

Westward Extension of Prolific Eagle Ford/Haynesville (Eqv.) Production into Mexico

GeoConvention, Calgary
May 9th, 2018



Talk Outline



- Opportunity for oil and gas
 - Resource size and characteristics
 - Advanced technology to use – things that make a difference
- What a new company would have to consider moving into the area:
 - Financial terms
 - Oil and Gas Market
 - Land Availability/Tenure
 - Oil Field Equipment
 - Environment
 - Security

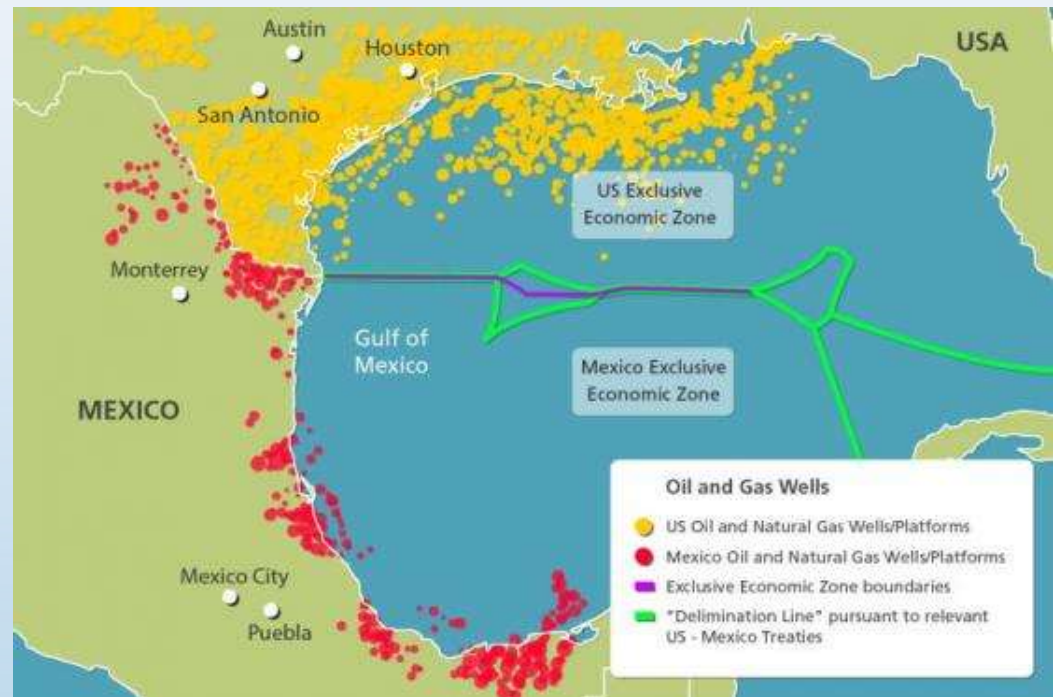


Source:Energy Digital

Texas / Mexico Border



- Well count in Texas vs. Mexico across the border
- No Eagle Ford production in the area across border
- The oil and gas doesn't stop here!



Source: Oil and Gas 360

Oil and Gas Prize

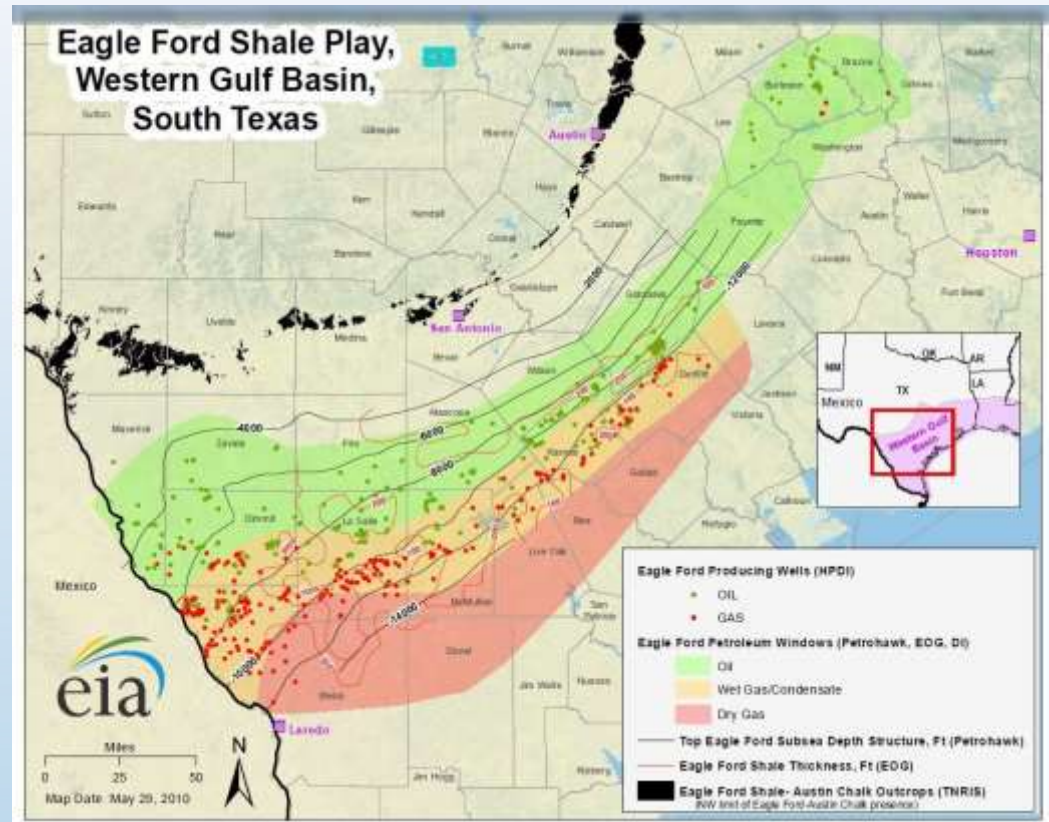


Delineation of the Eagle Ford and Pimienta (Haynesville eqv.) formations from South Texas across the Mexican border

2015 U.S. Energy Information Administration: for Burgos Basin

- Eagle Ford: 6.9 BBO and 43 Tcf
- Pimienta: 11 BBO and 119 Tcf

Risked Recoverable Resources

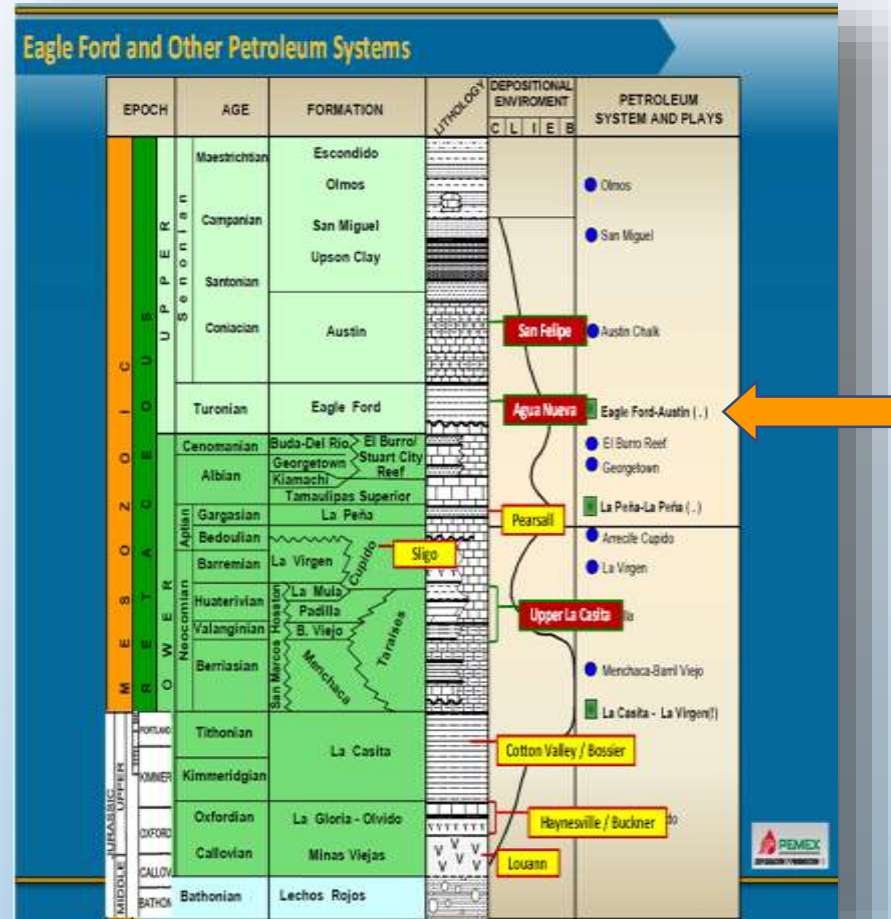


Source: EIA 2010

Eagle Ford Reservoir



- Less than 10 shale wells drilled to date in target area
- Organic-rich shale, carbonate-silica lithology
- Optimal depths (2000 to 3000 m)
- TOC 3%
- Thermal maturity (R_o -1.0)
- Over pressured reservoir

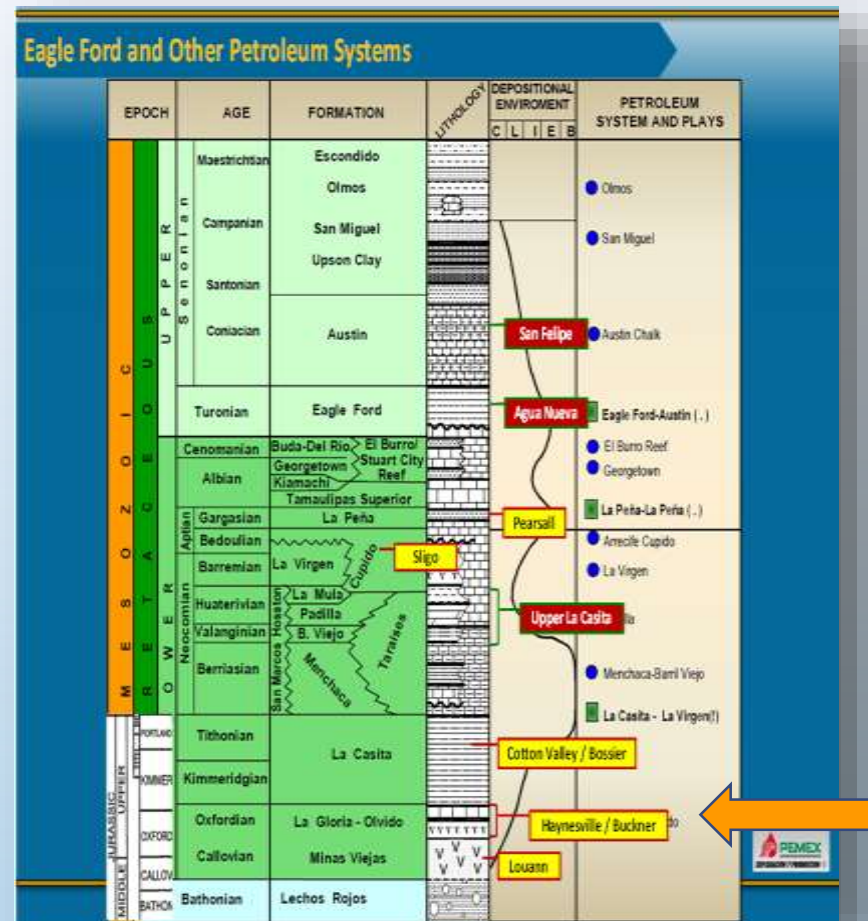


Source: PEMEX

Pimienta (Haynesville eqv.)



- 200 m of gross thickness
- Mineralogy calcite with minor quartz and illite clay.
- TOC lower than in the Eagle Ford at 2-3%
- Volatile oil to wet gas
- Depths of 2-4 km or deeper
- Porosity as high as 7%.
- Reservoir pressure is high,
- The stress gradient 0.9 psi/ft, enabling good 3D fracturing
- Vast prospective area

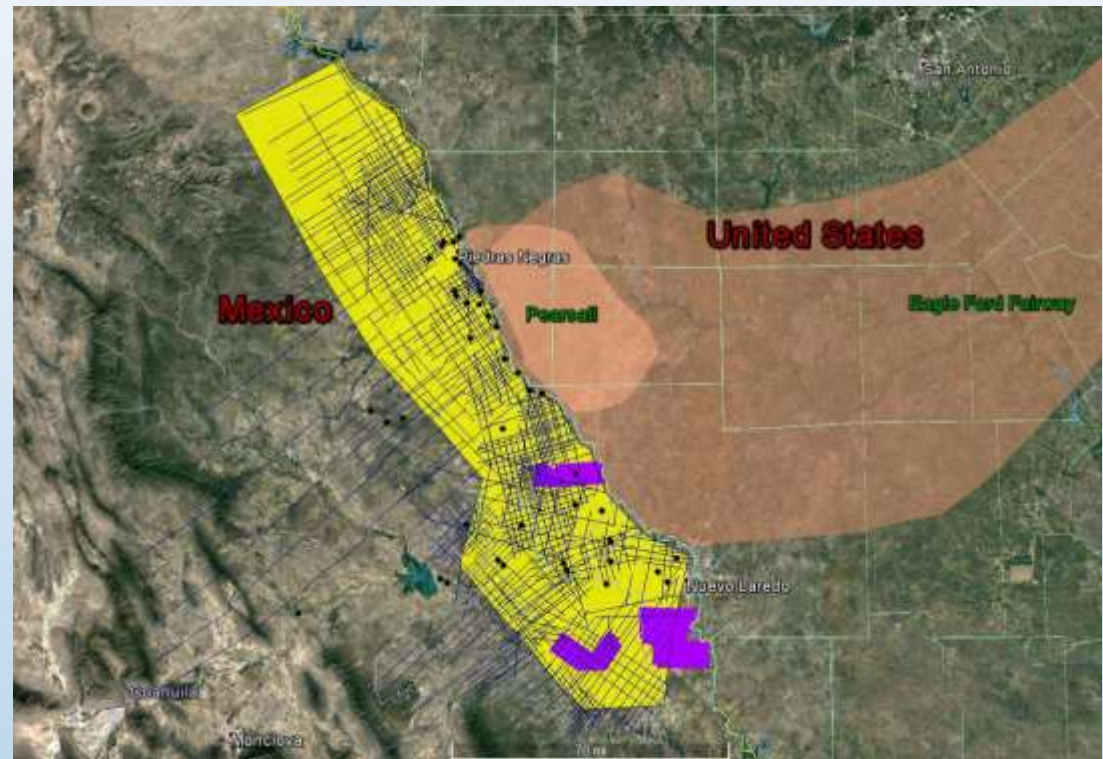


Source: PEMEX

New Technologies Applied



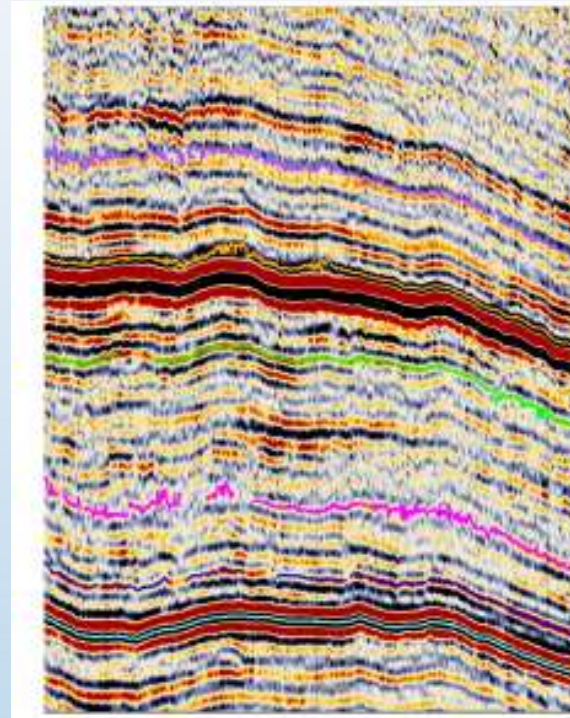
- PRCL and partners have a focus area highlighted 16,100 km² in size
- Covered by seismic, well and detailed hydrocarbon mapping to high grade areas for drilling and completion



Advance Subsurface Imaging



- Using existing dataset
- Advanced technology to bring data to modern standards
- Low cost effort for operator
- MM\$\$ saving on seismic acquisition
- Reduced environmental footprint by using existing data



Pemex reprocessed 2001



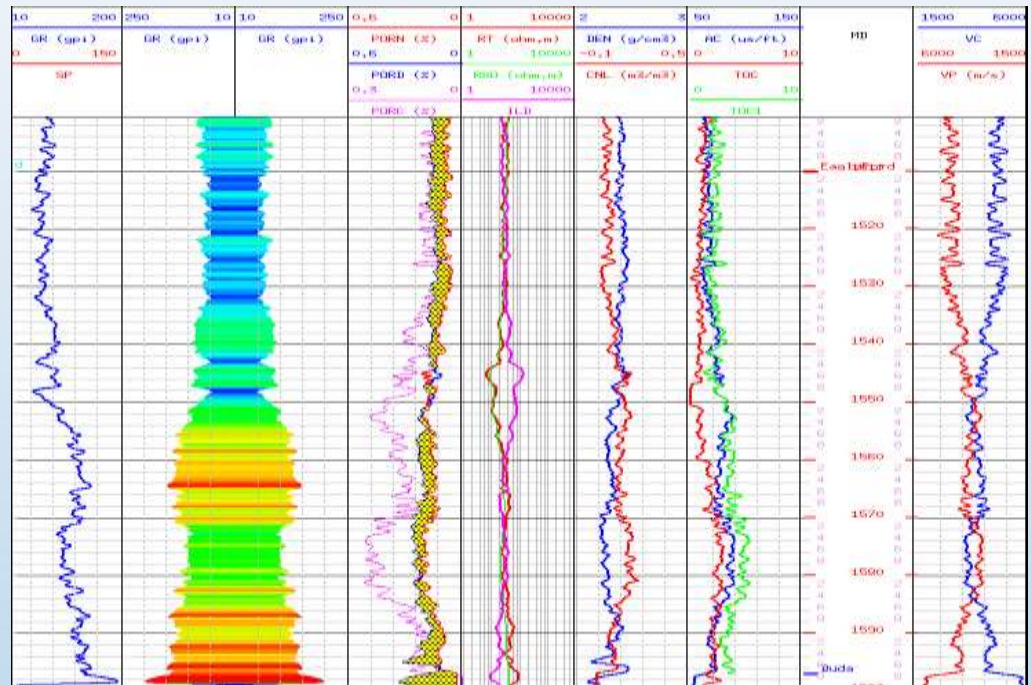
Reprocessing 2015

Reservoir Calculations



We can calibrate to the well control and extract rock properties from the seismic

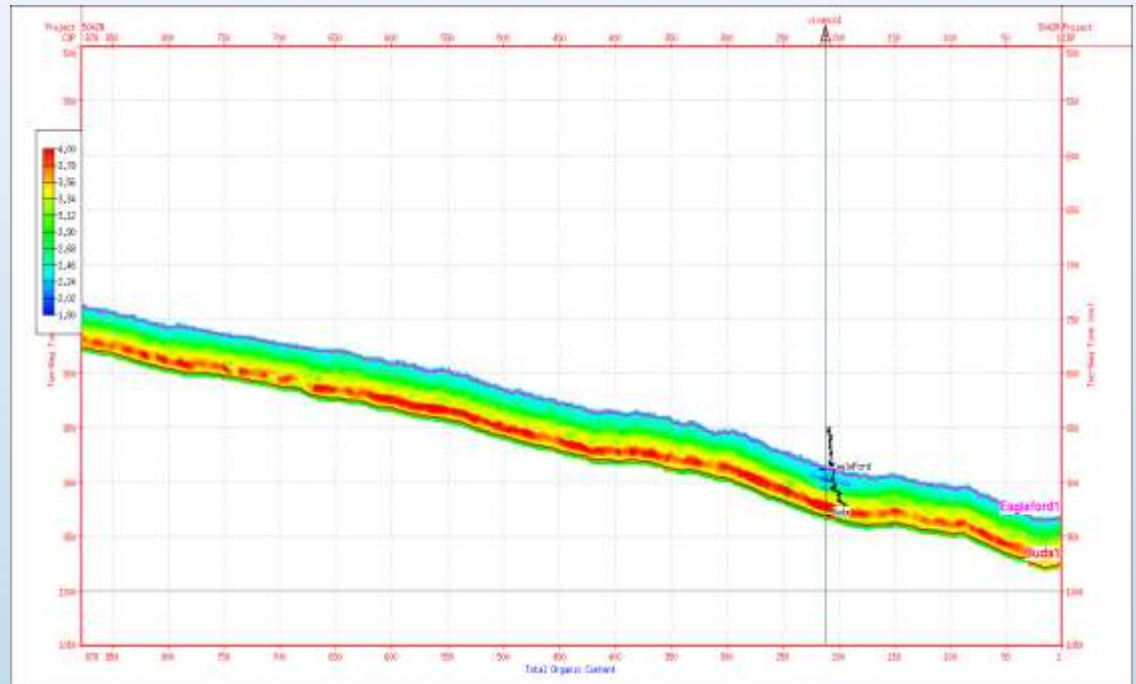
- Total Organic Carbon
- Brittleness
- Thickness
- Porosity



Tying Reservoir to Seismic



- TOC derived from pre-stack seismic inversion matches well control for the Eagle Ford

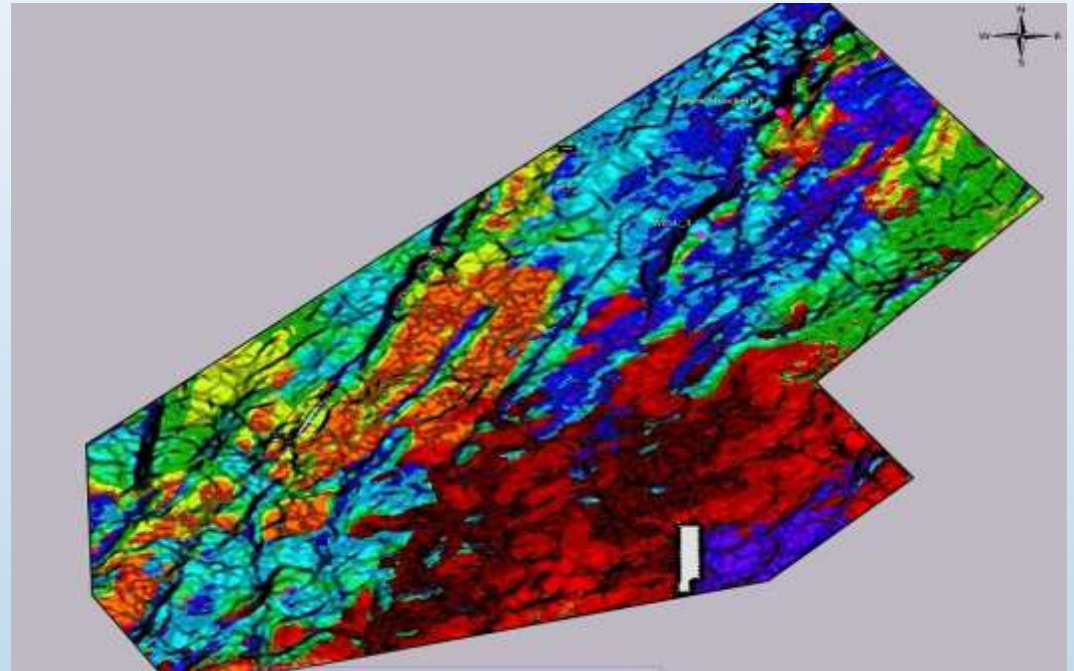


High grading Sweet Spots



Pre-stack seismic Inversion

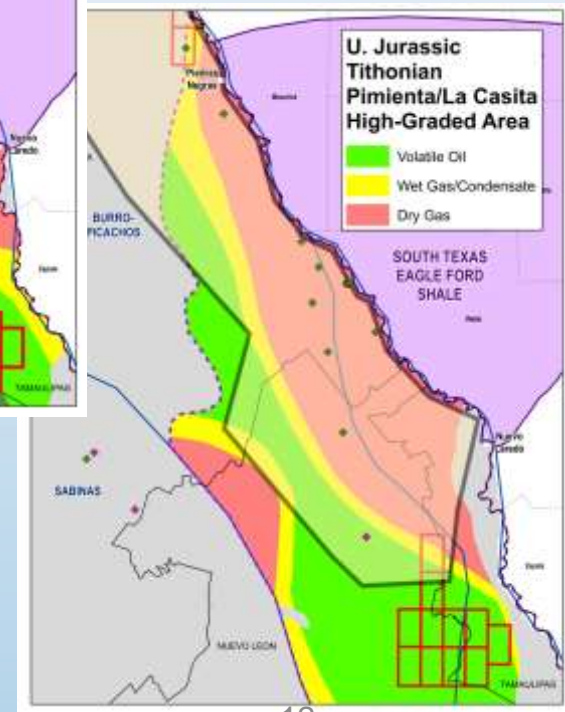
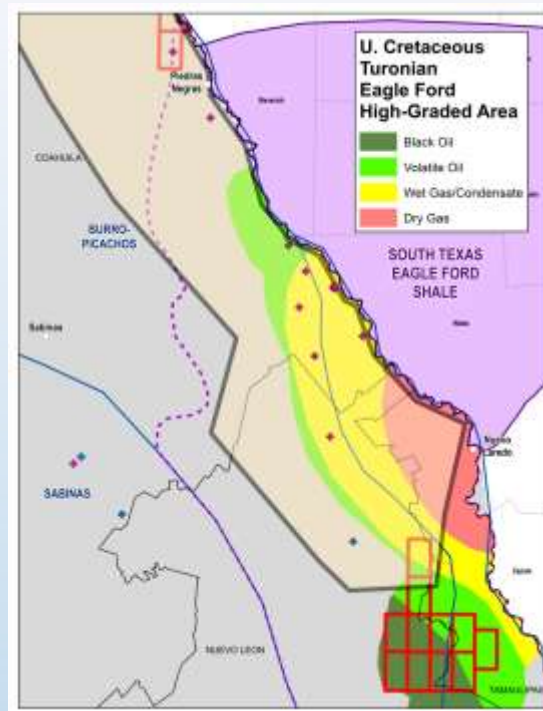
- Allows the mapping of rock properties in areas of limited well control
- High grade areas of drilling
- Projects will be more economic and are likely to have successful drilling programs



Oil and Gas Distributions



- Area prone to significant amounts of oil, condensate and gas, larger concentrations in the Pimienta than in Eagle Ford
- Map showing thickest areas of accumulation



Structure Information



- Sample seismic line from southern portion of study area
- Indications of faults which can provide natural fractures and structures that can trap oil and gas

Eagle Ford

U. Jurassic

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Stacked Oil and Gas Potential



Favorable conditions:

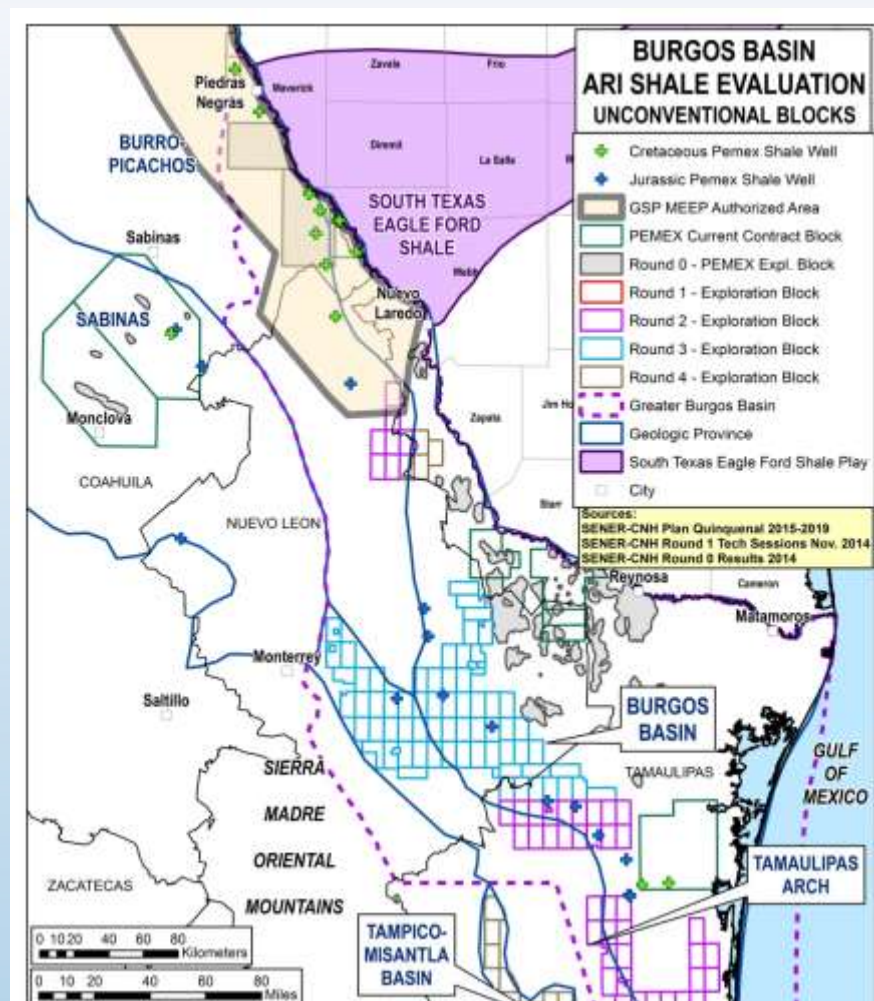
- Stacked oil and gas targets
- Liquids rich area
- May be able to produce with less fracing
- Cost savings to an operator
- Reduced environmental opposition

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Land rights opportunity



- Oil and gas rights available in area
- Upcoming unconventional bid rounds with land available for capital commitments and drilling
- Operator can request land rights in advance of bid rounds



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Source:Energy Digital

Financial terms



- New operator would need to partner with a Mexican company to nominate potential oil and gas acreage
- Partner needs to be Mexican government owned company (like a Mexican utility, or Pemex, etc...)
- Fiscal terms are still being developed for unconventionalals



Source: Global Accessibility

Oil and Gas Markets



Currently relying on U.S. pipeline imports and LNG imports from Central America to feed gas demand

- Import LNG from Peru, importing at high prices
- As of April, Mexico was importing 81% of the gas it consumes

More than half of electricity is produced by natural gas



Source: The Dialogue

Pipeline Availability



- Gas and oil pipelines currently exist in or to the south of the study area
- As drilling and production increases additional pipelines and facilities will be required



Source: Energy Consulting Group

Land Terms

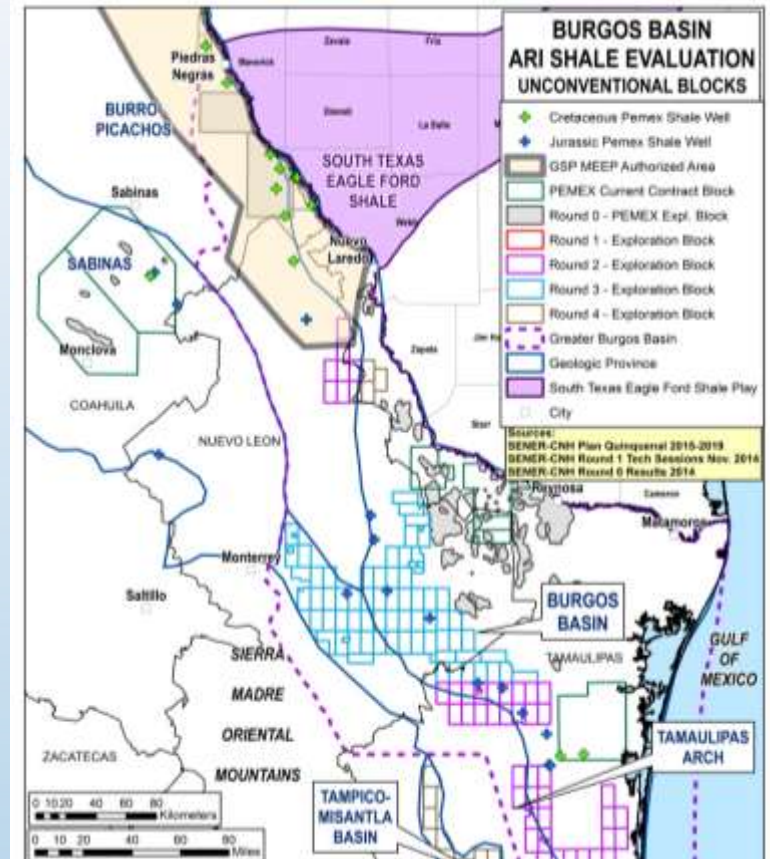


License agreements with E&P companies are desired for unconventional lands, not production sharing or profit sharing agreements.

- Allows longer evaluation phases
- Provides flexibility to allow development plans to be executed

Land auction for unconventional resources in 2017/2018

- Includes 25 onshore areas
- Round 3, before the end of 2018, will include shale and tight resources



Oil Field Equipment



Well costs dictated by availability of equipment from Texas

Wells already drilled in this area were drilled by US or international drilling companies

- Proppant likely to come from Texas as well
- SENER and CNH want experienced service companies to develop resources
- Close to U.S which has developed most unconventional resources



Source: Drilling Contractor

Environmental Considerations



- Surface access is good, low population area, flat terrain
- Water for fracking is in a shortage situation
 - Fresh water supply is short for municipal and industrial use
 - Water for fracking could come from near surface brackish water or deep saline subsurface formations
 - CNH wants to enact “sensible” environmental limits, have yet to develop policy around this
- Environmental impact low with pad drilling, assuming success of exploration wells



Source: W. Seberger

Security



- Agreement needed with Mexican authorities to provide additional security for oil and gas operations due to drug trade activity
- If an E&P company partners with a Mexican government owned entity they can use the Mexican army to provide security



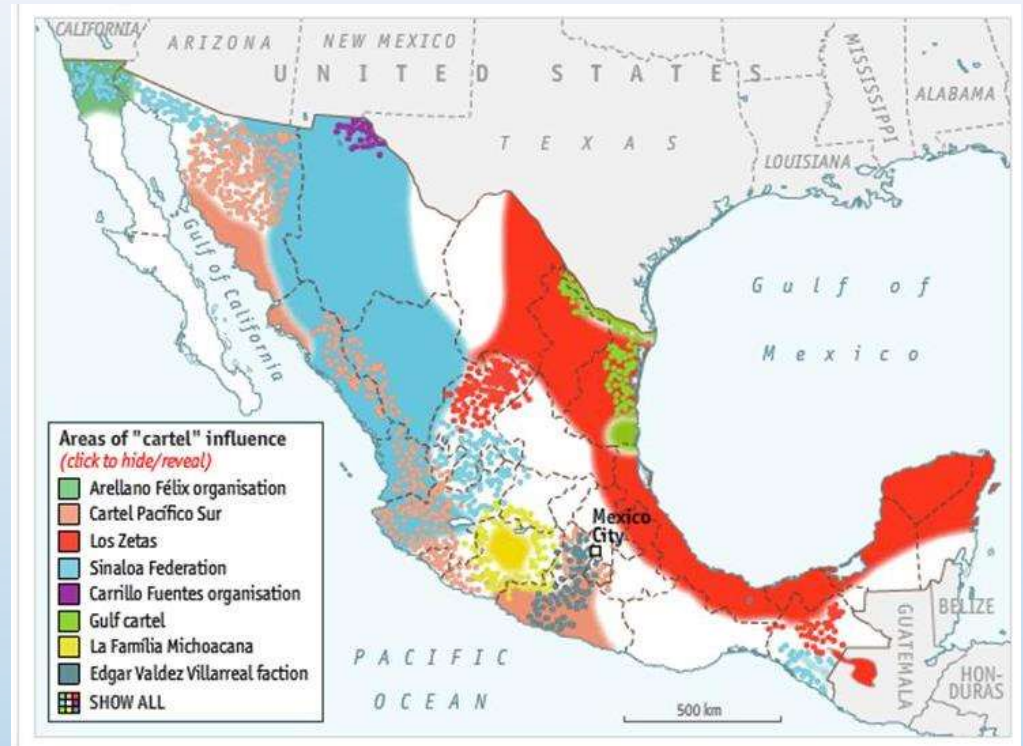
Source: Denver Post

Security



Main Cartels: Los Zetas and Gulf Cartel

- Risk Assessment
- Mitigation Measures
- Monitoring of area
- Plan for Crisis Management
- Training & drills for staff in case of emergency
- GPS Monitoring of Personnel & Vehicles
- Safety coordinators on site



Source: DAV Internacional

In Summary....



This global scale opportunity for oil and gas is in the billions of barrels range – unparalleled in today's marketplace

The keys to moving forward with this opportunity are:

- High grading of the opportunity for crown land acquisition
- Advanced geoscience technology to implement successful drilling program



Source: World Finance

Acknowledgements



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