STARR Oil and Gas Program Overview

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Outline

- Mission and Financial Model
- Results: 2008-2010 Biennium
- Research Projects
  - Woodbine: East Texas Field
  - Frio Formation: Lavaca Bay Field
  - Cleveland/Marmaton: Texas Panhandle
  - Eagle Ford, Barnett Shale: Shale Gas
- STARR Publications
STARR
State of Texas Advanced Oil and Gas Resource Recovery

Funding from Texas Legislature, and logistical support from the General Land Office and the Railroad Commission

Mission: Increase income to the State through working with operators to...
• Define, characterize, assess, and expand new hydrocarbon plays
• Recommend drilling deeper untested reservoirs
• Recommend secondary or tertiary recovery programs
• Recommend recompletions
• Help locate new wells (infill, step-outs, wildcats)

STARR Financial Model

• STARR Oil and Gas Program must be revenue neutral to be re-funded by the Legislature each biennium
• Recently funded at $1.5 million annually
• Funding increased to $2.2 million annually
• STARR return on State’s investment is \>5.5: 1 for 2008-2010 biennium
STARR Revenue Credit

- **Severance Taxes from O & G Production**
  - Field Studies (Reservoir Characterization)
  - Regional (New Venture) Studies
  - Unconventional Resource Studies
  - EOR Projects

[STARR Project Locations Diagram]
**STARR Program Structure**

**Reservoir Characterization**
- Ala. Ferry Glen Rose
- Eliasville Caddo
- Lavaca Bay Frio
- Copano Bay Frio
- Spur Lake Penn.
- Broken Bone Penn.
- La Sara Field Frio
- Woodbine AA Wells
- Cisco Ls. Tom Green Co.
- Marble Falls Jack Co.
- Austin Chalk Polk-Tyler Co.
- Ranger Ls. Eastland Co.
- Woodbine East Texas Field

**Regional Studies**
- Regional Frio Studies
- N. TX/Eastern Shelf exploration trend
- Bone Spring play analysis
- Woodbine exploration trend
- Bend Conglomerate
- Cleveland/Marmaton Panhandle
- Spraberry/Dean Permian Basin

**Unconventional Resources**
- Barnett/Haynesville/ Eagle Ford
- Pearsall
- Smithwick
- Shale-Gas Plays

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**STARR Project Locations**

- Keystone East field, Goredlane Ford and Ford West fields
- Spraberry regional study
- Regional Frio study
- Fort Worth Basin Barnett shale-gas play
- Woodbine shale-gas play
- Rayneville shale-gas play
- Eagle Ford shale-gas play
- Gold River North field
- Durla County Ranch fields
- Nueces Bay project
- South Texas GOM project
- Red Fish Bay (3 reserves)
- Corpus Christi NW, Corpus Christi E., Encinal Channel fields
- Mustang Island
- Offshore Calhoun NE, Red Fish Bay
- Matagorda Bay Copano Bay
- West Bay Sugarake field
- Greater Sabine Bay
- Yates field
- Lockridge Mahale, and Waha West fields
- Bar-Mar field
- Spur Lake Field
- Bonn Spring play analysis Barnett/Woodford shale-gas study
- North Texas Eastern Shelf exploration trend
- Current biennium studies
- Previous studies

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200 miles
300 km
East Texas Field: Summary

- Discovered in 1930
- Combination trap
- Strong water drive
- Depth ~3,500 ft
- ~31,000 wells
- 4.3-acre spacing
- 7.03 Bbbl oil in place
- 5.42 Bbbl produced
- 77% recovery efficiency
- Depth ~3,500 ft
- ~31,000 wells
- 77% recovery efficiency

Base of Austin Chalk
Base of Woodbine
Sabine Uplift

OOIP, EUR, and Implied Recovery Factor

- OOIP = 7.0 BSTSB
- Cumulative Production 5.422 BSTB, 77.5%
- Residual Oil 1.10 BSTB, 13.6%
- Remaining Mobile Oil 0.407 BSTSB, 5.8%
- Remaining Reserve 0.07 BSTSB, 1.0%
Woodbinder Depositional Model

BEG RI 274

STARR Project Locations

- Current millennium studies
- Previous studies

- Spur Lake Field
- Bona Spring play analysis
- Barnet/Woodford shale-gas study
- Keystone East field, Geceline Ford and Ford West fields
- Lockridge, Malco, and Waha West fields
- Bar-Mar field
- Eagle Ford shale-gas play
- Current GOM project
- Regional Frio study
- Spraberry regional study
- North Texas Eastern Shelf exploration trend
- Fort Worth Basin Barnett shale-gas field
- Woodbine exploration trend
- Rayneville shale-gas field
- Greater Sabine Bay
- West Bay
- Sugarloaf field
- Matagorda Bay
- Copano Bay
- Offshore Calhoun
- NE Redfish Bay
- Mustang Island
- Red Fish Bay (3 reservoirs)
- Corpus Christi NW, Corpus Christi E., Encinal Channel fields
- Gold River North field
- Duval County Ranch fields
- Nueces Bay project
- Laguna Madre
**Lavaca Bay**

Gross Sandstone

Field production >125 Bcf
Individual well production up to 9.8 Bcf

![Model](Modified from Hammes et al. (2007))

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- Keystone East field, Geccline Ford and Ford West fields
- North Texas Eastern Shelf exploration trend
- Varner East Field
- Fort Worth Basin Barnett shale-gas play
- Woodbine exploration trend
- Nacozar Field
- Regional Frio study
- Spraberry regional study
- Eagleford shale-gas play
- South Texas GOM project

- Current millennium studies
- Previous studies

- 0
- 200 mi
- 300 km

- Greater Sabine Bay
- Redfish Bay (3 reserves)
- Corpus Christi NW, Corpus Christi E., Encinal Channel fields
Cleveland Incised Valley Fill

Ambrose and Hentz (2011)

Cumulative Cleveland Oil Production

~37.3 MMbbl (June 2010)
Lower Eagle Ford Shale: Thickness

25 mi

C.I. = 25 ft

Maverick Basin

Eagle Ford and Austin Chalk

Austin Chalk

Upper Eagle Ford

Lower Eagle Ford

1 in
Eagle Ford Oil Production

Cumulative Oil (bbl)
Total: ~8 MMbbl

Barnett Shale Activity
**Barnett Shale: Gas Well Gas Production**

Total: 1.828 Tcf

**Barnett Shale: Paleogeography 325 Ma**

Blakey (2005)
Barnett Shale Depositional Model

Loucks and Ruppel (2007)

STARR BEG Publications

RI 273

RI 274
New STARR BEG Publication

RI 275