Legado History

- **Formed in July 2007**
  - Funding Commitment from EnCap Partners and Management, et al.

- **Business Plan Unique to Private Equity**
  - Exclusively Focused on Oil
  - Purchase Oil Properties that have EOR Upside
  - Oil "Resource Play" using techniques of the Gas Resources Plays

- **Extensive Experience in Miscible Gas Injection**
  - Multiple Basin – West Texas, Oklahoma, Wyoming, Mississippi, Alaska
  - Team Members have worked on over 20% of all CO₂ floods
  - Reservoir Engineering, Geology, Operations, Facilities, Pipelines
  - Business Development (Can’t flood something you don’t own)
Goldsmith Location

- Located in NW Ector County, Texas on the Central Basin Platform

Third Order Residual on top of Wolfcamp Formation
Goldsmith Field, Ector County, Texas
Goldsmith EOR Development Plan

- **Prolific San Andres**
  - Three Miles from CO₂ Pipeline

- **Evaluate the Reserve Opportunity**
  - Extensive History of San Andres CO₂ Projects in the Permian Basin
  - Determine if the Residual Oil Zone (ROZ) is an Economic Target

- **Evaluate the ROZ for Suitability to EOR**
  - Is the Oil Left in place similar to the existing main pay oil?
  - If the ROZ was flushed out by meteoric waters what is the Sor?
  - Quality of ROZ and thus Injectivity of CO₂?
  - Zonal Continuity?
Legado Cored Wells
Core Oil Saturation

Core Oil Saturation (uncorrected surface conditions)

- Gas Cap
- Main Pay
- ROZ
GLSAU 190 Deepening

- Deepening of existing wells
  - Determine cost
  - Core to evaluate ROZ
  - Establish productivity from ROZ
  - Obtain ROZ oil sample
  - Observe ROZ oil cut
Log to Core Calibration

- **Sonic log data is well calibrated to core data**
  - No noticeable wellbore effect on sonic logs

- **Neutron log data is well calibrated to core data**
  - Strong wellbore effect on neutron porosity
    - Only open hole neutron porosity logs were used
    - Legado deepening MP intervals discarded due to washout
    - Additional logs with high washout discarded

- **Sonic logs preferred over neutron logs**

- **Neutron/Density cross-plot porosity was calculated, but not used as it was very similar to the neutron porosity with similar wellbore effects**
Dolomite Porosity Correction

- Neutron $lm$
- Neutron $dolo$
- Core pts.
- DTPHI

Calibrated to core porosity
Neutron too high with high caliper
- Core was shifted to match log depth
- $\Delta t_{ma} = 41.1$ $\mu$s/ft was used for calculating dolomite porosity
- Core porosity ave. = 8.8%
- Log porosity ave. = 8.8%
Volumetric Calculations

- Zones were defined as:
  - Gas Cap = (Top SA phi) to (-975’) subsea
  - Main Pay = (-975’) to (-1080’) subsea
  - ROZ = (-1080’) to (-1230’) subsea

- Zones with <50% data coverage were discarded

- Net porosity cutoff of 6%
Ave. PHIH = 9.303 md-ft
Ave. PHIH = 12.46 md-ft
N-S Porosity Color Fill Cross-Section
Conditions

- OOIP = 240 MMBO (570 MMBO w/ ROZ)
- Cum = 74 MMBO (32% RF, oil in gas cap)
- Depth = 4200 ft, Temp = 96
- MMP = 1150 psi (34 API, 96°F)
- Pressure = 1500 psi (1000 – 2200)
- 40 ac 5-spot Patterns (6166 ac)
- Main Pay Oil = 100'
- ROZ = 150'

- Large tertiary target
- Previous CO2 pilot Dec-96 (Chevron)
- Constructed CO2 Pipeline (200 MMCFD)
- Initiated ROZ CO2 pilot Aug-09
- Demonstrated capital requirements
GLSAU ROZ Pilot

CO2 Flood vs Forecast

Start of CO2 Injection

[Graph showing data and trends related to CO2 injection, with various lines representing different parameters such as BOPD, % Oil Cut, and CO2.]
Questions?
Back Up
Extensional Phases and Reduction of Hydrodynamic Gradients in the Permian Basin

- Cross section showing current structure of Permian Basin Area
- Rio Grande Rift related extension causes uplift and increase in hydrologic head which floods central basin platform
- Additional extension collapses uplifted area allowing oil column to re-equilibrate
Original Oil Accumulation Under Static Aquifer Conditions (A Hypothetical Example)
Change in Hydrodynamic Conditions, Sweep of the Lower Oil Column, Oil/water Contact Tilt, and Development Of The Residual Oil Zone
Multiple Active ROZ Projects

MIDDLE SAN ANDRES PALEOGEOGRAPHY
with Location of Active Industry ROZ Zones/CO₂ EOR Projects*

* Adapted from Sagnak (2006), Chevron Presentation at the 12/06 CO₂ Flooding Conference