DECEMBER 2021

WSSAU CO_2 FLOOD SUMMARY

OXY RESERVOIR MANAGEMENT

2021 Permian CO_2 Conference

AGENDA & OUTLINE

Allotted ~40 minutes for content and QA

- EOR Process Overview
- Field Location and Geology Overview
- Development History
- Facility Overview
- CO_2 Overview and Current Progress
- Questions and Discussion

CO_2 EOR PROCESS

Natural Gas & NGL Sales

CO_2

CO_2 Recycled from Gas Plant

Produced Gas

Produced Liquids

Vapor Recovery

Oil Sales

Pipeline CO_2 from CO_2 source fields and natural gas separation plants

Injection

Produced Brine

Injection Well

Production Well

Reservoir

Drive Water

CO_2

Water

CO_2

Miscible Zone

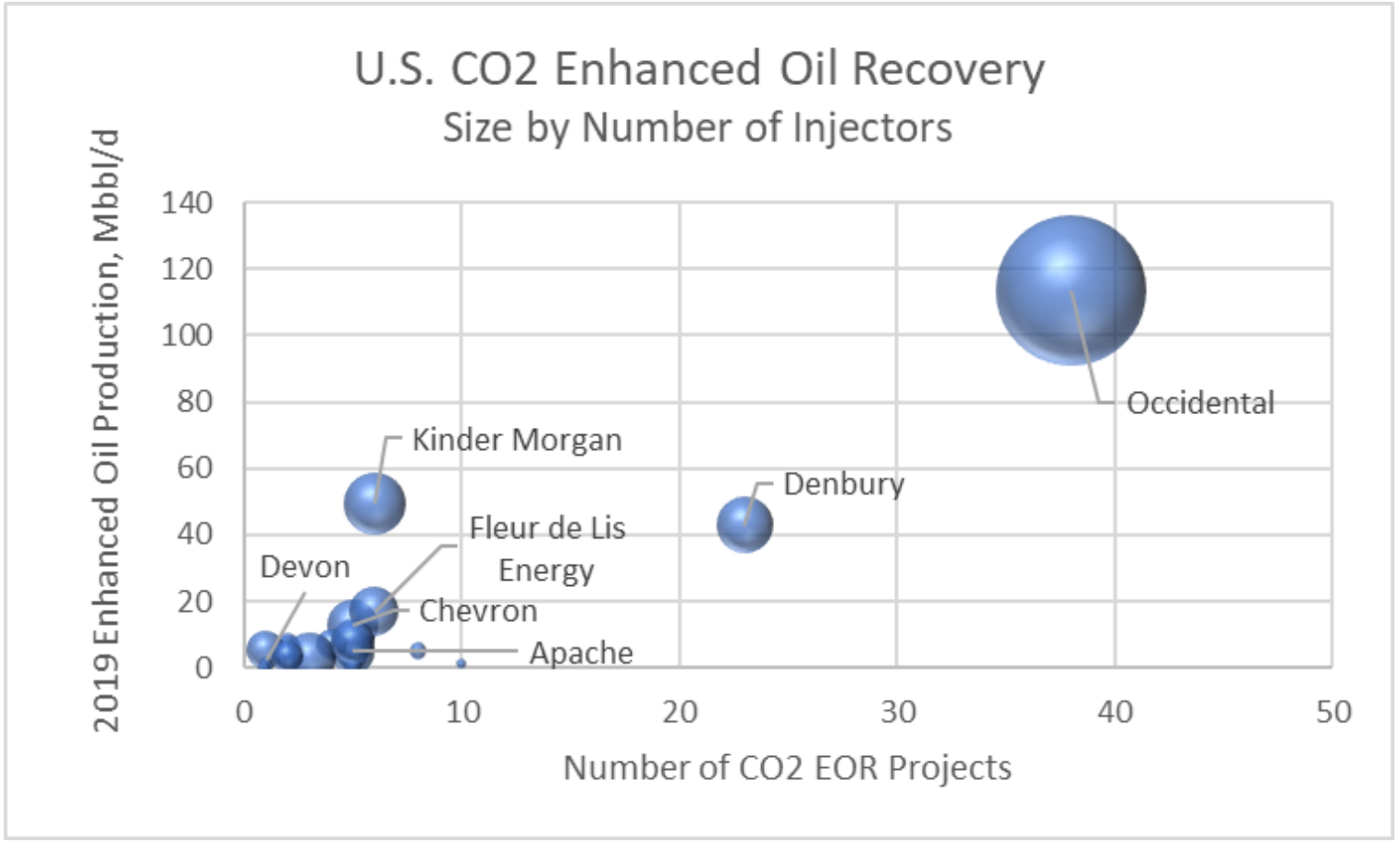
Oil Bank

Additional Oil Recovery

INDUSTRY LEADER IN ENHANCED OIL RECOVERY

Oxy-Operated EOR Stats (2019)

- 38 EOR Projects from ~283,000 acres
- ~4,600 injectors and ~6,200 producers associated with EOR Floods.
- 113 Mbopd from EOR Projects.

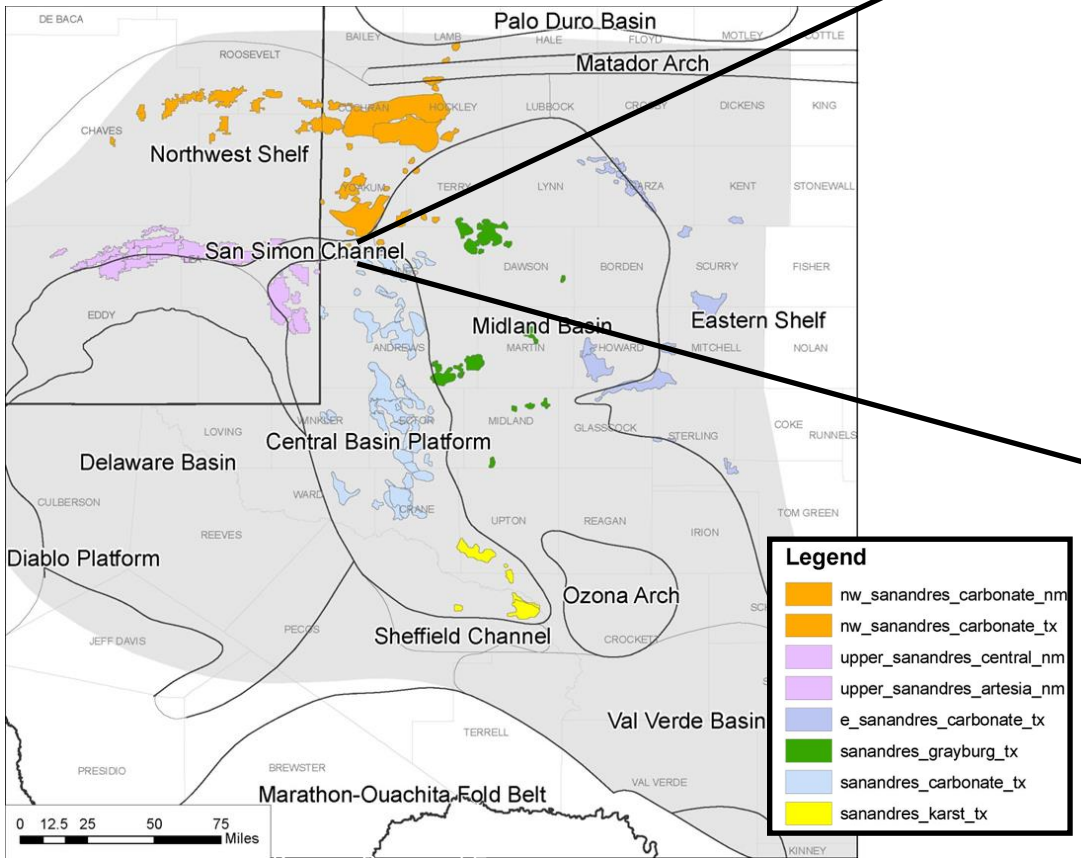


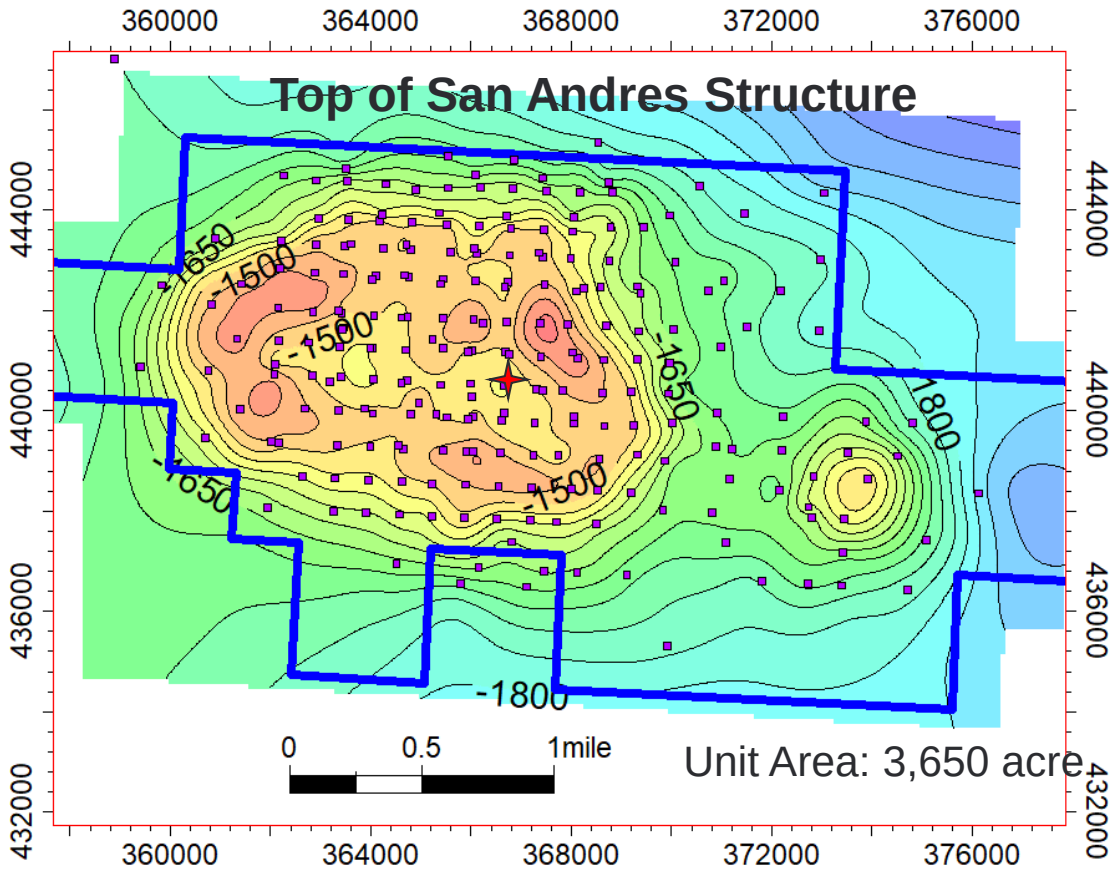
SOURCE: US CO2 EOR SURVEY (2019 ARI REPORT)

WEST SEMINOLE SAN ANDRES UNIT - BACKGROUND

LOCATION AND GEOLOGY

Situated along the northeast end of the CBP, San Simon channel to the north and Midland Basin to the northeast

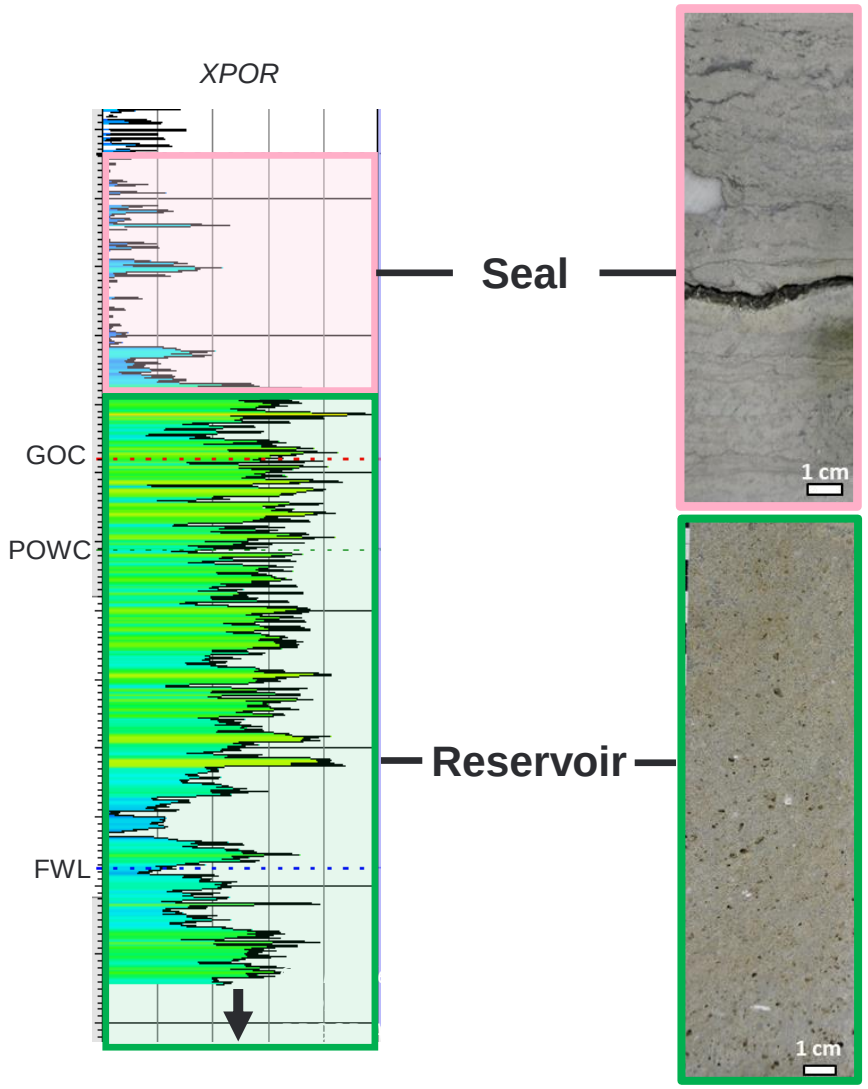




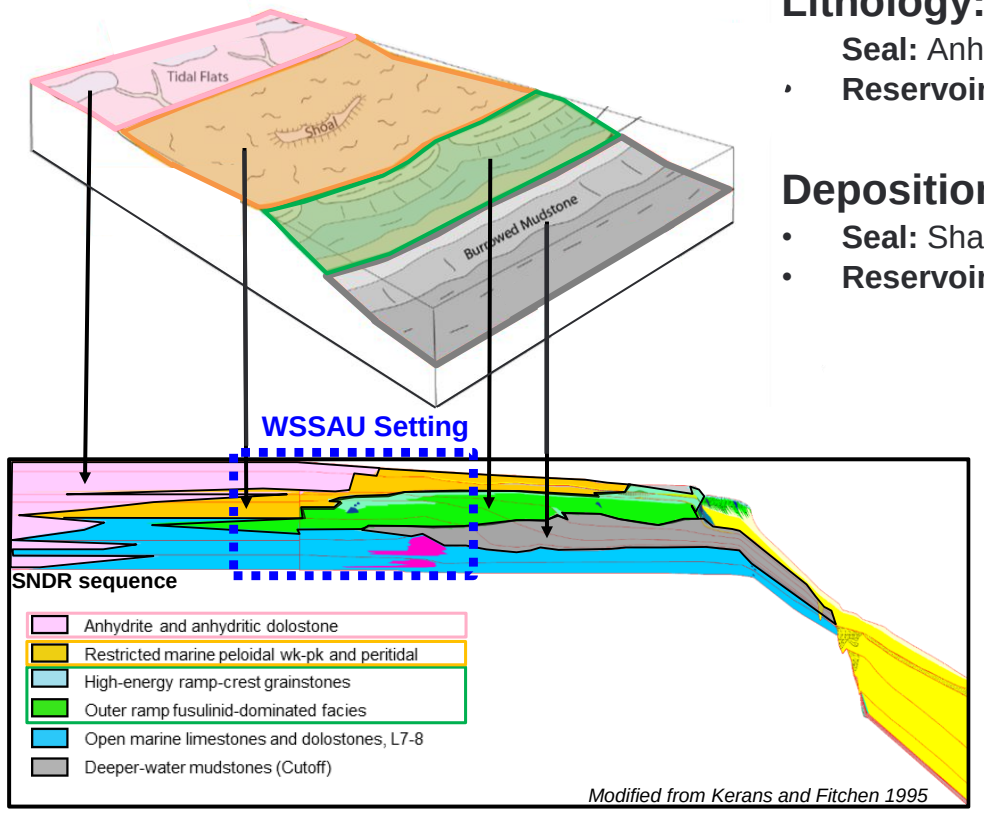
- Deep (Devonian) Structure
- Set up Wolfcamp/Leonard structural highs
- San Andres Structure associated with Sponge-Algal buildups that nucleated on and around a paleotopographic high
- Differential compaction results in present day structure

Charlie Kerans, Bureau of Economic Geology, PBGSP Annual Meeting, 2/27-3/06, Austin, TX

GEOLOGIC SETTING



Depositional model



Reservoir Characteristics

Thickness:

- **Primary Confining Layer:** 300’ average
- **Reservoir:** ~1,100’ (only ~450’ within oil zone)

Lithology:

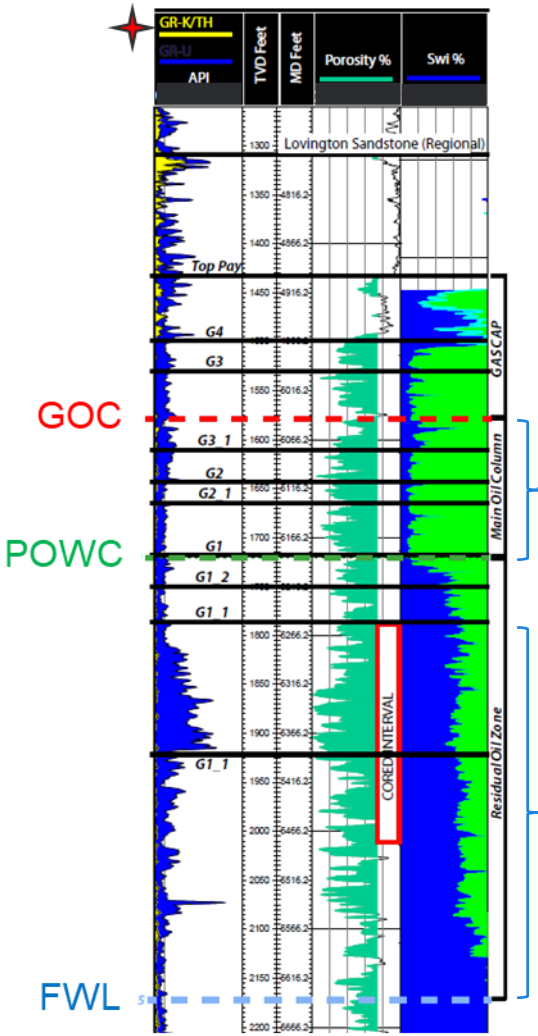
- **Seal:** Anhydrite & Fenestral Laminites
- **Reservoir:** Dolomitized Wackestone - Grainstone

Depositional Setting:

- **Seal:** Shallow Tidal Flat / Lagoon
- **Reservoir:** Subtidal Ramp-Interior / Ramp-Margin

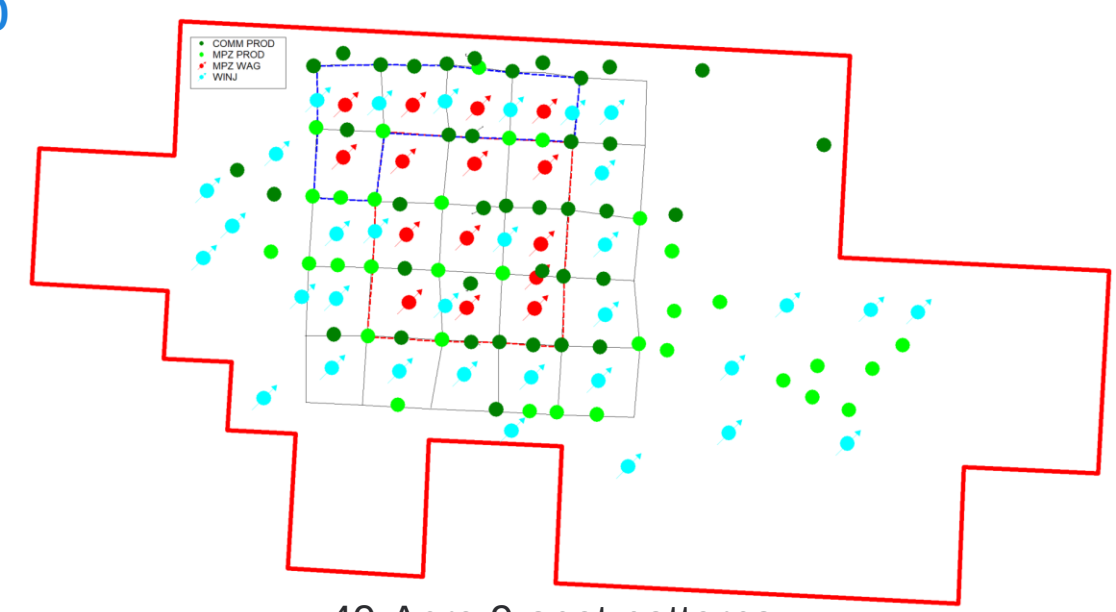
WEST SEMINOLE SAN ANDRES UNIT - BACKGROUND

TYPE LOG & PATTERNS

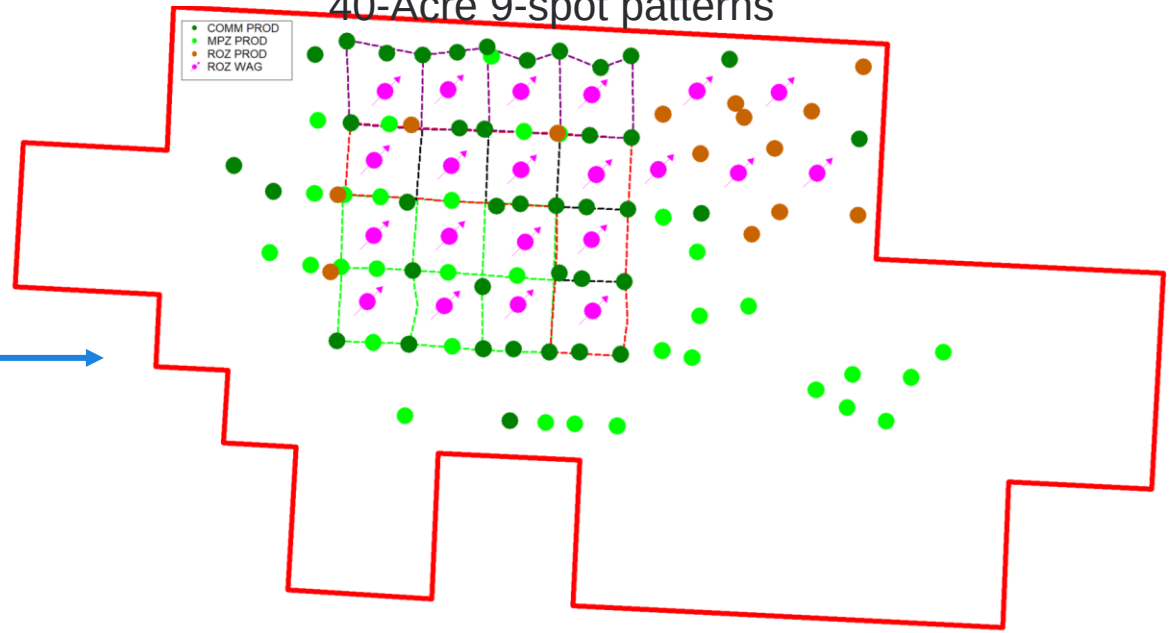


MOC Patterns
With dedicated injectors

ROZ Patterns
With dedicated injectors

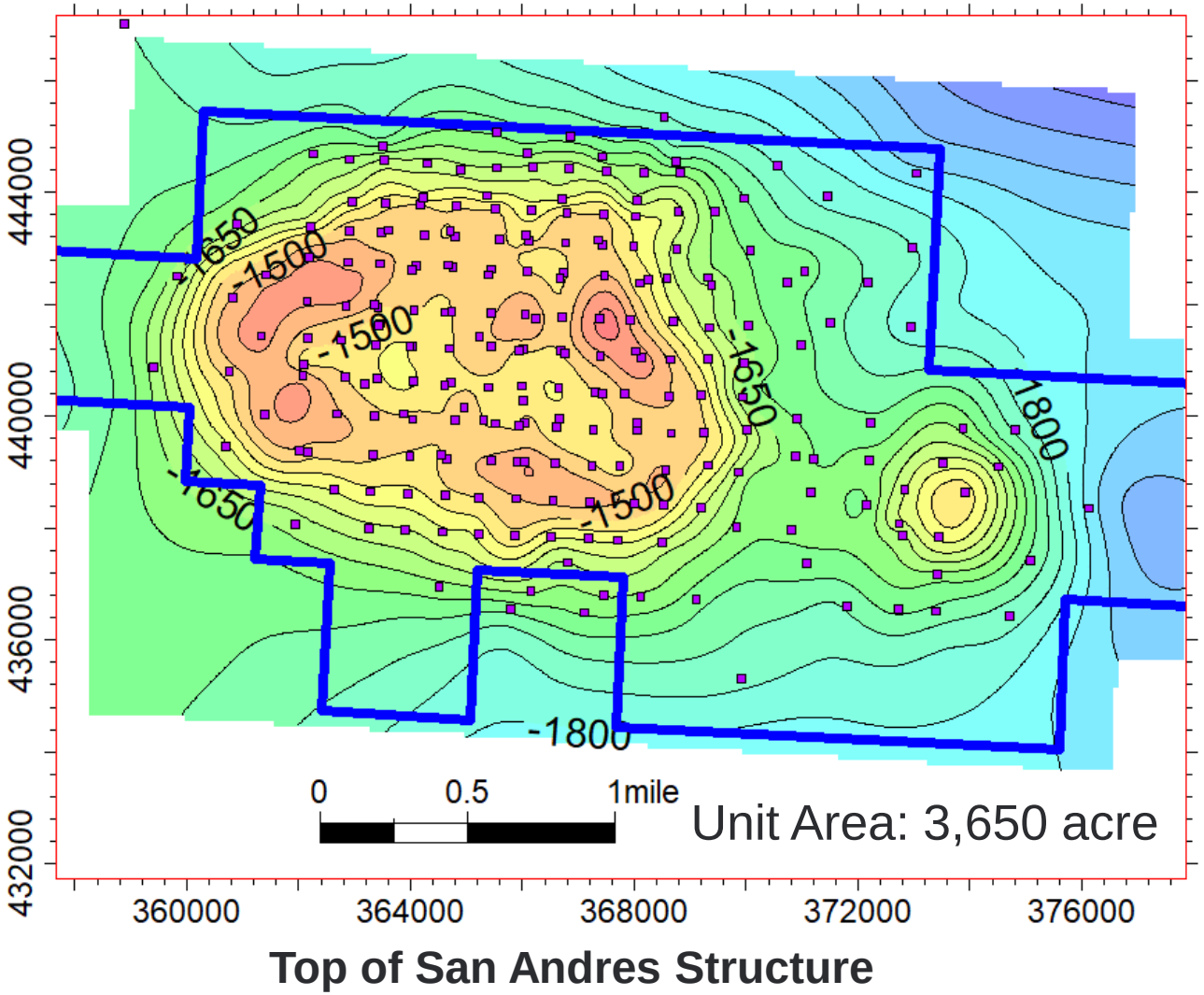


40-Acre 9-spot patterns

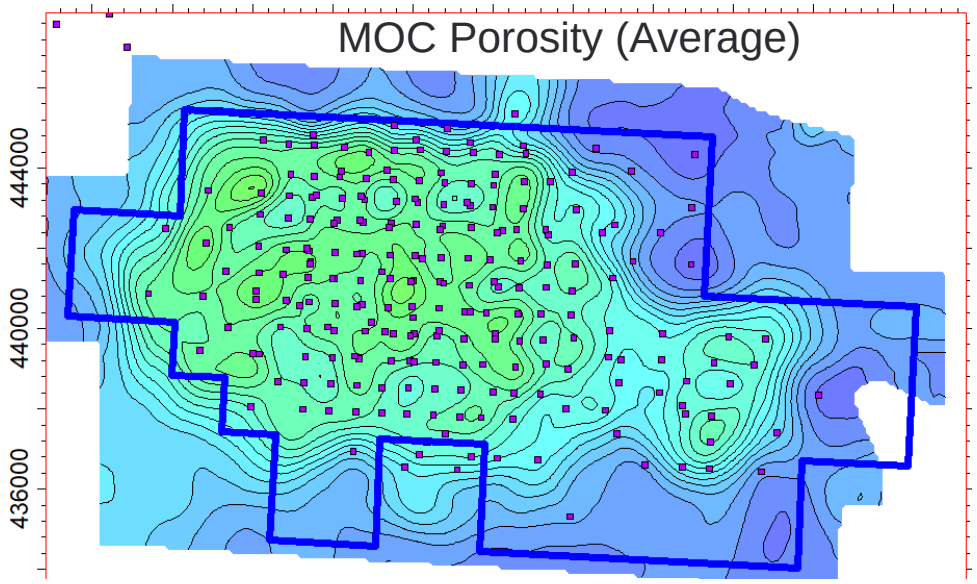


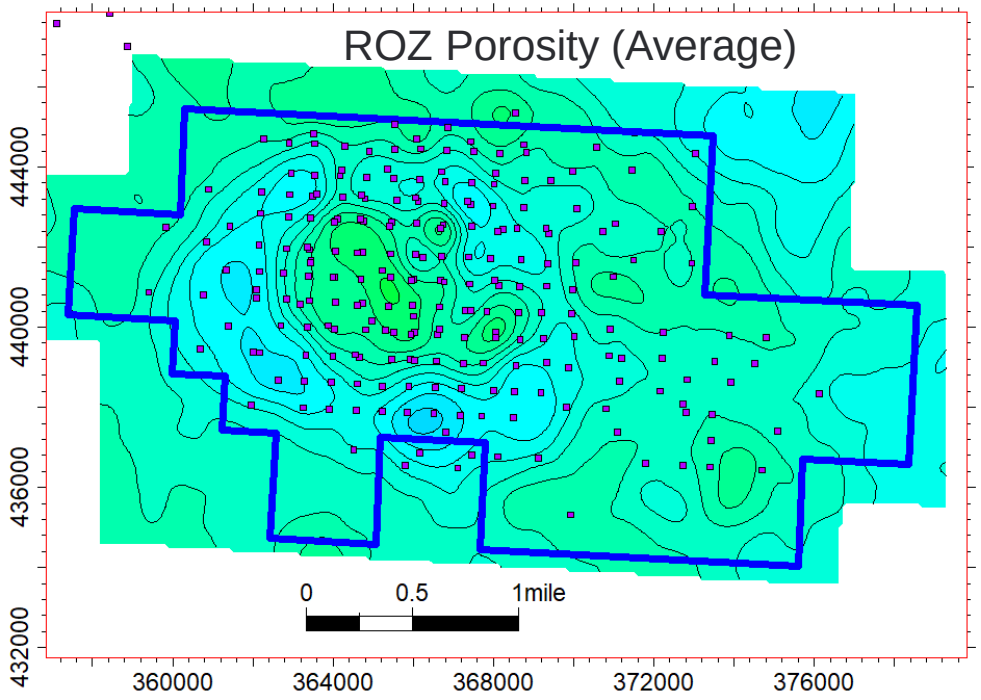
WEST SEMINOLE SAN ANDRES UNIT - BACKGROUND

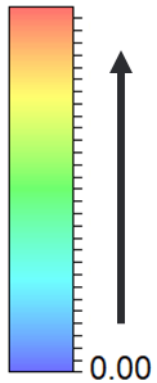
GEOLOGY OVERVIEW



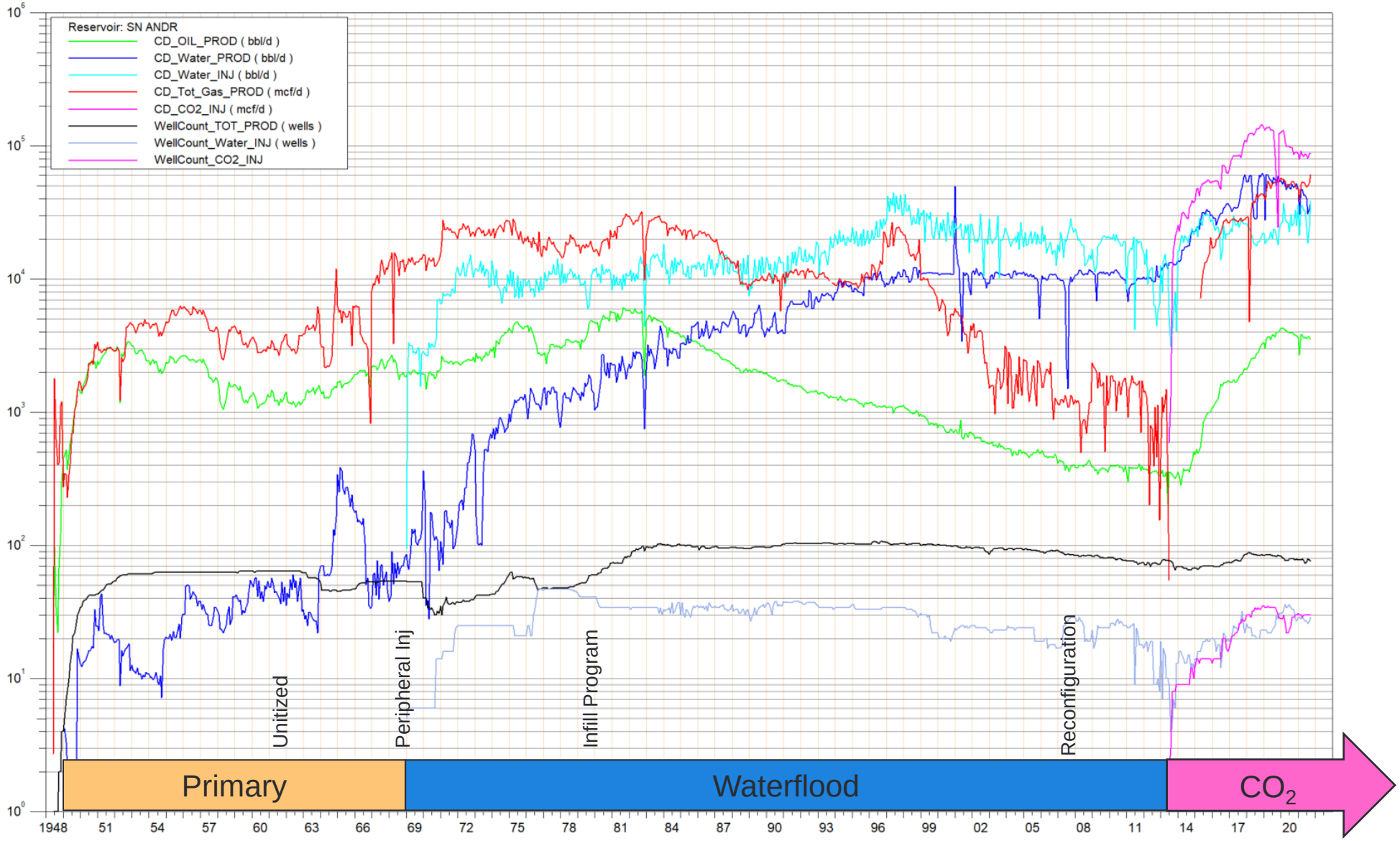
Top of San Andres Structure







WSSAU PRODUCTION HISTORY



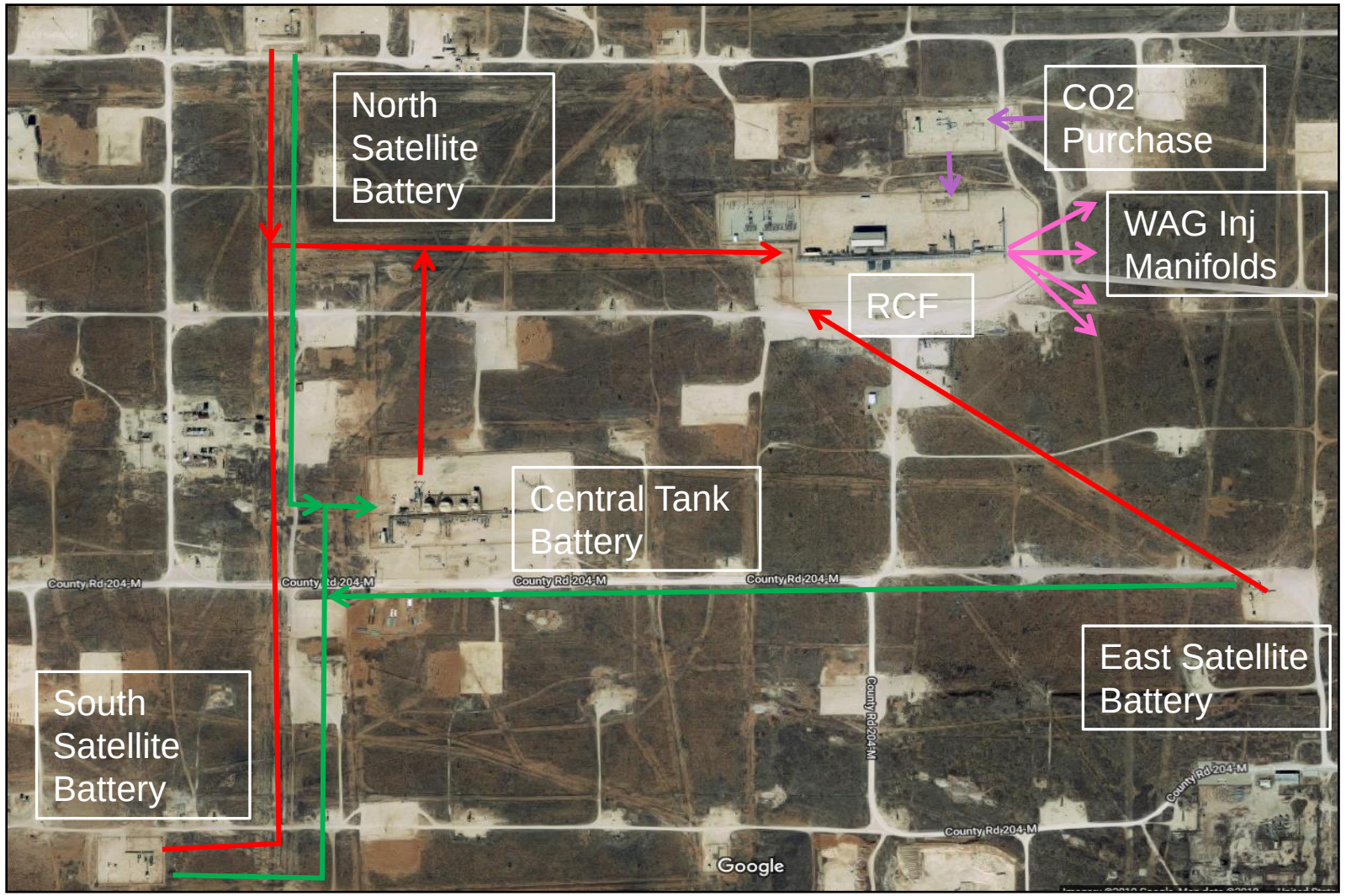
1948: Discovered
1948 – 1969: Primary Rec
- Solution Gas Drive

1962 – Unitized
1969 – 2013: Waterflood
2013 – Future: CO_2 Flood

<u>Current Field Stats:</u>
78 Active Producers
- 3,600 bopd x 40 Mbwpd
- 52 MMscf/d recycled

59 Active Injectors
- 88 MMscf/d CO_2 Inj
- 38 Mbwpd Injected
- 15 Mbwpd disposed

FACILITY OVERVIEW



Facility Notes:

- Production gathered and tested at three primary satellites. Liquids to Central Tank Battery (CT), and gas to Re-injection Compression Facility (RCF)
- No current separation of gas, H_2S, NGLs from CO_2 stream. Total recycle stream to RCF.
- Disposal wells utilized to manage produced water volumes that cannot be injected

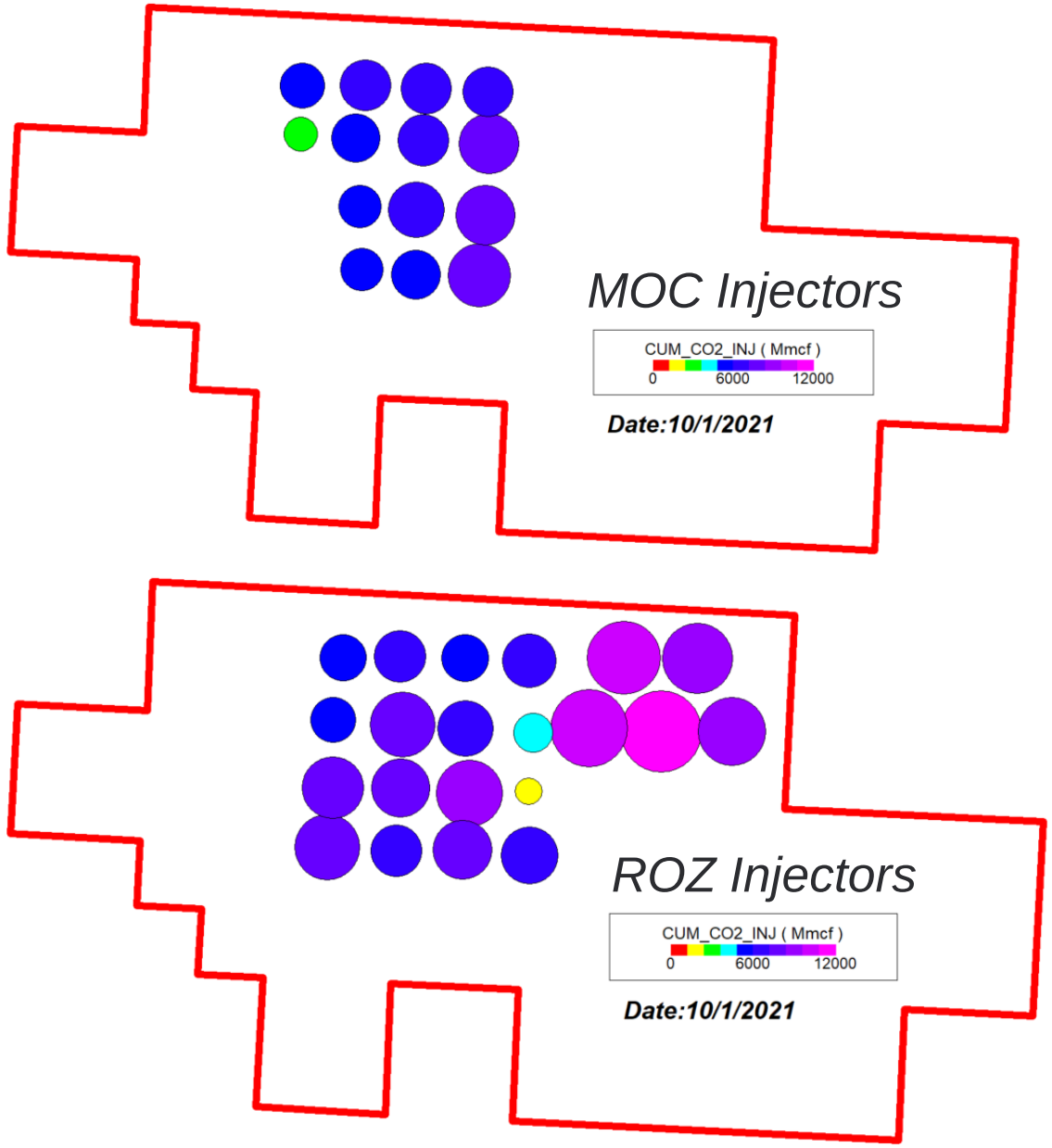
WSSAU CO2 FLOOD OVERVIEW

<u>Flood Highlights:</u>

- Targeting both MOC and ROZ moveable pore volumes in dedicated injection wells
- Water-Alternating-Gas following initial slug of CO_2
- Developed 2 phases of MOC and 4 of ROZ
- Total CO_2 Injection: 240 Bscf
- Peak CO_2 Injection Rate: 144 MMscf/d (2018)
- ~40 acre pattern spacing

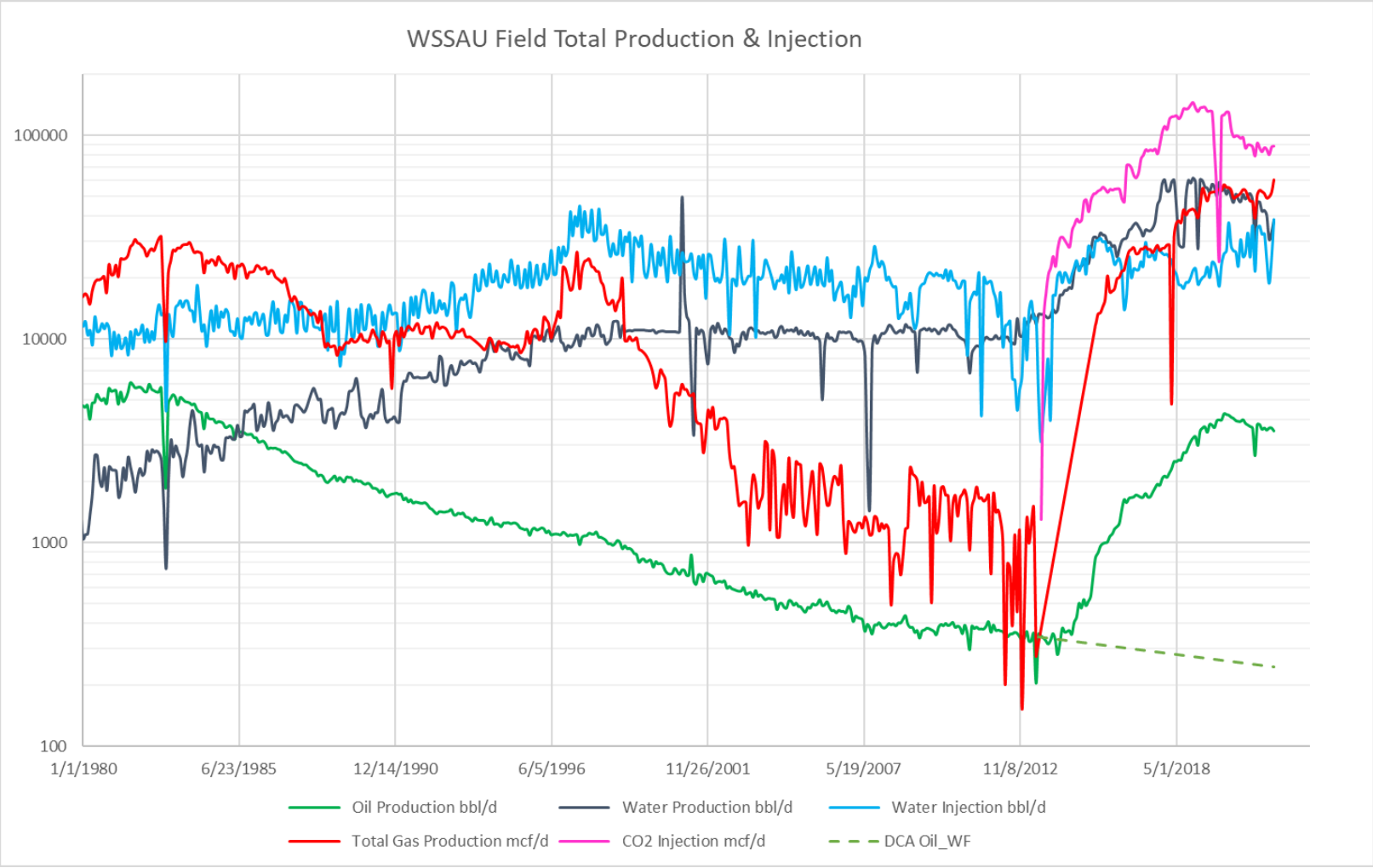
<u>Well Highlights</u>

- 35 wells with CO_2 injection
- Average Well CO_2 volume: ~7 Bscf
- Average Well CO_2 rate: ~2.8 MMscf/d*



*LAST 6 MONTHS AVERAGE

WF & CO_2 FLOOD PERFORMANCE



- Stabilized WF decline rate: 4%
- All drilling since 2013 has been associated with CO_2 development (i.e. no flank WF projects)

- Total CO_2 Inj: 240 Bscf
- Incremental oil to date: 5.6 Mmbo
- Total Field Cum'l: 53 MMbo

- Instantaneous Utilization: 27 Mscf/bo
- Cum'l Utilization: 42 Mscf/bo

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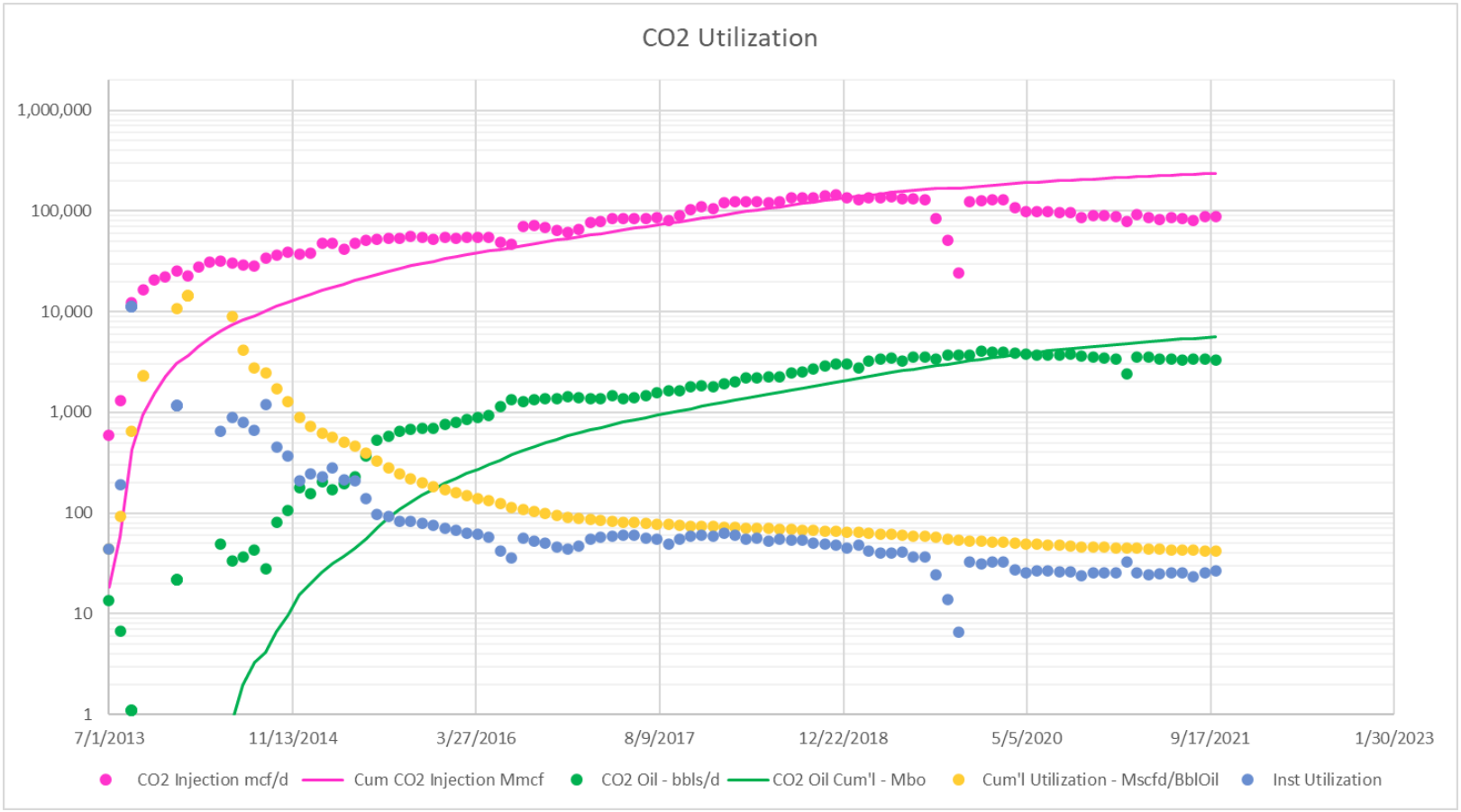

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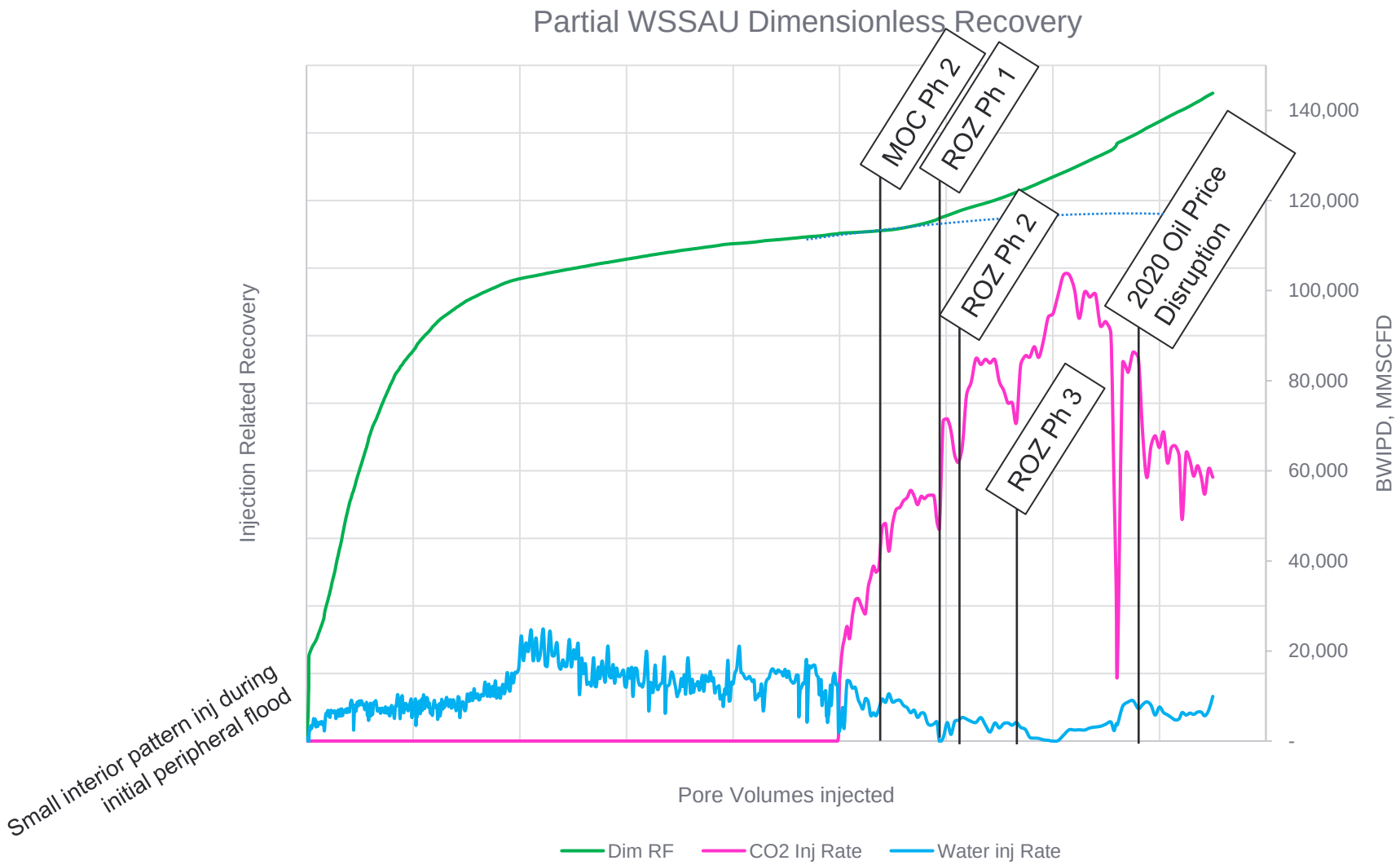


DIMENSIONLESS PERFORMANCE FOR PORTION OF WSSAU CO2 FLOOD – INCLUDES MOC + ROZ

FLOOD MANAGEMENT FOUNDATIONS

Maximize Efficient Injection Throughput (% HCPV inj / yr):

- Control injectors with maximum injection pressures allowable, staying 50 psi or more below formation parting pressures.

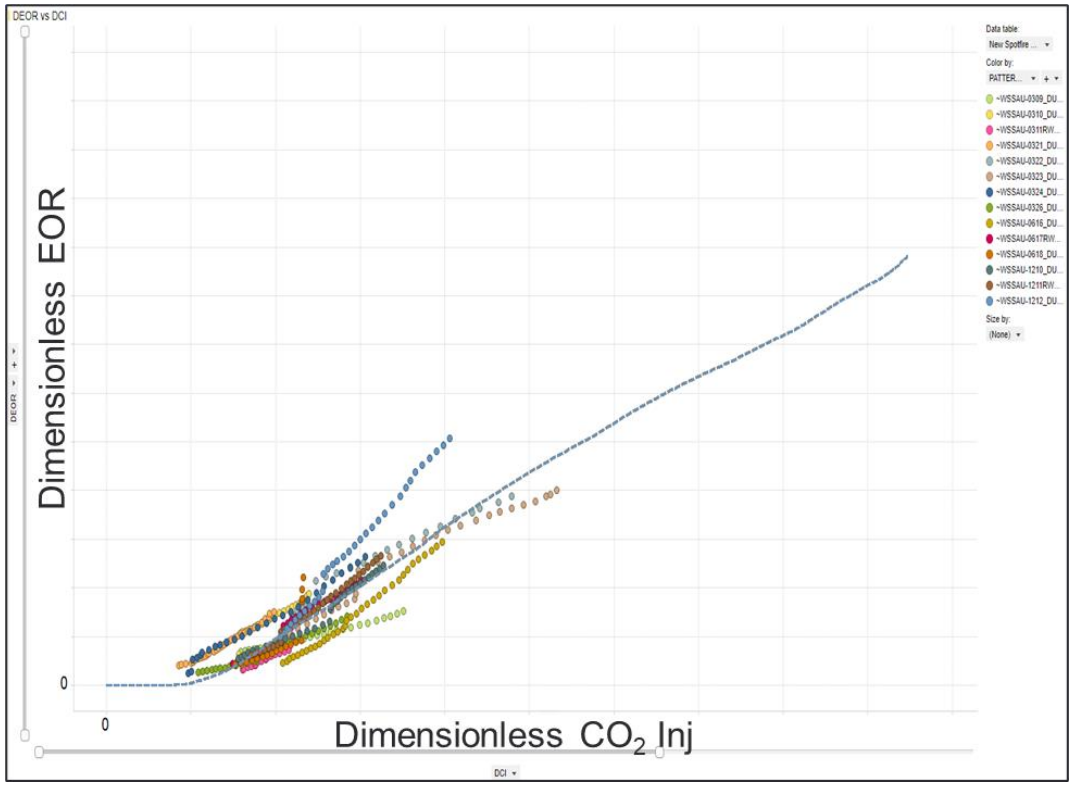
Optimize Sweep Efficiency

- Monitor injection zones with routine Injection Profile Logging
- Manage gas breakthrough with Water-Alternating-Gas routines (WAG)

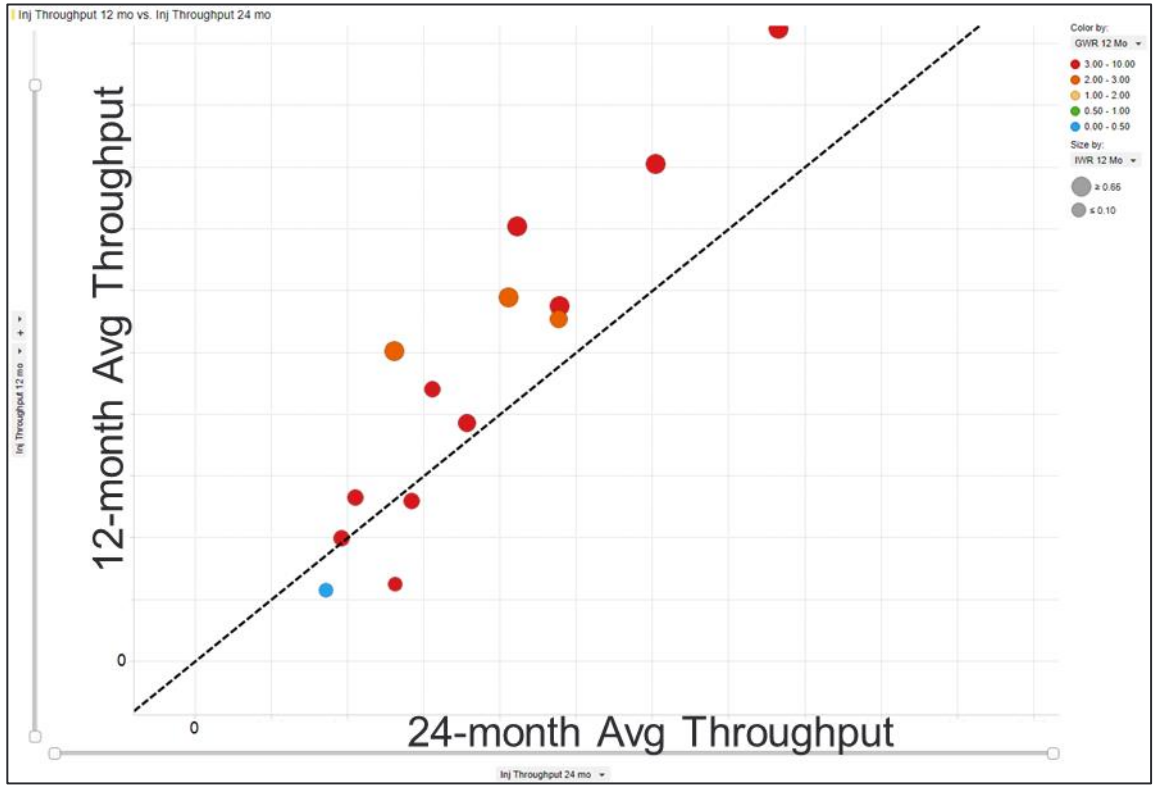
Cash Flow Evaluation

- Pattern-level cash flows reviewed to ensure long-term profitability of injection volumes.

PATTERN SURVEILLANCE METHODS



Pattern-level incremental Recovery Factor due to CO_2, relative to pore volumes of CO_2 injected (maturity)



Pattern-level Throughput (HCPV injected / yr) of last 12 months, relative to prior 24 months.

WSSAU CO2 FLOOD SUMMARY

Opportunities / Advantages

- ROZ across majority of unit
- Adequate CO_2 RCF capacity for several additional development phases
- Operational synergies with SSAU nearby
- WSSAU geology provides a natural trap for buoyant fluids, and provides secure containment of injected CO_2

Challenges

- Allocation of ROZ vs. MOC production for pattern-level surveillance and performance evaluation
  - Commingled producers
  - Timing of MOC response vs. ROZ Development
- Operational dependence on water disposal capacity
- Loss of Throughput (HCPV/yr injected) upon switch from initial CO_2 slug to WAG.

QUESTIONS?

Backup Slide Content

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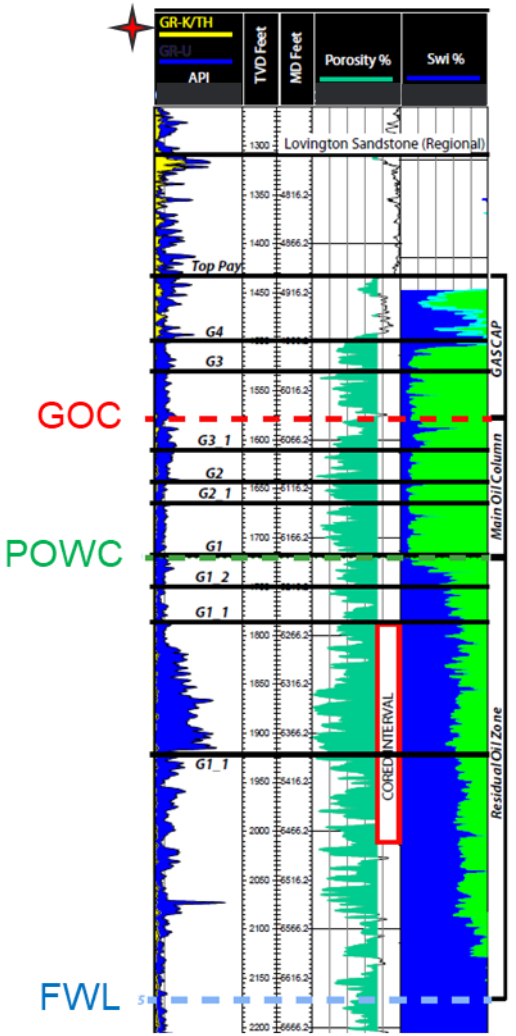

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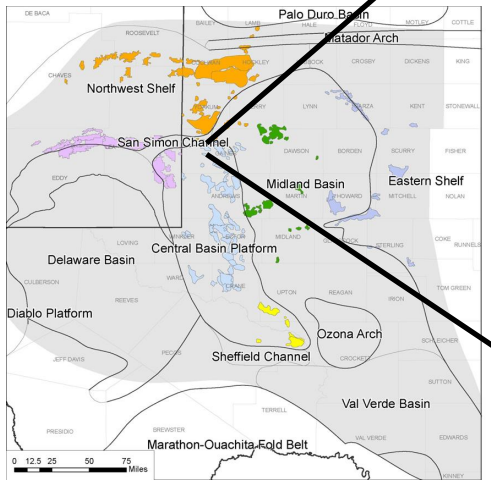

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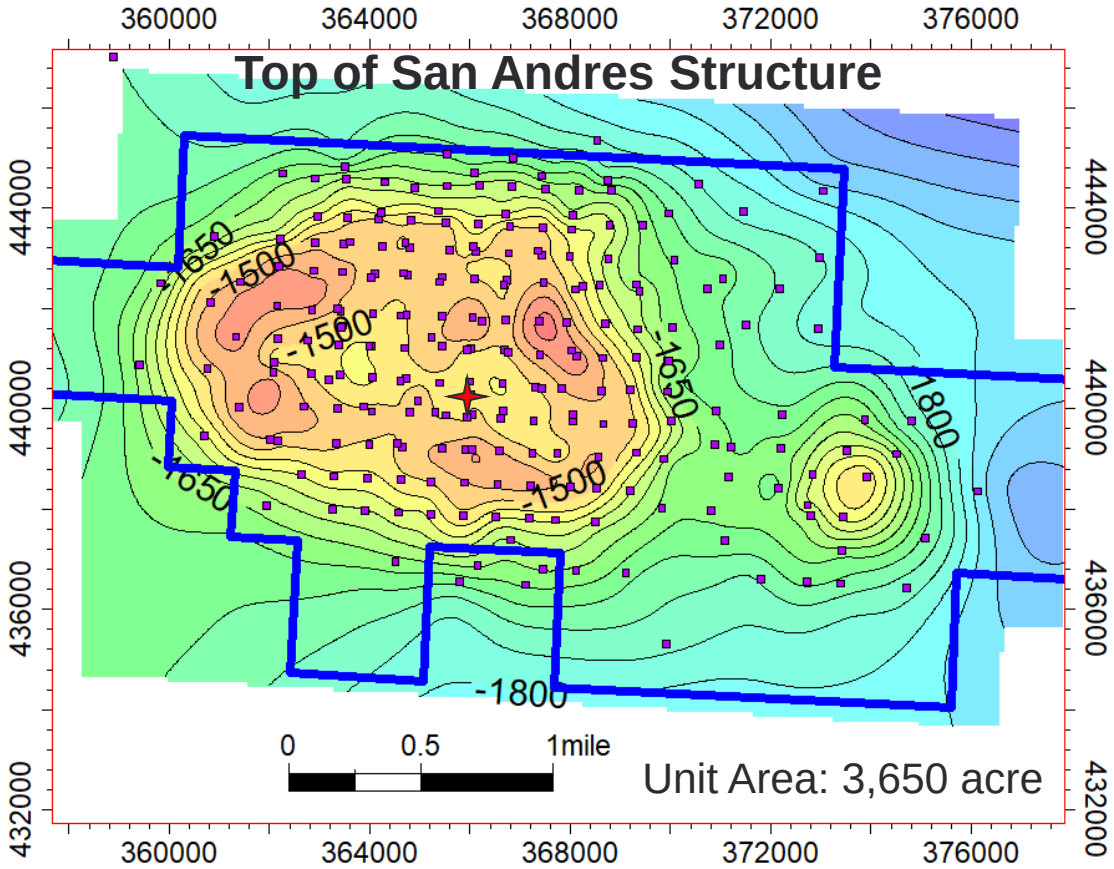
PBGSP Annual Meeting, 2/27-8/06, Austin, TX

Legend

- nw_sanandres_carbonate_nm
- nw_sanandres_carbonate_tx
- upper_sanandres_central_nm
- upper_sanandres_artesia_nm
- e_sanandres_carbonate_tx
- sanandres_grayburg_tx
- sanandres_carbonate_tx
- sanandres_karst_tx



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