Gulf of México Mapping NATCARB Atlas

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BUREAU OF ECONOMIC GEOLOGY

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- BEG Associate Director: Ian Duncan
- BEG Director: Scott Tinker
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GCCC sponsors

OVERVIEW

I. Previous Work (GCCC)

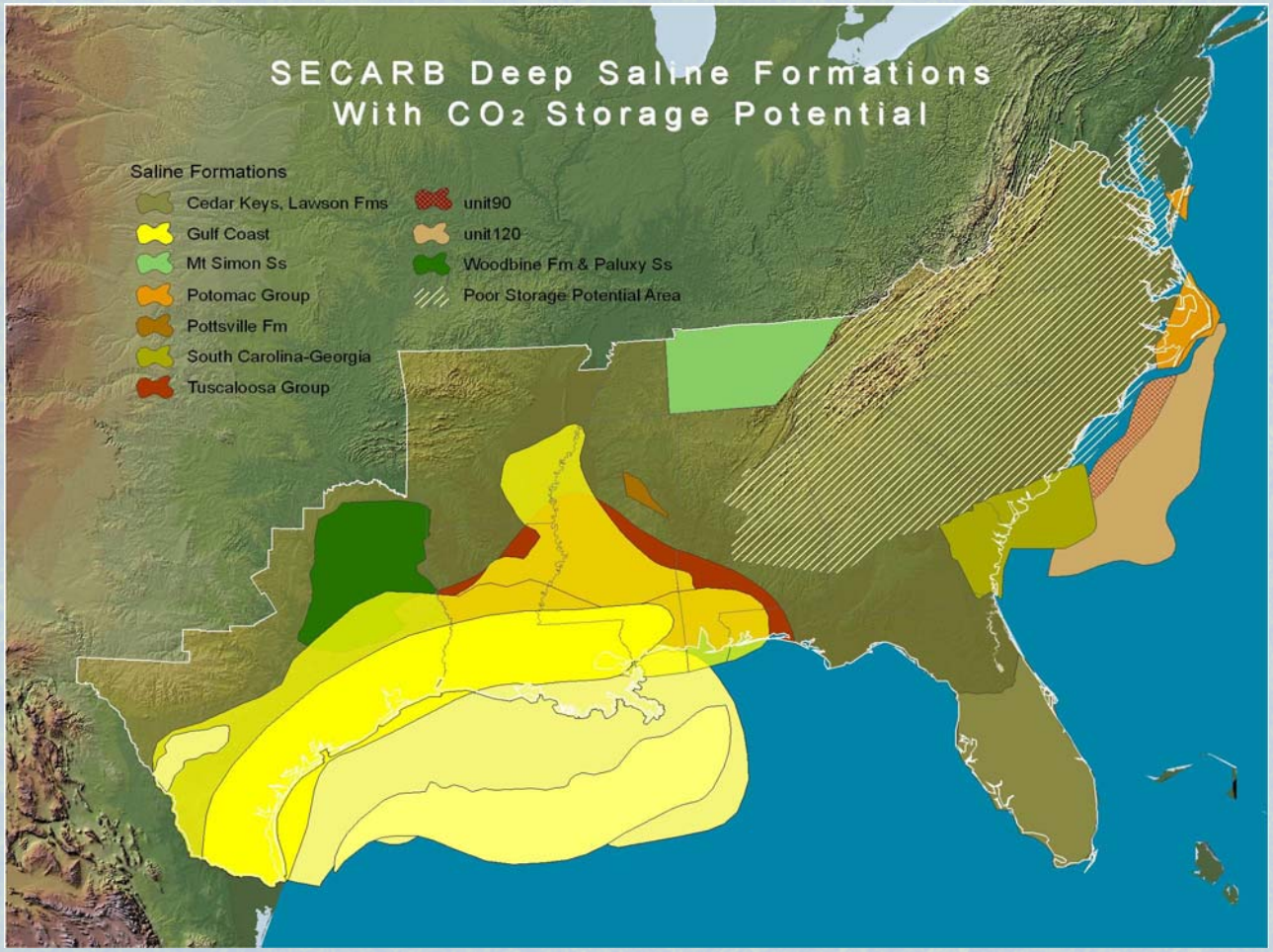
II. Current Studies
   A. SECARB III – Task 15
   B. Texas Offshore Miocene
      1. Department of Energy
      2. Texas General Land Office

PREVIOUS GCCC EFFORTS

Brine Formations Atlas

- Approach – Critical Constraints
  - Static Parameters
    - Reservoir Depth, Thickness, Mineralogy, Φ
    - Net Sand, Heterogeneity, % Shale
    - Seal Thickness & Discontinuities
  - Dynamic Parameters
    - Formation Pressure, Temperature, Salinity, k
    - Brine Age & Chemistry, CO_2 Reactions
    - Hydrologic regime, Dissolution, etc.

PREVIOUS GCCC / SECARB EFFORTS



Atlas II

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Special Acknowledgement

- SECARB's NatCarb Atlas II Contribution
- Data & Interpretive Contributions From:
- ***G**ulf **B**asin **D**epositional **S**ynthesis* Consortium
  - Dr. Bill Galloway, et al.

  Institute for Geophysics

  Jackson School of Geosciences

  University of Texas at Austin

Joint Bureau of Economic Geology / PEMEX Studies of Mexican Basins

- Regional basin studies
  - **Burgos Basin Miocene**
  - **Laguna Madre Tuxpan shelf**
  - **Veracruz Basin**
  - **Salina Basin**
  - **Macuspana Basin**

- Reservoir Characterization study
  - **Poza Rica – giant carbonate field, well into secondary recovery phase**

Joint BEG / PEMEX Studies

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OVERVIEW

I. Previous Work (GCCC)

II. Current Studies

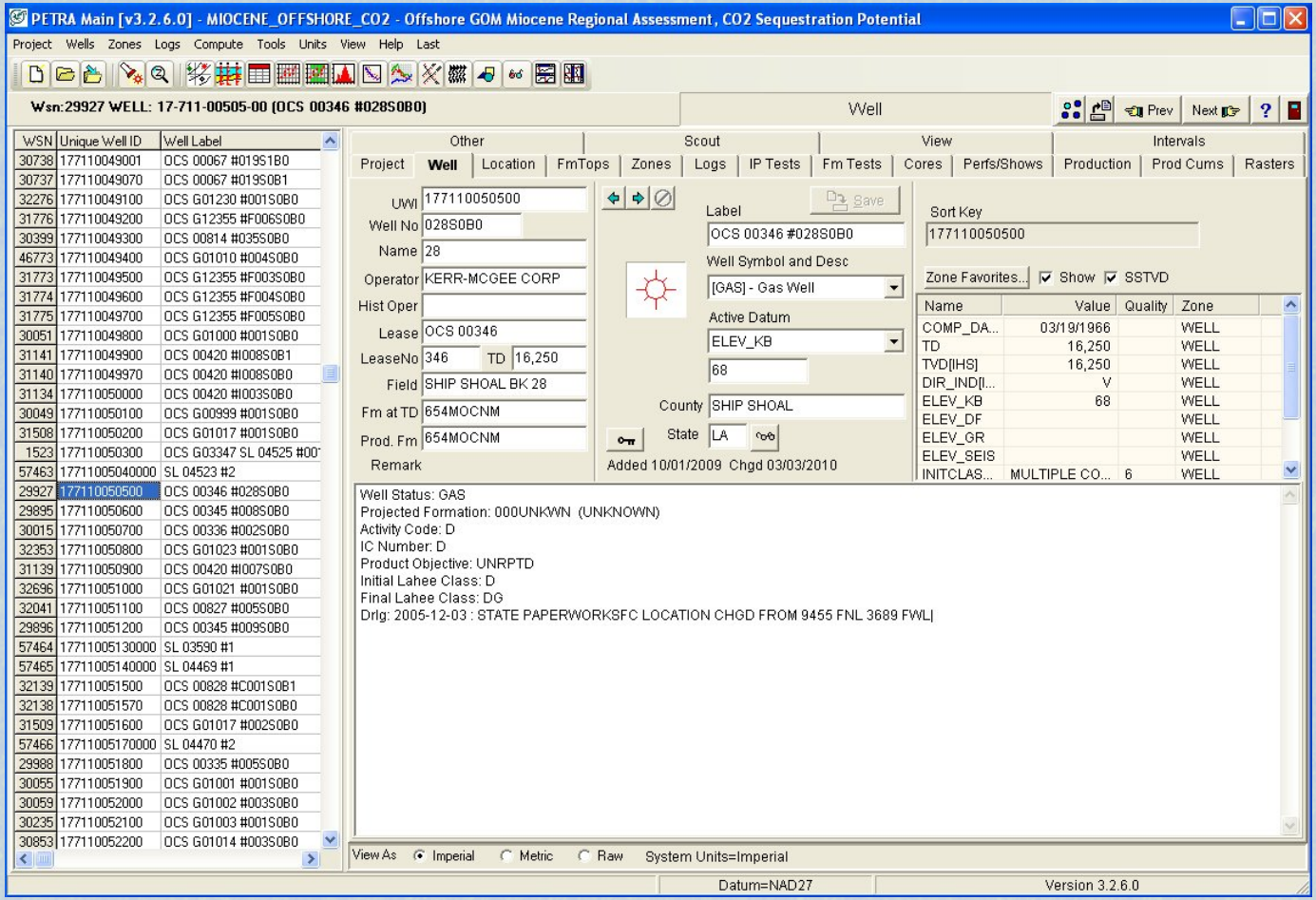
A. SECARB III – Task 15

1. U.S. Dept. of Energy (DOE)

B. Texas Offshore Miocene

1. U.S. Dept. of Energy (DOE)
2. Texas General Land Office (GLO)

Geologic Database – Petra (IHS)



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SECARB III – TASK 15

- Preliminary Wells & Infrastructure Assessment
- Mapping & Preliminary Capacity Assessment
- Integration / NatCarb ATLAS III Update

David Carr, Becky Smyth

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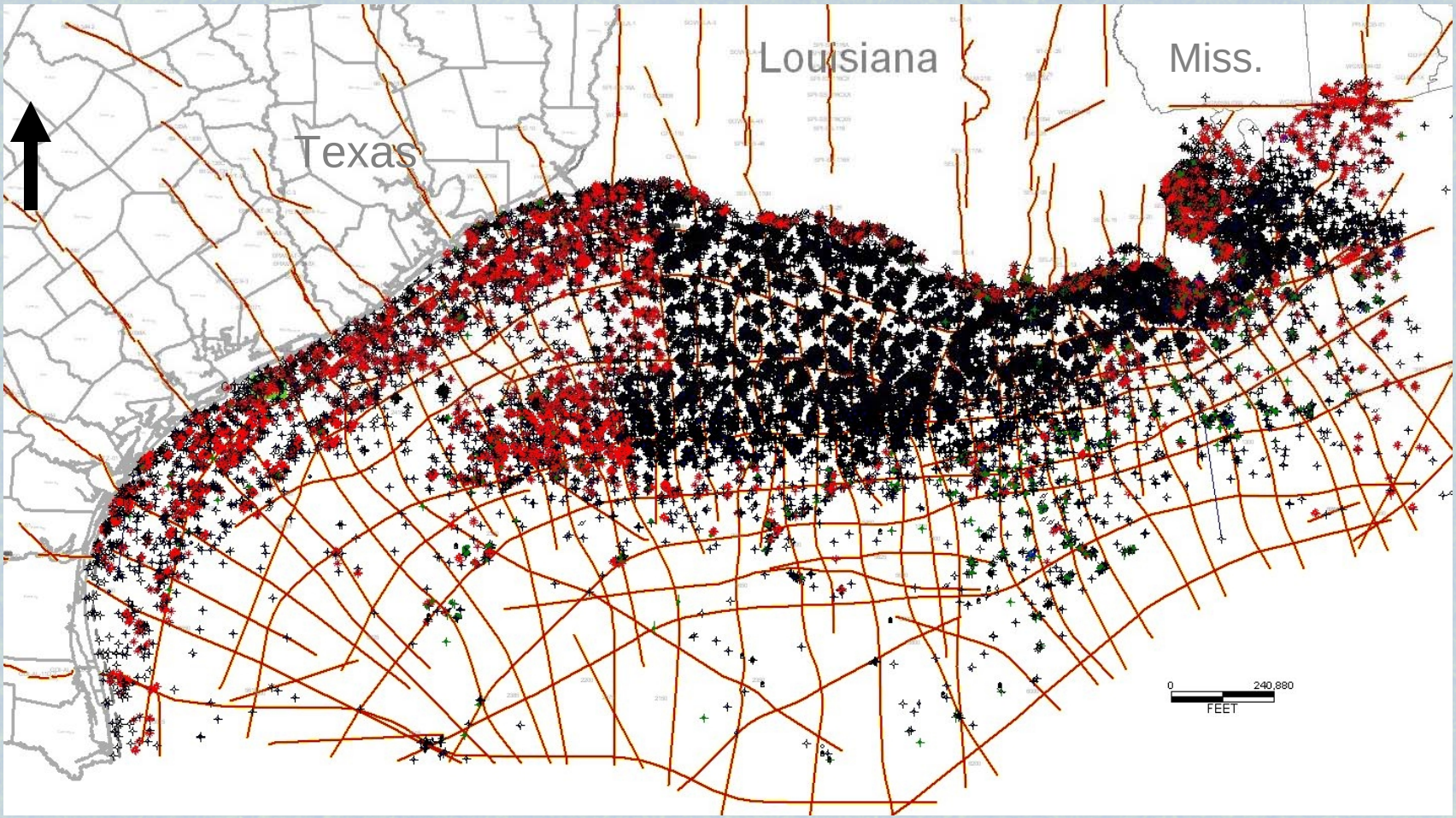
Current Dataset



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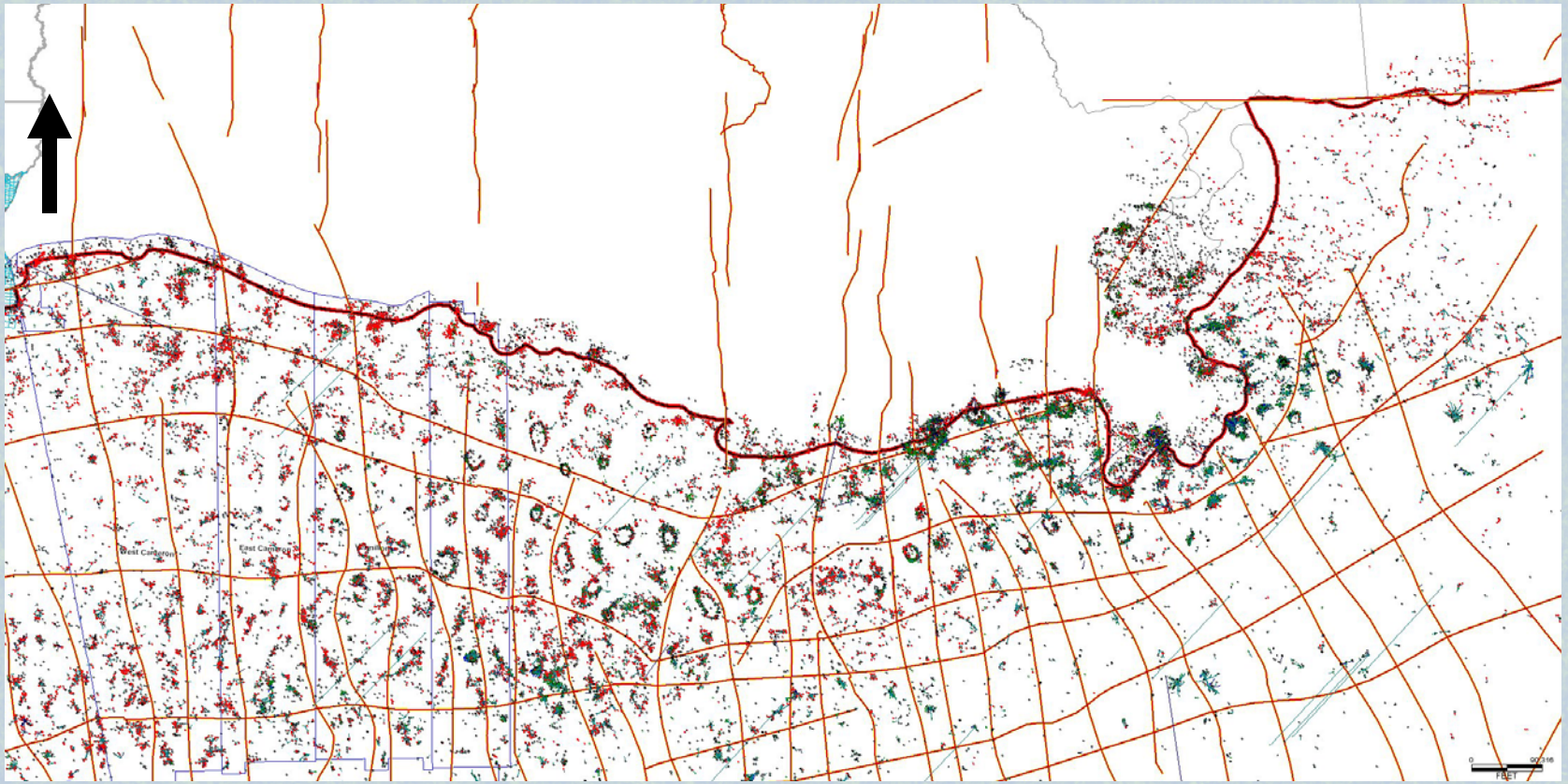
OCS / State Waters (LA & MS)



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TEXAS OFFSHORE MIOCENE

- **DOE FOA-33: Site Characterization**
- **TX General Land Office**
  - **(DOE Award Cost Match)**
- **Task 3 – Capacity Estimates**
  - **Subtask 3.1: Coordination with NATCARB**

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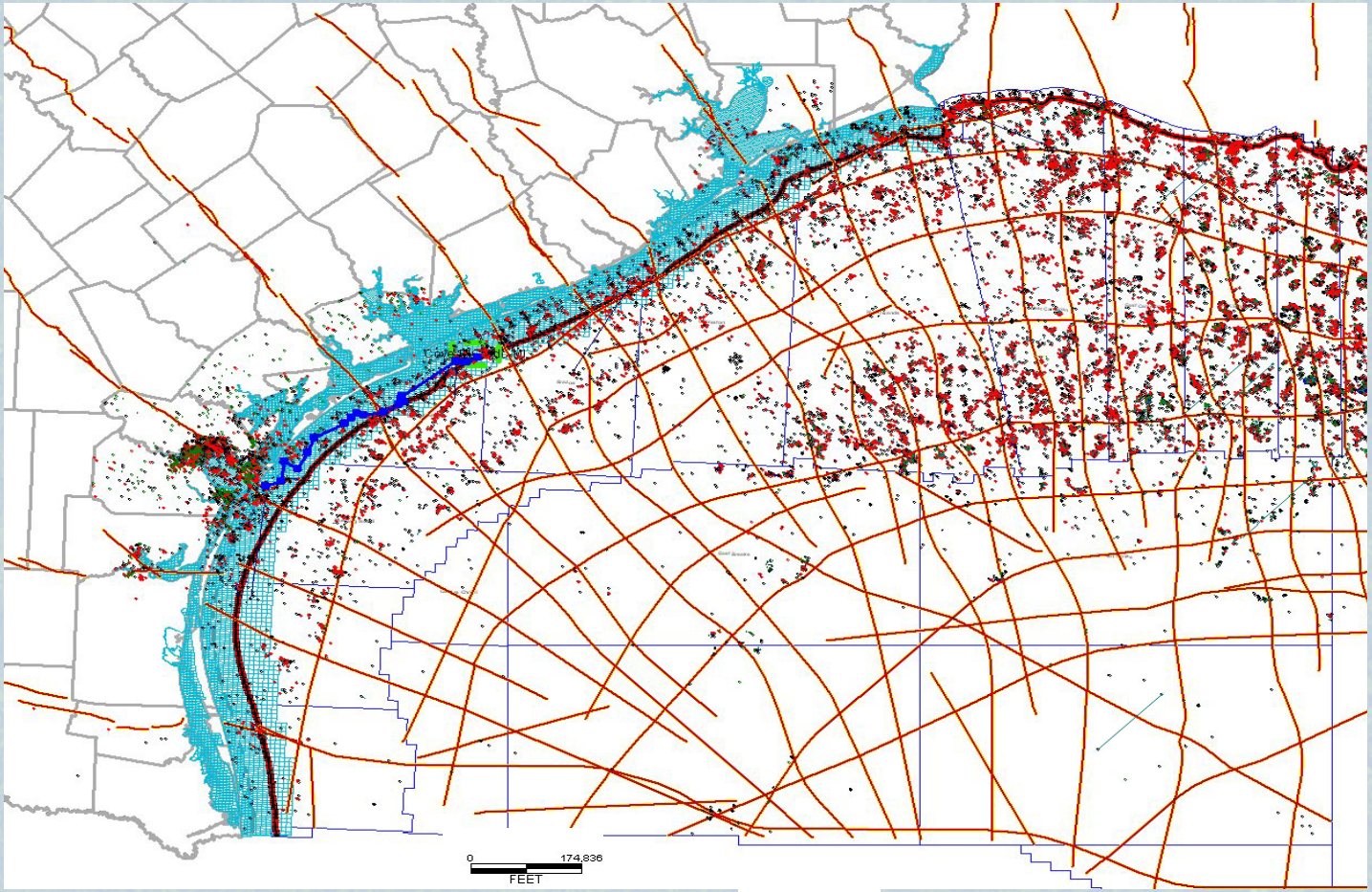
Texas Submerged Lands & Adjacent Federal Submerged Lands



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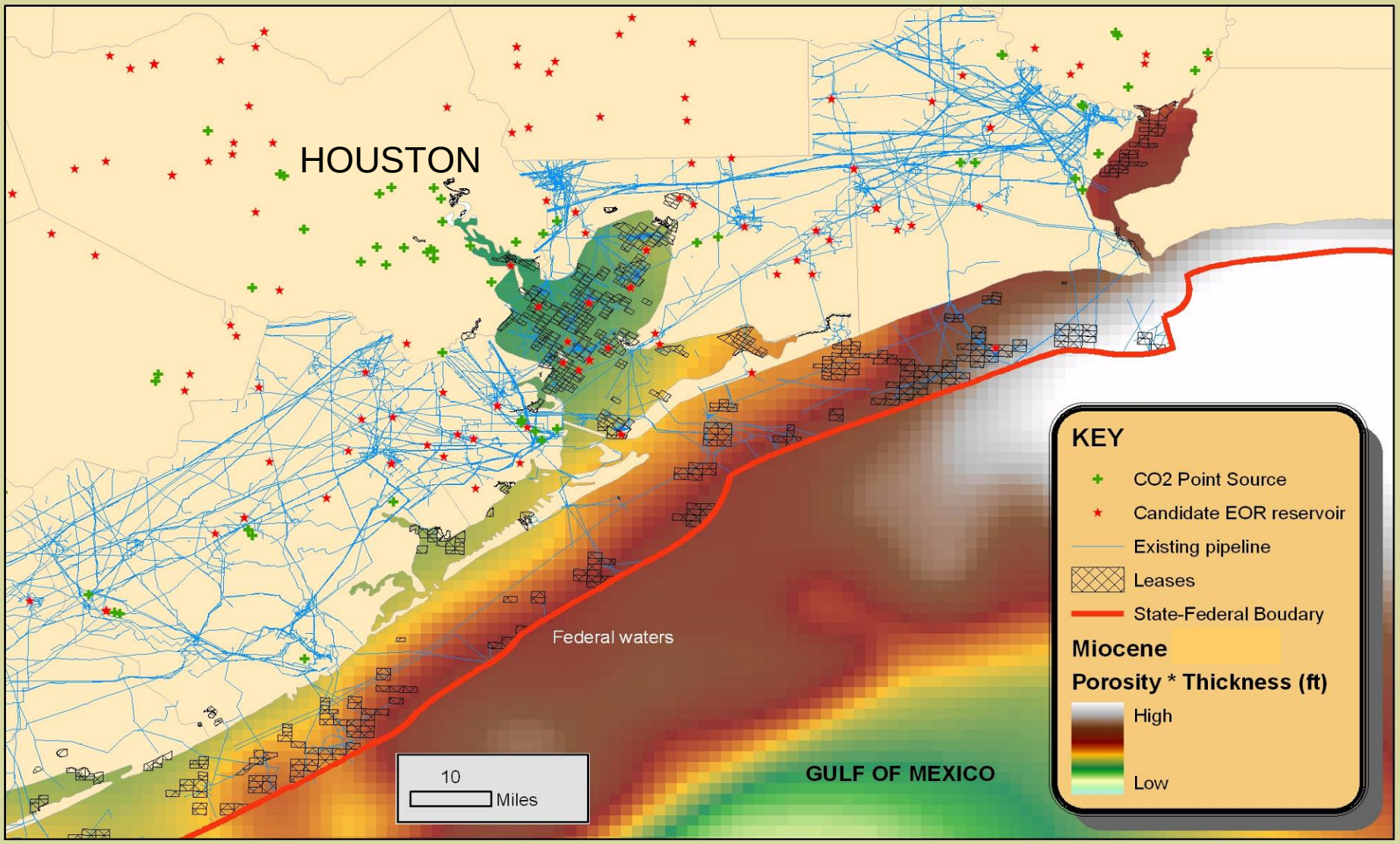
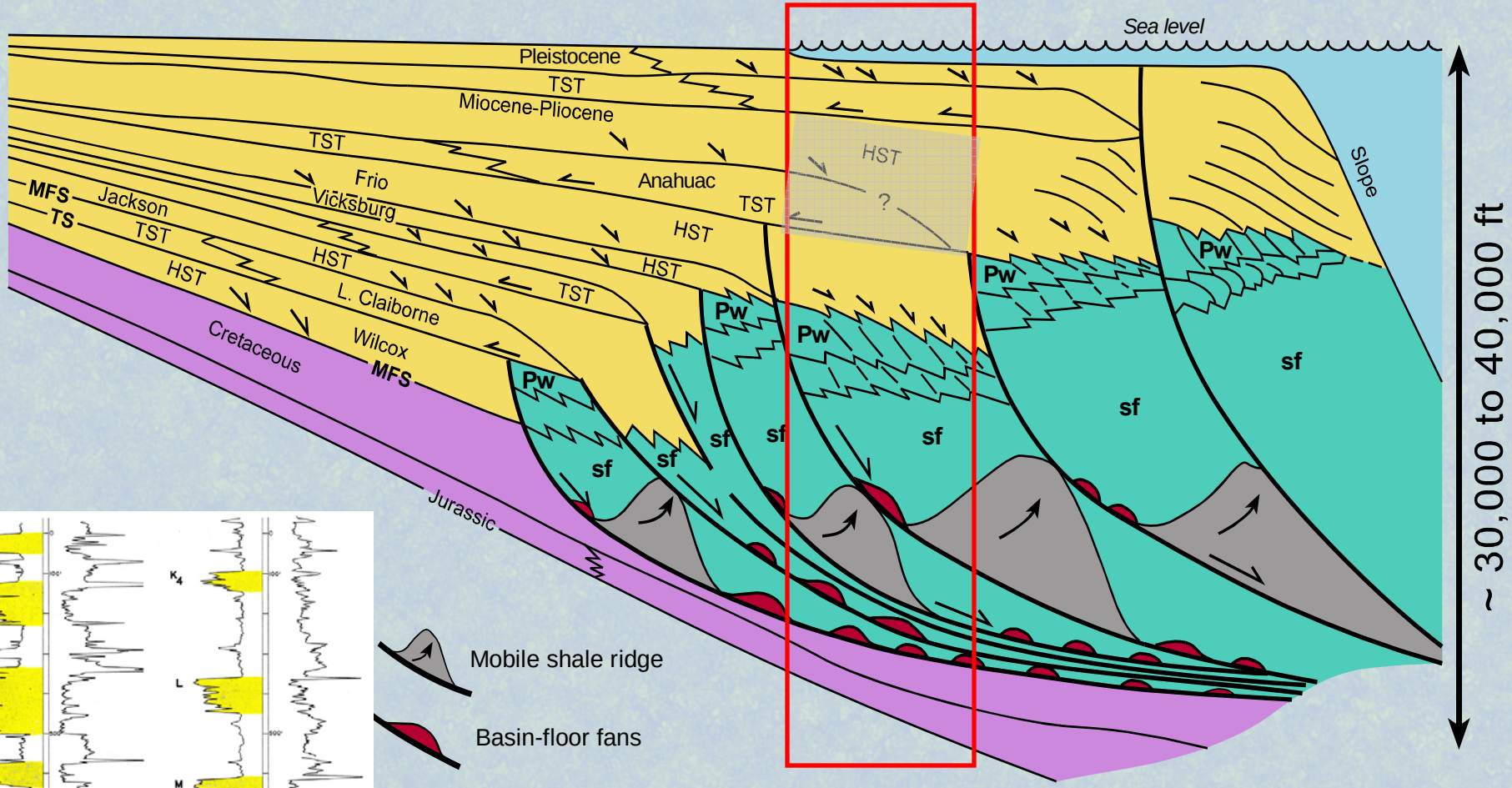
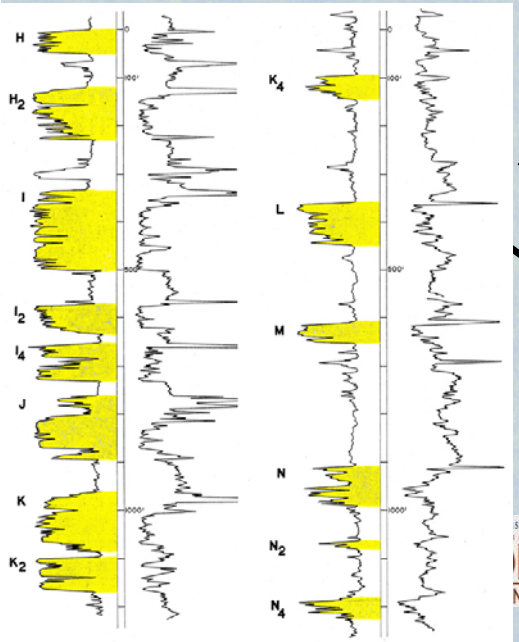
CO_2 Brine Storage Capacity



Tremendous Capacity in Offshore Wedge

Prograding wedge of fluvio-deltaic sediments in upper Miocene stratigraphy



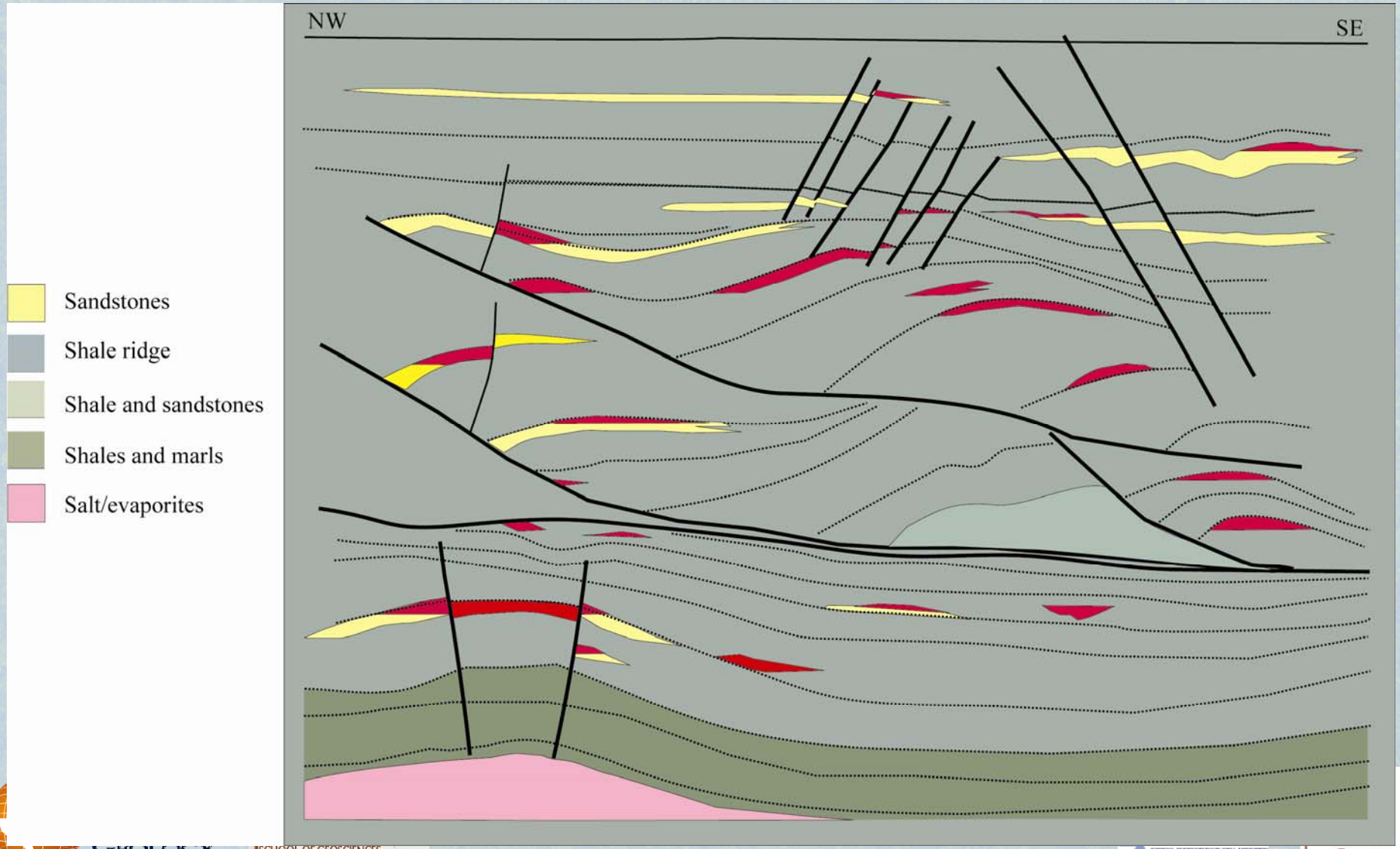


Brown, 2005, Modified from Bebout and Loucks (1981)

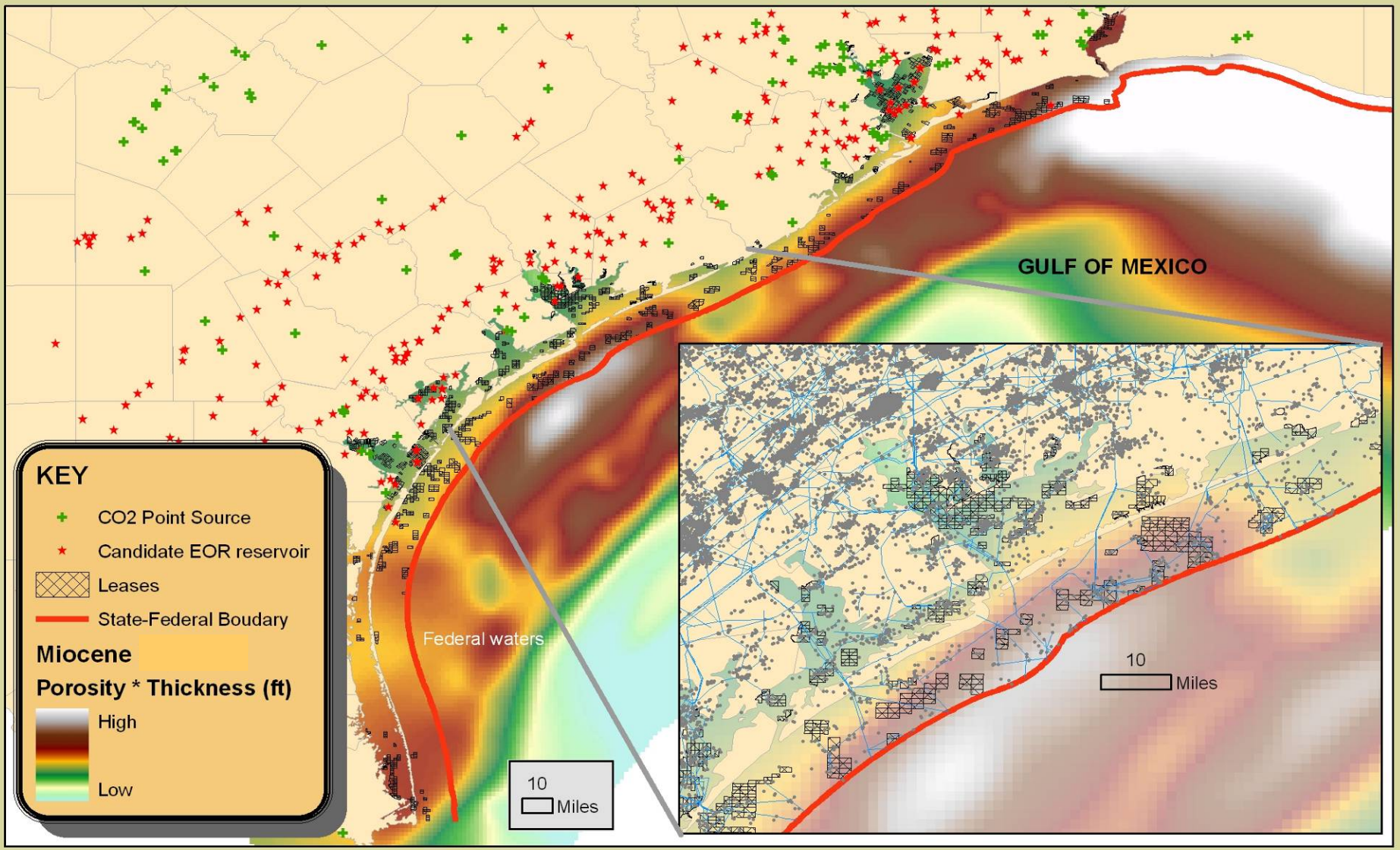
PROJECT STARR
State of Texas Advanced Oil and Gas Resource Recovery

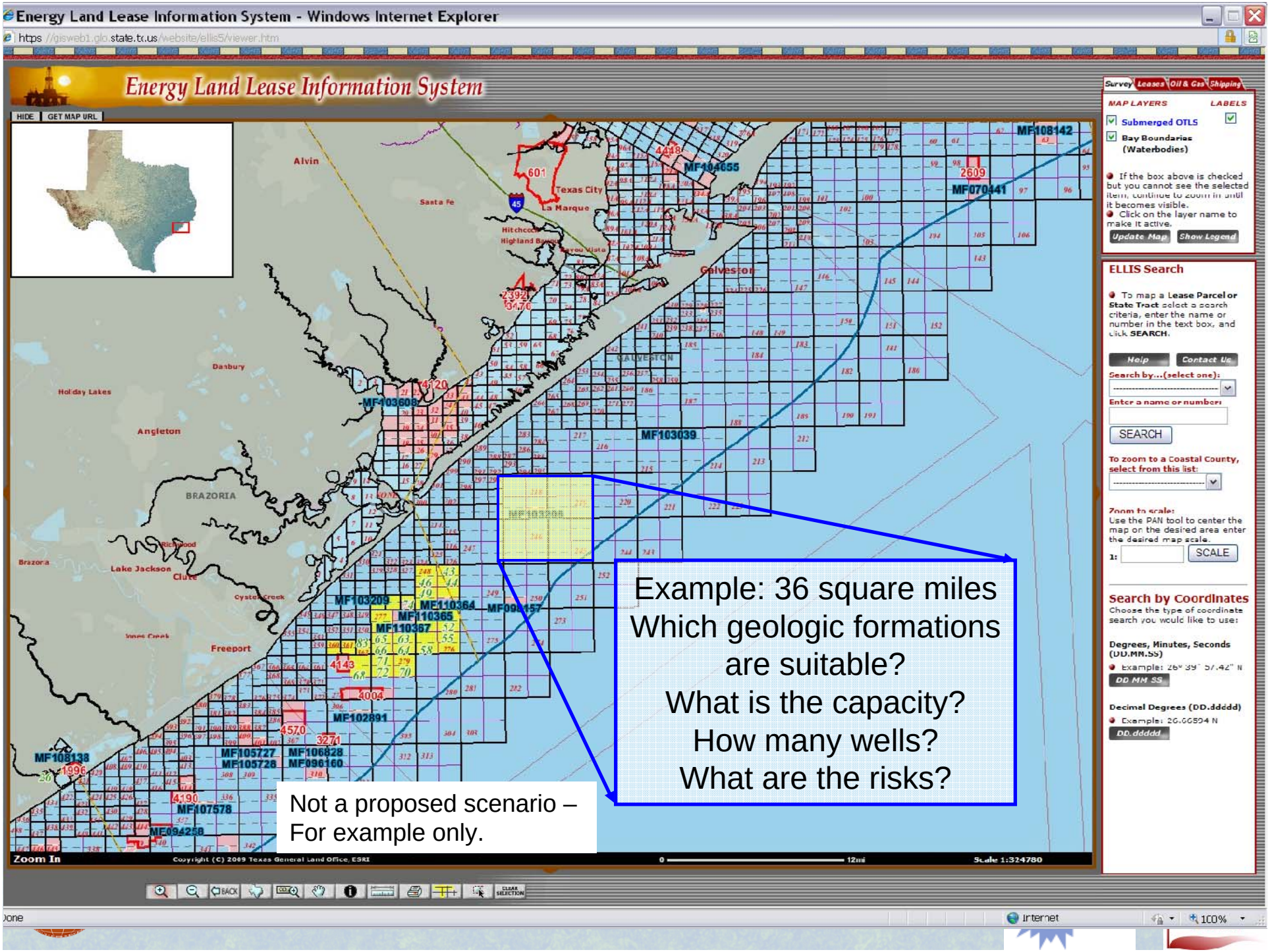
Gulf Coast Carbon Center

Variety of Trap Types



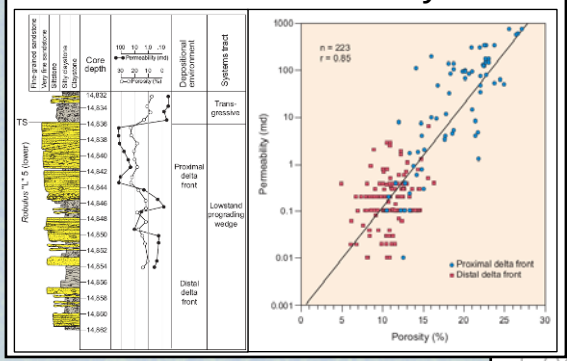
Miocene Porosity x Thickness



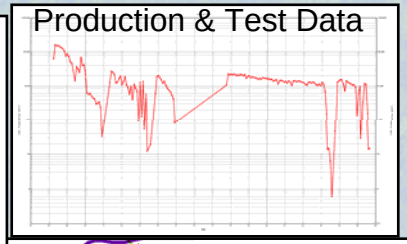

Energy Land Lease Information System - Windows Internet Explorer
https://gisweb1.glo.state.tx.us/website/ellis5/viewer.htm
Energy Land Lease Information System
HIDE
GET MAP URL
Survey
Leases
Oil & Gas
Shipping
MAP LAYERS
LABELS
Submerged OTLS
Bay Boundaries (Waterbodies)
If the box above is checked but you cannot see the selected item, continue to zoom in until it becomes visible.
Click on the layer name to make it active.
Update Map
Show Legend
ELLIS Search
To map a Lease Parcel or State Tract select a search criteria, enter the name or number in the text box, and click SEARCH.
Help
Contact Us
Search by...(select one):
Enter a name or number:
SEARCH
To zoom to a Coastal County, select from this list:
Zoom to scale:
Use the PAN tool to center the map or the desired area enter the desired map scale.
1:
SCALE
Search by Coordinates
Choose the type of coordinate search you would like to use:
Degrees, Minutes, Seconds (DD.MM.SS)
Example: 26° 39' 57.42" N
DD MM SS
Decimal Degrees (DD.ddddd)
Example: 26.66594 N
DD.ddddd
Alvin
Santa Fe
Texas City
La Marque
Hitchcock
Highland Bayou
Bayou Vista
Galveston
GALVESTON
Danbury
Holiday Lakes
Angleton
BRAZORIA
Brazoria
Lake Jackson
Clute
Richwood
Oyster Creek
Jones Creek
Freeport
MF108142
MF104655
MF070441
MF103608
MF103039
MF103209
MF110364
MF110365
MF110367
MF098157
MF102891
MF105727
MF105728
MF106828
MF096160
MF108138
MF107578
MF094258
601
4418
2609
2392
3476
4120
4143
4004
4570
3271
1996
4190
Example: 36 square miles
Which geologic formations are suitable?
What is the capacity?
How many wells?
What are the risks?
Not a proposed scenario – For example only.
Zoom In
Copyright (C) 2009 Texas General Land Office, ESRI
0
12mi
Scale 1:324780
Done
Internet
100%

Examples of Characterization Data

Cores & Core Analysis*



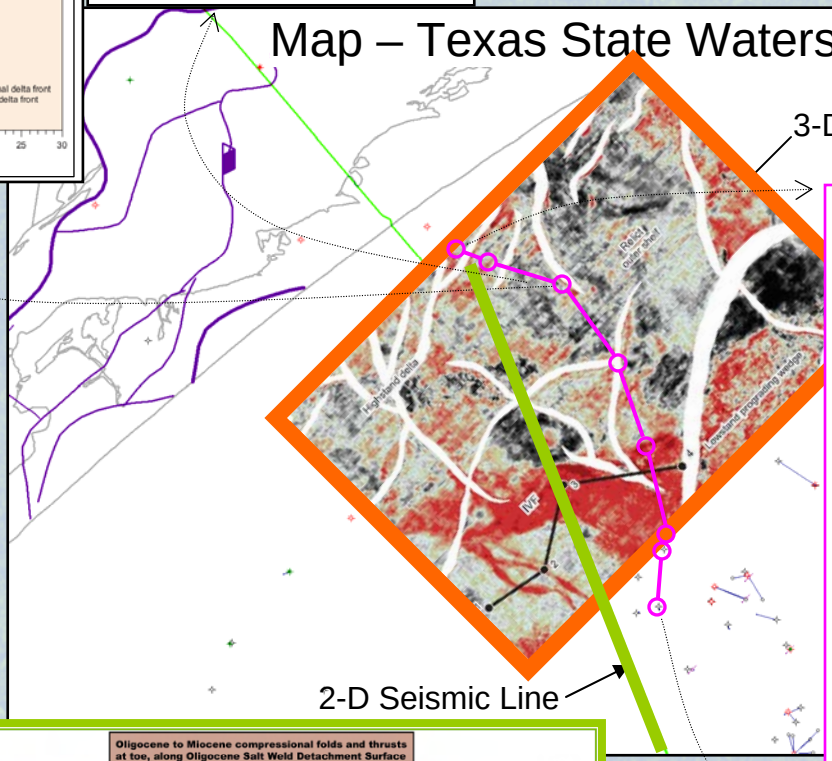
Production & Test Data



AMOCO PROD CO
APACHE CORPORATION
ST TR 00487-L SW/4 #2
MATGORD IL B 519L
42703303400000

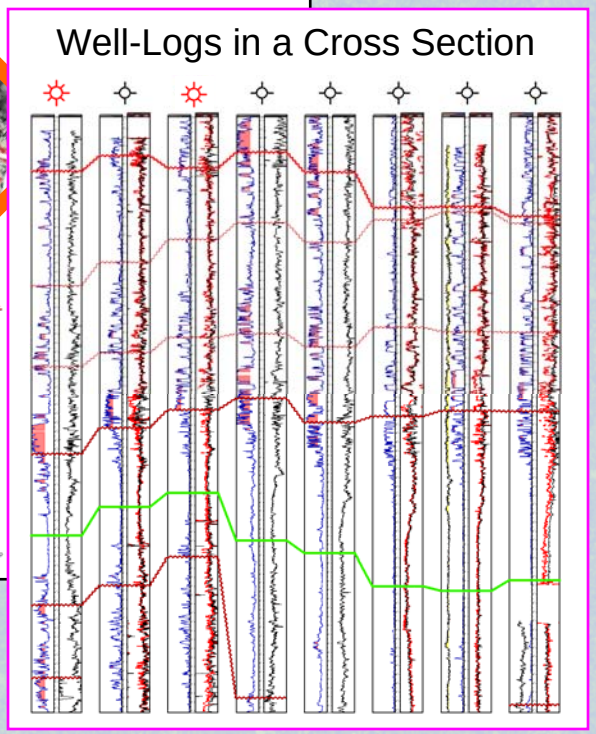
16,000
654MOCN
654MOCN
68,373,087 MCF
103,239 BBLS
149,670 BBLS

Map – Texas State Waters

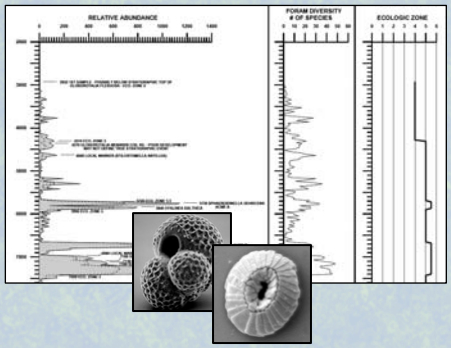


3-D Seismic Survey**

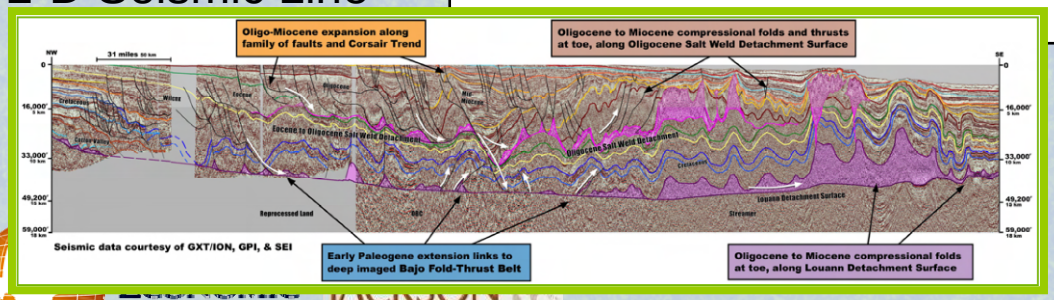
Well-Logs in a Cross Section



Paleo Data



2-D Seismic Line



2-D Seismic Line

* From Dutton and Hentz (2002)
** From Zeng and Hentz (2004)

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Research Development

AIMS:
- Identify uncertainties
- Characterize and collect data
- Reduce uncertainties
- Facilitate near-term commercial utilization.

Years 1-2: Characterization effort & Site Identification

- Capacity
- Injectivity
- Stratigraphic containment
- Caprock seal capacity
- Brine containment
- Mineralization containment
- Leakage pathways

Year 3: Uncertainty reduction via additional data collection

- Test well, core measurements
- Equivalent surface monitoring design and demonstration + modeling & simulation
- Marine survey (shallow seismic / bathymetry / water column)

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SUMMARY

- Building on Past Research / Results
- Current Gulf of Mexico Research Aims:
  - Better Quantify Static Capacity
    - Large Volume Brine Saturated Sandstones
  - Understand Limits
    - Leakage Risks
    - Compartmentalization & Pressure Build-up
  - Prepare “Storage Ready” Sites
    - Incentivize Use