

# **U.S. Geological Survey Input-Data Forms for the Assessment of the Upper Jurassic Haynesville Formation, U.S. Gulf Coast, 2016**

Open-File Report 2018–1130



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**U.S. Department of the Interior  
U.S. Geological Survey**

**U.S. Department of the Interior**  
RYAN K. ZINKE, Secretary

**U.S. Geological Survey**  
James F. Reilly II, Director

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## **Introduction**

In 2016, the U.S. Geological Survey (USGS) completed an updated assessment of undiscovered, technically recoverable oil and gas resources in the Upper Jurassic Haynesville Formation of the onshore U.S. Gulf Coast Province (Paxton and others, 2017). The Haynesville Formation was assessed using both the standard continuous (unconventional) and conventional methodologies established by the USGS for four assessment units (AUs): (1) Haynesville Western Shelf Carbonate Gas and Oil AU, (2) Haynesville Eastern Shelf Sandstone and Carbonate Oil and Gas AU, (3) Haynesville Shale Continuous Gas AU, and (4) Haynesville Shale Peripheral Continuous Gas AU. The revised assessment resulted in total estimated mean resources of 1.1 billion barrels of oil, 195.8 trillion cubic feet of gas, and 866 million barrels of natural gas liquids. The purpose of this report is to provide supplemental documentation of the input parameters used in the USGS 2016 Haynesville Formation assessment.

## **Assessment Methodology**

The USGS uses two different peer-reviewed methodologies to assess continuous (unconventional) and conventional resource accumulations. Continuous resource accumulations are defined as oil and (or) natural gas that have been generated from thermally mature source rock and have remained within or adjacent to the pod of active source rock. The continuous resources methodology focuses on uncertainties related to the average drainage area of wells and the average estimated ultimate recoveries of wells, in addition to the projection of future success ratios (Charpentier and Cook, 2012). In contrast, conventional petroleum resources are defined where oil and (or) natural gas have migrated into structural and (or) stratigraphic traps and are buoyant upon water. Conventional resource assessments therefore focus on the numbers and sizes of undiscovered conventional accumulations (Klett and others, 2005). Despite differences in the input parameters, both methodologies result in probabilistic estimates of undiscovered, technically recoverable petroleum resources. Supplemental documentation regarding these resource methodologies can be found in multiple published reports (Klett and Charpentier, 2003; Crovelli, 2005; Klett and others, 2005; Klett and Schmoker, 2005; Schmoker, 2005; Schmoker and Klett, 2005; Charpentier and Cook, 2012).

## **Summary Input-Data Forms for Assessment**

The input-data forms for the four quantitatively assessed Haynesville Formation AUs are provided in tables 1–4.

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**Table 1.** Input parameters for the Haynesville Western Shelf Carbonate Gas and Oil Assessment Unit (50490116), Onshore U.S. Gulf Coast Province.

[Field-scale data from Nehring (2016), and well production data from IHS Markit™ (2016). BCFG, billion cubic feet of gas; MMCFG, million cubic feet of gas; CFG, cubic feet of gas; MMBO, million barrels of oil; MMBOE, million barrels of oil equivalent; BO, barrel of oil; BLIQ, barrel of liquid; BNGL, barrel of natural gas liquids; no., number; m, meter; AU, assessment unit; API, American Petroleum Institute; %, percent; NRG, Nehring; IHS, IHS Markit; LA, Louisiana; TX, Texas]

**USGS U.S. PETROLEUM RESOURCES ASSESSMENT  
INPUT FORM FOR CONVENTIONAL ASSESSMENT UNITS (Version 7.0.2, 9 April 2015)**

**IDENTIFICATION INFORMATION**

Assessment Geologist:	<u>S.T. Paxton</u>	Date:	<u>20-Oct-16</u>
Region:	<u>North America</u>	Number:	<u>5</u>
Province:	<u>Gulf Coast Mesozoic</u>	Number:	<u>5049</u>
Total Petroleum System:	<u>Upper Jurassic-Cretaceous-Tertiary Composite</u>	Number:	<u>504901</u>
Assessment Unit:	<u>Haynesville Western Shelf Carbonate Gas and Oil</u>	Number:	<u>50490116</u>
Scenario:		Number:	
Based on Data as of:	<u>NRG (2016, data current through 2014), IHS (2016)</u>		
Notes from Assessor:	<u>Coproducts and ancillary data for oil accumulations from Haynesville Eastern Shelf 50490117</u>		

**CHARACTERISTICS OF ASSESSMENT UNIT**

Area of assessment unit: 43,069 square kilometers

Minimum assessed accumulation size: 0.5 MMBOE (grown)

No. of discovered accumulations exceeding minimum size: Oil: 2 Gas: 48

<b>Uncertainty Class:</b>	Check One	Number
Producing fields	<u>X</u>	<u>        </u>
Discoveries	<u>        </u>	<u>        </u>
Wells	<u>        </u>	<u>        </u>
Seismic	<u>        </u>	<u>        </u>
No seismic	<u>        </u>	<u>        </u>

Median size (grown) of discovered oil accumulations (MMBO):

1st 3rd	<u>        </u>	2nd 3rd	<u>        </u>	3rd 3rd	<u>        </u>
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Median size (grown) of discovered gas accumulations (BCFG):

1st 3rd	<u>18.67</u>	2nd 3rd	<u>42.56</u>	3rd 3rd	<u>6.40</u>
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**ANALOGS USED IN ESTIMATING INPUT**

<u>Purpose</u>	<u>Analog or Analog Set</u>
1 <u>        </u>	<u>        </u> <u>        </u> <u>        </u>
2 <u>        </u>	<u>        </u> <u>        </u> <u>        </u>
3 <u>        </u>	<u>        </u> <u>        </u> <u>        </u>
4 <u>        </u>	<u>        </u> <u>        </u> <u>        </u>

Assessment Unit (name, no.)  
 Scenario (name, no.)

Haynesville Western Shelf Carbonate Gas and Oil, 50490116

Probability of occurrence (0-1.0)

Scenario Probability:

**Assessment-Unit Probabilities:** (Adequacy for at least one undiscovered field of minimum size)

<u>Attribute</u>	<u>Probability of occurrence (0-1.0)</u>
1. <b>CHARGE:</b> Adequate petroleum charge:	<u>1.0</u>
2. <b>ROCKS:</b> Adequate reservoirs, traps, and seals:	<u>1.0</u>
3. <b>TIMING OF GEOLOGIC EVENTS:</b> Favorable timing:	<u>1.0</u>
<b>Assessment-Unit GEOLOGIC Probability</b> (Product of 1, 2, and 3):	<u>1.00</u>

### UNDISCOVERED ACCUMULATIONS

**Number of Undiscovered Accumulations:** How many undiscovered accumulations exist that are at least the minimum size?: (uncertainty of fixed but unknown values)

Total Accumulations:	minimum (>0) _____	median _____	maximum _____
Oil/Gas Mix:	minimum _____	mode _____	maximum _____
	_____ number of oil accumulations / number of total accumulations		
	_____ number of oil accumulations / number of gas accumulations		
	_____ number of gas accumulations / number of oil accumulations		
Oil Accumulations:	minimum <u>0</u>	median <u>4</u>	maximum <u>10</u>
Gas Accumulations:	minimum <u>1</u>	median <u>50</u>	maximum <u>150</u>

**Sizes of Undiscovered Accumulations:** What are the sizes (**grown**) of the above accumulations?: (variations in the sizes of undiscovered accumulations)

Oil in Oil Accumulations (MMBO):	minimum <u>0.5</u>	median <u>1</u>	maximum <u>10</u>
Gas in Gas Accumulations (BCFG):	minimum <u>3</u>	median <u>6</u>	maximum <u>300</u>

### RATIOS FOR UNDISCOVERED ACCUMULATIONS, TO ASSESS COPRODUCTS

(variations in the properties of undiscovered accumulations)

<u>Oil Accumulations:</u>	minimum	median	maximum
Gas/oil ratio (CFG/BO):	<u>2</u>	<u>1250</u>	<u>5500</u>
NGL/gas ratio (BNGL/MMCFG):	<u>32</u>	<u>102</u>	<u>132</u>
<u>Gas Accumulations:</u>	minimum	median	maximum
Liquids/gas ratio (BLIQ/MMCFG):	<u>0.1</u>	<u>8</u>	<u>46</u>

**SELECTED ANCILLARY DATA FOR UNDISCOVERED ACCUMULATIONS**  
 (variations in the properties of undiscovered accumulations)

<u>Oil Accumulations:</u>	minimum	median	maximum
API gravity (degrees):	<u>34</u>	<u>47</u>	<u>55</u>
Viscosity (centipoise):	<u>1.7</u>	<u>2</u>	<u>7.2</u>
Sulfur content of oil (%):	<u>0.4</u>	<u>0.5</u>	<u>1.5</u>
Depth (m) of water (if applicable):	<u></u>	<u></u>	<u></u>

	minimum	F75	median	F25	maximum
Drilling Depth (m):	<u>2800</u>		<u>3000</u>		<u>3200</u>

<u>Gas Accumulations:</u>	minimum	median	maximum
Inert gas content (%):	<u>0.4</u>	<u>0.7</u>	<u>5.1</u>
Carbon dioxide content (%):	<u>1.2</u>	<u>2.2</u>	<u>3.4</u>
Hydrogen sulfide content (%):	<u>0</u>	<u>0.06</u>	<u>0.6</u>
Depth (m) of water (if applicable):	<u></u>	<u></u>	<u></u>

	minimum	F75	median	F25	maximum
Drilling Depth (m):	<u>3000</u>		<u>3800</u>		<u>5500</u>

**ALLOCATIONS OF POTENTIAL ADDITIONS TO RESERVES TO STATES**  
**Surface Allocations**

1. Arkansas

Onshore: 2.03 area % of the AU

Oil in Oil Accumulations: 2.03 volume % of the AU  
Gas in Gas Accumulations: 2.03 volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU  
Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

2. Louisiana

Onshore: 3.79 area % of the AU

Oil in Oil Accumulations: 3.79 volume % of the AU  
Gas in Gas Accumulations: 3.79 volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU  
Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

3. Texas

Onshore: 94.18 area % of the AU

Oil in Oil Accumulations: 94.18 volume % of the AU  
Gas in Gas Accumulations: 94.18 volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU  
Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

4. \_\_\_\_\_

Onshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU  
Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU  
Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

**ALLOCATIONS OF POTENTIAL ADDITIONS TO RESERVES TO STATES**  
**Surface Allocations**

5. \_\_\_\_\_

Onshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

6. \_\_\_\_\_

Onshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

7. \_\_\_\_\_

Onshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

8. \_\_\_\_\_

Onshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

**ALLOCATIONS OF POTENTIAL ADDITIONS TO RESERVES TO STATES**  
**Surface Allocations**

9. \_\_\_\_\_

Onshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

10. \_\_\_\_\_

Onshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

11. \_\_\_\_\_

Onshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

12. \_\_\_\_\_

Onshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

Assessment Unit (name, no.)  
Scenario (name, no.)

Haynesville Western Shelf Carbonate Gas and Oil, 50490116

**ALLOCATIONS OF POTENTIAL ADDITIONS TO RESERVES TO PROVINCES**  
**Surface Allocations**

1. Province Number: 5049 Name: Gulf Coast Mesozoic

Onshore: 100.00 area % of the AU

Oil in Oil Accumulations: 100.00 volume % of the AU

Gas in Gas Accumulations: 100.00 volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

2. Province Number: \_\_\_\_\_ Name: \_\_\_\_\_

Onshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

3. Province Number: \_\_\_\_\_ Name: \_\_\_\_\_

Onshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

4. Province Number: \_\_\_\_\_ Name: \_\_\_\_\_

Onshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU



Assessment Unit (name, no.)  
Scenario (name, no.)

Haynesville Western Shelf Carbonate Gas and Oil, 50490116

**ALLOCATIONS OF POTENTIAL ADDITIONS TO RESERVES TO PROVINCES**  
**Surface Allocations**

5. Province Number: \_\_\_\_\_ Name: \_\_\_\_\_

Onshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

6. Province Number: \_\_\_\_\_ Name: \_\_\_\_\_

Onshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

7. Province Number: \_\_\_\_\_ Name: \_\_\_\_\_

Onshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

8. Province Number: \_\_\_\_\_ Name: \_\_\_\_\_

Onshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU



**ALLOCATIONS OF POTENTIAL ADDITIONS TO RESERVES TO LAND ENTITIES**  
**Surface Allocations**

9. \_\_\_\_\_ represents \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU  
Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

10. \_\_\_\_\_ represents \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU  
Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

11. \_\_\_\_\_ represents \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU  
Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

12. \_\_\_\_\_ represents \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU  
Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

13. \_\_\_\_\_ represents \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU  
Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

14. \_\_\_\_\_ represents \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU  
Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

15. \_\_\_\_\_ represents \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU  
Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

**ALLOCATIONS OF POTENTIAL ADDITIONS TO RESERVES TO FEDERAL LAND SUBDIVISIONS**  
**Surface Allocations**

1. Bureau of Land Management (BLM) represents \_\_\_\_\_ area % of the AU  
Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU  
Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU
  
2. BLM Wilderness Areas (BLMW) represents \_\_\_\_\_ area % of the AU  
Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU  
Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU
  
3. BLM Roadless Areas (BLMR) represents \_\_\_\_\_ area % of the AU  
Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU  
Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU
  
4. National Park Service (NPS) represents \_\_\_\_\_ area % of the AU  
Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU  
Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU
  
5. NPS Wilderness Areas (NPSW) represents \_\_\_\_\_ area % of the AU  
Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU  
Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU
  
6. NPS Protected Withdrawals (NPSP) represents \_\_\_\_\_ area % of the AU  
Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU  
Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU
  
7. US Forest Service (FS) represents \_\_\_\_\_ area % of the AU  
Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU  
Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU
  
8. USFS Wilderness Areas (FSW) represents \_\_\_\_\_ area % of the AU  
Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU  
Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

Assessment Unit (name, no.)  
Scenario (name, no.)

Haynesville Western Shelf Carbonate Gas and Oil, 50490116

**ALLOCATIONS OF POTENTIAL ADDITIONS TO RESERVES TO FEDERAL LAND SUBDIVISIONS**  
**Surface Allocations**

9. USFS Roadless Areas (FSR) represents \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

10. USFS Protected Withdrawals (FSP) represents \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

11. US Fish and Wildlife Service (FWS) represents \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

12. USFWS Wilderness Areas (FWSW) represents \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

13. USFWS Protected Withdrawals (FWSP) represents \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

14. Wilderness Study Areas (WS) represents \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

15. Department of Energy (DOE) represents \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

16. Department of Defense (DOD) represents 1.15 area % of the AU

Oil in Oil Accumulations: 1.15 volume % of the AU

Gas in Gas Accumulations: 1.15 volume % of the AU

Assessment Unit (name, no.)  
Scenario (name, no.)

Haynesville Western Shelf Carbonate Gas and Oil, 50490116

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**ALLOCATIONS OF POTENTIAL ADDITIONS TO RESERVES TO FEDERAL LAND SUBDIVISIONS**  
**Surface Allocations**

17. Bureau of Reclamation (BOR) represents \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

18. Tennessee Valley Authority (TVA) represents \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

19. Other Federal represents \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

20. \_\_\_\_\_ represents \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

**ALLOCATIONS OF POTENTIAL ADDITIONS TO RESERVES TO ECOSYSTEMS**  
**Surface Allocations**

1. Blackland Prairies (BLPR) represents 11.25 area % of the AU  
Oil in Oil Accumulations: 11.25 volume % of the AU  
Gas in Gas Accumulations: 11.25 volume % of the AU
  
2. Mid Coastal Plains, Western (MCPW) represents 21.76 area % of the AU  
Oil in Oil Accumulations: 21.76 volume % of the AU  
Gas in Gas Accumulations: 21.76 volume % of the AU
  
3. Mississippi Alluvial Basin (MABA) represents 2.74 area % of the AU  
Oil in Oil Accumulations: 2.74 volume % of the AU  
Gas in Gas Accumulations: 2.74 volume % of the AU
  
4. Oak Woods and Prairies (OWPR) represents 39.12 area % of the AU  
Oil in Oil Accumulations: 39.12 volume % of the AU  
Gas in Gas Accumulations: 39.12 volume % of the AU
  
5. Rio Grande Plain (RGPL) represents 25.12 area % of the AU  
Oil in Oil Accumulations: 25.12 volume % of the AU  
Gas in Gas Accumulations: 25.12 volume % of the AU
  
6. \_\_\_\_\_ represents \_\_\_\_\_ area % of the AU  
Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU  
Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU
  
7. \_\_\_\_\_ represents \_\_\_\_\_ area % of the AU  
Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU  
Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU
  
8. \_\_\_\_\_ represents \_\_\_\_\_ area % of the AU  
Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU  
Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

Assessment Unit (name, no.)  
Scenario (name, no.)

Haynesville Western Shelf Carbonate Gas and Oil, 50490116

**ALLOCATIONS OF POTENTIAL ADDITIONS TO RESERVES TO ECOSYSTEMS**  
**Surface Allocations**

9. \_\_\_\_\_ represents \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

10. \_\_\_\_\_ represents \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

11. \_\_\_\_\_ represents \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

12. \_\_\_\_\_ represents \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU



**Table 2.** Input parameters for the Haynesville Eastern Shelf Sandstone and Carbonate Oil and Gas Assessment Unit (50490117), Onshore U.S. Gulf Coast Province.

[Well production data from IHS Markit™ (2016), and field-scale data from Nehring (2016). BCFG, billion cubic feet of gas; MMCFG, million cubic feet of gas; CFG, cubic feet of gas; MMBO, million barrels of oil; MMBOE, million barrels of oil equivalent; BO, barrel of oil; BLIQ, barrel of liquid; BNGL, barrel of natural gas liquids; no., number; m, meter; AU, assessment unit; API, American Petroleum Institute; %, percent; NRG, Nehring database; IHS, IHS Markit; AL, Alabama; FL, Florida; LA, Louisiana; MS, Mississippi; TX, Texas]



Assessment Unit (name, no.)  
 Scenario (name, no.)

Haynesville Eastern Shelf Sandstone and Carbonate Oil and Gas, 50490117

Probability of occurrence (0-1.0)

Scenario Probability:

**Assessment-Unit Probabilities:** (Adequacy for at least one undiscovered field of minimum size)

<u>Attribute</u>	<u>Probability of occurrence (0-1.0)</u>
1. <b>CHARGE:</b> Adequate petroleum charge:	<u>1.0</u>
2. <b>ROCKS:</b> Adequate reservoirs, traps, and seals:	<u>1.0</u>
3. <b>TIMING OF GEOLOGIC EVENTS:</b> Favorable timing:	<u>1.0</u>
<b>Assessment-Unit GEOLOGIC Probability</b> (Product of 1, 2, and 3):	<u>1.00</u>

### UNDISCOVERED ACCUMULATIONS

**Number of Undiscovered Accumulations:** How many undiscovered accumulations exist that are at least the minimum size?: (uncertainty of fixed but unknown values)

Total Accumulations:	minimum (>0) _____	median _____	maximum _____
Oil/Gas Mix:	minimum _____	mode _____	maximum _____
	_____ number of oil accumulations / number of total accumulations		
	_____ number of oil accumulations / number of gas accumulations		
	_____ number of gas accumulations / number of oil accumulations		
Oil Accumulations:	minimum <u>1</u>	median <u>75</u>	maximum <u>250</u>
Gas Accumulations:	minimum <u>1</u>	median <u>150</u>	maximum <u>500</u>

**Sizes of Undiscovered Accumulations:** What are the sizes (**grown**) of the above accumulations?: (variations in the sizes of undiscovered accumulations)

Oil in Oil Accumulations (MMBO):	minimum <u>0.5</u>	median <u>1.5</u>	maximum <u>1600</u>
Gas in Gas Accumulations (BCFG):	minimum <u>3</u>	median <u>18</u>	maximum <u>10000</u>

### RATIOS FOR UNDISCOVERED ACCUMULATIONS, TO ASSESS COPRODUCTS

(variations in the properties of undiscovered accumulations)

<u>Oil Accumulations:</u>	minimum	median	maximum
Gas/oil ratio (CFG/BO):	<u>2</u>	<u>1250</u>	<u>5500</u>
NGL/gas ratio (BNGL/MMCFG):	<u>32</u>	<u>102</u>	<u>132</u>
 <u>Gas Accumulations:</u>	 minimum	 median	 maximum
Liquids/gas ratio (BLIQ/MMCFG):	<u>0.1</u>	<u>8</u>	<u>46</u>

**SELECTED ANCILLARY DATA FOR UNDISCOVERED ACCUMULATIONS**

(variations in the properties of undiscovered accumulations)

<u>Oil Accumulations:</u>	minimum	median	maximum
API gravity (degrees):	<u>34</u>	<u>47</u>	<u>55</u>
Viscosity (centipoise):	<u>1.7</u>	<u>2</u>	<u>7.2</u>
Sulfur content of oil (%):	<u>0.4</u>	<u>0.5</u>	<u>1.5</u>
Depth (m) of water (if applicable):	<u>0</u>	<u>5</u>	<u>10</u>

	minimum	F75	median	F25	maximum
Drilling Depth (m):	<u>2000</u>		<u>3700</u>		<u>5500</u>

<u>Gas Accumulations:</u>	minimum	median	maximum
Inert gas content (%):	<u>0.4</u>	<u>0.7</u>	<u>5.1</u>
Carbon dioxide content (%):	<u>1.2</u>	<u>2.2</u>	<u>3.4</u>
Hydrogen sulfide content (%):	<u>0</u>	<u>0.06</u>	<u>0.6</u>
Depth (m) of water (if applicable):	<u>0</u>	<u>5</u>	<u>10</u>

	minimum	F75	median	F25	maximum
Drilling Depth (m):	<u>2000</u>		<u>5000</u>		<u>10000</u>

**ALLOCATIONS OF POTENTIAL ADDITIONS TO RESERVES TO STATES**  
**Surface Allocations**

1. Alabama

Onshore: 11.69 area % of the AU

Oil in Oil Accumulations: 11.69 volume % of the AU

Gas in Gas Accumulations: 11.69 volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

2. Arkansas

Onshore: 1.20 area % of the AU

Oil in Oil Accumulations: 1.20 volume % of the AU

Gas in Gas Accumulations: 1.20 volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

3. Florida

Onshore: 8.12 area % of the AU

Oil in Oil Accumulations: 8.12 volume % of the AU

Gas in Gas Accumulations: 8.12 volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

4. Louisiana

Onshore: 50.54 area % of the AU

Oil in Oil Accumulations: 50.54 volume % of the AU

Gas in Gas Accumulations: 50.54 volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

**ALLOCATIONS OF POTENTIAL ADDITIONS TO RESERVES TO STATES**  
**Surface Allocations**

5. Mississippi

Onshore: 28.16 area % of the AU

Oil in Oil Accumulations: 28.16 volume % of the AU  
Gas in Gas Accumulations: 28.16 volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU  
Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

6. Texas

Onshore: 0.29 area % of the AU

Oil in Oil Accumulations: 0.29 volume % of the AU  
Gas in Gas Accumulations: 0.29 volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU  
Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

7. \_\_\_\_\_

Onshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU  
Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU  
Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

8. \_\_\_\_\_

Onshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU  
Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU  
Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

**ALLOCATIONS OF POTENTIAL ADDITIONS TO RESERVES TO STATES**  
**Surface Allocations**

9. \_\_\_\_\_

Onshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

10. \_\_\_\_\_

Onshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

11. \_\_\_\_\_

Onshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

12. \_\_\_\_\_

Onshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

**ALLOCATIONS OF POTENTIAL ADDITIONS TO RESERVES TO PROVINCES**  
**Surface Allocations**

1. Province Number: 5049 Name: Gulf Coast Mesozoic

Onshore: 100.00 area % of the AU

Oil in Oil Accumulations: 100.00 volume % of the AU  
Gas in Gas Accumulations: 100.00 volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU  
Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

2. Province Number: \_\_\_\_\_ Name: \_\_\_\_\_

Onshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU  
Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU  
Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

3. Province Number: \_\_\_\_\_ Name: \_\_\_\_\_

Onshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU  
Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU  
Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

4. Province Number: \_\_\_\_\_ Name: \_\_\_\_\_

Onshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU  
Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU  
Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU



**ALLOCATIONS OF POTENTIAL ADDITIONS TO RESERVES TO PROVINCES**  
**Surface Allocations**

5. Province Number: \_\_\_\_\_ Name: \_\_\_\_\_

Onshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

6. Province Number: \_\_\_\_\_ Name: \_\_\_\_\_

Onshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

7. Province Number: \_\_\_\_\_ Name: \_\_\_\_\_

Onshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

8. Province Number: \_\_\_\_\_ Name: \_\_\_\_\_

Onshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

**ALLOCATIONS OF POTENTIAL ADDITIONS TO RESERVES TO LAND ENTITIES**  
**Surface Allocations**

1. <u>Federal Lands</u>	represents	<u>5.64</u>	area % of the AU
	Oil in Oil Accumulations:	<u>5.64</u>	volume % of the AU
	Gas in Gas Accumulations:	<u>5.64</u>	volume % of the AU
2. <u>Private Lands</u>	represents	<u>1.24</u>	area % of the AU
	Oil in Oil Accumulations:	<u>1.24</u>	volume % of the AU
	Gas in Gas Accumulations:	<u>1.24</u>	volume % of the AU
3. <u>Tribal Lands</u>	represents	<u>0.23</u>	area % of the AU
	Oil in Oil Accumulations:	<u>0.23</u>	volume % of the AU
	Gas in Gas Accumulations:	<u>0.23</u>	volume % of the AU
4. <u>Other Lands</u>	represents	<u>78.83</u>	area % of the AU
	Oil in Oil Accumulations:	<u>78.83</u>	volume % of the AU
	Gas in Gas Accumulations:	<u>78.83</u>	volume % of the AU
5. <u>AL State Lands</u>	represents	<u>0.25</u>	area % of the AU
	Oil in Oil Accumulations:	<u>0.25</u>	volume % of the AU
	Gas in Gas Accumulations:	<u>0.25</u>	volume % of the AU
6. <u>FL State Lands</u>	represents	<u>0.17</u>	area % of the AU
	Oil in Oil Accumulations:	<u>0.17</u>	volume % of the AU
	Gas in Gas Accumulations:	<u>0.17</u>	volume % of the AU
7. <u>LA State Lands</u>	represents	<u>1.89</u>	area % of the AU
	Oil in Oil Accumulations:	<u>1.89</u>	volume % of the AU
	Gas in Gas Accumulations:	<u>1.89</u>	volume % of the AU
8. <u>MS State Lands</u>	represents	<u>0.12</u>	area % of the AU
	Oil in Oil Accumulations:	<u>0.12</u>	volume % of the AU
	Gas in Gas Accumulations:	<u>0.12</u>	volume % of the AU

**ALLOCATIONS OF POTENTIAL ADDITIONS TO RESERVES TO LAND ENTITIES**  
**Surface Allocations**

9. TX State Lands represents 0.02 area % of the AU

Oil in Oil Accumulations: 0.02 volume % of the AU

Gas in Gas Accumulations: 0.02 volume % of the AU

10. AL Offshore represents 0.96 area % of the AU

Oil in Oil Accumulations: 0.96 volume % of the AU

Gas in Gas Accumulations: 0.96 volume % of the AU

11. FL Offshore represents 2.46 area % of the AU

Oil in Oil Accumulations: 2.46 volume % of the AU

Gas in Gas Accumulations: 2.46 volume % of the AU

12. LA Offshore represents 7.15 area % of the AU

Oil in Oil Accumulations: 7.15 volume % of the AU

Gas in Gas Accumulations: 7.15 volume % of the AU

13. MS Offshore represents 0.97 area % of the AU

Oil in Oil Accumulations: 0.97 volume % of the AU

Gas in Gas Accumulations: 0.97 volume % of the AU

14. TX Offshore represents 0.06 area % of the AU

Oil in Oil Accumulations: 0.06 volume % of the AU

Gas in Gas Accumulations: 0.06 volume % of the AU

15. \_\_\_\_\_ represents \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

**ALLOCATIONS OF POTENTIAL ADDITIONS TO RESERVES TO FEDERAL LAND SUBDIVISIONS**  
**Surface Allocations**

1. Bureau of Land Management (BLM) represents 0.00 area % of the AU  
Oil in Oil Accumulations: 0.00 volume % of the AU  
Gas in Gas Accumulations: 0.00 volume % of the AU
  
2. BLM Wilderness Areas (BLMW) represents \_\_\_\_\_ area % of the AU  
Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU  
Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU
  
3. BLM Roadless Areas (BLMR) represents \_\_\_\_\_ area % of the AU  
Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU  
Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU
  
4. National Park Service (NPS) represents 0.05 area % of the AU  
Oil in Oil Accumulations: 0.05 volume % of the AU  
Gas in Gas Accumulations: 0.05 volume % of the AU
  
5. NPS Wilderness Areas (NPSW) represents \_\_\_\_\_ area % of the AU  
Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU  
Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU
  
6. NPS Protected Withdrawals (NPSP) represents \_\_\_\_\_ area % of the AU  
Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU  
Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU
  
7. US Forest Service (FS) represents 3.27 area % of the AU  
Oil in Oil Accumulations: 3.27 volume % of the AU  
Gas in Gas Accumulations: 3.27 volume % of the AU
  
8. USFS Wilderness Areas (FSW) represents \_\_\_\_\_ area % of the AU  
Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU  
Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

**ALLOCATIONS OF POTENTIAL ADDITIONS TO RESERVES TO FEDERAL LAND SUBDIVISIONS**  
**Surface Allocations**

9. USFS Roadless Areas (FSR) represents \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

10. USFS Protected Withdrawals (FSP) represents \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

11. US Fish and Wildlife Service (FWS) represents 1.10 area % of the AU

Oil in Oil Accumulations: 1.10 volume % of the AU

Gas in Gas Accumulations: 1.10 volume % of the AU

12. USFWS Wilderness Areas (FWSW) represents \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

13. USFWS Protected Withdrawals (FWSP) represents \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

14. Wilderness Study Areas (WS) represents \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

15. Department of Energy (DOE) represents \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

16. Department of Defense (DOD) represents 1.23 area % of the AU

Oil in Oil Accumulations: 1.23 volume % of the AU

Gas in Gas Accumulations: 1.23 volume % of the AU

Assessment Unit (name, no.)  
Scenario (name, no.)

Haynesville Eastern Shelf Sandstone and Carbonate Oil and Gas, 50490117

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**ALLOCATIONS OF POTENTIAL ADDITIONS TO RESERVES TO FEDERAL LAND SUBDIVISIONS**  
**Surface Allocations**

17. Bureau of Reclamation (BOR) represents \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

18. Tennessee Valley Authority (TVA) represents \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

19. Other Federal represents \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

20. \_\_\_\_\_ represents \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

**ALLOCATIONS OF POTENTIAL ADDITIONS TO RESERVES TO ECOSYSTEMS**  
**Surface Allocations**

1. Coastal Plains and Flatwoods, Lower (CPFL) represents 24.09 area % of the AU  
Oil in Oil Accumulations: 24.09 volume % of the AU  
Gas in Gas Accumulations: 24.09 volume % of the AU
  
2. Coastal Plains and Flatwoods, Western Gulf (CPFW) represents 6.16 area % of the AU  
Oil in Oil Accumulations: 6.16 volume % of the AU  
Gas in Gas Accumulations: 6.16 volume % of the AU
  
3. Coastal Plains, Middle (CPMD) represents 18.49 area % of the AU  
Oil in Oil Accumulations: 18.49 volume % of the AU  
Gas in Gas Accumulations: 18.49 volume % of the AU
  
4. Eastern Gulf Prairies and Marshes (EGPM) represents 0.11 area % of the AU  
Oil in Oil Accumulations: 0.11 volume % of the AU  
Gas in Gas Accumulations: 0.11 volume % of the AU
  
5. Florida Coastal Lowlands (Western) (FCLW) represents 3.69 area % of the AU  
Oil in Oil Accumulations: 3.69 volume % of the AU  
Gas in Gas Accumulations: 3.69 volume % of the AU
  
6. Louisiana Coast Prairies and Marshes (LCPM) represents 17.52 area % of the AU  
Oil in Oil Accumulations: 17.52 volume % of the AU  
Gas in Gas Accumulations: 17.52 volume % of the AU
  
7. Mid Coastal Plains, Western (MCPW) represents 4.16 area % of the AU  
Oil in Oil Accumulations: 4.16 volume % of the AU  
Gas in Gas Accumulations: 4.16 volume % of the AU
  
8. Mississippi Alluvial Basin (MABA) represents 14.19 area % of the AU  
Oil in Oil Accumulations: 14.19 volume % of the AU  
Gas in Gas Accumulations: 14.19 volume % of the AU

**ALLOCATIONS OF POTENTIAL ADDITIONS TO RESERVES TO ECOSYSTEMS**  
**Surface Allocations**

9. \_\_\_\_\_ represents \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

10. \_\_\_\_\_ represents \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

11. \_\_\_\_\_ represents \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU

12. \_\_\_\_\_ represents \_\_\_\_\_ area % of the AU

Oil in Oil Accumulations: \_\_\_\_\_ volume % of the AU

Gas in Gas Accumulations: \_\_\_\_\_ volume % of the AU



**Table 3.** Input parameters for the Haynesville Shale Continuous Gas Assessment Unit (50490161), Onshore U.S. Gulf Coast Province.

[Well production data from IHS Markit™ (2016). bcfg, billion cubic feet of gas; mmcfg, million cubic feet of gas; cfg, cubic feet of gas; mmbo, million barrels of oil; bo, barrel of oil; bliq, barrel of liquid; NGL, natural gas liquids; bnlg, barrel of natural gas liquids; m, meter; no., number; AU, assessment unit; EUR, estimated ultimate recovery; API, American Petroleum Institute; %, percent; CO<sub>2</sub>, carbon dioxide; frac, hydraulic fracturing; IHS, IHS Markit; BTU, British thermal unit; LA, Louisiana; TX, Texas]

**USGS U.S. PETROLEUM RESOURCES ASSESSMENT  
INPUT DATA FORM FOR CONTINUOUS ACCUMULATIONS (version 1.3, April 29, 2015)**

**IDENTIFICATION INFORMATION**

Assessment Geologist:	<u>S.T. Paxton</u>	Date:	<u>20-Oct-16</u>
Region:	<u>North America</u>	Number:	<u>5</u>
Province:	<u>Gulf Coast Mesozoic</u>	Number:	<u>5049</u>
Total Petroleum System:	<u>Upper Jurassic-Cretaceous-Tertiary Composite</u>	Number:	<u>504901</u>
Assessment Unit:	<u>Haynesville Shale Continuous Gas</u>	Number:	<u>50490161</u>
Based on Data as of:	<u>IHS (2016)</u>		
Notes from Assessor:	<u>Coproduct ratios and ancillary data from Haynesville Western Shelf AU 50490116</u>		

**CHARACTERISTICS OF ASSESSMENT UNIT**

**Assessment-unit type:** oil (<20,000 cfg/bo)                      gas (>20,000 cfg/bo)   X    
heavy oil (<10 API)                     

**Well type:** vertical                      horizontal   X  

**Major reservoir type (Choose one.):**  
shale   X   low-permeability clastics                       
coal                      low-permeability carbonates                       
diatomite                     

**Minimum EUR per well**   0.02   (mmbo for oil AU; bcfg for gas AU)

**Number of tested wells:**   4111  

**Number of tested wells with EUR > minimum:**   3480  

**Historic success ratio, tested wells (%)**       85      

**Assessment-Unit Probability:**

What is the probability that at least one well within the AU will have production capacity of at least the minimum EUR?                     1.0                    

**NUMBER OF UNDRILLED WELLS WITH POTENTIAL FOR ADDITIONS TO RESERVES**

- Productive area of accumulation (acres): (triangular)  
calculated mean   6,787,000   minimum   4,017,000   mode   5,565,000   maximum   10,779,000
- Uncertainty about average drainage area of wells (acres): (triangular)  
calculated mean       107       minimum       80       mode       100       maximum       140
- Percentage of total assessment-unit area that is untested (%): (triangular)  
calculated mean       94       minimum       92       mode       94       maximum       95
- Percentage of untested assessment-unit area in sweet spots (%): (triangular)  
calculated mean       100       minimum       100       mode       100       maximum       100

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**ESTIMATED ULTIMATE RECOVERY (EUR) PER WELL**

**SWEET SPOTS**

5a. Future success ratio (%): (triangular)

calculated mean 70 minimum 50 mode 70 maximum 90

5b. Uncertainty about average EUR (mmbo for oil; bcfg for gas): (shifted truncated lognormal)

calculated mean 3.093 minimum 2 median 3 maximum 5

**NON-SWEET SPOTS**

6a. Future success ratio (%): (triangular)

calculated mean \_\_\_\_\_ minimum \_\_\_\_\_ mode \_\_\_\_\_ maximum \_\_\_\_\_

6b. Uncertainty about average EUR (mmbo for oil; bcfg for gas): (shifted truncated lognormal)

calculated mean \_\_\_\_\_ minimum \_\_\_\_\_ median \_\_\_\_\_ maximum \_\_\_\_\_

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**UNCERTAINTY ABOUT AVERAGE COPRODUCT RATIOS FOR UNTESTED WELLS**

(triangular)

Oil assessment unit:

minimum

mode

maximum

Gas/oil ratio (cfg/bo)

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

NGL/gas ratio (bnl/mmcf)

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Gas assessment unit:

Liquids/gas ratio (bliq/mmcf)

1

3

5

---

**SELECTED ANCILLARY DATA FOR UNTESTED WELLS**  
 (no specified distribution type)

<u>Oil assessment unit:</u>	minimum		median		maximum
API gravity of oil (degrees)	_____		_____		_____
Sulfur content of oil (%)	_____		_____		_____
Depth (m) of water (if applicable)	_____		_____		_____
Drilling depth (m)	minimum	F75	median	F25	maximum

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<u>Gas assessment unit:</u>	minimum		median		maximum
Inert-gas content (%)	0.40		1.00		5.00
CO <sub>2</sub> content (%)	1.00		2.00		3.00
Hydrogen sulfide content (%)	0.00		0.10		0.60
Heating value (BTU)	946		1020		1221
Depth (m) of water (if applicable)	_____		_____		_____
Drilling depth (m)	minimum	F75	median	F25	maximum
	3000		3500		5200

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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>1.00</u>
3. Predominant type of stimulation (none, frac, acid, other)	<u>frac. and acid</u>
4. Historic fraction of wells drilled that are horizontal	<u>1.00</u>

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**ALLOCATIONS OF POTENTIAL ADDITIONS TO RESERVES TO STATES**  
**Surface Allocations**

1. Louisiana

Onshore:	<u>56.64</u>	area % of the AU
	<u>56.64</u>	mean volume % of the AU
Offshore:	<u>          </u>	area % of the AU
	<u>          </u>	mean volume % of the AU

2. Texas

Onshore:	<u>43.36</u>	area % of the AU
	<u>43.36</u>	mean volume % of the AU
Offshore:	<u>          </u>	area % of the AU
	<u>          </u>	mean volume % of the AU

3.                                 

Onshore:	<u>          </u>	area % of the AU
	<u>          </u>	mean volume % of the AU
Offshore:	<u>          </u>	area % of the AU
	<u>          </u>	mean volume % of the AU

4.                                 

Onshore:	<u>          </u>	area % of the AU
	<u>          </u>	mean volume % of the AU
Offshore:	<u>          </u>	area % of the AU
	<u>          </u>	mean volume % of the AU

5.                                 

Onshore:	<u>          </u>	area % of the AU
	<u>          </u>	mean volume % of the AU
Offshore:	<u>          </u>	area % of the AU
	<u>          </u>	mean volume % of the AU

**ALLOCATIONS OF POTENTIAL ADDITIONS TO RESERVES TO STATES**  
(continued)

6. \_\_\_\_\_

Onshore: \_\_\_\_\_ area % of the AU  
                  \_\_\_\_\_ mean volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU  
                  \_\_\_\_\_ mean volume % of the AU

7. \_\_\_\_\_

Onshore: \_\_\_\_\_ area % of the AU  
                  \_\_\_\_\_ mean volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU  
                  \_\_\_\_\_ mean volume % of the AU

8. \_\_\_\_\_

Onshore: \_\_\_\_\_ area % of the AU  
                  \_\_\_\_\_ mean volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU  
                  \_\_\_\_\_ mean volume % of the AU

9. \_\_\_\_\_

Onshore: \_\_\_\_\_ area % of the AU  
                  \_\_\_\_\_ mean volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU  
                  \_\_\_\_\_ mean volume % of the AU

10. \_\_\_\_\_

Onshore: \_\_\_\_\_ area % of the AU  
                  \_\_\_\_\_ mean volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU  
                  \_\_\_\_\_ mean volume % of the AU

**ALLOCATIONS OF POTENTIAL ADDITIONS TO RESERVES TO PROVINCES**  
**Surface Allocations**

1. Number: 5049 Name: Gulf Coast Mesozoic

---

Onshore: 100.00 area % of the AU  
100.00 mean volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU  
\_\_\_\_\_ mean volume % of the AU

2. Number: \_\_\_\_\_ Name: \_\_\_\_\_

---

Onshore: \_\_\_\_\_ area % of the AU  
\_\_\_\_\_ mean volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU  
\_\_\_\_\_ mean volume % of the AU

3. Number: \_\_\_\_\_ Name: \_\_\_\_\_

---

Onshore: \_\_\_\_\_ area % of the AU  
\_\_\_\_\_ mean volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU  
\_\_\_\_\_ mean volume % of the AU

4. Number: \_\_\_\_\_ Name: \_\_\_\_\_

---

Onshore: \_\_\_\_\_ area % of the AU  
\_\_\_\_\_ mean volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU  
\_\_\_\_\_ mean volume % of the AU

5. Number: \_\_\_\_\_ Name: \_\_\_\_\_

---

Onshore: \_\_\_\_\_ area % of the AU  
\_\_\_\_\_ mean volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU  
\_\_\_\_\_ mean volume % of the AU

**ALLOCATIONS OF POTENTIAL ADDITIONS TO RESERVES TO PROVINCES**  
(continued)

6. Number: \_\_\_\_\_ Name: \_\_\_\_\_

Onshore: \_\_\_\_\_ area % of the AU  
\_\_\_\_\_ mean volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU  
\_\_\_\_\_ mean volume % of the AU

7. Number: \_\_\_\_\_ Name: \_\_\_\_\_

Onshore: \_\_\_\_\_ area % of the AU  
\_\_\_\_\_ mean volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU  
\_\_\_\_\_ mean volume % of the AU

8. Number: \_\_\_\_\_ Name: \_\_\_\_\_

Onshore: \_\_\_\_\_ area % of the AU  
\_\_\_\_\_ mean volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU  
\_\_\_\_\_ mean volume % of the AU

9. Number: \_\_\_\_\_ Name: \_\_\_\_\_

Onshore: \_\_\_\_\_ area % of the AU  
\_\_\_\_\_ mean volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU  
\_\_\_\_\_ mean volume % of the AU

10. Number: \_\_\_\_\_ Name: \_\_\_\_\_

Onshore: \_\_\_\_\_ area % of the AU  
\_\_\_\_\_ mean volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU  
\_\_\_\_\_ mean volume % of the AU



**ALLOCATIONS OF POTENTIAL ADDITIONS TO RESERVES TO GENERAL LAND OWNERSHIPS**  
**Surface Allocations**

1. Federal Lands	is	<u>6.26</u>	% of the AREA of the AU
mean VOLUME % in entity		<u>6.26</u>	
2. Private Lands	is	<u>0.55</u>	% of the AREA of the AU
mean VOLUME % in entity		<u>0.55</u>	
3. Tribal Lands	is	<u>0.00</u>	% of the AREA of the AU
mean VOLUME % in entity		<u>0.00</u>	
4. Other Lands	is	<u>91.78</u>	% of the AREA of the AU
mean VOLUME % in entity		<u>91.78</u>	
5. <u>LA State Lands</u>	is	<u>1.30</u>	% of the AREA of the AU
mean VOLUME % in entity		<u>1.30</u>	
6. <u>TX State Lands</u>	is	<u>0.11</u>	% of the AREA of the AU
mean VOLUME % in entity		<u>0.11</u>	
7. _____	is	_____	% of the AREA of the AU
mean VOLUME % in entity		_____	
8. _____	is	_____	% of the AREA of the AU
mean VOLUME % in entity		_____	
9. _____	is	_____	% of the AREA of the AU
mean VOLUME % in entity		_____	
10. _____	is	_____	% of the AREA of the AU
mean VOLUME % in entity		_____	

**ALLOCATIONS OF POTENTIAL ADDITIONS TO RESERVES TO GENERAL LAND OWNERSHIPS**  
(continued)

11. \_\_\_\_\_ is \_\_\_\_\_ % of the AREA of the AU  
mean VOLUME % in entity \_\_\_\_\_
12. \_\_\_\_\_ is \_\_\_\_\_ % of the AREA of the AU  
mean VOLUME % in entity \_\_\_\_\_
13. \_\_\_\_\_ is \_\_\_\_\_ % of the AREA of the AU  
mean VOLUME % in entity \_\_\_\_\_
14. \_\_\_\_\_ is \_\_\_\_\_ % of the AREA of the AU  
mean VOLUME % in entity \_\_\_\_\_
15. \_\_\_\_\_ is \_\_\_\_\_ % of the AREA of the AU  
mean VOLUME % in entity \_\_\_\_\_
16. \_\_\_\_\_ is \_\_\_\_\_ % of the AREA of the AU  
mean VOLUME % in entity \_\_\_\_\_
17. \_\_\_\_\_ is \_\_\_\_\_ % of the AREA of the AU  
mean VOLUME % in entity \_\_\_\_\_
18. \_\_\_\_\_ is \_\_\_\_\_ % of the AREA of the AU  
mean VOLUME % in entity \_\_\_\_\_
19. \_\_\_\_\_ is \_\_\_\_\_ % of the AREA of the AU  
mean VOLUME % in entity \_\_\_\_\_
20. \_\_\_\_\_ is \_\_\_\_\_ % of the AREA of the AU  
mean VOLUME % in entity \_\_\_\_\_

**ALLOCATIONS OF POTENTIAL ADDITIONS TO RESERVES TO FEDERAL LAND SUBDIVISIONS**  
**Surface Allocations**

- |                                      |    |                   |                         |
|--------------------------------------|----|-------------------|-------------------------|
| 1. Bureau of Land Management (BLM)   | is | <u>0.00</u>       | % of the AREA of the AU |
| mean VOLUME % in entity              |    | <u>0.00</u>       |                         |
| 2. BLM Wilderness Areas (BLMW)       | is | <u>          </u> | % of the AREA of the AU |
| mean VOLUME % in entity              |    | <u>          </u> |                         |
| 3. BLM Roadless Areas (BLMR)         | is | <u>          </u> | % of the AREA of the AU |
| mean VOLUME % in entity              |    | <u>          </u> |                         |
| 4. National Park Service (NPS)       | is | <u>0.00</u>       | % of the AREA of the AU |
| mean VOLUME % in entity              |    | <u>0.00</u>       |                         |
| 5. NPS Wilderness Areas (NPSW)       | is | <u>          </u> | % of the AREA of the AU |
| mean VOLUME % in entity              |    | <u>          </u> |                         |
| 6. NPS Protected Withdrawals (NPSP)  | is | <u>          </u> | % of the AREA of the AU |
| mean VOLUME % in entity              |    | <u>          </u> |                         |
| 7. US Forest Service (FS)            | is | <u>4.36</u>       | % of the AREA of the AU |
| mean VOLUME % in entity              |    | <u>4.36</u>       |                         |
| 8. USFS Wilderness Areas (FSW)       | is | <u>          </u> | % of the AREA of the AU |
| mean VOLUME % in entity              |    | <u>          </u> |                         |
| 9. USFS Roadless Areas (FSR)         | is | <u>          </u> | % of the AREA of the AU |
| mean VOLUME % in entity              |    | <u>          </u> |                         |
| 10. USFS Protected Withdrawals (FSP) | is | <u>          </u> | % of the AREA of the AU |
| mean VOLUME % in entity              |    | <u>          </u> |                         |



**ALLOCATIONS OF POTENTIAL ADDITIONS TO RESERVES TO ECOSYSTEMS**  
**Surface Allocations**

- |     |  |    |              |                         |
|-----|--|----|--------------|-------------------------|
| 1.  | <u>Coastal Plains and Flatwoods, Western Gulf (CF)</u> | is | <u>30.35</u> | % of the AREA of the AU |
|     | mean VOLUME % in entity                                |    | <u>30.35</u> |                         |
| 2.  | <u>Mid Coastal Plains, Western (MCPW)</u>              | is | <u>58.35</u> | % of the AREA of the AU |
|     | mean VOLUME % in entity                                |    | <u>58.35</u> |                         |
| 3.  | <u>Mississippi Alluvial Basin (MABA)</u>               | is | <u>11.30</u> | % of the AREA of the AU |
|     | mean VOLUME % in entity                                |    | <u>11.30</u> |                         |
| 4.  | _____  | is | _____        | % of the AREA of the AU |
|     | mean VOLUME % in entity                                |    | _____        |                         |
| 5.  | _____  | is | _____        | % of the AREA of the AU |
|     | mean VOLUME % in entity                                |    | _____        |                         |
| 6.  | _____  | is | _____        | % of the AREA of the AU |
|     | mean VOLUME % in entity                                |    | _____        |                         |
| 7.  | _____  | is | _____        | % of the AREA of the AU |
|     | mean VOLUME % in entity                                |    | _____        |                         |
| 8.  | _____  | is | _____        | % of the AREA of the AU |
|     | mean VOLUME % in entity                                |    | _____        |                         |
| 9.  | _____  | is | _____        | % of the AREA of the AU |
|     | mean VOLUME % in entity                                |    | _____        |                         |
| 10. | _____  | is | _____        | % of the AREA of the AU |
|     | mean VOLUME % in entity                                |    | _____        |                         |

**ALLOCATIONS OF POTENTIAL ADDITIONS TO RESERVES TO ECOSYSTEMS**  
(continued)

11. \_\_\_\_\_ is \_\_\_\_\_ % of the AREA of the AU  
mean VOLUME % in entity \_\_\_\_\_
12. \_\_\_\_\_ is \_\_\_\_\_ % of the AREA of the AU  
mean VOLUME % in entity \_\_\_\_\_
13. \_\_\_\_\_ is \_\_\_\_\_ % of the AREA of the AU  
mean VOLUME % in entity \_\_\_\_\_
14. \_\_\_\_\_ is \_\_\_\_\_ % of the AREA of the AU  
mean VOLUME % in entity \_\_\_\_\_
15. \_\_\_\_\_ is \_\_\_\_\_ % of the AREA of the AU  
mean VOLUME % in entity \_\_\_\_\_
16. \_\_\_\_\_ is \_\_\_\_\_ % of the AREA of the AU  
mean VOLUME % in entity \_\_\_\_\_
17. \_\_\_\_\_ is \_\_\_\_\_ % of the AREA of the AU  
mean VOLUME % in entity \_\_\_\_\_
18. \_\_\_\_\_ is \_\_\_\_\_ % of the AREA of the AU  
mean VOLUME % in entity \_\_\_\_\_
19. \_\_\_\_\_ is \_\_\_\_\_ % of the AREA of the AU  
mean VOLUME % in entity \_\_\_\_\_
20. \_\_\_\_\_ is \_\_\_\_\_ % of the AREA of the AU  
mean VOLUME % in entity \_\_\_\_\_

**Table 4.** Input parameters for the Haynesville Shale Peripheral Continuous Gas Assessment Unit (50490162), Onshore U.S. Gulf Coast Province.

[Well production data from IHS Markit™ (2016). bcfg, billion cubic feet of gas; mmcfg, million cubic feet of gas; cfg, cubic feet of gas; mmbo, million barrels of oil; bo, barrel of oil; bliq, barrel of liquid; NGL, natural gas liquids; bngl, barrel of natural gas liquids; m, meter; no., number; AU, assessment unit; EUR, estimated ultimate recovery; API, American Petroleum Institute; %, percent; CO<sub>2</sub>, carbon dioxide; frac, hydraulic fracturing; IHS, IHS Markit; BTU, British thermal unit; LA, Louisiana; MS, Mississippi; TX, Texas]

**USGS U.S. PETROLEUM RESOURCES ASSESSMENT  
INPUT DATA FORM FOR CONTINUOUS ACCUMULATIONS (version 1.3, April 29, 2015)**

**IDENTIFICATION INFORMATION**

Assessment Geologist:	<u>S.T. Paxton</u>	Date:	<u>20-Oct-16</u>
Region:	<u>North America</u>	Number:	<u>5</u>
Province:	<u>Gulf Coast Mesozoic</u>	Number:	<u>5049</u>
Total Petroleum System:	<u>Upper Jurassic-Cretaceous-Tertiary Composite</u>	Number:	<u>504901</u>
Assessment Unit:	<u>Haynesville Shale Peripheral Continuous Gas</u>	Number:	<u>50490162</u>
Based on Data as of:	<u>IHS (2016)</u>		
Notes from Assessor:	<u>Coproduct ratios and ancillary data from Haynesville Western Shelf AU 50490116</u>		

**CHARACTERISTICS OF ASSESSMENT UNIT**

**Assessment-unit type:** oil (<20,000 cfg/bo) \_\_\_\_\_ gas (>20,000 cfg/bo) X  
heavy oil (<10 API) \_\_\_\_\_

**Well type:** vertical \_\_\_\_\_ horizontal X

**Major reservoir type (Choose one.):**  
shale X low-permeability clastics \_\_\_\_\_  
coal \_\_\_\_\_ low-permeability carbonates \_\_\_\_\_  
diatomite \_\_\_\_\_

**Minimum EUR per well** 0.02 (mmbo for oil AU; bcfg for gas AU)

**Number of tested wells:** \_\_\_\_\_

**Number of tested wells with EUR > minimum:** \_\_\_\_\_

**Historic success ratio, tested wells (%)** \_\_\_\_\_

**Assessment-Unit Probability:**

What is the probability that at least one well within the AU will have  
production capacity of at least the minimum EUR? \_\_\_\_\_ 1.0

**NUMBER OF UNDRILLED WELLS WITH POTENTIAL FOR ADDITIONS TO RESERVES**

1. Productive area of accumulation (acres): (triangular)

calculated mean 6,386,667 minimum 10,000 mode 5,116,000 maximum 14,034,000

2. Uncertainty about average drainage area of wells (acres): (triangular)

calculated mean 113 minimum 60 mode 100 maximum 180

3. Percentage of total assessment-unit area that is untested (%): (triangular)

calculated mean 100 minimum 100 mode 100 maximum 100

4. Percentage of untested assessment-unit area in sweet spots (%): (triangular)

calculated mean 100 minimum 100 mode 100 maximum 100



---

**ESTIMATED ULTIMATE RECOVERY (EUR) PER WELL**

**SWEET SPOTS**

5a. Future success ratio (%): (triangular)

calculated mean 50 minimum 10 mode 50 maximum 90

5b. Uncertainty about average EUR (mmbo for oil; bcfg for gas): (shifted truncated lognormal)

calculated mean 1.562 minimum 0.5 median 1.5 maximum 3

**NON-SWEET SPOTS**

6a. Future success ratio (%): (triangular)

calculated mean \_\_\_\_\_ minimum \_\_\_\_\_ mode \_\_\_\_\_ maximum \_\_\_\_\_

6b. Uncertainty about average EUR (mmbo for oil; bcfg for gas): (shifted truncated lognormal)

calculated mean \_\_\_\_\_ minimum \_\_\_\_\_ median \_\_\_\_\_ maximum \_\_\_\_\_

---

**UNCERTAINTY ABOUT AVERAGE COPRODUCT RATIOS FOR UNTESTED WELLS**

(triangular)

Oil assessment unit:

Gas/oil ratio (cfg/bo)

NGL/gas ratio (bnl/mmcf)

minimum

mode

maximum

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Gas assessment unit:

Liquids/gas ratio (bliq/mmcf)

1

3

5

**SELECTED ANCILLARY DATA FOR UNTESTED WELLS**  
 (no specified distribution type)

<u>Oil assessment unit:</u>	minimum		median		maximum
API gravity of oil (degrees)	_____		_____		_____
Sulfur content of oil (%)	_____		_____		_____
Depth (m) of water (if applicable)	_____		_____		_____
Drilling depth (m)	minimum	F75	median	F25	maximum

---

<u>Gas assessment unit:</u>	minimum		median		maximum
Inert-gas content (%)	0.40		1.00		5.00
CO <sub>2</sub> content (%)	1.00		2.00		3.00
Hydrogen sulfide content (%)	0.00		0.10		0.60
Heating value (BTU)	946		1020		1221
Depth (m) of water (if applicable)	0		5		10
Drilling depth (m)	minimum	F75	median	F25	maximum
	3000		4000		5200

---

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>1.00</u>
3. Predominant type of stimulation (none, frac, acid, other)	<u>frac. and acid</u>
4. Historic fraction of wells drilled that are horizontal	<u>1.00</u>

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**ALLOCATIONS OF POTENTIAL ADDITIONS TO RESERVES TO STATES**  
(continued)

6. \_\_\_\_\_

Onshore: \_\_\_\_\_ area % of the AU  
                  \_\_\_\_\_ mean volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU  
                  \_\_\_\_\_ mean volume % of the AU

7. \_\_\_\_\_

Onshore: \_\_\_\_\_ area % of the AU  
                  \_\_\_\_\_ mean volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU  
                  \_\_\_\_\_ mean volume % of the AU

8. \_\_\_\_\_

Onshore: \_\_\_\_\_ area % of the AU  
                  \_\_\_\_\_ mean volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU  
                  \_\_\_\_\_ mean volume % of the AU

9. \_\_\_\_\_

Onshore: \_\_\_\_\_ area % of the AU  
                  \_\_\_\_\_ mean volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU  
                  \_\_\_\_\_ mean volume % of the AU

10. \_\_\_\_\_

Onshore: \_\_\_\_\_ area % of the AU  
                  \_\_\_\_\_ mean volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU  
                  \_\_\_\_\_ mean volume % of the AU

**ALLOCATIONS OF POTENTIAL ADDITIONS TO RESERVES TO PROVINCES**  
**Surface Allocations**

1. Number: 5049 Name: Gulf Coast Mesozoic

---

Onshore: 100.00 area % of the AU  
100.00 mean volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU  
\_\_\_\_\_ mean volume % of the AU

2. Number: \_\_\_\_\_ Name: \_\_\_\_\_

---

Onshore: \_\_\_\_\_ area % of the AU  
\_\_\_\_\_ mean volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU  
\_\_\_\_\_ mean volume % of the AU

3. Number: \_\_\_\_\_ Name: \_\_\_\_\_

---

Onshore: \_\_\_\_\_ area % of the AU  
\_\_\_\_\_ mean volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU  
\_\_\_\_\_ mean volume % of the AU

4. Number: \_\_\_\_\_ Name: \_\_\_\_\_

---

Onshore: \_\_\_\_\_ area % of the AU  
\_\_\_\_\_ mean volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU  
\_\_\_\_\_ mean volume % of the AU

5. Number: \_\_\_\_\_ Name: \_\_\_\_\_

---

Onshore: \_\_\_\_\_ area % of the AU  
\_\_\_\_\_ mean volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU  
\_\_\_\_\_ mean volume % of the AU

**ALLOCATIONS OF POTENTIAL ADDITIONS TO RESERVES TO PROVINCES**  
(continued)

6. Number: \_\_\_\_\_ Name: \_\_\_\_\_

Onshore: \_\_\_\_\_ area % of the AU  
\_\_\_\_\_ mean volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU  
\_\_\_\_\_ mean volume % of the AU

7. Number: \_\_\_\_\_ Name: \_\_\_\_\_

Onshore: \_\_\_\_\_ area % of the AU  
\_\_\_\_\_ mean volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU  
\_\_\_\_\_ mean volume % of the AU

8. Number: \_\_\_\_\_ Name: \_\_\_\_\_

Onshore: \_\_\_\_\_ area % of the AU  
\_\_\_\_\_ mean volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU  
\_\_\_\_\_ mean volume % of the AU

9. Number: \_\_\_\_\_ Name: \_\_\_\_\_

Onshore: \_\_\_\_\_ area % of the AU  
\_\_\_\_\_ mean volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU  
\_\_\_\_\_ mean volume % of the AU

10. Number: \_\_\_\_\_ Name: \_\_\_\_\_

Onshore: \_\_\_\_\_ area % of the AU  
\_\_\_\_\_ mean volume % of the AU

Offshore: \_\_\_\_\_ area % of the AU  
\_\_\_\_\_ mean volume % of the AU



**ALLOCATIONS OF POTENTIAL ADDITIONS TO RESERVES TO GENERAL LAND OWNERSHIPS**  
(continued)

11. \_\_\_\_\_ is \_\_\_\_\_ % of the AREA of the AU  
mean VOLUME % in entity \_\_\_\_\_
12. \_\_\_\_\_ is \_\_\_\_\_ % of the AREA of the AU  
mean VOLUME % in entity \_\_\_\_\_
13. \_\_\_\_\_ is \_\_\_\_\_ % of the AREA of the AU  
mean VOLUME % in entity \_\_\_\_\_
14. \_\_\_\_\_ is \_\_\_\_\_ % of the AREA of the AU  
mean VOLUME % in entity \_\_\_\_\_
15. \_\_\_\_\_ is \_\_\_\_\_ % of the AREA of the AU  
mean VOLUME % in entity \_\_\_\_\_
16. \_\_\_\_\_ is \_\_\_\_\_ % of the AREA of the AU  
mean VOLUME % in entity \_\_\_\_\_
17. \_\_\_\_\_ is \_\_\_\_\_ % of the AREA of the AU  
mean VOLUME % in entity \_\_\_\_\_
18. \_\_\_\_\_ is \_\_\_\_\_ % of the AREA of the AU  
mean VOLUME % in entity \_\_\_\_\_
19. \_\_\_\_\_ is \_\_\_\_\_ % of the AREA of the AU  
mean VOLUME % in entity \_\_\_\_\_
20. \_\_\_\_\_ is \_\_\_\_\_ % of the AREA of the AU  
mean VOLUME % in entity \_\_\_\_\_



**ALLOCATIONS OF POTENTIAL ADDITIONS TO RESERVES TO FEDERAL LAND SUBDIVISIONS**  
**Surface Allocations**

- |                                      |    |                   |                         |
|--------------------------------------|----|-------------------|-------------------------|
| 1. Bureau of Land Management (BLM)   | is | <u>0.00</u>       | % of the AREA of the AU |
| mean VOLUME % in entity              |    | <u>0.00</u>       |                         |
| 2. BLM Wilderness Areas (BLMW)       | is | <u>          </u> | % of the AREA of the AU |
| mean VOLUME % in entity              |    | <u>          </u> |                         |
| 3. BLM Roadless Areas (BLMR)         | is | <u>          </u> | % of the AREA of the AU |
| mean VOLUME % in entity              |    | <u>          </u> |                         |
| 4. National Park Service (NPS)       | is | <u>          </u> | % of the AREA of the AU |
| mean VOLUME % in entity              |    | <u>          </u> |                         |
| 5. NPS Wilderness Areas (NPSW)       | is | <u>          </u> | % of the AREA of the AU |
| mean VOLUME % in entity              |    | <u>          </u> |                         |
| 6. NPS Protected Withdrawals (NPSP)  | is | <u>          </u> | % of the AREA of the AU |
| mean VOLUME % in entity              |    | <u>          </u> |                         |
| 7. US Forest Service (FS)            | is | <u>3.31</u>       | % of the AREA of the AU |
| mean VOLUME % in entity              |    | <u>3.31</u>       |                         |
| 8. USFS Wilderness Areas (FSW)       | is | <u>          </u> | % of the AREA of the AU |
| mean VOLUME % in entity              |    | <u>          </u> |                         |
| 9. USFS Roadless Areas (FSR)         | is | <u>          </u> | % of the AREA of the AU |
| mean VOLUME % in entity              |    | <u>          </u> |                         |
| 10. USFS Protected Withdrawals (FSP) | is | <u>          </u> | % of the AREA of the AU |
| mean VOLUME % in entity              |    | <u>          </u> |                         |





**ALLOCATIONS OF POTENTIAL ADDITIONS TO RESERVES TO ECOSYSTEMS**  
(continued)

11. \_\_\_\_\_ is \_\_\_\_\_ % of the AREA of the AU  
mean VOLUME % in entity \_\_\_\_\_
12. \_\_\_\_\_ is \_\_\_\_\_ % of the AREA of the AU  
mean VOLUME % in entity \_\_\_\_\_
13. \_\_\_\_\_ is \_\_\_\_\_ % of the AREA of the AU  
mean VOLUME % in entity \_\_\_\_\_
14. \_\_\_\_\_ is \_\_\_\_\_ % of the AREA of the AU  
mean VOLUME % in entity \_\_\_\_\_
15. \_\_\_\_\_ is \_\_\_\_\_ % of the AREA of the AU  
mean VOLUME % in entity \_\_\_\_\_
16. \_\_\_\_\_ is \_\_\_\_\_ % of the AREA of the AU  
mean VOLUME % in entity \_\_\_\_\_
17. \_\_\_\_\_ is \_\_\_\_\_ % of the AREA of the AU  
mean VOLUME % in entity \_\_\_\_\_
18. \_\_\_\_\_ is \_\_\_\_\_ % of the AREA of the AU  
mean VOLUME % in entity \_\_\_\_\_
19. \_\_\_\_\_ is \_\_\_\_\_ % of the AREA of the AU  
mean VOLUME % in entity \_\_\_\_\_
20. \_\_\_\_\_ is \_\_\_\_\_ % of the AREA of the AU  
mean VOLUME % in entity \_\_\_\_\_

Ecosystem allocations do not include offshore areas, hence the sum total <100%



