Geologic evidence for estimates:

TOTAL RECOVERY PER CELL

Total recovery per cell for untested cells having potential for additions to reserves:
 (values are inherently variable; mmbo for oil A.U.; bcfg for gas A.U.)

calculated mean 0.21 minimum 0.02 median 0.1 maximum 5

**AVERAGE COPRODUCT RATIOS FOR UNTESTED CELLS, TO ASSESS COPRODUCTS
 (uncertainty of fixed but unknown values)**

<u>Oil assessment unit:</u>	minimum	mode	maximum
Gas/oil ratio (cfg/bo)	<u> </u>	<u> </u>	<u> </u>
NGL/gas ratio (bngl/mmcfg)	<u> </u>	<u> </u>	<u> </u>
<u>Gas assessment unit:</u>			
Liquids/gas ratio (bliq/mmcfg)	<u>0</u>	<u>0</u>	<u>0</u>

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Assessment Unit (name, no.)
 Foldbelt Marcellus, 50670467

SELECTED ANCILLARY DATA FOR UNTESTED CELLS

(values are inherently variable)

<u>Oil assessment unit:</u>		minimum	mode	maximum
API gravity of oil (degrees)		_____	_____	_____
Sulfur content of oil (%)		_____	_____	_____
Depth (m) of water (if applicable)		_____	_____	_____

Drilling depth (m)

minimum	F75	mode	F25	maximum
_____	_____	_____	_____	_____

Gas assessment unit:

		minimum	mode	maximum
Inert-gas content (%)		0.00	0.50	1.00
CO ₂ content (%)		0.00	1.00	3.00
Hydrogen sulfide content (%)		0.00	0.00	0.00
Heating value (BTU)		900	925	950
Depth (m) of water (if applicable)		_____	_____	_____

Drilling depth (m)

minimum	F75	mode	F25	maximum
1000	_____	3000	_____	5000

Success ratios:

	calculated mean	minimum	mode	maximum
Future success ratio (%)	40	20	40	60

Historic success ratio, tested cells (%) _____

Completion practices:

1. Typical well-completion practices (conventional, open hole, open cavity, other)	<u>conventional</u>
2. Fraction of wells drilled that are typically stimulated	<u>1</u>
3. Predominant type of stimulation (none, frac, acid, other)	<u>slickwater and sand</u>
4. Fraction of wells drilled that are horizontal	<u>0.6</u>
