

**Appendix 2.** Input parameters for the Interior Marcellus Assessment Unit (50670468), 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>Interior Marcellus</u>	Number:	<u>50670468</u>
Based on Data as of:	<u>State data West Virginia and Pennsylvania</u>		

Notes from Assessor: \_\_\_\_\_

**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: 3200

Number of tested cells with total recovery per cell ≥ minimum: >487

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

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

1st 3rd discovered	_____	2nd 3rd	_____	3rd 3rd	_____
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**Assessment-Unit Probabilities:**

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

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

calculated mean	<u>28,900,000</u>	minimum	<u>27,455,000</u>	mode	<u>28,900,000</u>	maximum	<u>30,345,000</u>
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2. 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>			

3. Percentage of total assessment-unit area that is untested (%): (uncertainty of a fixed value)

calculated mean	<u>99</u>	minimum	<u>98.5</u>	mode	<u>99</u>	maximum	<u>99.5</u>
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Assessment Unit (name, no.)  
 Interior Marcellus, 50670468

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**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 37      minimum 10      mode 25      maximum 75

Geologic evidence for estimates:

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**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 1.15      minimum 0.02      median 0.8      maximum 12

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**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/mmcf)	<u>                    </u>	<u>                    </u>	<u>                    </u>
<u>Gas assessment unit:</u>			
Liquids/gas ratio (bliq/mmcf)	<u>20</u>	<u>40</u>	<u>60</u>

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Assessment Unit (name, no.)  
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**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 <sub>2</sub> content (%)	0.00	1.00	2.00
Hydrogen sulfide content (%)	0.00	0.10	1.00
Heating value (BTU)	900	1000	1300
Depth (m) of water (if applicable)	_____	_____	_____

Drilling depth (m)

minimum	F75	mode	F25	maximum
1000	_____	2500	_____	4500

Success ratios:

	calculated mean	minimum	mode	maximum
Future success ratio (%)	85	75	85	95

Historic success ratio, tested cells (%) 85

Completion practices:

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|--|----------------------------|
| 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>0.73</u>                |
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