

U.S. Geological Survey Input-Data Forms for the Assessment of the Spraberry Formation of the Midland Basin, Permian Basin Province, Texas, 2017

Open-File Report 2017–1117

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By Kristen R. Marra

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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

William H. Werkheiser, Acting Director

U.S. Geological Survey, Reston, Virginia: 2017

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Contents

Introduction.....	1
Assessment Methodology.....	1
Summary Input-Data Forms for Assessment.....	1
References Cited.....	1

Tables

1. Input parameters for the Lower Spraberry Continuous Oil Trend Assessment Unit (50440176), Midland Basin, Permian Basin Province, Texas	3
2. Input parameters for the Middle Spraberry Continuous Oil Trend Assessment Unit (50440177), Midland Basin, Permian Basin Province, Texas	17
3. Input parameters for the Northern Spraberry Conventional Oil Assessment Unit (50440117), Midland Basin, Permian Basin Province, Texas	31

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By Kristen R. Marra

Introduction

In 2017, the U.S. Geological Survey (USGS) completed an updated assessment of undiscovered, technically recoverable oil and gas resources in the Spraberry Formation of the Midland Basin (Permian Basin Province) in southwestern Texas (Marra and others, 2017). The Spraberry Formation was assessed using both the standard continuous (unconventional) and conventional methodologies established by the USGS for three assessment units (AUs): (1) Lower Spraberry Continuous Oil Trend AU, (2) Middle Spraberry Continuous Oil Trend AU, and (3) Northern Spraberry Conventional Oil AU. The revised assessment resulted in total estimated mean resources of 4,245 million barrels of oil, 3,112 billion cubic feet of gas, and 311 million barrels of natural gas liquids. The purpose of this report is to provide supplemental documentation of the input parameters used in the USGS 2017 Spraberry 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 three quantitatively assessed Spraberry Formation AUs of the Midland Basin, Permian Basin Province, Texas, are provided in tables 1–3.

References Cited

Charpentier, R.R., and Cook, T.A., 2012, Improved USGS methodology for assessing continuous petroleum resources, ver. 2.0: U.S. Geological Survey Data Series 547, 22 p.

- Crovelli, R.A., 2005, Analytical resource assessment method for continuous petroleum accumulations—The ACCESS assessment methodology, chap. 22 *of* USGS Southwestern Wyoming Province Assessment Team, Petroleum systems and geologic assessment of oil and gas in the Southwestern Wyoming Province, Wyoming, Colorado, and Utah: U.S. Geological Survey Digital Data Series DDS-69-D, 10 p.
- Klett, T.R., and Charpentier, R.R., 2003, FORSPAN model users guide: U.S. Geological Survey Open-File Report 2003-354, 37 p.
- Klett, T.R., and Schmoker, J.W., 2005, Input-data form and operational procedure for the assessment of continuous accumulations, 2002, chap. 18 *of* USGS Southwestern Wyoming Province Assessment Team, Petroleum systems and geologic assessment of oil and gas in the Southwestern Wyoming Province, Wyoming, Colorado, and Utah: U.S. Geological Survey Digital Data Series DDS-69-D, 8 p.
- Klett, T.R., Schmoker, J.W., and Charpentier, R.R., 2005, U.S. Geological Survey input-data form and operational procedure for the assessment of conventional petroleum accumulations, chap. 20 *of* USGS Southwestern Wyoming Province Assessment Team, Petroleum systems and geologic assessment of oil and gas in the Southwestern Wyoming Province, Wyoming, Colorado, and Utah: U.S. Geological Survey Digital Data Series DDS-69-D, 8 p.
- Marra, K.R., Gaswirth, S.B., Schenk, C.J., Leathers-Miller, H.M., Klett, T.R., Mercier, T.J., Le, P.A., Tennyson, M.E., Finn, T.M., Hawkins, S.J., and Brownfield, M.E., 2017, Assessment of undiscovered oil and gas resources in the Spraberry Formation of the Midland Basin, Permian Basin Province, Texas, 2017: U.S. Geological Survey Fact Sheet 2017-3029, 2 p.
- Schmoker, J.W., 2005, U.S. Geological Survey assessment concepts for continuous petroleum accumulations, chap. 13 *of* USGS Southwestern Wyoming Province Assessment Team, Petroleum systems and geologic assessment of oil and gas in the Southwestern Wyoming Province, Wyoming, Colorado, and Utah: U.S. Geological Survey Data Series DDS-69-D, 7 p.
- Schmoker, J.W., and Klett, T.R., 2005, U.S. Geological Survey assessment concepts for conventional petroleum accumulations, chap. 19 *of* USGS Southwestern Wyoming Province Assessment Team, Petroleum systems and geologic assessment of oil and gas in the Southwestern Wyoming Province, Wyoming, Colorado, and Utah: U.S. Geological Survey Data Series DDS-69-D, 6 p.

Table 1. Input parameters for the Lower Spraberry Continuous Oil Trend Assessment Unit (50440176), Midland Basin, Permian Basin Province, Texas.

[AU, assessment unit; cfg, cubic feet of gas; bo, barrel of oil; API, American Petroleum Institute; mmo, million barrels of oil; bcfg, billion cubic feet of gas; EUR, estimated ultimate recovery; %, percent; bnlg, barrel of natural gas liquids; mmcf, million cubic feet of gas; bliq, barrel of liquid; m, meters; CO₂, carbon dioxide; BTU, British thermal units; conv, conventional; frac, hydraulic fracturing]

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

IDENTIFICATION INFORMATION

Assessment Geologist:	<u>K.R. Marra</u>	Date:	<u>2/2/2017</u>
Region:	<u>North America</u>	Number:	<u>5</u>
Province:	<u>Permian Basin</u>	Number:	<u>5044</u>
Total Petroleum System:	<u>Permian Basin Paleozoic Composite</u>	Number:	<u>504401</u>
Assessment Unit:	<u>Lower Spraberry Continuous Oil Trend</u>	Number:	<u>50440176</u>
Based on Data as of:	<u>IHS Markit™, July 2016</u>		
Notes from Assessor:	<u>Ancillary data from 2007 Spraberry Continuous Oil AU</u>		

CHARACTERISTICS OF ASSESSMENT UNIT

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

Well type: vertical _____ horizontal X

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

Minimum EUR per well 0.002 (mmbb for oil AU; bcfg for gas AU)

Number of tested wells: 41,622

Number of tested wells with EUR > minimum: 33,833

Historic success ratio, tested wells (%) 81

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 4,243,333 minimum 2,315,000 mode 4,200,000 maximum 6,215,000
- Uncertainty about average drainage area of wells (acres): (triangular)
calculated mean 127 minimum 60 mode 80 maximum 240
- Percentage of total assessment-unit area that is untested (%): (triangular)
calculated mean 50 minimum 20 mode 50 maximum 80
- 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 88 minimum 80 mode 90 maximum 95

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

calculated mean 0.176 minimum 0.1 median 0.17 maximum 0.3

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:

	minimum	mode	maximum
Gas/oil ratio (cfg/bo)	<u>200</u>	<u>800</u>	<u>1200</u>
NGL/gas ratio (bnl/mmcf)	<u>50</u>	<u>100</u>	<u>150</u>

Gas assessment unit:

Liquids/gas ratio (bliq/mmcf)	_____	_____	_____
-------------------------------	-------	-------	-------

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

<u>Oil assessment unit:</u>	minimum		median		maximum
API gravity of oil (degrees)	32		40		48
Sulfur content of oil (%)	0		0.1		1
Depth (m) of water (if applicable)					
Drilling depth (m)	minimum	F75	median	F25	maximum
	1,000		1,650		2,450

<u>Gas assessment unit:</u>	minimum		median		maximum
Inert-gas content (%)					
CO ₂ content (%)					
Hydrogen sulfide content (%)					
Heating value (BTU)					
Depth (m) of water (if applicable)					
Drilling depth (m)	minimum	F75	median	F25	maximum

Completion practices:

1. Typical well-completion practices (conventional, open hole, open cavity, other)	Conv
2. Fraction of wells drilled that are typically stimulated	100%
3. Predominant type of stimulation (none, frac, acid, other)	Frac
4. Historic fraction of wells drilled that are horizontal	5%

ALLOCATIONS OF POTENTIAL ADDITIONS TO RESERVES TO STATES
Surface Allocations

1. Texas

Onshore:	<u>100.00</u>	area % of the AU
	<u>100.00</u>	mean volume % of the AU
Offshore:	<u> </u>	area % of the AU
	<u> </u>	mean volume % of the AU

2. _____

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

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: 5044 Name: Permian Basin

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>0.00</u>	% of the AREA of the AU
mean VOLUME % in entity		<u>0.00</u>	
2. Private Lands	is	<u>0.03</u>	% of the AREA of the AU
mean VOLUME % in entity		_____	
3. Tribal Lands	is	<u>0.00</u>	% of the AREA of the AU
mean VOLUME % in entity		_____	
4. Other Lands	is	<u>94.67</u>	% of the AREA of the AU
mean VOLUME % in entity		<u>95.00</u>	
5. <u>Texas State Lands</u>	is	<u>5.30</u>	% of the AREA of the AU
mean VOLUME % in entity		<u>5.00</u>	
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 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> </u> | % of the AREA of the AU |
| mean VOLUME % in entity | | <u> </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 FEDERAL LAND SUBDIVISIONS
(continued)

11. US Fish and Wildlife Service (FWS) is _____ % of the AREA of the AU
mean VOLUME % in entity _____
12. USFWS Wilderness Areas (FWSW) is _____ % of the AREA of the AU
mean VOLUME % in entity _____
13. USFWS Protected Withdrawals (FWSP) is _____ % of the AREA of the AU
mean VOLUME % in entity _____
14. Wilderness Study Areas (WS) is _____ % of the AREA of the AU
mean VOLUME % in entity _____
15. Department of Energy (DOE) is _____ % of the AREA of the AU
mean VOLUME % in entity _____
16. Department of Defense (DOD) is _____ % of the AREA of the AU
mean VOLUME % in entity _____
17. Bureau of Reclamation (BOR) is _____ % of the AREA of the AU
mean VOLUME % in entity _____
18. Tennessee Valley Authority (TVA) is _____ % of the AREA of the AU
mean VOLUME % in entity _____
19. Other Federal 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 ECOSYSTEMS
Surface Allocations

1.	<u>Basin and Range (BARA)</u>	is	<u>6.73</u>	% of the AREA of the AU
	mean VOLUME % in entity		<u>7.00</u>	
2.	<u>Rolling Plains (RLPL)</u>	is	<u>45.42</u>	% of the AREA of the AU
	mean VOLUME % in entity		<u>45.00</u>	
3.	<u>Stockton Plateau (STPT)</u>	is	<u>0.46</u>	% of the AREA of the AU
	mean VOLUME % in entity		<u>0.00</u>	
4.	<u>Texas High Plains (TXHP)</u>	is	<u>47.39</u>	% of the AREA of the AU
	mean VOLUME % in entity		<u>48.00</u>	
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 2. Input parameters for the Middle Spraberry Continuous Oil Trend Assessment Unit (50440177), Midland Basin, Permian Basin Province, Texas.

[AU, assessment unit; cfg, cubic feet of gas; bo, barrel of oil; API, American Petroleum Institute; mmo, million barrels of oil; bcfg, billion cubic feet of gas; EUR, estimated ultimate recovery; %, percent; bngl, barrel of natural gas liquids; mmcfcg, million cubic feet of gas; bliq, barrel of liquid; m, meters; CO₂, carbon dioxide; BTU, British thermal units; conv, conventional; frac, hydraulic fracturing]

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

IDENTIFICATION INFORMATION

Assessment Geologist:	<u>K.R. Marra</u>	Date:	<u>2/2/2017</u>
Region:	<u>North America</u>	Number:	<u>5</u>
Province:	<u>Permian Basin</u>	Number:	<u>5044</u>
Total Petroleum System:	<u>Permian Basin Paleozoic Composite</u>	Number:	<u>504401</u>
Assessment Unit:	<u>Middle Spraberry Continuous Oil Trend</u>	Number:	<u>50440177</u>
Based on Data as of:	<u>IHS Markit™, July 2016</u>		
Notes from Assessor:	<u>Ancillary data from 2007 Spraberry Continuous Oil AU</u>		

CHARACTERISTICS OF ASSESSMENT UNIT

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

Well type: vertical _____ horizontal X

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

Minimum EUR per well 0.002 (mmbo for oil AU; bcfg for gas AU)

Number of tested wells: 41,622

Number of tested wells with EUR > minimum: 33,833

Historic success ratio, tested wells (%) 81

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 4,243,333 minimum 2,315,000 mode 4,200,000 maximum 6,215,000
- Uncertainty about average drainage area of wells (acres): (triangular)
calculated mean 160 minimum 80 mode 160 maximum 240
- Percentage of total assessment-unit area that is untested (%): (triangular)
calculated mean 47 minimum 15 mode 50 maximum 75
- 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 88 minimum 80 mode 90 maximum 95

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

calculated mean 0.13 minimum 0.08 median 0.12 maximum 0.3

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:

	minimum	mode	maximum
Gas/oil ratio (cfg/bo)	<u>200</u>	<u>800</u>	<u>1200</u>
NGL/gas ratio (bnl/mmcf)	<u>50</u>	<u>100</u>	<u>150</u>

Gas assessment unit:

Liquids/gas ratio (bliq/mmcf)	_____	_____	_____
-------------------------------	-------	-------	-------

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

<u>Oil assessment unit:</u>	minimum		median		maximum
API gravity of oil (degrees)	32		40		48
Sulfur content of oil (%)	0		0.1		1
Depth (m) of water (if applicable)					
Drilling depth (m)	minimum	F75	median	F25	maximum
	850		1,500		2,350

<u>Gas assessment unit:</u>	minimum		median		maximum
Inert-gas content (%)					
CO ₂ content (%)					
Hydrogen sulfide content (%)					
Heating value (BTU)					
Depth (m) of water (if applicable)					
Drilling depth (m)	minimum	F75	median	F25	maximum

Completion practices:

1. Typical well-completion practices (conventional, open hole, open cavity, other)	Conv
2. Fraction of wells drilled that are typically stimulated	100%
3. Predominant type of stimulation (none, frac, acid, other)	Frac
4. Historic fraction of wells drilled that are horizontal	5%

ALLOCATIONS OF POTENTIAL ADDITIONS TO RESERVES TO STATES
Surface Allocations

1. Texas

Onshore:	<u>100.00</u>	area % of the AU
	<u>100.00</u>	mean volume % of the AU
Offshore:	<u> </u>	area % of the AU
	<u> </u>	mean volume % of the AU

2. _____

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

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: 5044 Name: Permian Basin

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>0.00</u>	% of the AREA of the AU
mean VOLUME % in entity		<u>0</u>	
2. Private Lands	is	<u>0.03</u>	% of the AREA of the AU
mean VOLUME % in entity		<u>0</u>	
3. Tribal Lands	is	<u>0.00</u>	% of the AREA of the AU
mean VOLUME % in entity		<u>0</u>	
4. Other Lands	is	<u>94.67</u>	% of the AREA of the AU
mean VOLUME % in entity		<u>95</u>	
5. <u>Texas State Lands</u>	is	<u>5.30</u>	% of the AREA of the AU
mean VOLUME % in entity		<u>5</u>	
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 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</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> </u> | % of the AREA of the AU |
| mean VOLUME % in entity | | <u> </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 FEDERAL LAND SUBDIVISIONS
(continued)

11. US Fish and Wildlife Service (FWS) is _____ % of the AREA of the AU
mean VOLUME % in entity _____
12. USFWS Wilderness Areas (FWSW) is _____ % of the AREA of the AU
mean VOLUME % in entity _____
13. USFWS Protected Withdrawals (FWSP) is _____ % of the AREA of the AU
mean VOLUME % in entity _____
14. Wilderness Study Areas (WS) is _____ % of the AREA of the AU
mean VOLUME % in entity _____
15. Department of Energy (DOE) is _____ % of the AREA of the AU
mean VOLUME % in entity _____
16. Department of Defense (DOD) is _____ % of the AREA of the AU
mean VOLUME % in entity _____
17. Bureau of Reclamation (BOR) is _____ % of the AREA of the AU
mean VOLUME % in entity _____
18. Tennessee Valley Authority (TVA) is _____ % of the AREA of the AU
mean VOLUME % in entity _____
19. Other Federal 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 ECOSYSTEMS
Surface Allocations

- | | | | | |
|-----|---------------------------------|----|--------------|-------------------------|
| 1. | <u>Basin and Range (BARA)</u> | is | <u>6.73</u> | % of the AREA of the AU |
| | mean VOLUME % in entity | | <u>7</u> | |
| 2. | <u>Rolling Plains (RLPL)</u> | is | <u>45.42</u> | % of the AREA of the AU |
| | mean VOLUME % in entity | | <u>45</u> | |
| 3. | <u>Stockton Plateau (STPT)</u> | is | <u>0.46</u> | % of the AREA of the AU |
| | mean VOLUME % in entity | | <u>0</u> | |
| 4. | <u>Texas High Plains (TXHP)</u> | is | <u>47.39</u> | % of the AREA of the AU |
| | mean VOLUME % in entity | | <u>48</u> | |
| 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 3. Input parameters for the Northern Spraberry Conventional Oil Assessment Unit (50440117), Midland Basin, Permian Basin Province, Texas.

[mmboe, million barrels of oil equivalent; no., number; mmbo, million barrels of oil; bcfg, billion cubic feet of gas; cfg, cubic feet of gas; bo, barrel of oil; bnlg, barrel of natural gas liquids; mmcf, million cubic feet of gas; bliq, barrel of liquid; API, American Petroleum Institute; %, percent; m, meters; AU, assessment unit]

**USGS U.S. PETROLEUM RESOURCES ASSESSMENT
INPUT FORM FOR CONVENTIONAL ASSESSMENT UNITS (Version 7.0.2, April 29, 2015)**

IDENTIFICATION INFORMATION

Assessment Geologist:	<u>K.R. Marra</u>	Date:	<u>2/2/2017</u>
Region:	<u>North America</u>	Number:	<u>5</u>
Province:	<u>Permian Basin</u>	Number:	<u>5044</u>
Total Petroleum System:	<u>Permian Basin Paleozoic Composite</u>	Number:	<u>504401</u>
Assessment Unit:	<u>Northern Spraberry Conventional Oil</u>	Number:	<u>50440117</u>
Scenario:		Number:	
Based on Data as of:	<u>IHS MarkitTM, January 2016</u>		
Notes from Assessor:	<u></u>		

CHARACTERISTICS OF ASSESSMENT UNIT

Area of assessment unit: 13,081 square kilometers

Minimum assessed accumulation size: 0.5 MMBOE (grown)

No. of discovered accumulations exceeding minimum size: Oil: 34 Gas:

Uncertainty Class:	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>6</u>	2nd 3rd	<u>1.5</u>	3rd 3rd	<u>1</u>
---------	----------	---------	------------	---------	----------

Median size (grown) of discovered gas accumulations (BCFG):

1st 3rd	<u></u>	2nd 3rd	<u></u>	3rd 3rd	<u></u>
---------	---------	---------	---------	---------	---------

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.) Northern Spraberry Conventional Oil, 50440117
 Scenario (name, no.) _____

Scenario Probability: Probability of occurrence (0-1.0)
1.0

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. CHARGE: Adequate petroleum charge:	<u>1.0</u>
2. ROCKS: Adequate reservoirs, traps, and seals:	<u>1.0</u>
3. TIMING OF GEOLOGIC EVENTS: Favorable timing:	<u>1.0</u>
Assessment-Unit GEOLOGIC Probability (Product of 1, 2, and 3):	<u>1.0</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>4</u>	maximum <u>10</u>
Gas Accumulations:	minimum _____	median _____	maximum _____

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 _____	median _____	maximum _____

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>5</u>	<u>450</u>	<u>1,300</u>
NGL/gas ratio (BNGL/MMCFG):	<u>70</u>	<u>100</u>	<u>205</u>
<u>Gas Accumulations:</u>	minimum	median	maximum
Liquids/gas ratio (BLIQ/MMCFG):	_____	_____	_____

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

<u>Oil Accumulations:</u>	minimum	median	maximum
API gravity (degrees):	31	38	43
Viscosity (centipoise):	0.4	1.4	5.8
Sulfur content of oil (%):	0	0.1	0.3
Depth (m) of water (if applicable):			

	minimum	F75	median	F25	maximum
Drilling Depth (m):	1,474		2,090		2,518

<u>Gas Accumulations:</u>	minimum	median	maximum
Inert gas content (%):	_____	_____	_____
Carbon dioxide content (%):	_____	_____	_____
Hydrogen sulfide content (%):	_____	_____	_____
Depth (m) of water (if applicable):	_____	_____	_____

	minimum	F75	median	F25	maximum
Drilling Depth (m):					

ALLOCATIONS OF POTENTIAL ADDITIONS TO RESERVES TO STATES
Surface Allocations

1. Texas

Onshore: 100.00 area % of the AU

Oil in Oil Accumulations: 100.00 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

2. _____

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. _____

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. _____

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.)

Northern Spraberry Conventional Oil, 50440117

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 0.00 area % of the AU
Oil in Oil Accumulations: 0.00 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

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 _____ 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.)

Northern Spraberry Conventional Oil, 50440117

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. Rolling Plains (RLPL) represents 25.50 area % of the AU
Oil in Oil Accumulations: 25.00 volume % of the AU
Gas in Gas Accumulations: _____ volume % of the AU

2. Texas High Plains (TXHP) represents 74.50 area % of the AU
Oil in Oil Accumulations: 75.00 volume % of the AU
Gas in Gas Accumulations: _____ volume % of the AU

3. _____ represents _____ area % of the AU
Oil in Oil Accumulations: _____ volume % of the AU
Gas in Gas Accumulations: _____ volume % of the AU

4. _____ represents _____ area % of the AU
Oil in Oil Accumulations: _____ volume % of the AU
Gas in Gas Accumulations: _____ volume % of the AU

5. _____ represents _____ area % of the AU
Oil in Oil Accumulations: _____ volume % of the AU
Gas in Gas Accumulations: _____ 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.)

Northern Spraberry Conventional Oil, 50440117

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

