Tuscaloosa Marine Shale
Louisiana Activity Update

By

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Commissioner of Conservation

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Office of Conservation

And

Louis Temento
Louisiana Office of Mineral Resources

March 27, 2014
West Feliciana Parish
Tuscaloosa Marine Shale Play
Lower Smackover “Brown Dense” and Haynesville Shale Plays
Challenges of Resource Plays

- Resource or source rock plays—where hydrocarbons originated
- Extraction of hydrocarbons that have not migrated out
- Large geographic area involved
- Requires high technology methods
- Horizontal drilling for increased surface area to make venture economical
- Hydro-fracturing “Fracking”
- Large amounts of water for fracking
- Flowback water management
- Long lateral lengths requiring large pooled units to meet economic needs
- Quick regulatory action to meet new economical and environmental needs
- Cross Unit Laterals
- Low natural gas prices
- Urban drilling activity-environmental concerns/solutions
WHAT IS THE TMS?

Tuscaloosa Marine Shale (TMS)

- Sedimentary rock composed of compacted, lithified clays and very fine sand grains (silt)
- Contains oil generated from organic matter deposited with the sediments
- Oil held tightly between the clays and silts
- Deposited approximately 90 million years ago, marine (ocean) environment
- Depth ranges from -13,000 feet to > -15,000 in E-W Feliciana area
- Approximately -15,000 feet in Ethel Field, East Feliciana Parish
- Will require horizontal wells with long lateral length and hydraulic fracturing to extract the oil economically
- Economics still uncertain, play is in early stages of development
- 1997 LSU study provides in-depth look at the play/Originally exploited in 1975
- Callon, Texas Pacific original operators in TMS
- Encore, Devon, Encana and Indigo II LA. (western “Eagle Ford” part of trend) early operators
- EOG, Justiss Oil Co., Conterra, Halcon, Goodrich latest operators to enter the TMS play
Regulating the TMS Activity

LDNR- Offices/Organization

Permitting/Drilling/Production

Inspection/Enforcement

E&P Waste Disposal

Groundwater Protection

Frac Related Rules/Reporting
ORGANIZATIONAL CHART
LOUISIANA DEPARTMENT OF NATURAL RESOURCES

OS
Office of the Secretary

OC
Office of Conservation
  - Engineering Administrative
  - Engineering Regulatory
  - Environmental
  - Geological Oil and Gas
  - Injection and Mining
  - Pipeline

OCM
Office of Coastal Management
  - Interagency Affairs and Field Services
  - Permits and Mitigation
  - Atchafalaya Basin Program

OMF
Office of Management & Finance
  - Legal
  - Public Information
  - Technology Assessment Energy Office

OMR
Office of Mineral Resources
  - Fiscal Management
  - Human Resources Management
  - Information Technology
  - Procurement and Contracts
  - Geological and Engineering
  - Mineral Income
  - Petroleum Lands

Boards and Commissions
- Atchafalaya Basin Research and Promotion Board
- Atchafalaya Basin Technical Advisory Group
- Oilfield Site Restoration Commission
- Oyster Lease Damage Evaluation Board
- State Mineral and Energy Board
- Water Resources Commission
- Water Management Advisory Task Force
OFFICE OF CONSERVATION
ALL ENGINEERING/INJECTION & MINING/Pipeline DIVISIONS
CONSERVATION ENFORCEMENT SPECIALISTS & PIPELINE CONSERVATION PROGRAM MANAGERS

Districts
- Lafayette
- Monroe
- Shreveport

August 12, 2013
Protection of Groundwater Through Well Construction

• Construction requirements result in protection of USDW and isolation of hydrocarbon bearing zones.
  – Multiple casing strings
  – Minimum setting depth
  – Cement requirements
  – Pressure testing
# T.M.S. Generalized Horizontal Well

<table>
<thead>
<tr>
<th>SERIES/GROUP/FORMATION</th>
<th>APPROX. DEPTH (Feet)</th>
<th>LITHOLOGY</th>
<th>Representative Tuscaloosa Marine Shale Horizontal Wellbore</th>
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<tr>
<td>Quaternary Alluvium</td>
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<td>Lower Tuscaloosa</td>
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*Productive or Potentially Productive Intervals*
Ground Water Use Advisory

Therefore, if ground water must be used for drilling or hydraulic fracture stimulation purposes, it is recommended that the Red River Alluvial aquifer be utilized for these purposes, where feasible, as the source of ground water supply in lieu of the Carrizo-Wilcox aquifer.

The Commissioner further encourages oil and gas operators to use the available surface water resources or other acceptable alternative water sources in Northwest Louisiana, where practical and feasible.
Due to revisions of the WH-1 form, water source and associated volumes are now reported on page 3.

Specifically, the water source and associated volume must be reported on page two (2) of the ‘Well History and Work Resume Report’ (Form WH-1) which must be filed within twenty days after completion or recompletion operations. The water sources must be identified by either the water well number or water body name, as appropriate. Separate water volumes for rig supply use and stimulation operation use must be provided. A completed example of page two (2) of the ‘Well History and Work Resume Report’ (Form WH-1) is attached.
Waste Management

• Exploration & Production (E&P) Wastes primarily include:
  – Drilling fluids
  – Flowback water
  – Produced water

• E&P Waste regulations ensure proper disposal to minimize environmental impacts of resource development.

• Manifest and reporting systems ensure transparency and accountability.

• Waste Management options include:
  – Onsite disposal using conservative limiting criteria
  – Well injection
  – Commercial disposal
  – Recycling in limited cases
Hydraulic Fracturing Rule

LAC 43:XIX.118

- Effective as of October 20, 2011
- Must file application with and receive work permit to hydraulically frack from the appropriate district office (Lafayette, Shreveport, & Monroe) prior to beginning fracking operations. Sec. 118.B.
- Following completion of hydraulic fracturing the operator must file a Well History and Work Resume Report (Form WH-1) in accordance with Sec. 105 & Sec. 118.C.
- LAC 43:XIX.105 requires:
  - At least 12 hours prior notice must be given to the manager of the appropriate district office, so that a Conservation representative may have a chance to witness the fracturing operations.
  - Within 20 days of completing work under the work permit, the work must be described on the Well History and Work Resume Report and submitted to the appropriate district office.
What Must Be Reported?

With the Well History and Work Resume Report (Form WH-1), the following information must be reported:

- Types and volumes (in gal.) of hydraulic fracturing fluid used in the operation.
- A list by type of all additives used during hydraulic fracturing operations. Specifically list the following for each type:
  - Specific trade name and suppliers.
- List of chemical ingredients in fracturing fluid subject to requirements of 29 CFR 1910.1200(g)(2) and their associated CAS numbers. Also specify for each chemical ingredient:
  - Maximum ingredient concentration within the additive expressed as a chemical by mass of each chemical ingredient;
  - Maximum concentration of each chemical ingredient expressed as a percentage by mass of the total volume of hydraulic frac fluid used.
How to Report?

- On the Work History/Well Resume Report (Form WH-1) submitted to the appropriate district office within 20 days of completion of the hydraulic fracturing operations.

- Frac Focus Chemical Disclosure Registry – online accessible registry sponsored by Groundwater Protection Council and the Interstate Oil & Gas Compact Commission.
  - Fracfocus.org
  - Search for specific well information by location, operator, well name, etc.
  - Under new reporting requirements, must report within 20 days of completion of hydraulic fracturing operations.
  - Reporting on Frac Focus does not fully replace WH-1 Requirement.

- Similar Publicly Available Websites.
Like similar statutes or regulations in other jurisdictions, the new fracturing information reporting requirements provide that specific chemical ingredient identity and CAS numbers entitled to trade secret designation pursuant to 29 CFR Sec. 1910.1200(i), do not need to be reported.

When a trade secret is claimed by the party entitled to make such a claim, then the following information must be provided:

- The chemical family of the trade secret ingredient; and
- A statement claiming that trade secret protection is being made.

  - Statement may be as simple as stating that the ingredient is “privileged”, “proprietary” or a “trade secret.”

Despite this protection, no party can withhold trade secret information from a health care professional when such disclosure is required by state or federal law.
TMS ACTIVITY UPDATE

- Wells
- Units
- Production
- How to Access Information
• 26 Hearings held to date

• 32 Units adopted to date

• 1 Upcoming hearing for Little Comite Creek Fld. on April 15

• Units configured to accommodate long horizontal laterals

• Unit Sizes: Dependent upon operators’ ability to drill horizontal laterals to a length that fits their individual economics and technical expertise as well as their geological interpretation

• Unit Sizes range from 720 acres (East Feliciana Parish, Ethel Field) to 1348 acres (Concordia Parish, North Bougere Field); approximately one mile wide by the approximate proposed horizontal lateral length.
FIRST TMS UNIT FORMED IN LA.
# TMS Production by Unit/Well

<table>
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<th>Field Name</th>
<th>Parish</th>
<th>Well Name/Unit Name</th>
<th>Cumulative Prod. (bbls.)</th>
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<td>Murphy 63H #1 - TMS RA SUA</td>
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<td>TMS RA SUB and SUC</td>
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<td>Northwest Wilmer field</td>
<td>Tangipahoa</td>
<td>TMS RA SUA and SUB</td>
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<td>Vernon</td>
<td>Bentley Lumber 32 No. 1</td>
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<td>Rapides</td>
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<td>Rapides</td>
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<td>Vick</td>
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<td>Oden Lake</td>
<td>Rapides</td>
<td>TMS RA SUA; Lambright H No. 1</td>
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</table>
Total Production by Parish (from Greatest to Least)

2. Avoyelles = 144,309 bbls.
3. Tangipahoa = 131,812 bbls.
4. East Feliciana = 93,231 bbls.
5. West Feliciana = 48,755 bbls.
6. Rapides = 13,733 bbls.
7. Vernon = 843 bbls.

Total Production = 804,768 bbls.
SONRIS  http://sonris.com/
Strategic Online Natural Resources Information System
  Energy
  Coastal Management
  Mineral Resources-State owned lands/water bottoms

Conservation
  Well Data/Production & Test Data/Unitization Data
  GIS-Maps with various land/culture and oil and gas layers
  Oil and Gas Hearing Transcripts-Not available online
  Unit Survey Plats-Available online
API Offshore Area Code Information
Area Code Information
Consumer Information
District Information
DNR Glossary
Drip Point Information by Field
Drip Point Information by Name
Drip Point Information by Organization
Facility Code Description
Field List by Requested District & Area
Field Listing
Fields by Parish
Group Code Information
LUW Information by Code Number
LUW Type Codes Information
LUWs by Field
LUWs by Name
Location Codes
Operation Type Codes
Organization Information by Name
Organization Ledger Listing-Alpha
Organization Ledger Listing-Numeric
Organization Type Codes
Organizational Mailing Address List
Organizations by Parish
Parish Code Information
Product Type Code Information
Retrieve Operator Compliance Details
Reservoir Nomenclature Abbreviations
Scout Report Codes and Terminology
Well Class Type Information
Well Status Code List
Offshore Wells By Parish
Orphan Wells By Parish
Permitted Wells By Date
Permitted Wells By Date/Parish
Retrieve Compliance Review By Serial Number
Scout Report Information
Severance Tax Relief Report
Well Count for Field By Organization
Well Count for Organization By Field
Well Permits by District
Wells by API Number
Wells by Field ID
Wells by Lambert Coordinates
Wells by Lambert Coordinates - Tabular
Wells by LUW
Wells by Organization Name
Wells by Parish
Wells by Section, Township and Range
Wells By Section, Township, Range By Parish
Wells by Serial Number
Wells by Specific Field / Operator
Wells (Excluding Well Status 03,28,29,30)
Disposition by Field, Operator, Report Date
Disposition by Operator, Date and Field
Field Production by Parish for a Period
Field Production by Year
Field Production for an Organization by Month
LUW Production By Month
LUW Production By Year
Louisiana LUW Production by Year
Monthly Parish Production for a Period
OGP Data Entry (Oil & Gas Production)
OGP Ledger by Commingling Facility
OGP Ledger by LUW

Operator Oil/Gas Production for a Year
Operator Production by Parish
Organization Production for a Field by Month
R5D Data Entry (Gas Disposition)
R5D DE Disposition by Operator & Field for 3 years
Ranking Gas Production by Field
Ranking Gas Production by Operator
Ranking Oil Production by Field
Ranking Oil Production by Operator
Statewide Monthly Production for a Year
Yearly Production by Parish
The majority of information collected by the Office of Conservation is available to the public free of charge through the DNR website – SONRIS (www.sonris.com)

- Access to the DNR Database
- Access to map-based (GIS) information (Geographic Information System (GIS))
- Access to images of documents on file
Key personnel to answer questions regarding SONRIS/TMS

IT issues (applications not working) DNR Help Desk 225-342-4556 in the Baton Rouge area or toll-free 888-792-0432 outside the area.

Well production information—Production Audit Section 225-342-5530 or 225-342-5265

TMS well/unit information:
Geologist Mike Kline 225-342-3335

TMS Page-Conservation Web page-News and Events-Tuscaloosa Marine Shale
Leasing Private Lands

Land man will visit with an offer. He should have:
1. Map to describe area of interest
2. Lease Form – the lease form is the contract to set the terms of the lease.

Primary Terms – amount of time the contract is valid; usually 3 – 5 years.
Price Per Acre
Royalty – percentage of royalty produced by the unit
Ideas to consider in advance:

Surface Leasing – Separate lease to allow surface facilities
Will the well be located on your property?

Unitization - Will you be included in a unit?
Royalty payments are dependent on unit participation.

Length of Terms -
How deep will the well be?
It may take a long time to drill.

Royalty & Price per Acre
What is a fair value?

Is it good to be the first or last to lease?
Favored nations clause
Brokerage firms – broker leases to drilling company for percentage of royalty
Ideas to consider in advance:

What companies are leasing in the area?

1. OMR Interactive Maps

Web based interactive map allows user to select which map features are visible to build a clear view of relative information.
SONRIS Interactive Maps - GIS

DNR uses its Administrative Web Server as the electronic access portal to information about DNR stored in static pages on the Administrative Web Server, and to update SONRIS information available from other DNR web servers. The public now has access via their web browser to various tool sets within SONRIS:

- **GIS Access**: Retrieve information using interactive, geographically oriented, map capabilities, and select from a variety of layers of backgrounds.
- **Online Well Log Submission**: Submit your well log electronically. Click here to view preliminary guidelines & training for submission.
- **Online Royalty Reporting**: Report mineral royalty online, refer to Tutorial for instructions.
- **Online Reporting**: Report oil & gas online, refer to the User Guide for instructions.
- **Online Surface Water**: Apply and track surface water application online visit our Louisiana Surface Water Management Program.
- **Legacy Lawsuits**: Helpful reports for Legal cases. For use of Reports on Demand.
- **Disaster Preparation Reports**: Helpful reports for hurricane season. For use of Reports on Demand, view the tutorial.
- **FAQ**: Frequently Asked Questions and more....
- **Downloads**: Click here to get required components.
- **Online Acceptance**: Submit oil & gas online, refer to the User Guide for instructions.
- **Online Online Reporting**: Report mineral royalty online, refer to Tutorial for instructions.
- **Online Reporting**: Report oil & gas online, refer to the User Guide for instructions.
- **Online Reporting**: Report mineral royalty online, refer to Tutorial for instructions.

These servers provide this service to the public via dynamic pages generated on a number of Web Servers. For more information on how these Web servers fit into DNR's computing architecture and future direction, you are invited to review the project overview for the Strategic Online Natural Resources Information System [SONRIS].

**Disclaimer**

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SONRIS Interactive Maps - GIS
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SONRIS Interactive Maps - GIS
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<th>Company Name</th>
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## SONRIS Interactive Maps - GIS

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Ideas to consider in advance:

Which companies are leasing in the area?

2. Clerk of Court Office
   Leases Documents are recorded.
   Terms of lease are public information.
Thank you for the opportunity to speak to you today.

Questions?