Shale and Chalk Plays in Louisiana
   A Brief Historical Review
   Current Activity Summary
   Future Potential
• Haynesville Shale
  • Dry gas
  • North Louisiana and Texas
    • DeSoto, Caddo, Sabine, Bossier, Red River Parishes
    • Panola and Harrison Counties
  • 40 rigs and over 100 active permits
  • 20,000’ MD horizontal wells

• Tuscaloosa Marine Shale
  • Oil
  • E Central Louisiana and W Central Mississippi
    • Avoyelles, E and W Feliciana, St. Helena, Tangipahoa Parishes
    • Wilkinson, Amite, and McComb Counties
  • 1 active rig, completions peaked in 2015
  • 19,000’ MD horizontal wells

• Austin Chalk
  • Oil and Gas
  • (Re)emerging Louisiana play (fracture stimulation)
  • Central Louisiana and Texas
    • Successful fracs applied in Eagle Ford offsets in Texas
# Shale and Chalk Plays in Louisiana - Geology

### Upper Cretaceous
- Austin Chalk
- Eagle Ford/TMS (source rock)
- Woodbine/Tuscaloosa

### Upper Jurassic
- Haynesville (source rock)

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**Recent USGS Oil and Gas Assessments in the Gulf Basin**

<table>
<thead>
<tr>
<th>Age</th>
<th>Group or Formation</th>
<th>Gas</th>
<th>Oil</th>
<th>Source Rock</th>
<th>Coal</th>
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**Assessed 2007:**
- Tertiary Strata Fact Sheet 2007-3098
- Cretaceous-Tertiary Coals Fact Sheet 2007-3098

**Assessed 2003:**
- South Florida USGS Digital Data Series DSS 69-A

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**Assessed 2001:**
- USGS Fact Sheet 2004-3114 and Digital Data Series DSS 69-6
- USGS Fact Sheets 2011-3046 and 2012-3003
- USGS Fact Sheet 2005-3146
- USGS Fact Sheet 2011-3005
- USGS Fact Sheets 047-08, 085-02, and Digital Data Series DSS 69-E
Historical Completions LA-MS-TX
Haynesville Shale
- Horizontal
- Frac
TMS
- Horizontal
- Frac
Austin Chalk
- Vertical
- Horizontal
- Frac
Haynesville Shale
- 2,390 (LA)
- 1,360 (TX)
- Dry Gas
- 1st 6 mos-250 MBOE
TMS Comps
- 250 (MS)
- 30 (LA)
- 1st 6 mos 120 MBOE
Austin Chalk Comps
- 21,500 (TX)
- 240 (LA)
- Historically exploited natural fractures
- Texas-recent development associated with Eagle Ford production in Karnes Co. and legacy Chalk production in Giddings Field in Washington and Lee Co.

1.8 billion BOE from Maverick County, Texas to Livingston Parish, Louisiana
Historical Chalk Completions-first six months oil cumulative

- Perception: significant variation in well performance
- Significant number of ‘big’ wells in Masters Creek area (300 MBOE)
- Two mile laterals = 25,000’ MD and greater; difficult and expensive
South-North Structural Cross-Section

- Austin Chalk maintains thickness
- Dramatic Eagle Ford thinning updip
Chalk matrix: 9-12% Φ, 43% Sw
- Rock properties are consistent across the field
- Seven full Austin Chalk penetrations with full log suites

Schlumberger 1” GR-SP-Induction Log

Austin Chalk Petrophysical Evaluation (Nutech)

Zone of Interest ‘B’ & ‘A’
- Highest quality pay flags
- Good Porosity
Average first six months daily oil production is a good predictor of EUR
- Quickly normalize production
- Longer times (12 months) improve the correlation
Where would you rather be?
- Masters Creek Austin Chalk vs resource plays and other chalk fields
- Not cherry-picked, driven by data quality (vertical vs. horizontal wells, comp dates
- Updated through 2016

1- Per well comparison - P50 case (IHS)
Austin Chalk
EOG
• 2016 no frac or bad rocks
• 2017 frac-Karnes Co
• Outstanding results
  • 50 MBO 30 day
  • 400 MBO cum
• Make the Chalk repeatable
• Take it to Louisiana
  • 96 MBO Cum
Cumulative Gross Revenue
High and Low Cases
• Austin Chalk
• TMS
• Haynesville
Shale and Chalk Plays in Louisiana

- Austin Chalk is an Emerging Play
  - Fracture Stimulation
- Austin Chalk Has Proven Upside
  - Masters Creek Analog
  - Large Resource Players Have Committed
    - Significant lease positions
- Early Results
  - EOG well is so-so
- Will there be a secret key?