Fairway James Lime Field, East Texas: Still Developing After 48 Years* By Robert E. Webster¹, David Luttner¹, and Lawrence Liu¹

Search and Discovery Article #110061 (2008) Posted August 10, 2008

*Adapted from oral presentation at AAPG Annual Convention, San Antonio, Texas, April 20-23, 2008

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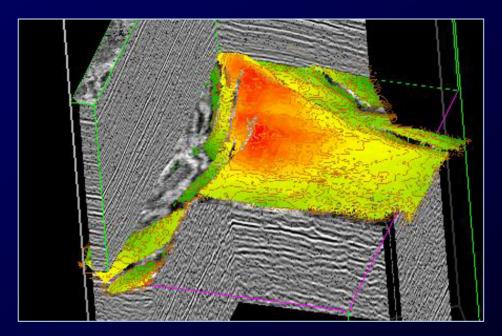
Abstract

Fairway (James Lime) Field, in Henderson and Anderson counties, Texas, trapped volatile 48° oil in the Aptian age James Lime member of the Pearsall Formation. The reservoir is a large patch reef complex of varied carbonate facies that grew on a paleobathymetric high in the interior platform of the Lower Cretaceous shelf. For reservoir management purposes, the James is divided into an upper "A" zone with reef-derived skeletal grainstone and/or lagoonal facies with moldic and interparticle porosity, a "B" dense zone of non-porous reef core, and a lower "C" zone composed of uniform fine grainstone. Porosity and permeability average 12.5% and 33 mD in the "A" zone and 12.9% and <1 mD in the "C" zone, respectively, at depths of 9,800 to 10,200 ft. Total net pay averages 56 ft.

Following discovery in 1960, 157 wells were drilled on 160 acre spacing during the initial development phase. In 1963, a high pressure gas gathering system and gas plant were put into operation, and in 1965 a field-wide unit of 28,518 acres was approved, designed to conduct gas and water pressure maintenance operations. An injection project was then initiated to preserve reservoir energy and increase recovery through use of a WAG (water-alternating-gas) miscible recovery process. Additional infill drilling projects were implemented in 1971, 1980, 1991, and 2006 to optimize recovery; to date 237 wells have been drilled, including 3 recent horizontal wells targeting bypassed pay in the upper "A" and lower "C" zones. A large secondary gas saturation developed over the years as the gas recycling program was implemented. Gas sales began in 2000, and gas injection was terminated in January, 2005. OOIP in the James was calculated as 410 MMBO, of which 213 MMBO has been produced. As of Aug. 1, 2007, production was 1220 BOPD, 23,400 BWPD, 70 MMCFD, and 3360 BNGLPD. Field life is projected beyond 2015.

Fairway James Lime Field

Still Developing after 48 Years



by Robert Webster, David Luttner, and Lawrence Liu

AAPG Annual Convention

April 21, 2008



Fairway James Lime Field Still a Giant after 45 Years

Acknowledgements

- Thanks to Hunt Oil Company for permission to present this paper, and to colleagues who provided valuable assistance: Larry Galbiati, Frank Stillwell, David Hulslander.
- Thanks to Western Geco for permission to show selected seismic data from the Fairway-Pert 3-D survey.



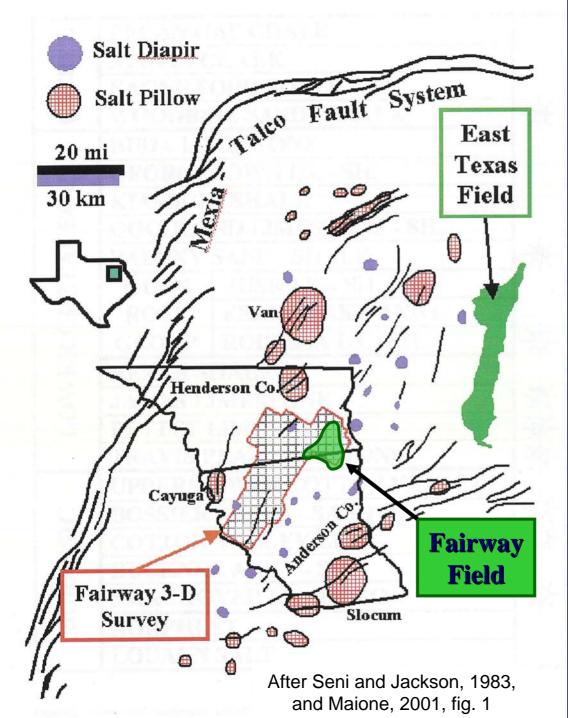


Fairway Field Talk Outline

- Introduction and Field History
- Development of the James Reef
- Field Structure and Trapping Mechanism
- Production History
- Recent targeted drilling- flank fault blocks and horizontal wells
- Future Operations

FAIRWAY FIELD OVERVIEW

- Discovered 1960
- Main Reservoir James Lime (Aptian, 110 ma.)
 - Also Pettet, Rodessa, and Massive Anhydrite limestones.
- James Lime Unit (28,518 ac.) formed 1965.
- 237 wells drilled.
- OOIP: 410 Million Barrels of Oil.
- Production: 212 MMBO + 114 BCFG sold.
- Currently in gas blowdown phase.

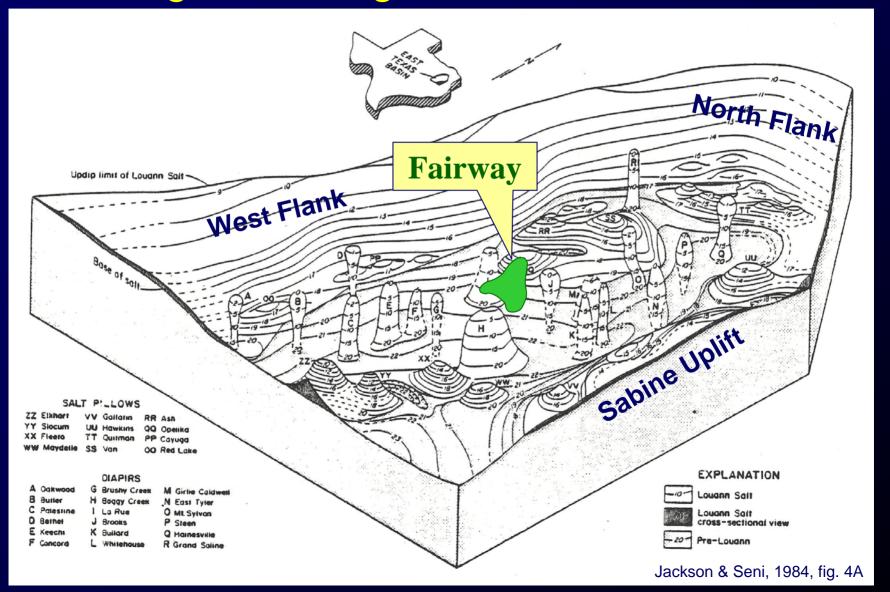


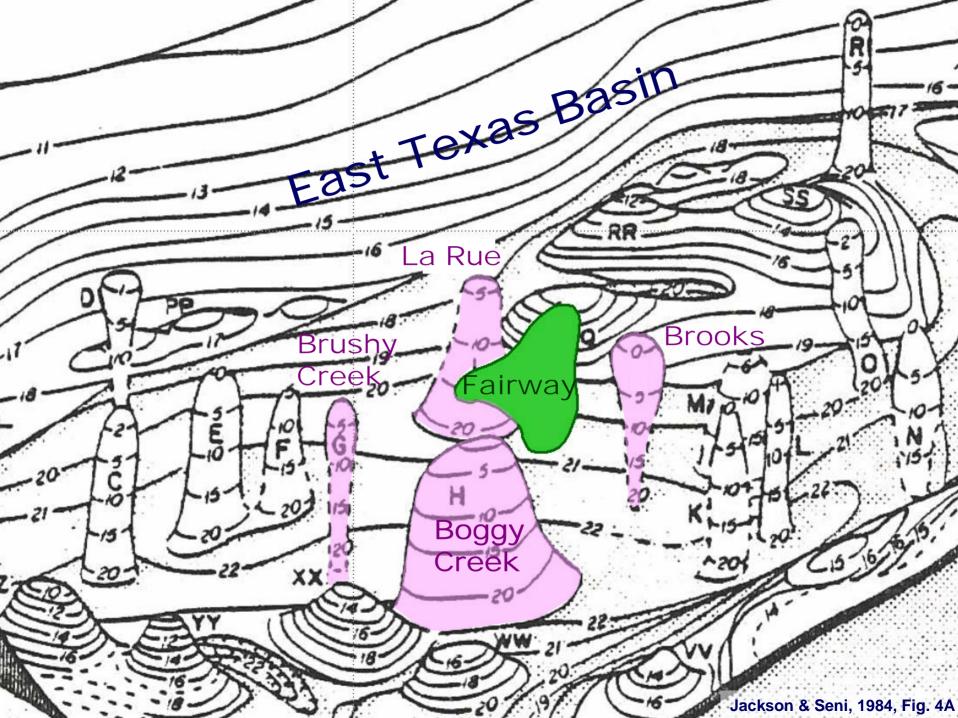
East Texas Basin

Index Map showing Major Faults, Salt Diapirs and Pillows, Fairway Field and Fairway 3-D Survey



Isometric Diagram, E. Tx. Basin showing 3-D configuration of salt structures

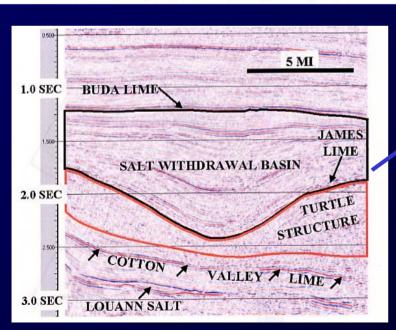


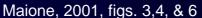


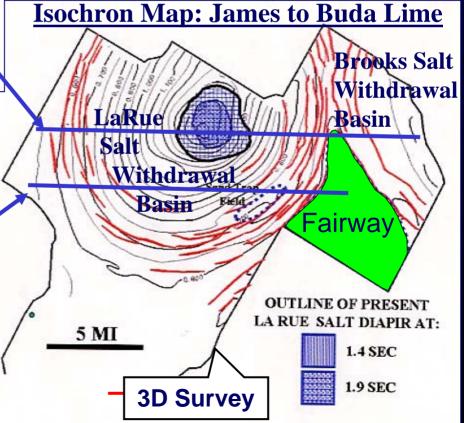
1.0 SEC BUDA LIME La Rue: Salt Diapir LOSEC LOBEANN SALT RECAN GAP CHALK Value Vani Value SALT WELD

Growth of James Reef on Turtle Structure

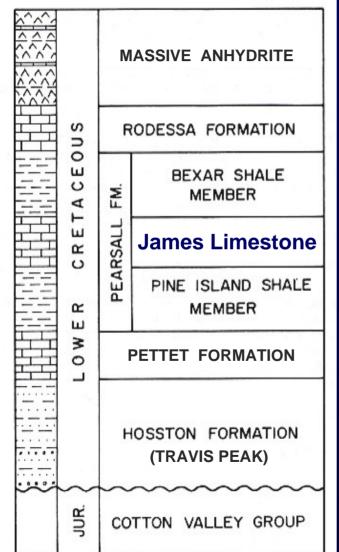
Amplitude sections showing salt withdrawal basin, La Rue diapir, ring faults, and Fairway turtle structure



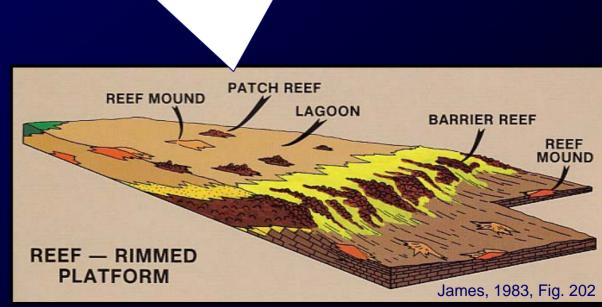




Lower Cretaceous Stratigraphic Column Fairway Field, East Texas Basin



Fairway developed as a large reef atoll with associated facies behind the Pearsall platform-margin barrier reef.

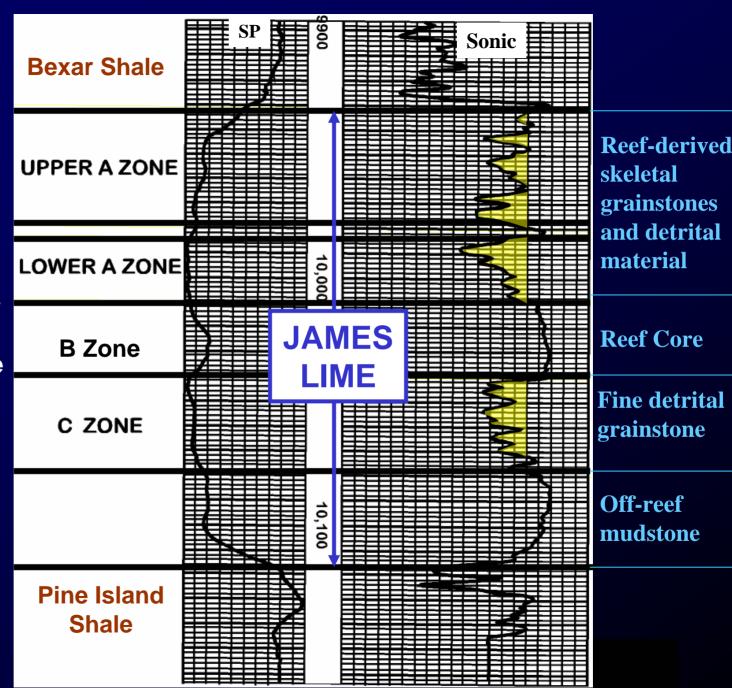


TYPE LOG (FJLU 545-2)

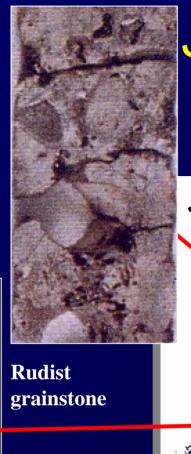
Showing reservoir porosity zones in the James Lime

A Zone Ø=12.5% K=33mD

<u>C Zone</u> Ø=12.9% K=<1mD



Rudist peloid packstone reef-margin facies with moldic porosity



James Reef "Atoll"
Carbonate Facies
Core Photographs

James Reef Facies Map
Fairway Field

after Achauer, 1985, fig. 30-4

ZERO EDGE OF LAGOONAL FACIES
ANS OF MAXIMUM THICKNESS
OF LAGOONAL FACIES
FEE CORE FACES
REEN KERIVED SKELETAL
GRAINN ONE FACIES
LIMES TO CORE CONTROL

2 MILES

KILOMETERS
2 MILES

Well-sorted

grainstone

with black

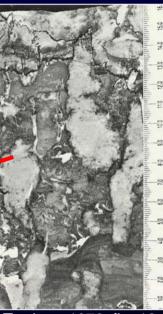
"gilsonite"

Terriere, 1976, fig. 5

in pores.

off-reef

Reef Core Stromatoperoid colonies and lime mud

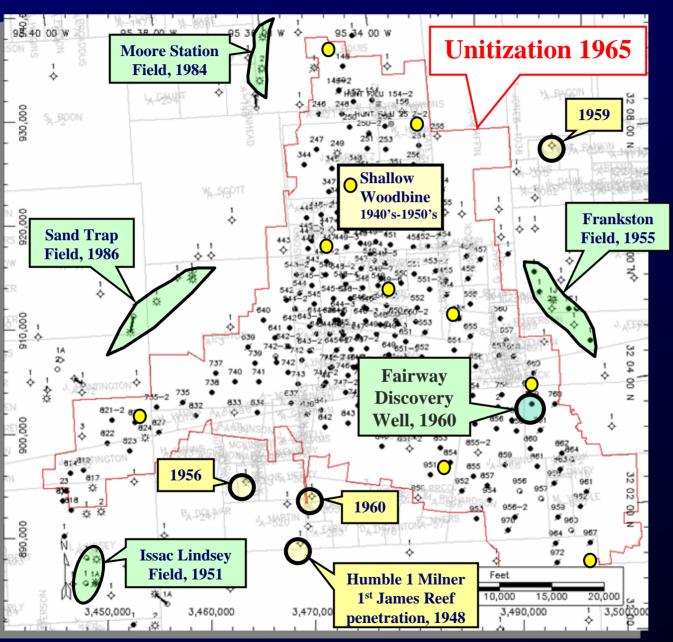


Terriere, 1976, fig. 12

Lagoonal mudstone with muddy grainstone-filled burrows

Terriere, 1976, fig. 7

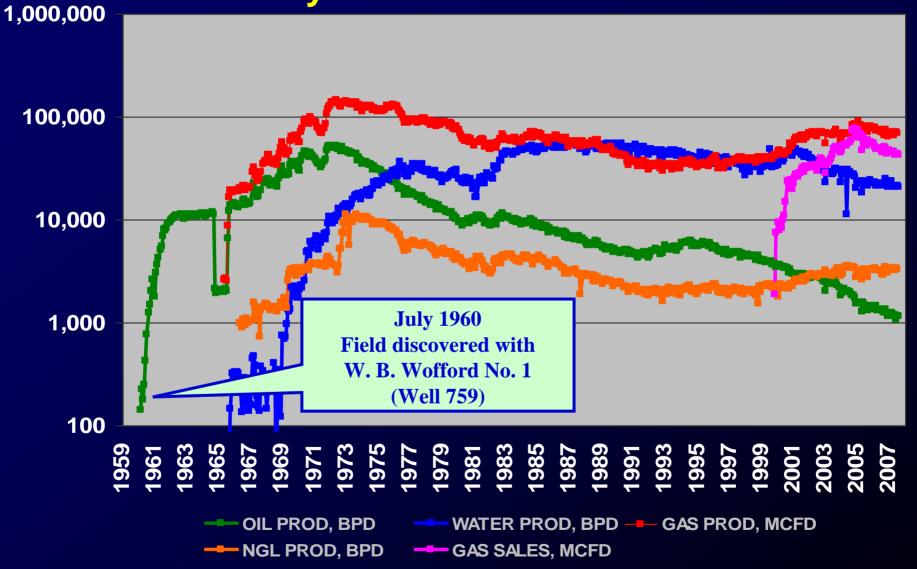




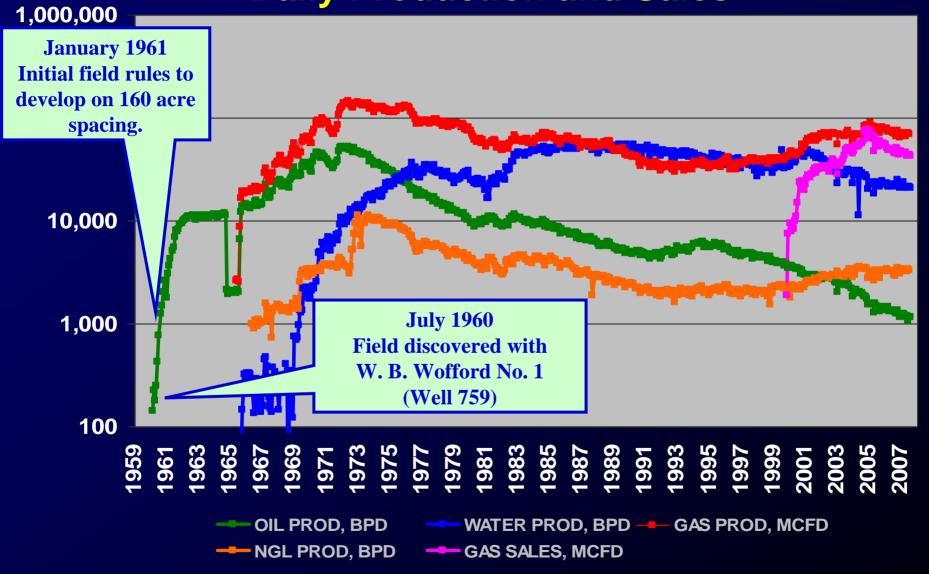
Exploration History Fairway Field

- Fairway was too large to be easily recognized.
- Seismic was poor quality.
- James lime was not perceived as a good reservoir.
- Discovery was made by stepping updip to the small Frankston field.

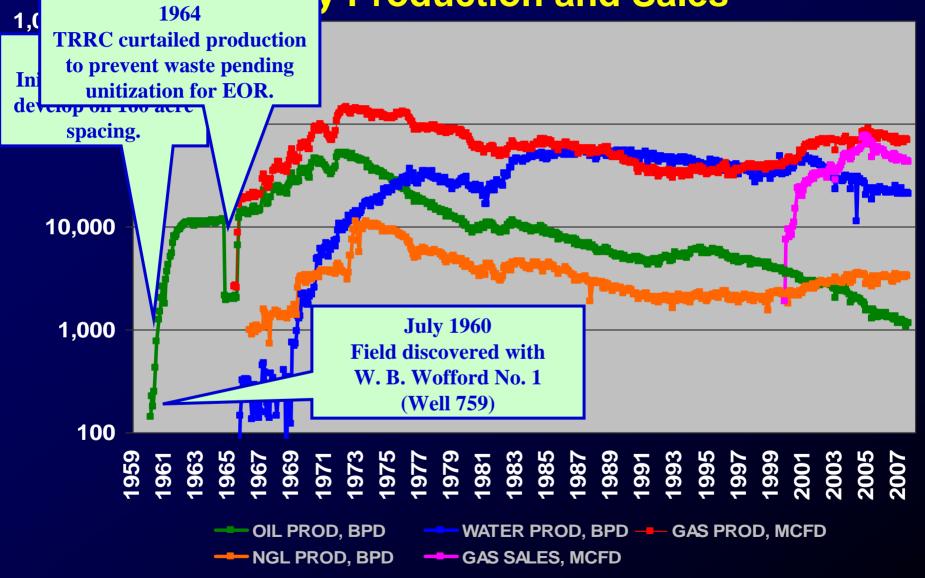
Fairway (James Lime) Unit Daily Production and Sales



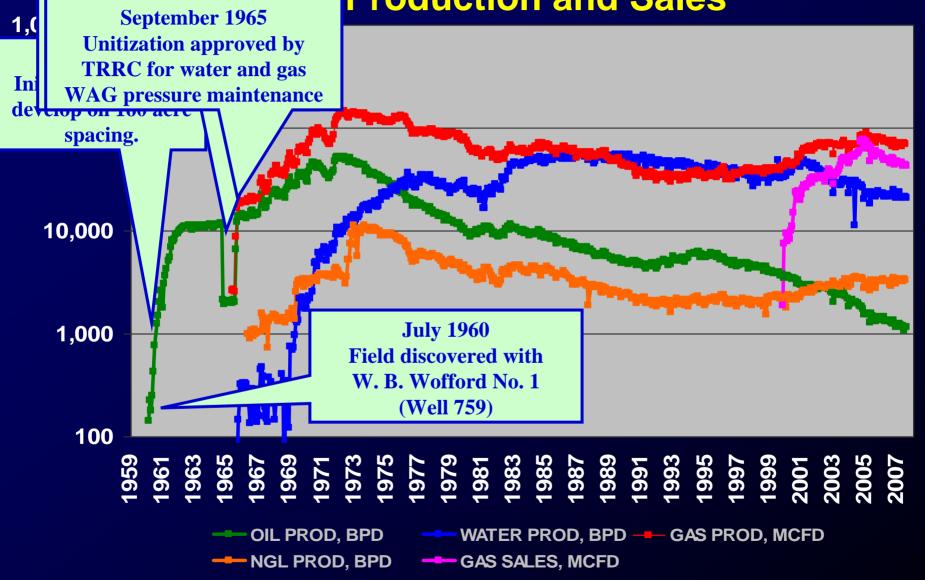
Fairway (James Lime) Unit Daily Production and Sales

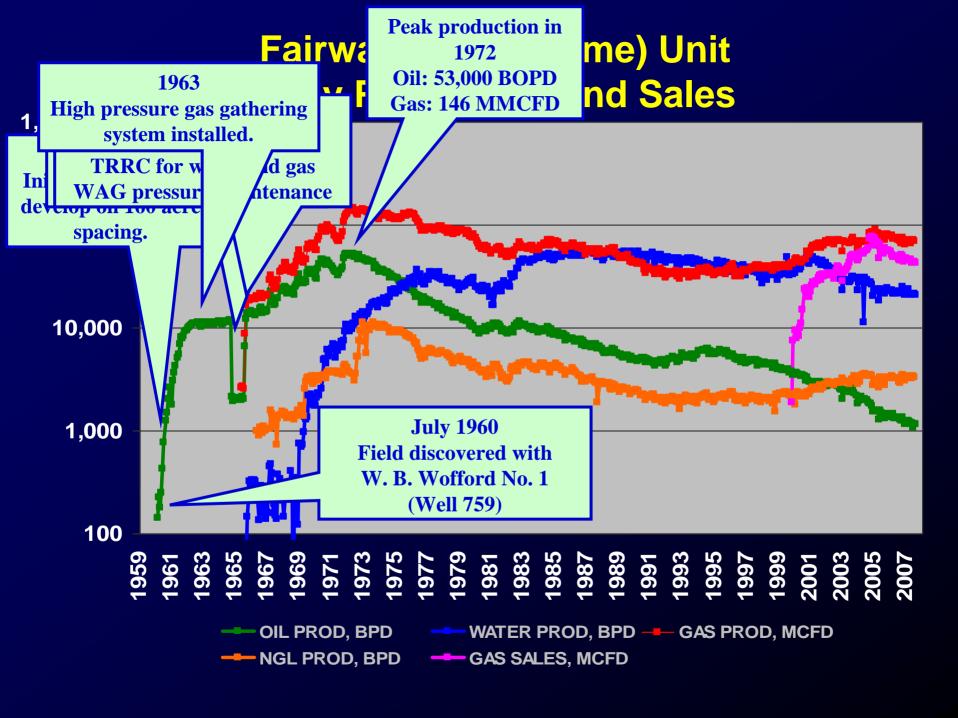


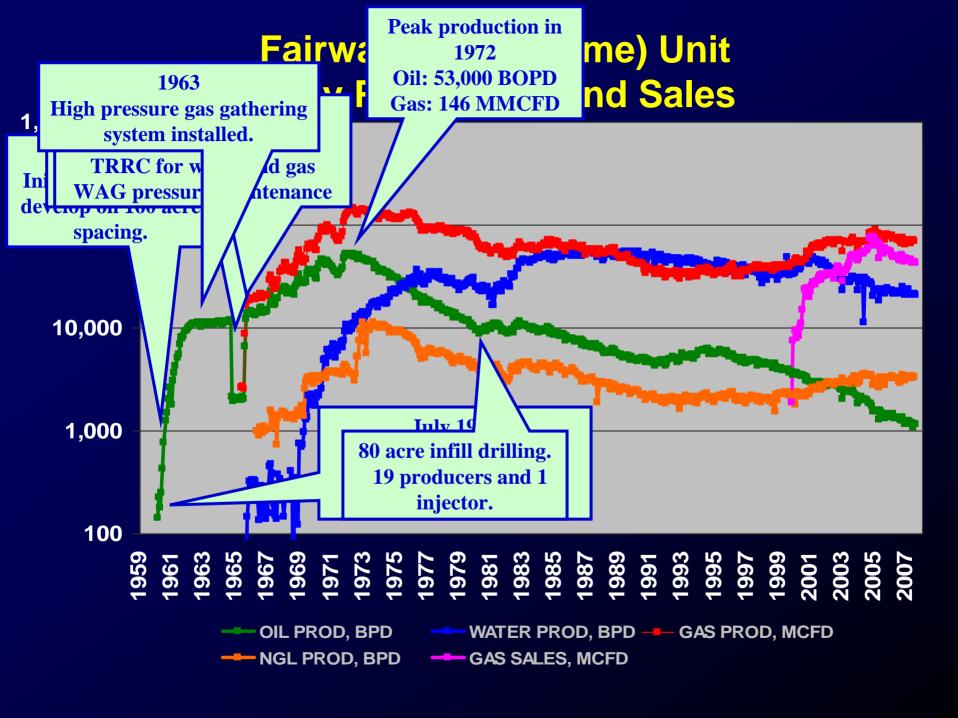
Fairway (James Lime) Unit

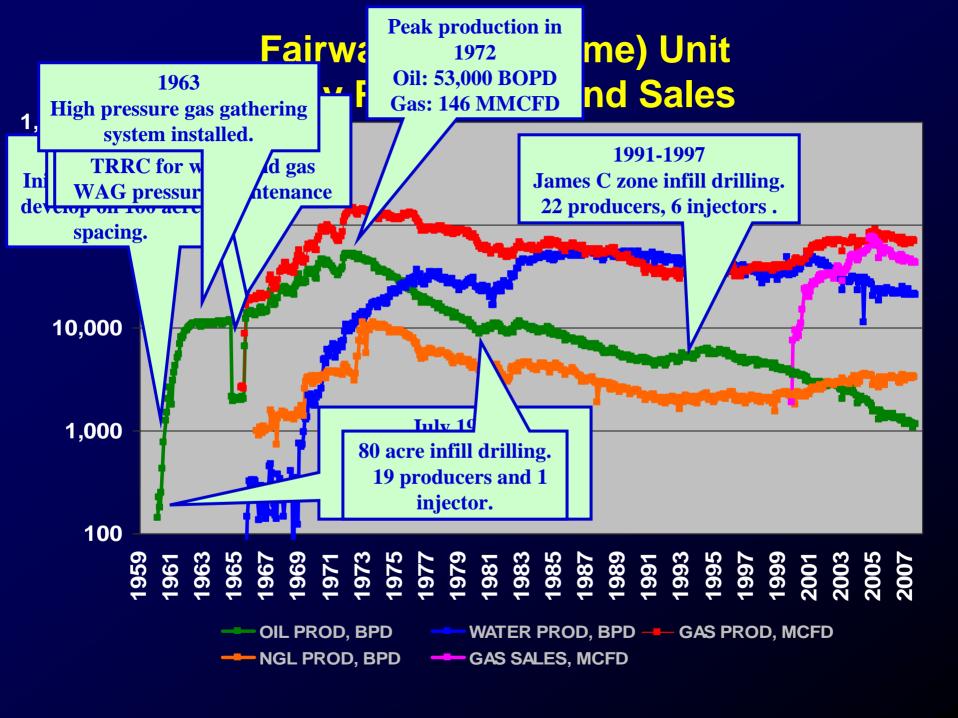


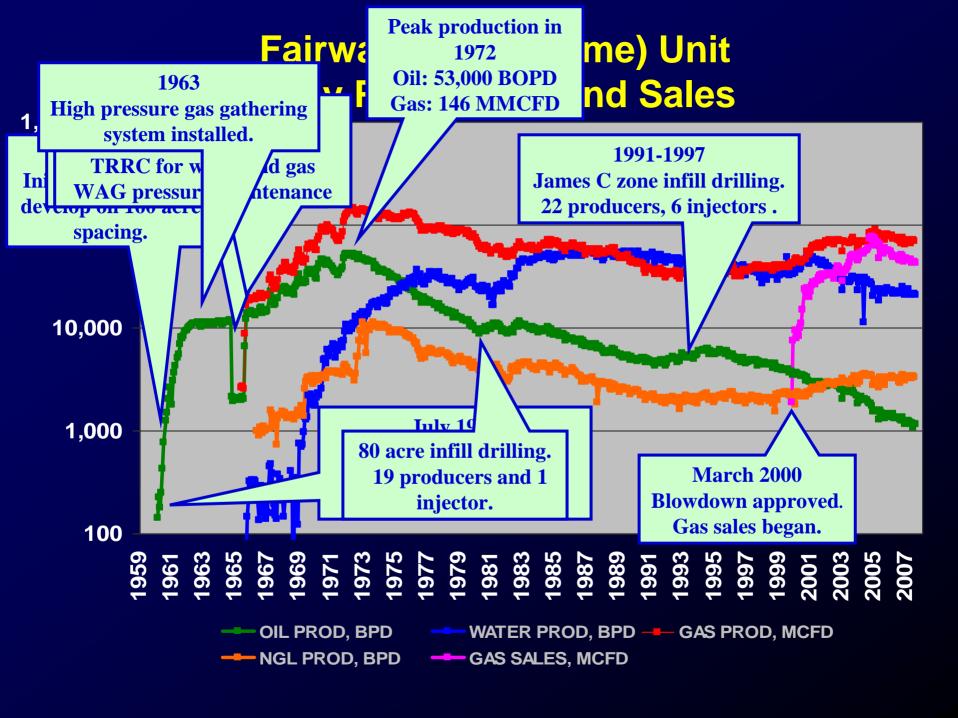
Fairway (James Lime) Unit Pails Production and Sales

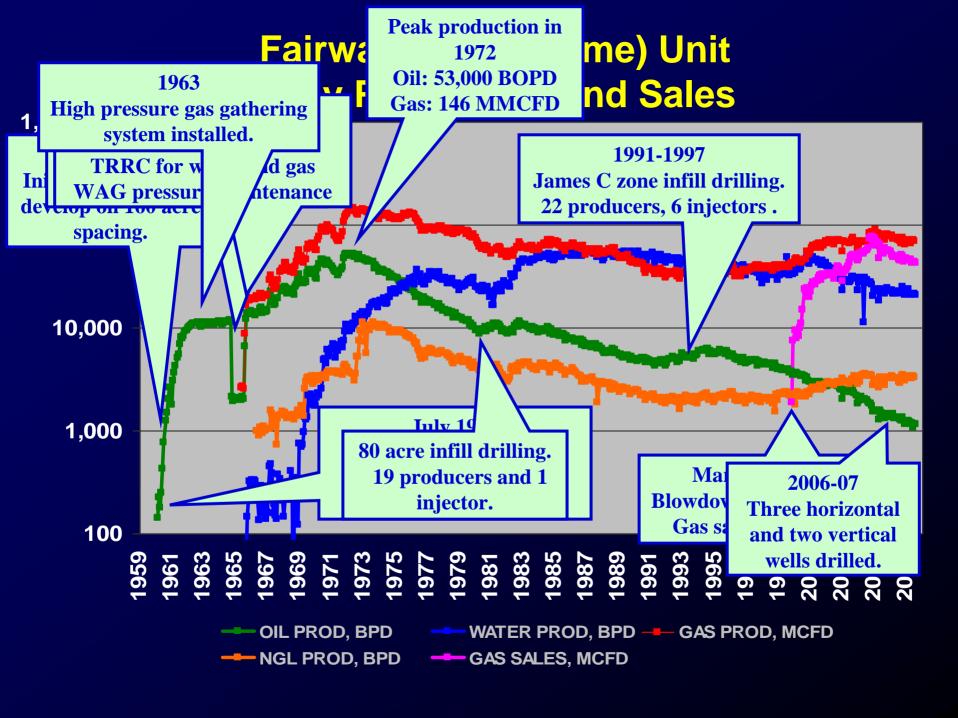




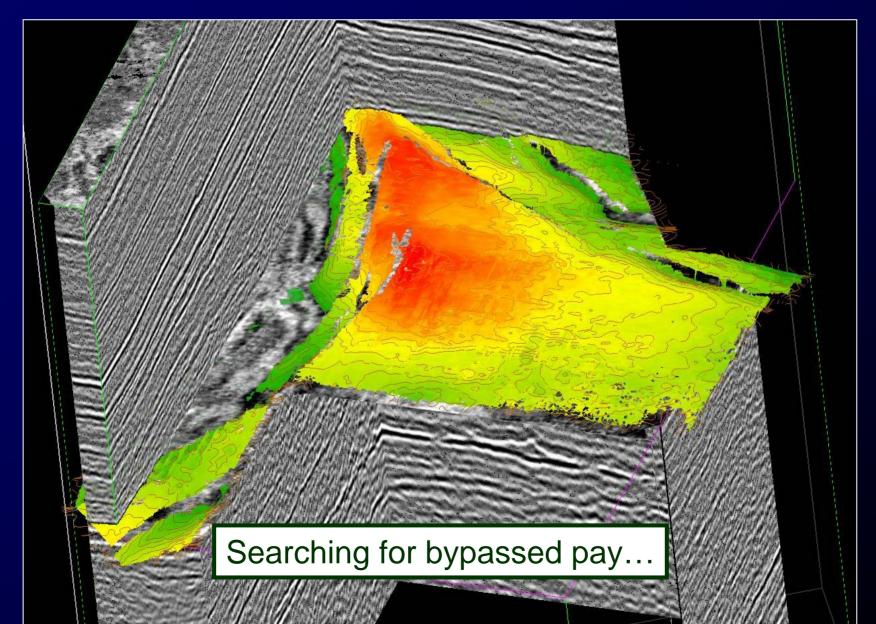




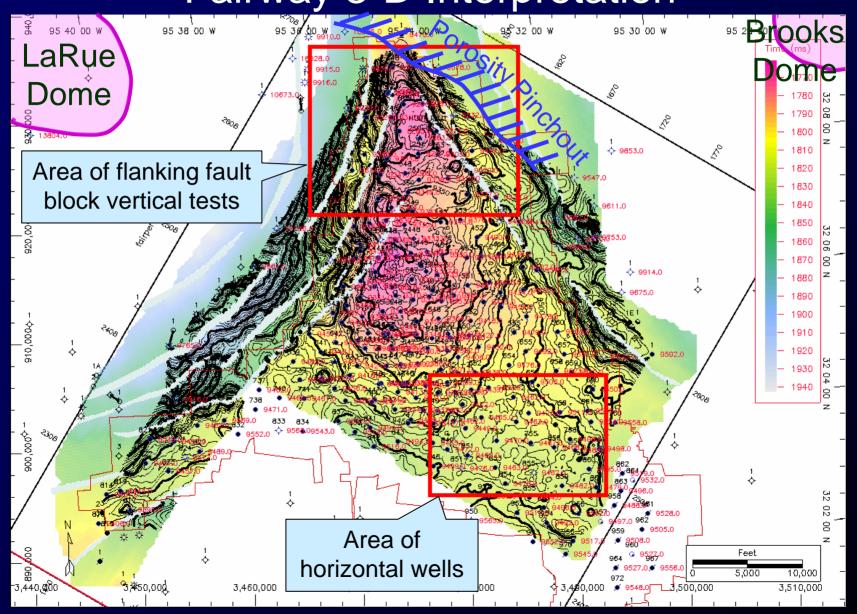




3-D View of Top James Lime

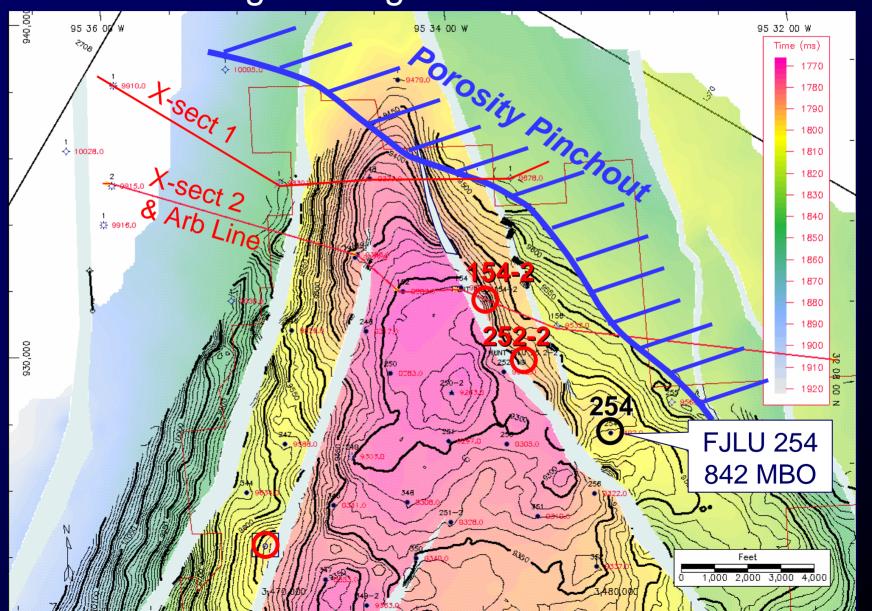


Top James Lime Depth Structure Fairway 3-D Interpretation

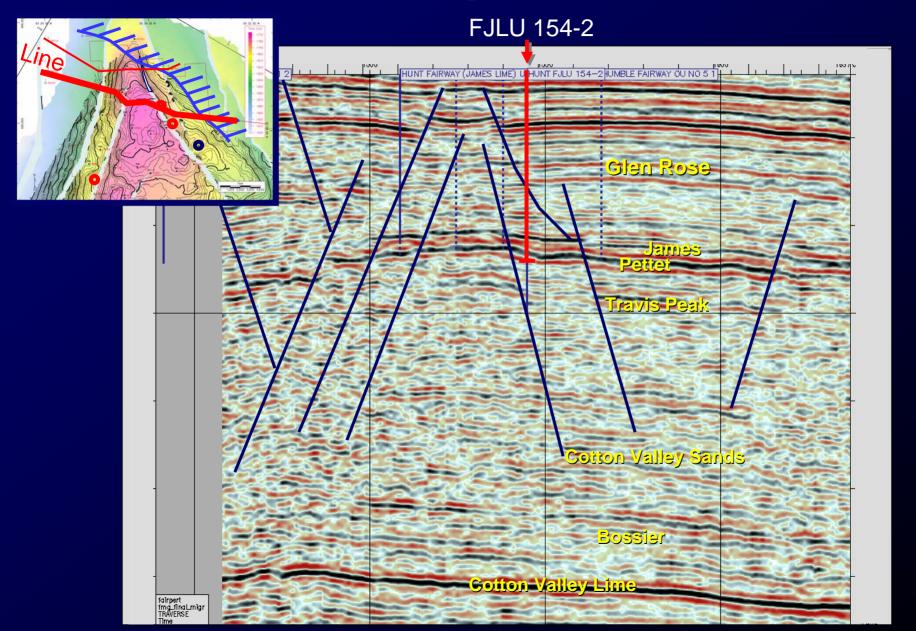


Top James, Northern FJLU

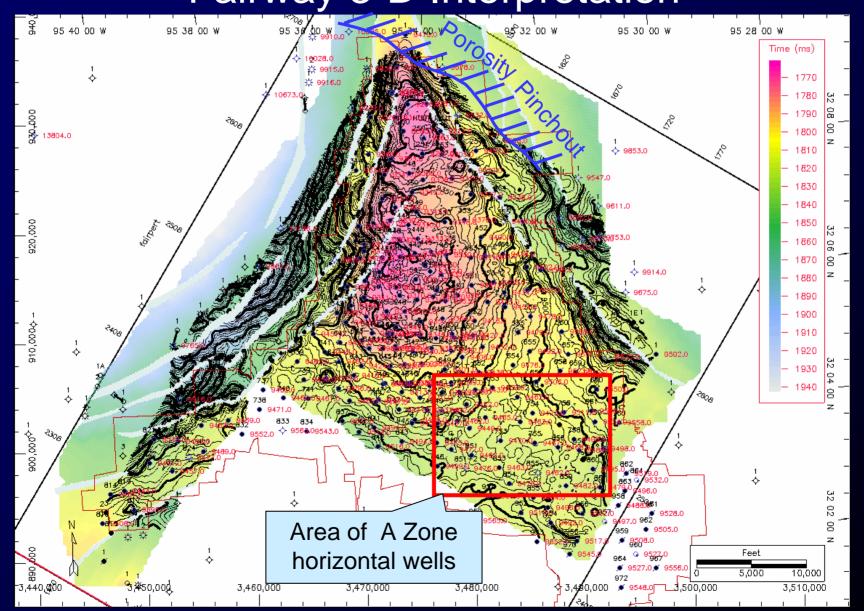
Showing flanking fault block locations



Arb Line through FJLU 154-2

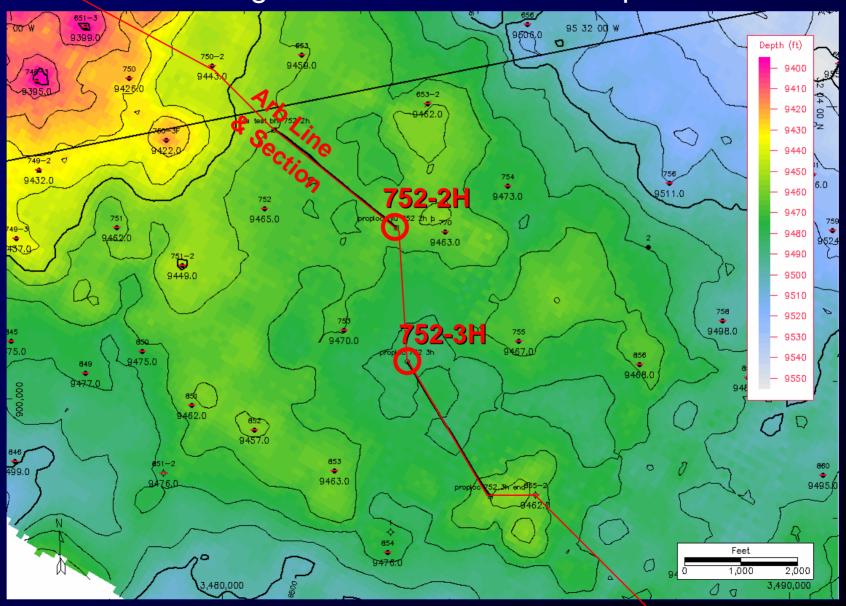


Top James Lime Depth Structure Fairway 3-D Interpretation

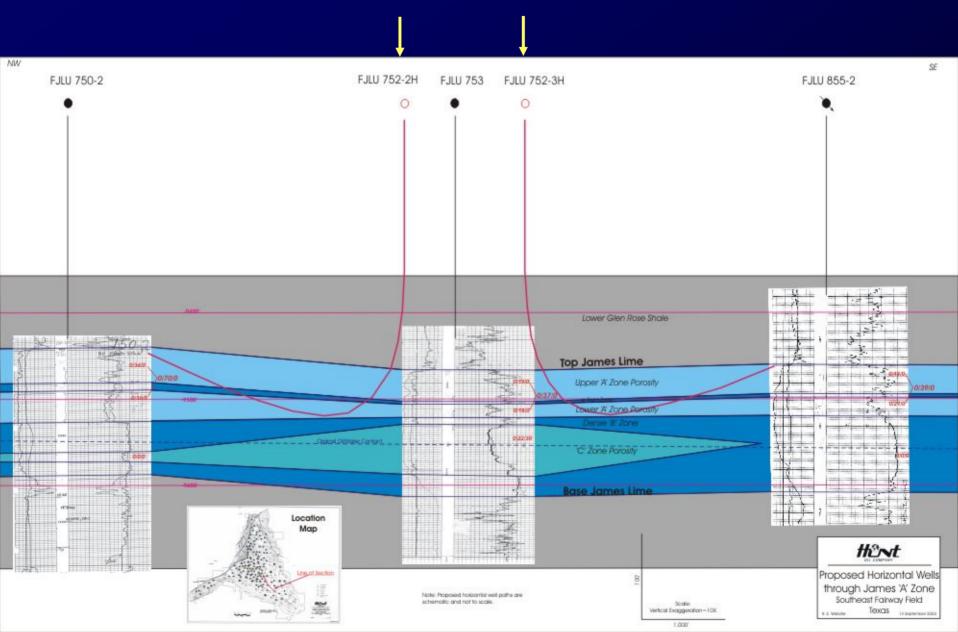


Top James, SE Fairway Field

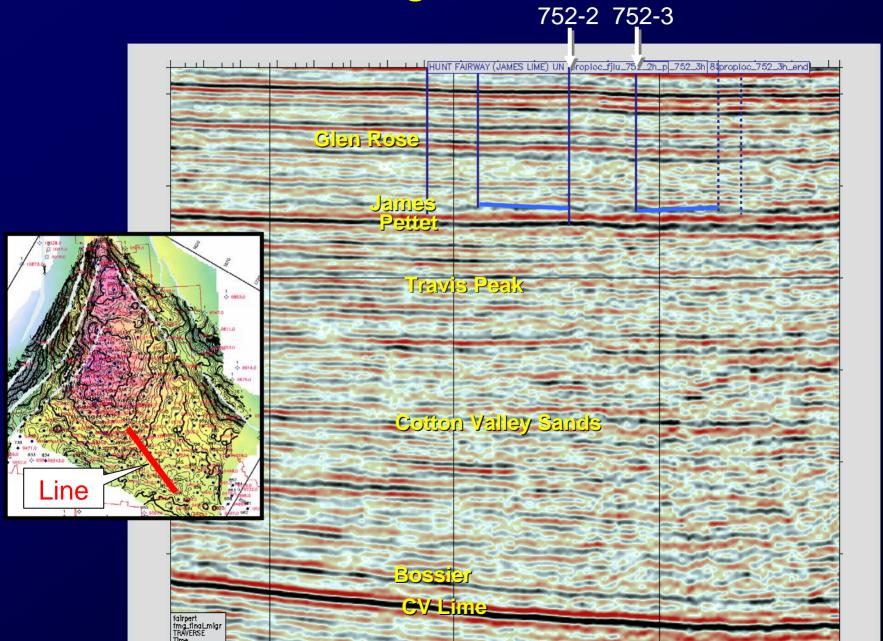
Showing "A" Zone horizontal well paths

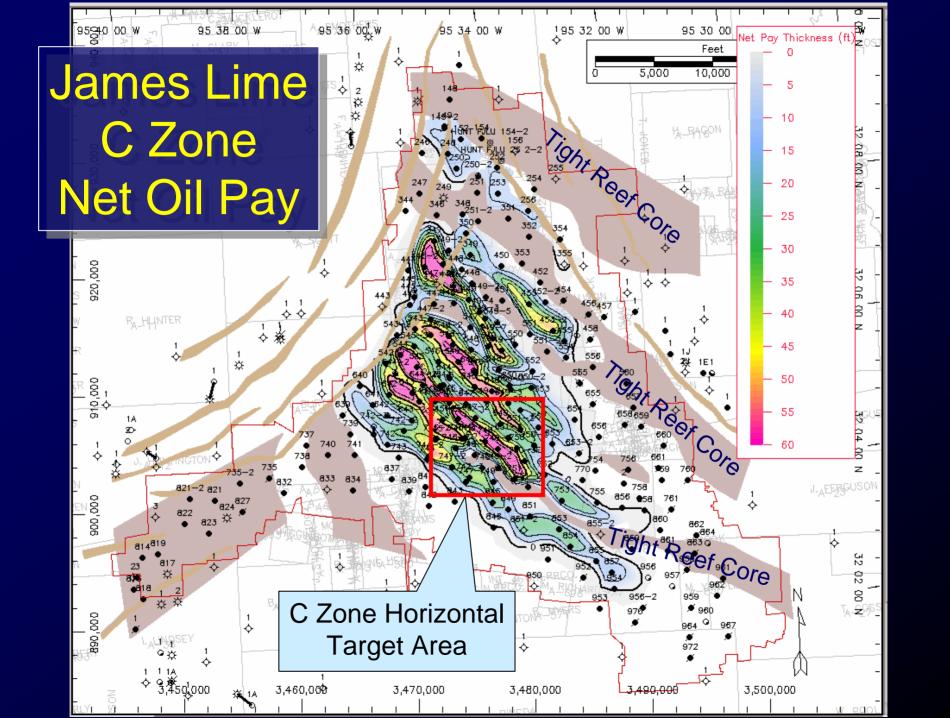


Horizontal Wells FJLU 752-2H & 752-3H

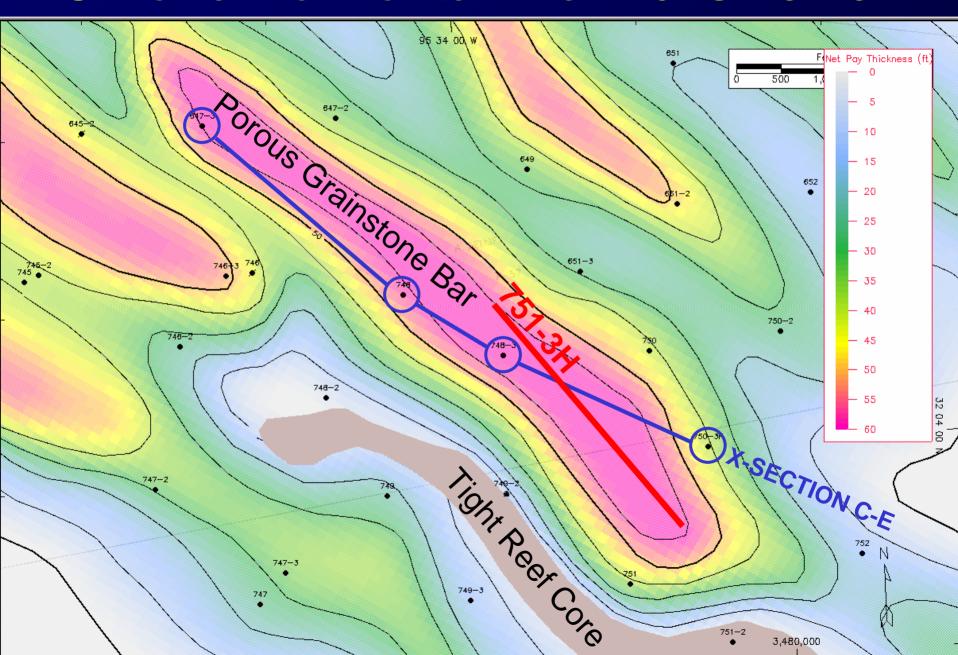


Arb Line Through 752-2H & 752-3H

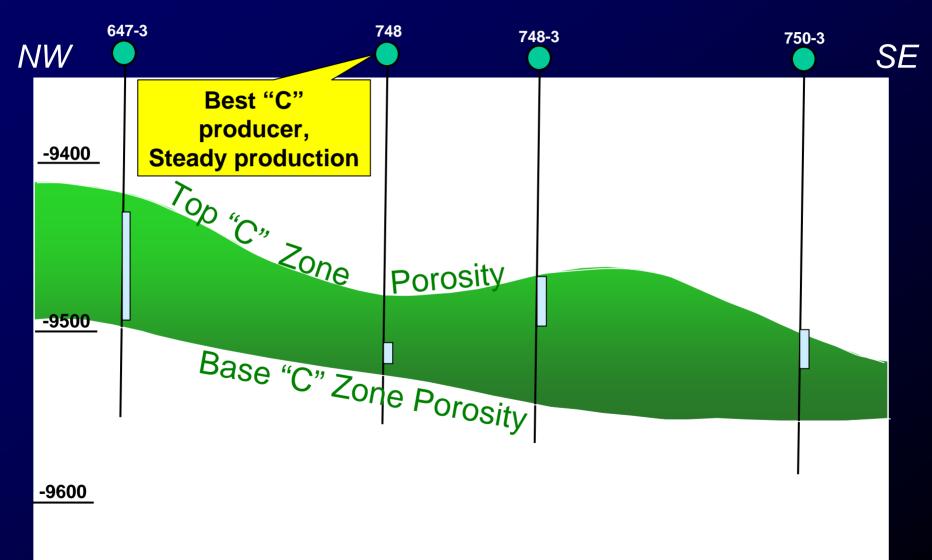




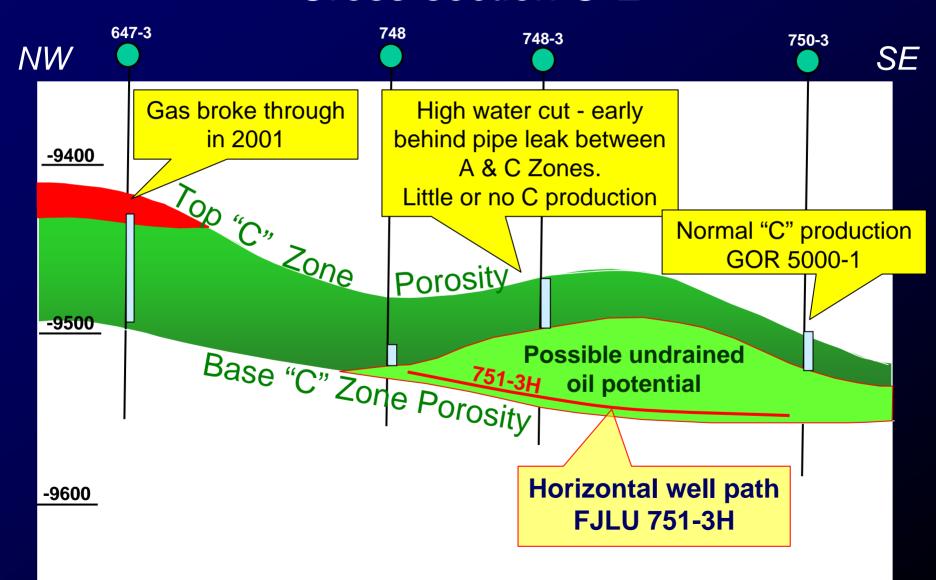
C Zone Horizontal Well FJLU 751-3H



Fairway James Lime "C" Zone Cross-section C-E



Fairway James Lime "C" Zone Cross-section C-E



Fairway 2006-2007 Drilling Results

Vertical Wells:

- -FJLU 252-2 (James Lime "A")
 - Comp. 7/06 ARO 299 BOPD, 703 MCFD, 61 BWPD
- FJLU 154-2 (James Lime "A")
 - Comp. 12/06 ARO 66 BOPD, 260 MCFD, 34 BWPD

Horizontal Wells:

- FJLU 752-3H (James Lime "A")
 - Comp. 2/07 ARO 30 BOPD, 6100 MCFD, 2476 BWPD
- FJLU 752-2H (James Lime "A")
 - Comp. 11/07 ARO 102 BOPD, 1800 MCFD, 467 BWPD
- FJLU 751-3H (James Lime "C")
 - ■TA mechanical problems, stuck BHA fish. Under review.

Fairway Future Operations

- The James Lime reservoir has evolved from a high rate oil field under enhanced recovery to a large gas field under pressure depletion drive.
- Future field operations will be targeted at:
 - reducing system pressures,
 - optimizing compression,
 - dewatering the reservoir, and
 - additional drilling to recover large remaining gas reserves.

Current Status of Unit March, 2008

- Production: 1,173 BOPD, 21,000 BWPD,
 69 MMCFD, 3,346 BNGLPD (Unit and plant total)
 Produced water is injected into 8 Woodbine disposal wells.
- Gas Injection: Ceased January 22, 2005
- Gas Sales: 43 MMCFD
- Well Count: 120 Producers, 8 SWD, 7 SI
- Cumulative oil production: 212 MMBbls,52% recovery of est. 410 MMBbls OIP
- Cumulative Gas Sales: 114 BCF since start of blowdown in April 2000

Fairway (James Lime) Unit Recovery Summary

Original Oil in Place, MMBbls Original Gas in Place, BCF	410 594
Cumulative Oil & Cond. Prod., MMBbls (1/31/08) Cumulative Natural Gas Liquids, MMBbls (1/31/08)	122 54 176
Total Oil & NGL, MMBbls (1/31/08) Cumulative Liquid Hydrocarbon Recovery, % OOIP	43
Cumulative Gas Production, BCF (1/31/08) Cumulative Blowdown Gas Sales, BCF (1/31/08) Cumulative Gas Injection, BCF (1/31/08)	1002 114 624
Cumulative Water Production, MMBbls (1/31/08) Cumulative Water Injection, MMBbls (1/31/08)	472 674

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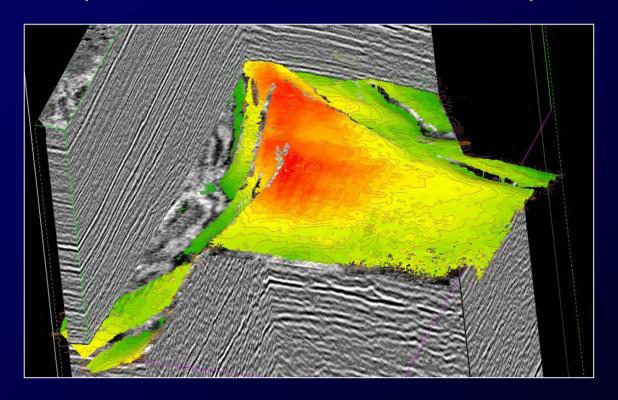
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The End

(Of the talk, not the field)



Still a lot of oil and gas to go...

