



IHS Markit™

# Greater Anadarko Basin Kingdom Project



The Greater Anadarko Basin Kingdom Geology Project encompasses the entire Anadarko Basin proper and the surrounding features; Keyes Dome, Cimarron Uplift, Amarillo Uplift, Ardmore & Marietta Basins and the Seminole Uplift in Texas, Oklahoma and Kansas, USA.

The project contains 3D geological models of 28 formations and 14 reservoir benches built entirely from IHS Markit Interpreted Formation Tops data. The project contains cleaned Well data, Interpreted Tops, Digital Logs, digital Land Grid and Lat Longs, and raw Production data.

It also contains various analytical data types, including Zones Attributes and Grid Files, plus a comprehensive play analyses comprising 4 Shale (Continuous Type), 12 Granite Wash (Continuous Type) and 25 Stratigraphic-Structural (Non-Continuous Type) Plays. All Producing Formations have been normalized using PRODFit, a new enhancement to the IHS Well database.

The value proposition of the project is to provide a basic, ready-made geological platform and enhanced data for effective evaluation of any area of interest within the basin. Users can readily incorporate their proprietary and third-party data, saving hundreds of man hours normally required for data collation and mining.

The Greater Anadarko project boundary is defined by IHS Markit basin limits. No seismic data was incorporated for the geologic/stratigraphic modelling.

#### File sizes

**41GB**

Total

**12 GB**

Kingdom project directory  
(Shape files, grids, models etc.)

**29 GB**

Kingdom project SQL database

#### Projection System

NAD\_1927\_UTM\_Zone\_14N,  
Linear Unit: Feet\_US

#### Software Requirement

- Kingdom Geology package (VuPAK and EarthPAK modules)
- SQL Server

\*The 40 GB project size requires Full SQL Server. A lighter version of the project (total size:16.5 GB and project database size: 3.2 GB) without digital logs and production data is also available. This version allows users to work in SQL Express and download digital logs and production data in smaller areas of interest. The limit of SQL express project database is 10 GB.

# Data Inventory and Description

## Authors

Kingdom Authorship allows for enhanced data management in Kingdom Projects.

Each project user can create their own unique authorship, allowing them to keep track of, and manage their own interpretation(s).

### Admin

The Admin author is created as the default author in Kingdom. To avoid listing out volumes of data in the general Kingdom Project Folder, this author is only used for management purposes.

Subsequent authors have been created to store various types of data. Ideally, each user accessing the project will create their own authorship for their specific interpretation(s).

### IHSM Interpreted

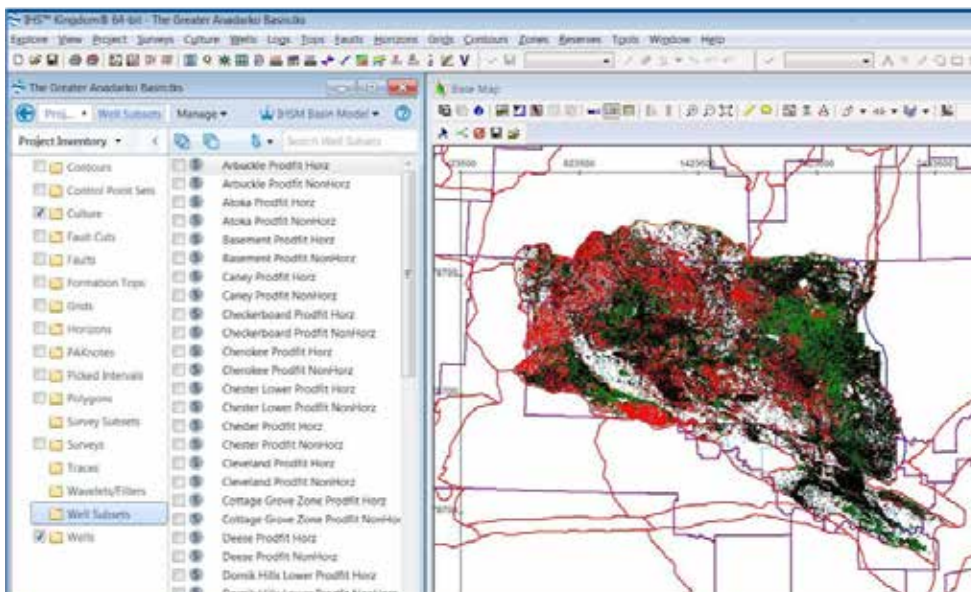
This author is available for the sole purpose of populating the project with IHS Markit Interpreted Tops, including detailed Reservoir Benches, for the entire Greater Anadarko Basin. It separates them from any other formation tops that are loaded from additional sources.

### IHSM Basin Model

This author is where all geologic/stratigraphic models for the entire Greater Anadarko Basin are stored.

### IHSM Bench Model

This author is where all Reservoir Bench models are stored.



\*All users are advised to create a separate Author for any further work.

Greater Anadarko Basin – All Wells Plot

# Well Data

Total number of wells  
from Well database

**322,668**

Wells with Interpreted  
Formation Tops

**139,371**

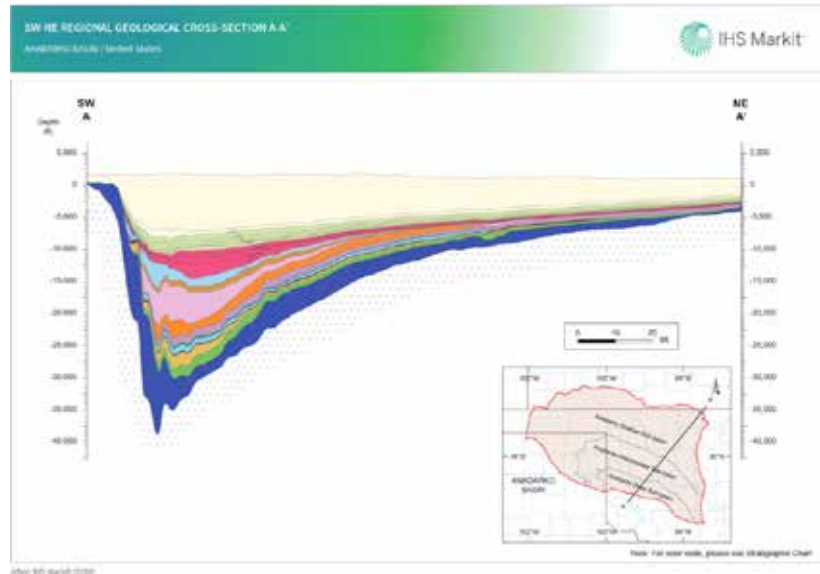
(\*All tops used are IHS Markit Interpreted  
tops. Top depths are in feet)

Total number  
of wells with  
Production volumes

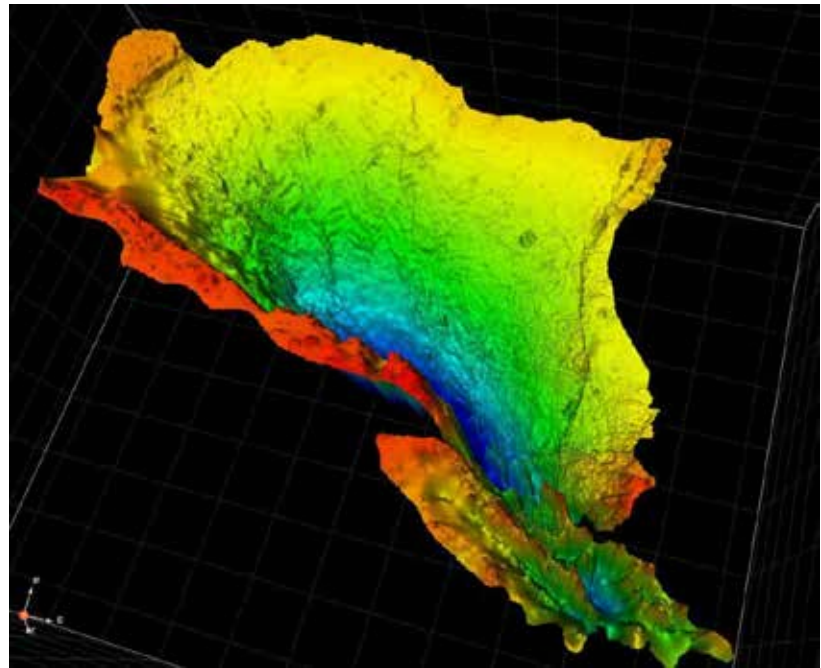
**140,076**

Total number of  
wells with PRODFit  
enhanced Data

**241,175**



Greater Anadarko Basin Geologic Section using only IHS Markit  
Interpreted Tops

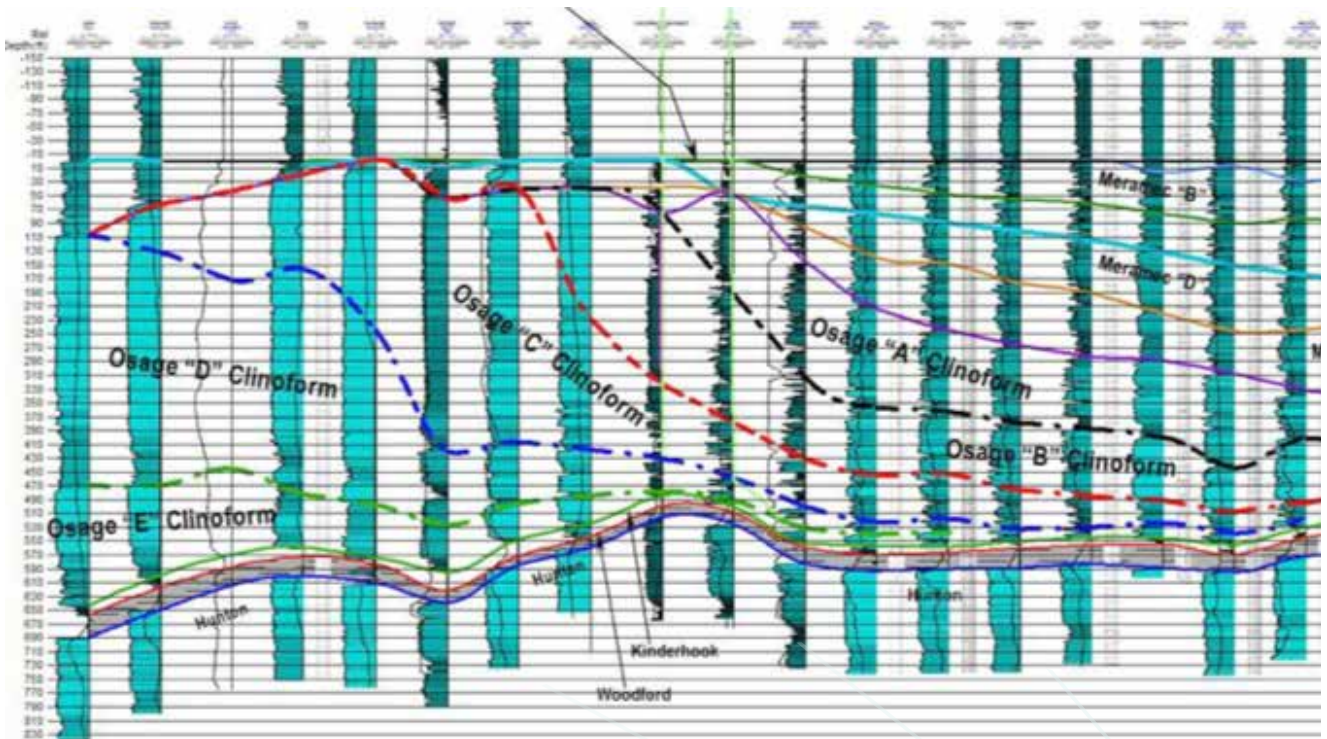


3D Structure Map on Top of Arbuckle Formation

# Digital Logs

Total number of Wells with digital Logs

45,914



STACK Play Stratigraphic Model – Regional NW-SE cross section of Meramec and Osage Benches

# Borehole Zone Data

PRODFit contains the following enhanced attributes:

- Producing Formation(s)
- IP Tests
- Perforation Intervals
- Formation @TD (to be added in a future release)
- HZ Producing Formation (Landing Zone)
- Core and Drill Stem Tests
- Pressure Tests
- Oil, Gas, Water Analysis Tests (to be added in a future release)
- Well Tubulars
- Mud Weights

BOREHOLE TYPE: contains the hole direction attribute below:

- Vertical
- Directional
  - Horizontal

# Interval Zone Data

An Interval Zone corresponds to the top of a formation to the top of its underlying formation.

\*All Formation Intervals include the following Zone Data attributes:

TVT:	True Vertical Thickness.
GR_ARTH MEAN:	Mean Gamma Ray API value
Ro_Oil_Gravity_Derived:	Vitrinites Reflectance Value (Ro%) derived from Oil Gravity API Value.



# GRID Data

Total Number of Grid files

## 155

116 under “IHSM Basin Model” author, 39 under “IHSM Bench Model” author. All the Grids are 1,000’ grid cells and derived using the Flex gridding method.

Top Grid Files

## 46

These are built by gridding only IHS Markit Interpreted Tops. Each grid is continuous across the basin except for Bench grids which are restricted by available well log data within specific HZ plays. All stratigraphic layers are built by stacking TVTs to surface gaps and grid cross-over (conformal limited). The grids are sequentially numbered based on their stratigraphic position, youngest to oldest.

TVT Grid Files

## 42

These are prepared by gridding TVT attribute values from zones and depict the distribution of vertical thickness of a formation/bench.

GR\_ARTH MEAN

## 39

These are prepared by gridding GR\_ARTH Mean attribute value for zones and provide a quick view of muddy and non- muddy parts of the formations/ benches. Values less than 5 and above 300 are considered anomalous and are ignored during gridding.

Ro\_Oil\_Gravity\_Derived

## 28

Layers for all the Continuous plays are prepared by gridding Ro values derived from Oil Gravity API.

# Literature

The following items in PDF format are located in “The Greater Anadarko Basin FSQ/Literature”.

1. Greater Anadarko Basin Stratigraphy
2. Greater Anadarko Basin SW-NE Geological Section
3. Meramec-Osage Stack Type Log
4. Woodford Type Log 5.Selected Bibliography
6. Greater Anadarko Basin Kingdom Project Brochure

# Play Definition

## Shale Play (Continuous Type)

Self-sourcing, filled during expulsion. It is also referred to as source- rock-reservoir-system implying that part of the generated hydrocarbons remain trapped within the source rock itself with minimal or no migration. The extent of a shale play is defined by area where the concerned interval is greater than 10 feet in true vertical thickness, between 1,000-18,000 feet in true vertical depth and between 0.55°- 4° in Vitrinite Reflectance (Ro) values.

## Granite Wash Plays (Continuous Type)

It is complex succession of detrital arkosic rocks inter-bedded with source rock quality fine grain rocks. In general, it has higher porosity than the shale. The extent of a wash play is defined same as the Shale Play.

## Stratigraphic-Structural Play (Non-Continuous Type)

Non-self-sourced reservoirs disconnected from a mature source rock, filled during secondary and tertiary migration and spatially confined by a conventional trap mechanism. The extent of a Stratigraphic-Structural Play is defined by 1 to 1.5 miles buffer around productive and show wells from the concerned interval.

# Spatial Data

The following shapefiles are available

## Cultural Data

The following culture shapefiles are located in the “The Greater Anadarko Basin FSQ\ Shapefiles\Culture”. They are also shown in the Kingdom Base Map under the Culture Inventory.

- |                                  |                               |                    |
|----------------------------------|-------------------------------|--------------------|
| 1. AAPG_Province                 | 5. Greater_Anadarko_OK_KS_Twp | 9. IHSM_Main_Basin |
| 2. County                        | 6. Greater_Anadarko_TX_Block  | 10. IHSM_Sub_Basin |
| 3. Greater_Anadarko_Basin_Extent | 7. Greater_Anadarko_TX_Survey | 11. State          |
| 4. Greater_Anadarko_OK_KS_Sec    | 8. IHSM_Faults                |                    |

## Play & Play Zone for the Greater Anadarko Basin:

The following play and play zone shapefiles are located in the “The Greater Anadarko Basin FSQ\Shapefiles\Plays.”

### Plays

- |  |  |
|--|--|
| Play_001_Tonkawa_Wash                                | Play_022_Atoka_Wash                                  |
| Play_002_Tonkawa_Stratigraphic-Structural            | Play_023_Atoka_Stratigraphic-Structural              |
| Play_003_Cottage_Grove_Zone_Wash                     | Play_024_Dornik_Hills_Upper_Stratigraphic-Structural |
| Play_004_Cottage_Grove_Zone_Stratigraphic-Structural | Play_025_Dornik_Hills_Lower_Stratigraphic-Structural |
| Play_005_Hogshooter_Wash                             | Play_026_Morrow_Wash                                 |
| Play_006_Hogshooter_Stratigraphic-Structural         | Play_027_Morrow_Stratigraphic-Structural             |
| Play_007_Checkerboard_Wash                           | Play_028_Springer-Morrow_Stratigraphic-Structural    |
| Play_008_Checkerboard_Stratigraphic-Structural       | Play_029_Chester_Stratigraphic-Structural            |
| Play_009_Cleveland_Wash                              | Play_030_Chester_Lower_Stratigraphic-Structural      |
| Play_010_Cleveland_Stratigraphic-Structural          | Play_031_Meramec-Osage_Stratigraphic-Structural      |
| Play_011_Hoxbar_Upper_Stratigraphic-Structural       | Play_032_Caney_Shale                                 |
| Play_012_Marmaton_Wash                               | Play_033_Sycamore_Stratigraphic-Structural           |
| Play_013_Oswego_Wash                                 | Play_034_Woodford_Shale                              |
| Play_014_Oswego_Stratigraphic-Structural             | Play_035_Hunton_Stratigraphic-Structural             |
| Play_015_Cherokee_Wash                               | Play_036_Sylvan_Shale                                |
| Play_016_Cherokee_Stratigraphic-Structural           | Play_037_Sylvan_Stratigraphic-Structural             |
| Play_017_Verdigris_Wash                              | Play_038_Viola_Stratigraphic-Structural              |
| Play_018_Verdigris_Stratigraphic-Structural          | Play_039_Simpson_Shale                               |
| Play_019_Red_Fork_Zone_Wash                          | Play_040_Arbuckle_Stratigraphic-Structural           |
| Play_020_Red_Fork_Zone_Stratigraphic-Structural      | Play_041_Basement_Stratigraphic-Structural           |
| Play_021_Deese_Stratigraphic-Structural              |  |



## Play Zone

Play\_Zone\_001\_  
Tonkawa\_Wash

Play\_Zone\_003\_  
Cottage\_Grove\_Zone\_Wash

Play\_Zone\_005\_  
Hogshooter\_Wash

Play\_Zone\_007\_Checkerboard\_  
Wash

Play\_Zone\_009\_  
Cleveland\_Wash

Play\_Zone\_012\_  
Marmaton\_Wash

Play\_Zone\_013\_  
Oswego\_Wash

Play\_Zone\_015\_  
Cherokee\_Wash

Play\_Zone\_017\_  
Verdigris\_Wash

Play\_Zone\_019\_  
Red\_Fork\_Zone\_Wash

Play\_Zone\_022\_Atoka\_Wash

Play\_Zone\_026\_Morrow\_Wash

Play\_Zone\_032\_Caney\_Shale

Play\_Zone\_034\_  
Woodford\_Shale

Play\_Zone\_036\_Sylvan\_Shale

Play\_Zone\_039\_  
Simpson\_Shale.

## Merged Shapefiles

Greater\_Anadarko\_All\_Plays.

Greater\_Anadarko\_All\_Play\_Zones.

## Play Shapefiles have following abbreviated attributes

1. TopAvgFT: Average top depth (MD) in feet
2. GrThkAvgFT: Average Gross Thickness in feet
3. TOCMin: Minimum Total Organic Carbon in wt%
4. TOCAvg: Average Total Organic Carbon in wt%
5. TOCMax: Maximum Total Organic Carbon wt%
6. Play\_SQMI: Play area in square miles
7. OOIP\_MMb: Original Oil in-Place in Millions of Barrels, resource estimated through IHS Markit's "TightEval".
8. Cn\_RF\_O: Conventional Recovery Factor for Oil
9. UCn\_RF\_O: Unconventional Recovery Factor for Oil
10. Tot\_RF\_O: Total Recovery Factor for Oil
11. Cn\_Re\_MMb: Conventional Recoverable Millions of Barrels
12. UCn\_Re\_MMb: Unconventional Recoverable Millions of Barrels
13. NHz\_Pd\_MMb: Non-Horizontal (Vertical and Directional) Cumulative Production in Millions of Barrels
14. Hz\_Pd\_MMb: Horizontal Cumulative Production in Millions of Barrels
15. Tot\_Pd\_MMb: Total Cumulative Production in Millions of Barrels
16. Cn\_Rm\_MMb: Conventional Remaining in Millions of Barrels
17. UCn\_Rm\_MMb: Unconventional Remaining in Millions of Barrels
18. Tot\_Rm\_MMb: Total Remaining in Millions of Barrels
19. OGIP\_BCF: Original Gas in-Place in Billion Cubic Feet, resource estimated through IHS Markit's "TightEval".
20. Cn\_RF\_G: Conventional Recovery Factor for Gas
21. UCn\_RF\_G: Unconventional Recovery Factor for Gas
22. Tot\_RF\_G: Total Recovery Factor for Gas
23. Cn\_Re\_BCF: Conventional Recoverable in Billion Cubic Feet
24. UCn\_Re\_BCF: Unconventional Recoverable in Billion Cubic Feet
25. Tot\_Re\_BCF: Total Recoverable in Billion Cubic Feet
26. NHz\_Pd\_BCF: Non-Horizontal (Vertical and Directional) Cumulative Production in Billion Cubic Feet.
27. Hz\_Pd\_BCF: Horizontal Cumulative Production in Billion Cubic Feet
28. Tot\_Pd\_Bcf: Total Cumulative Production in Billion Cubic Feet
29. Cn\_Rm\_BCF: Conventional Remaining in Billion Cubic Feet
30. UCn\_Rm\_BCF: Unconventional Remaining in Billion Cubic Feet
31. Tot\_Rm\_BCF: Total Remaining in Billion Cubic Feet

# Play Zones (Continuous plays only):

Hydrocarbon maturity window delineating areas of:



## Oil Zone

Ro values between  
 $0.55^{\circ}$  -  $0.9^{\circ}$ ,

approximately  
corresponding to

$15^{\circ}$  -  $35^{\circ}$

API Gravity



## Wet Gas Zone

Ro values between  
 $0.9^{\circ}$  -  $1.4^{\circ}$ ,

approximately  
corresponding to

$35^{\circ}$  -  $50^{\circ}$

API Gravity



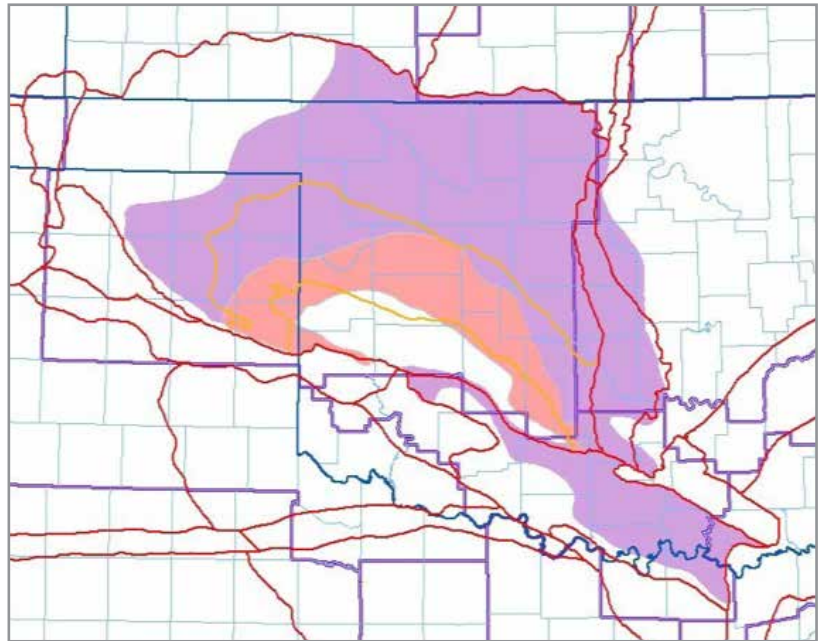
## Dry Gas Zone

Ro values between  
 $1.4^{\circ}$  -  $4^{\circ}$ ,

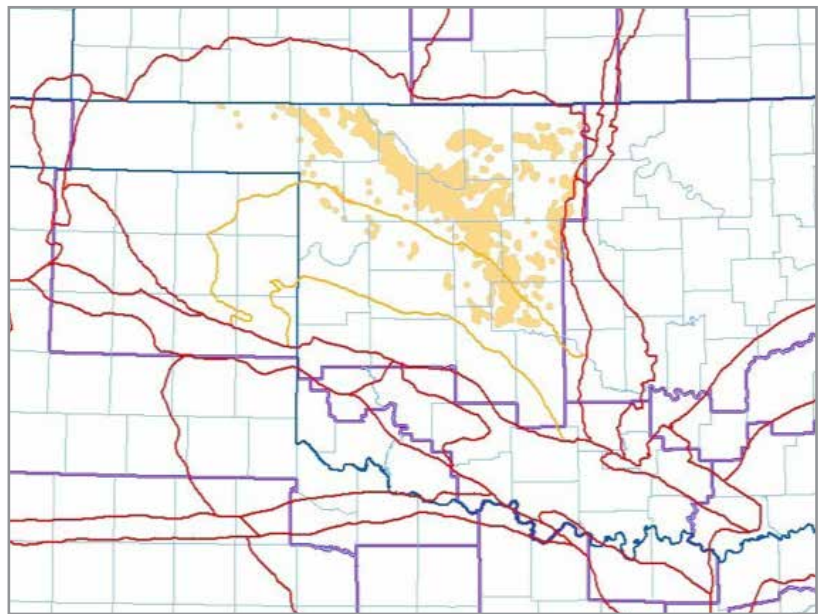
approximately corresponding  
to greater than

$50^{\circ}$

API Gravity



Continuous Play



Non-Continuous Play

## About IHS Markit

IHS Markit (Nasdaq: INFO) is a world leader in critical information, analytics and solutions for the major industries and markets that drive economies worldwide. The company delivers next-generation information, analytics and solutions to customers in business, finance and government, improving their operational efficiency and providing deep insights that lead to well-informed, confident decisions. IHS Markit has more than 50,000 key business and government customers, including 85 percent of the Fortune Global 500 and the world's leading financial institutions. Headquartered in London, IHS Markit is committed to sustainable, profitable growth.

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