

Coastal Bend Carbon Management Project

CarbonSAFE Phase II FE0032265

Recipient:

Port of Corpus Christi Authority

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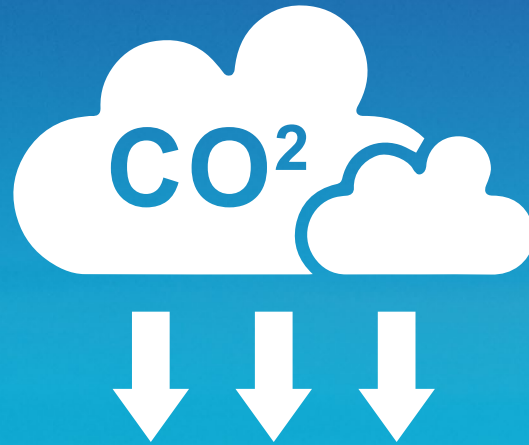
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The Port of Corpus Christi's Role in CCUS



Send clear signal to the marketplace that centralized CCS solution IS coming

Cultivate CCS opportunities (new projects and customers for the Port)

Identify/vet/permit route alternatives for CO₂ delivery infrastructure

Lease Port-owned pore space for CO₂ injection and storage

Facilitate logistical/commercial connections between emitters & CCS service providers

Deploy Port capital to fund key infrastructure elements

Pursue/leverage federal capital

Advocate for appropriate state and federal policy

Two Discrete Projects: (This is the ONshore Project)

US DOE awards Port of Corpus Christi with \$16.4M in CarbonSAFE grants

BUSINESS DEVELOPMENTS & PROJECTS

February 2, 2023, by Aida Čučuk

The Port of Corpus Christi has been allocated \$16.4 million through the US Department of Energy's (DOE) Carbon Storage Assurance Facility Enterprise (CarbonSAFE) initiative to evaluate the technical and economic feasibility of permanently storing captured carbon dioxide (CO₂) from industrial operations.



Partners:

- Howard Energy Partners
- TotalEnergies (as of Mar 24)
- Texas A&M University

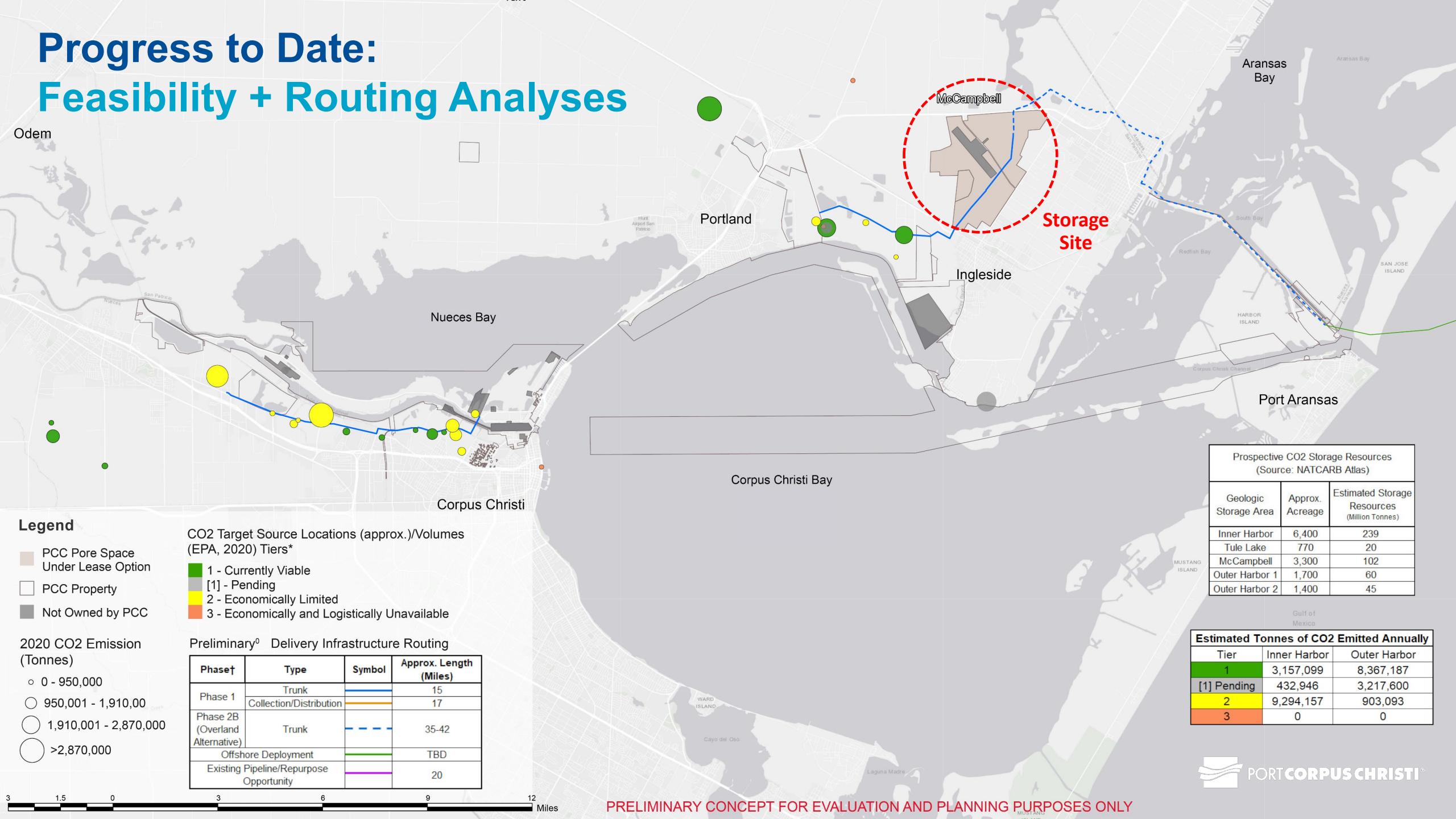
Total Project: \$12,079,448

- DOE Award \$9,000,000
- PCCA & Partner Match \$3,079,448

Objectives:

- Quantify subsurface storage resources available
- Refine reservoir targets/priorities for permanent storage of commercial quantities of CO₂
- Design surface facilities to ensure safety, identify risks, and mitigants, costs, and legal and regulatory requirements as a key step in developing the Mitigation and Monitoring Plan
- Conduct full spectrum cost-benefit analysis that captures the environmental and socio-economic impacts, focusing on benefits to disadvantaged communities in the region
- Develop two-way outreach and engagement program that promotes equitable, inclusive economic development and seeks to prioritize benefits to historically disadvantaged communities

Progress to Date: Feasibility + Routing Analyses



- Legend**
- PCC Pore Space Under Lease Option
 - PCC Property
 - Not Owned by PCC
- 2020 CO2 Emission (Tonnes)**
- 0 - 950,000
 - 950,001 - 1,910,00
 - 1,910,001 - 2,870,000
 - >2,870,000

- CO2 Target Source Locations (approx.)/Volumes (EPA, 2020) Tiers***
- 1 - Currently Viable
 - [1] - Pending
 - 2 - Economically Limited
 - 3 - Economically and Logistically Unavailable

Preliminary⁰ Delivery Infrastructure Routing

Phase†	Type	Symbol	Approx. Length (Miles)
Phase 1	Trunk		15
	Collection/Distribution		17
Phase 2B (Overland Alternative)	Trunk		35-42
	Offshore Deployment		TBD
	Existing Pipeline/Repurpose Opportunity		20

Prospective CO2 Storage Resources (Source: NATCARB Atlas)

Geologic Storage Area	Approx. Acreage	Estimated Storage Resources (Million Tonnes)
Inner Harbor	6,400	239
Tule Lake	770	20
McCampbell	3,300	102
Outer Harbor 1	1,700	60
Outer Harbor 2	1,400	45

Estimated Tonnes of CO2 Emitted Annually

Tier	Inner Harbor	Outer Harbor
1	3,157,099	8,367,187
[1] Pending	432,946	3,217,600
2	9,294,157	903,093
3	0	0



PRELIMINARY CONCEPT FOR EVALUATION AND PLANNING PURPOSES ONLY



Progress to Date: Feasibility + Routing Analyses

01

**Review of
existing
infrastructure**

02

**Probabilistic analysis
of known emitters
(volumes and
likelihood/timing of
participating in
centralized CO₂
mgmt. system)**

03

**Economic assessment
of infrastructure costs
that can be supported
by available storage
resources under current
45Q regulations**

Community Benefits / Societal Considerations (CB/SCI)

Community & Labor Engagement

- Local preference in standard PCCA public procurement process
- Doing Business with Giants Program at the Coastal Bend Innovation Center

Job Quality & Skilled Workforce

- Learning Undeclared™ PORTable learning laboratory/custom curriculum
- Targeted job postings and recruitment (including intern and practicum positions)

Diversity, Equity, Inclusion, Accessibility

- DEIA training for Project Team
- Coordination with Indigenous Peoples of Coastal Bend per the archaeological survey protocols

Justice 40

- Quality of Place Study



Project Overview

Project Objectives:

- Characterize target subsurface reservoirs for permanent storage of at least 50 MMt CO₂
- Design surface facilities such that safety of all inhabitants and property in region is ensured
- Quantify subsurface storage resources available for permanent and economical storage of commercial quantities of CO₂
- Conduct full spectrum cost-benefit analysis that captures environmental and socio-economic impact of the Project, focusing on benefits to disadvantaged communities

Project Objectives: (continued)

- Identify risks and mitigants, costs, and legal and regulatory requirements of the Project as key steps in developing a robust mitigation and monitoring plan
- Develop outreach and engagement program that promotes equitable, inclusive economic development and prioritizes benefits to historically disadvantaged communities

Project Performance Dates:

- (Intended) 01 Jan 2024 to 31 Dec 2025
- (Expected) Oct/Nov 2024 to Oct/Nov 2026

Project Background

CO2 Emissions:

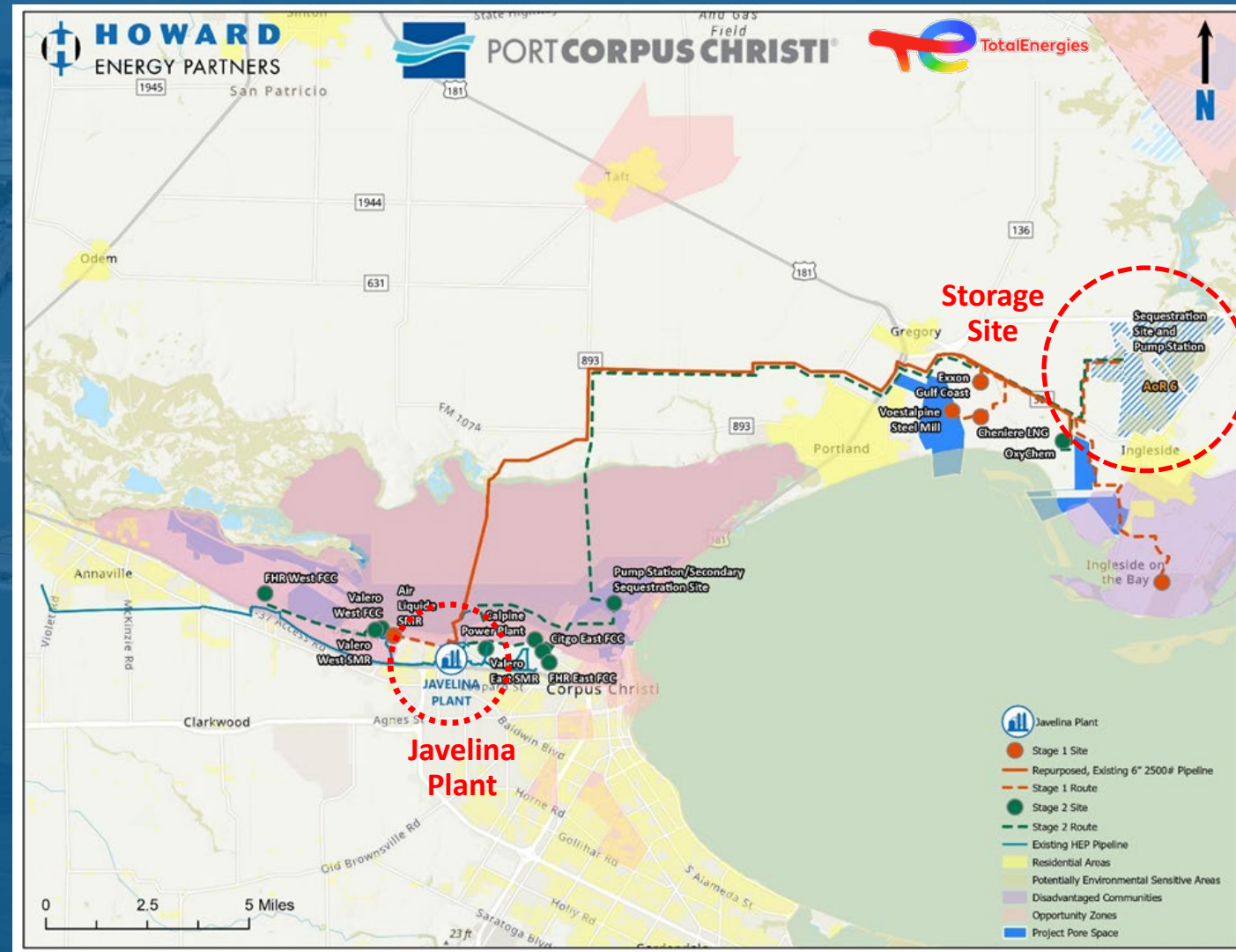
- Proposed Gathering Site has a connection 11 MMtpa of 20 MMtpa in regional CO₂ emissions
- 95% CO₂ (industry standard)

Transportation Infrastructure:

- Proposed Stage 1 Transportation System
- Existing Gathering footprint consists of 55 miles of pipeline connected to emitters

Storage Site:

- Pre-Feasibility Estimates of at least 50 MMt total storage capacity
- AoR-6 (3,300 acres)
- PCCA is pore space owner
- Stratigraphic well planned H1/25
- 3D seismic planned for H1/25 (this will be a TotalEnergies purchase, NOT DOE)

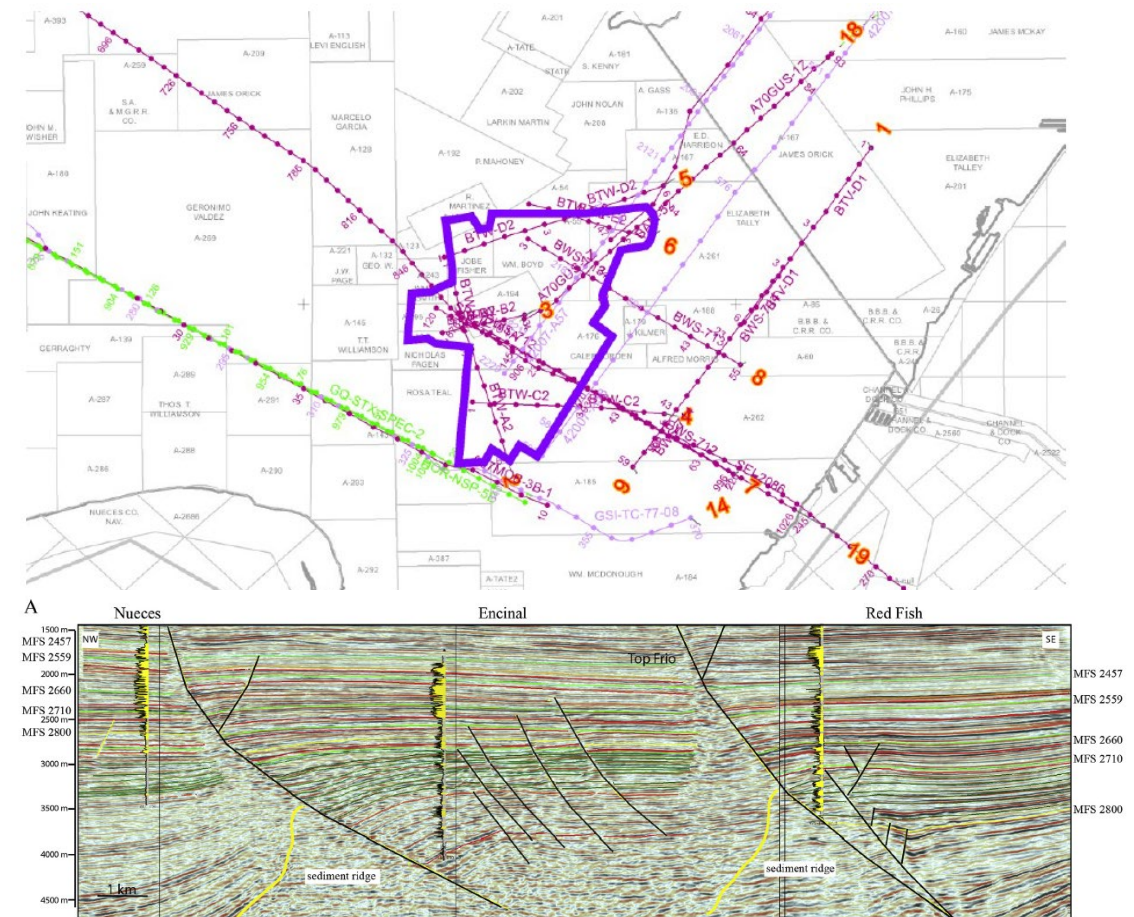


Technical Approach — Project Success Criteria (1/2)

Year 1 — Go/No-Go:

- Successful acquisition and interpretation of existing 2D seismic data.
- Building a 3D geological model of the Project Pore Space (AoR-6) area and begin flow simulation model to estimate plume migration and injectivity.
- Stakeholder engagement to identify potential risks (NRAP).
- SMART criteria preliminary report for community outreach, environmental justice, and economic growth.
- Successfully drill a "stratigraphic" appraisal well and analyze results for injectivity, reservoir potential and seal capacity.

Example of Existing 2D Seismic Data (near AoR-6)

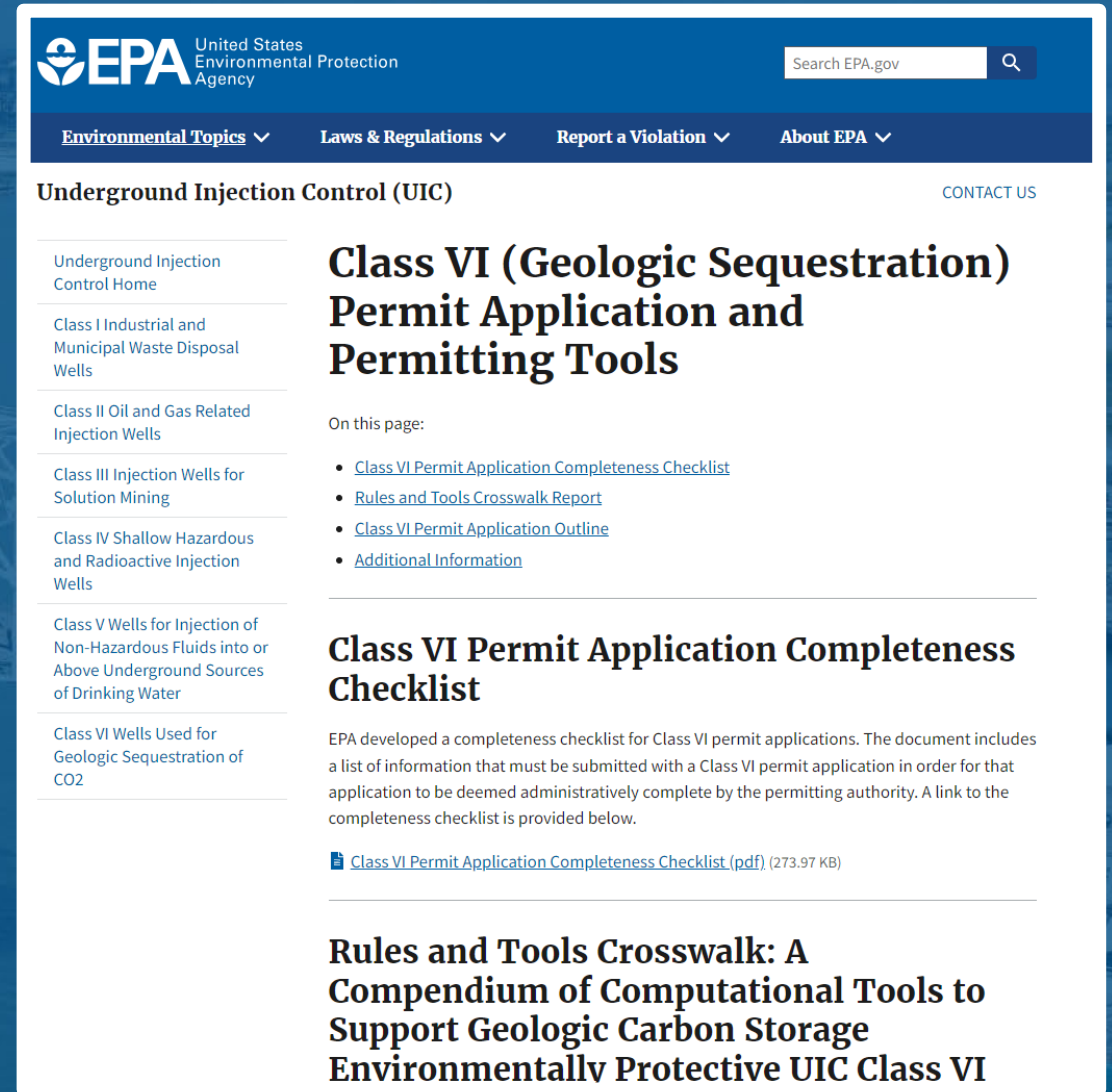


Olariu, M.I., Hammes, U., Ambrose, W.A., 2013, Depositional architecture of growth-fault related wave-dominated shelf edge deltas of the Oligocene Frio Formation in Corpus Christi Bay, Texas, *Marine and Petroleum Geology*, v. 48, p. 423-440. <http://dx.doi.org/10.1016/j.marpetgeo.2013.09.009>

Technical Approach — Project Success Criteria (2/2)

Year 2:

- Estimate Storage Resource Management System (SRMS) Contingent Resource volume based on technical work and project status.
- Prepare data and interpretations and be ready to apply for CarbonSafe Phase III program and begin engagement with EPA regarding the required UIC Class VI permit.
- SMART criteria final report for community outreach, environmental justice, and economic growth.



The screenshot displays the EPA website's "Underground Injection Control (UIC)" section. The header includes the EPA logo, "United States Environmental Protection Agency", a search bar, and navigation links for "Environmental Topics", "Laws & Regulations", "Report a Violation", and "About EPA". The main content area is titled "Underground Injection Control (UIC)" and includes a "CONTACT US" link. A sidebar on the left lists various UIC categories: "Underground Injection Control Home", "Class I Industrial and Municipal Waste Disposal Wells", "Class II Oil and Gas Related Injection Wells", "Class III Injection Wells for Solution Mining", "Class IV Shallow Hazardous and Radioactive Injection Wells", "Class V Wells for Injection of Non-Hazardous Fluids into or Above Underground Sources of Drinking Water", and "Class VI Wells Used for Geologic Sequestration of CO2". The main content area features a large heading for "Class VI (Geologic Sequestration) Permit Application and Permitting Tools". Below this heading, it states "On this page:" followed by a list of links: "Class VI Permit Application Completeness Checklist", "Rules and Tools Crosswalk Report", "Class VI Permit Application Outline", and "Additional Information". A section titled "Class VI Permit Application Completeness Checklist" explains that EPA developed a checklist for Class VI permit applications, including a list of information to be submitted. A link to the "Class VI Permit Application Completeness Checklist (pdf) (273.97 KB)" is provided. At the bottom, there is a heading for "Rules and Tools Crosswalk: A Compendium of Computational Tools to Support Geologic Carbon Storage Environmentally Protective UIC Class VI".

Current Status of Project and Accomplishments

Intended Start Date: January 2024

Estimated Start Date: October/November 2024

Status of Project Objectives and Tasks:

- Task 1 – Update Project Management Plan *(All)*
- Task 2 – Outreach & Environmental Justice *(PCCA)*
- Task 3 – Permitting & Site Access Agreement *(TotalEnergies/Howard)*
- Task 4 – Site Characterization & Geologic Data *(Texas A&M/TotalEnergies)*
- Task 5 – Subsurface Modeling & Flow Simulation *(Texas A&M/TotalEnergies)*
- Task 6 – Risk Assessment, Mitigation, Monitoring *(Texas A&M/TotalEnergies)*
- Task 7 – Plan for UIC Class VI Permitting *(TotalEnergies)*
- Task 8 – Infrastructure & Techno-Economic Feasibility *(PCCA/Howard)*

Current Status of Project and Accomplishments

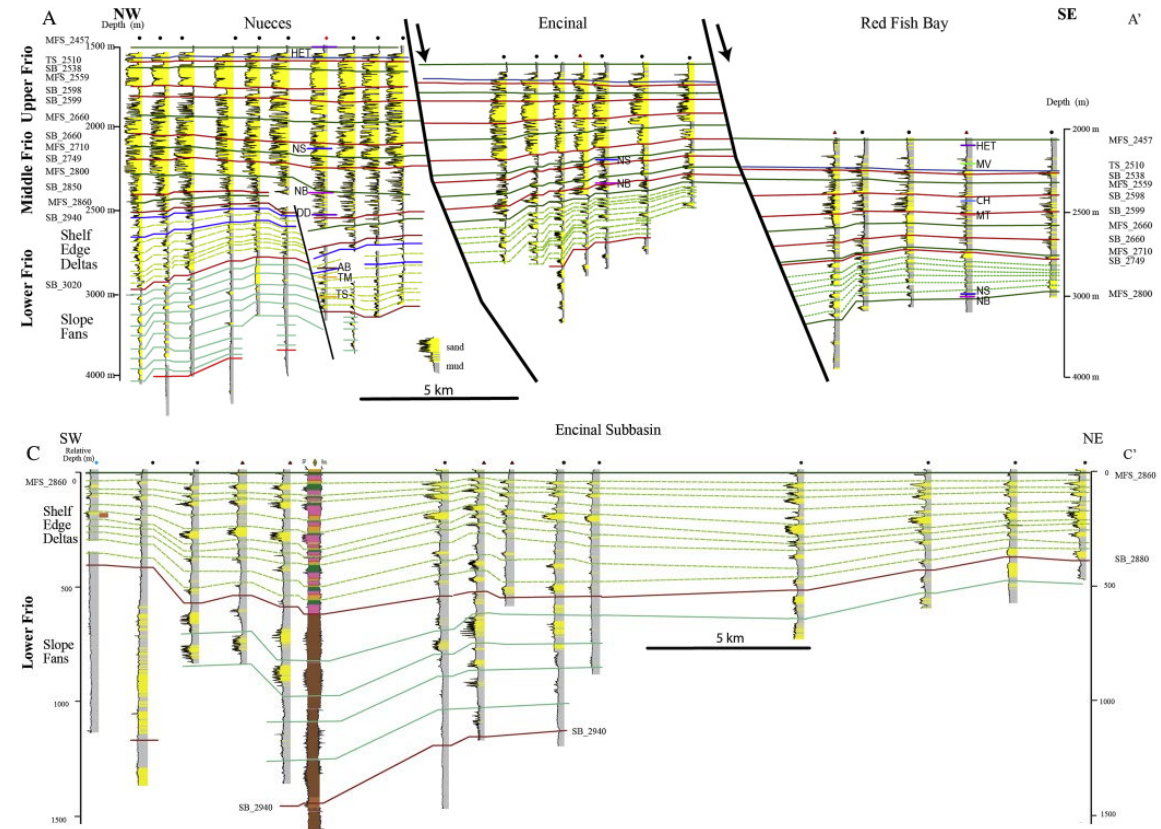
Key Findings and Their Impact:

- Geologically, the Frio Formation is more heterogenous than initially anticipated.
- Injection will require complex scheduling.

Challenges and Mitigations:

- Absence of seismic and core data for pre-feasibility study — acquisition of data during Phase II.
- No information on fault geometry and transmissibility — use structure mapping to assess displacement.
- Homogeneous reservoir properties — reduce injection rates to limit plume migration.
- Heterogeneous reservoir properties — reduce cell height to reduce averaging effects of interbedded sandstones and shales.

Example of Existing Stratigraphic Cross-Section (near AoR-6)



Olariu, M.I., Hammes, U., Ambrose, W.A., 2013, Depositional architecture of growth-fault related wave-dominated shelf edge deltas of the Oligocene Frio Formation in Corpus Christi Bay, Texas, *Marine and Petroleum Geology*, v. 48, p. 423-440. <http://dx.doi.org/10.1016/j.marpetgeo.2013.09.009>

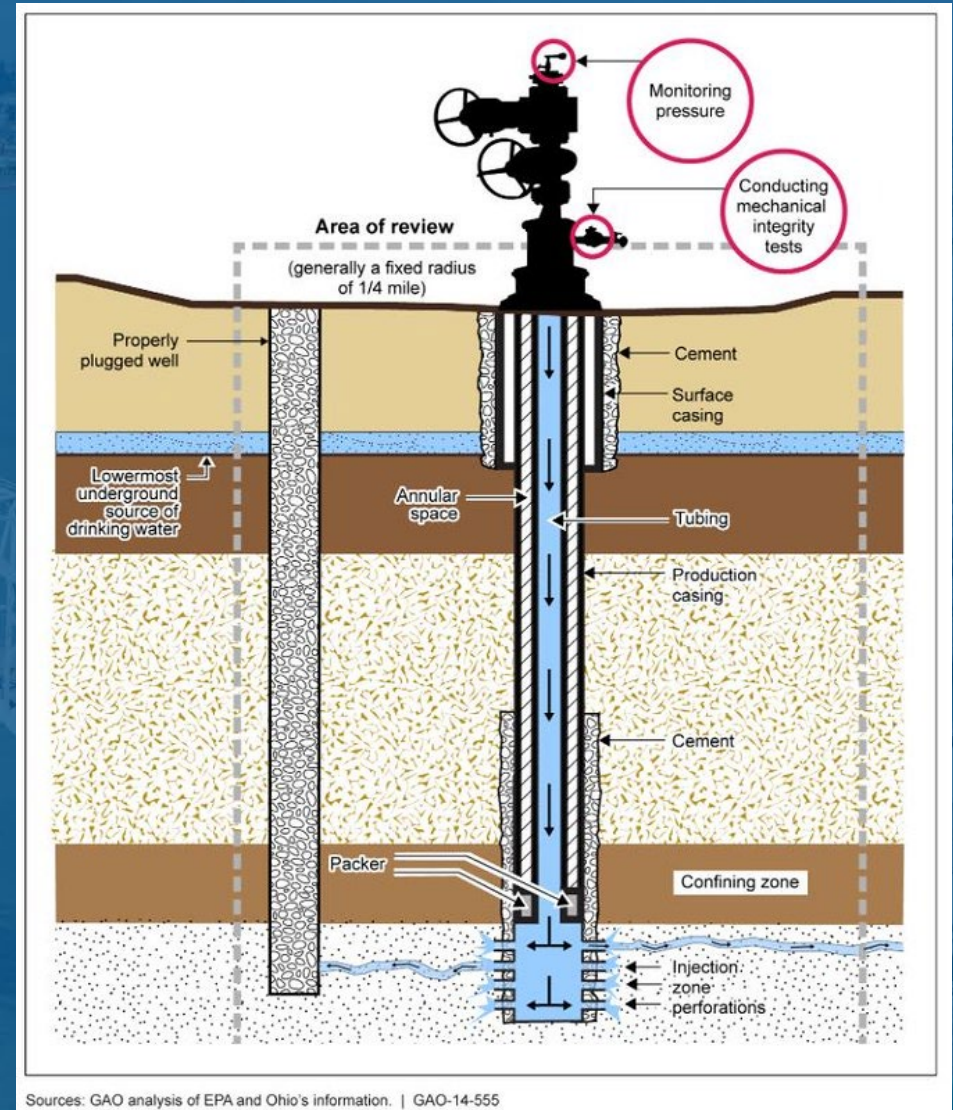
Current Status of Project and Accomplishments

National Environmental Policy Act: (Lead: HEP)

- Agency Kickoff Meetings
- Project Site Visits
- Wetland Delineations
- Cultural Resource Phase/Archaeological Intensive Survey & Report
 - Historical Resource Consultation
 - Community/Stakeholder Engagement
 - Environmental Assessment

Class VI Well Permitting: (Lead: TotalEnergies)

- Agency Consultation
- Emergency Response Planning
- Contractor Safety Management
- Process Safety Management
- Data Management

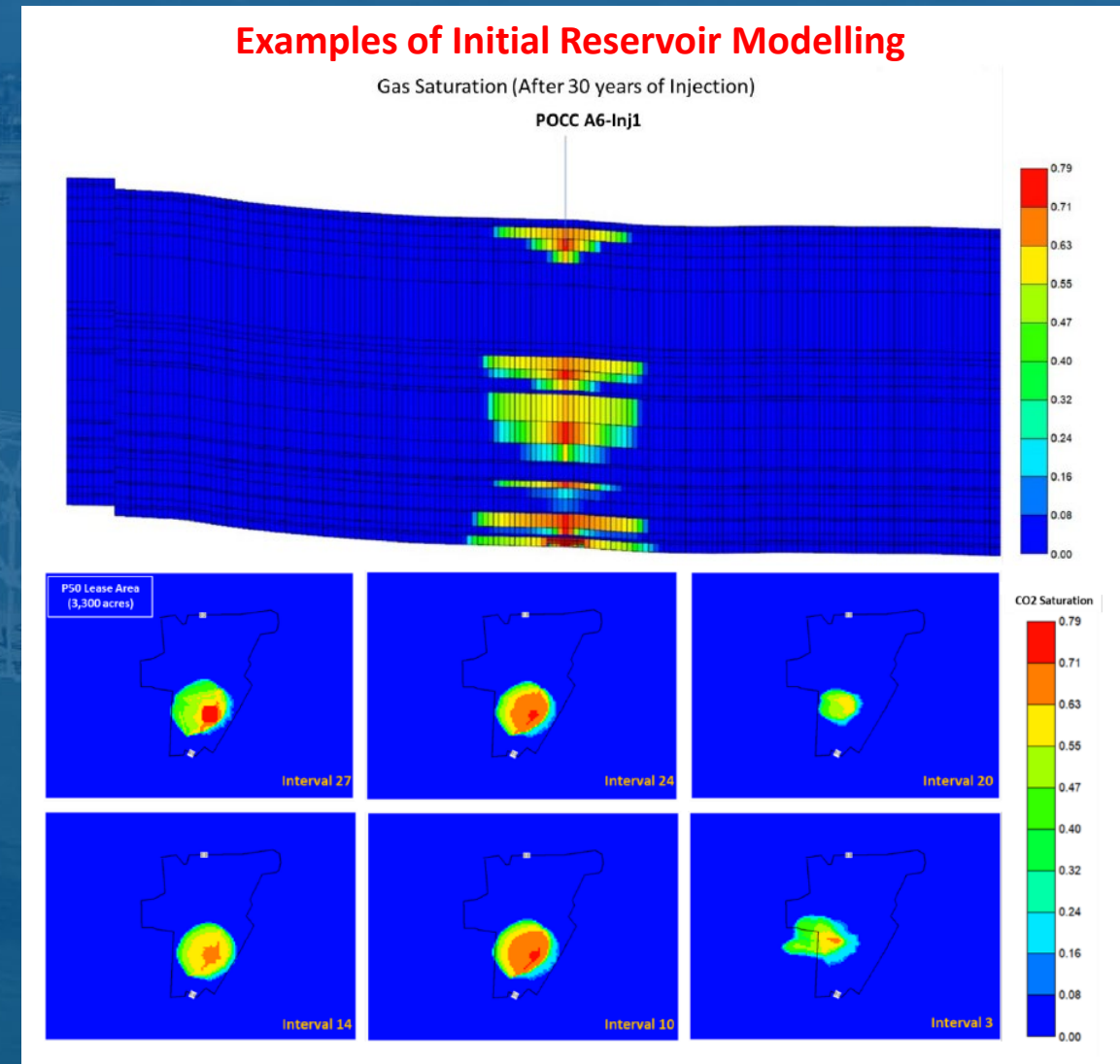


Sources: GAO analysis of EPA and Ohio's information. | GAO-14-555

Next Steps

Scope of Work:

- Integrate available data to characterize Frio and Margarita A (*i.e.*, Marg. A) Sandstone units in storage complex.
- Model storage resources, flow behavior, plume migration, and pressure propagation.
- Identify all relevant risks using the NRAP tools; maintain risk register and mitigation plans.
- Develop a Monitoring Plan for safe and permanent storage in AoR-6.
- Create a detailed technical and regulatory plan for UIC Class VI permit requirements.
- Conduct a comprehensive techno-economic analysis of the Project
- Prioritize project benefits in historically underserved and disadvantaged communities.



Thank you.



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