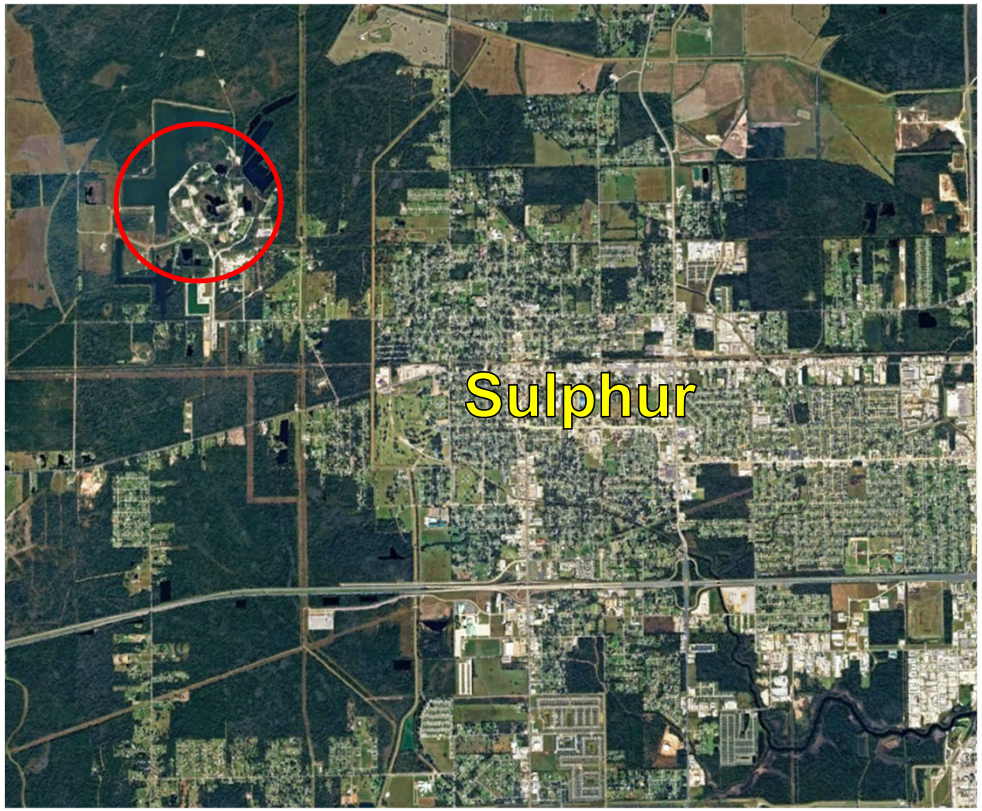
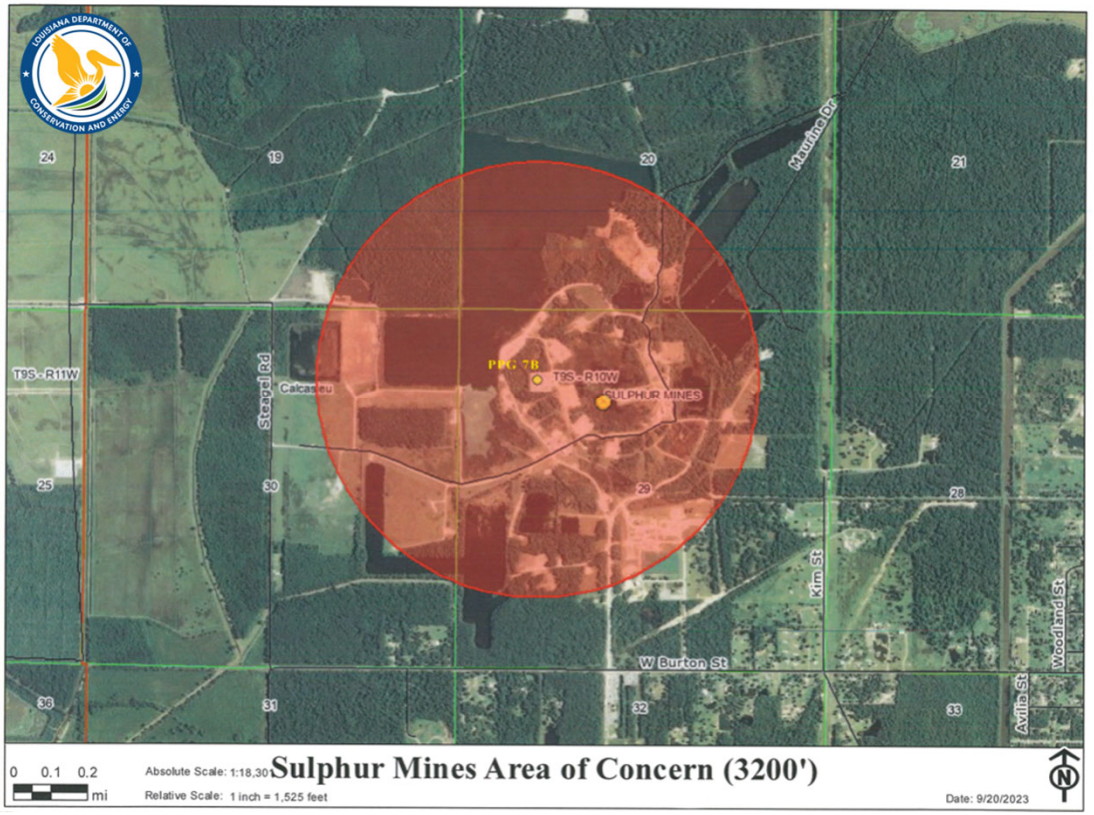
Sulphur Mines Community Update

LOUISIANA DEPARTMENT OF
CONSERVATION AND ENERGY

February 5, 2026

Location and Area of Concern

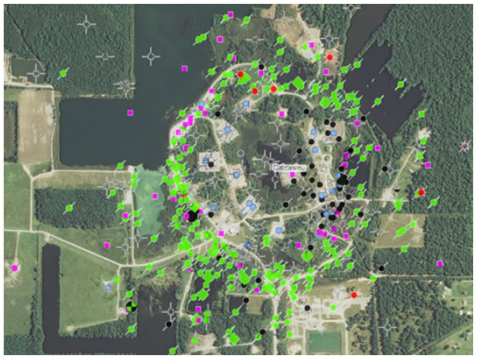




Area of Concern (3200' radius) designated in 2023.

Sulphur Mines Salt Dome History

- **70+ years** of **sulfur** extraction from the caprock (1860s - 1930s)
- **90+ years** of **oil and gas** exploration (since the 1920s)
- **80+ years** of **brine mining** of rock salt (since the 1940's)
- **60+ years** of **saltwater waste disposal into the caprock** (1960's)
- **50+ years** of **oil and product storage** in salt caverns (since the 1970's)



Above: 1-million ton block of sulfur (40' tall). About 10.5 million tons were produced from the Sulphur Mines dome

Sulphur Mines Current Dome Operations

Currently two <u>active cavern operators</u> at Sulphur Mines:

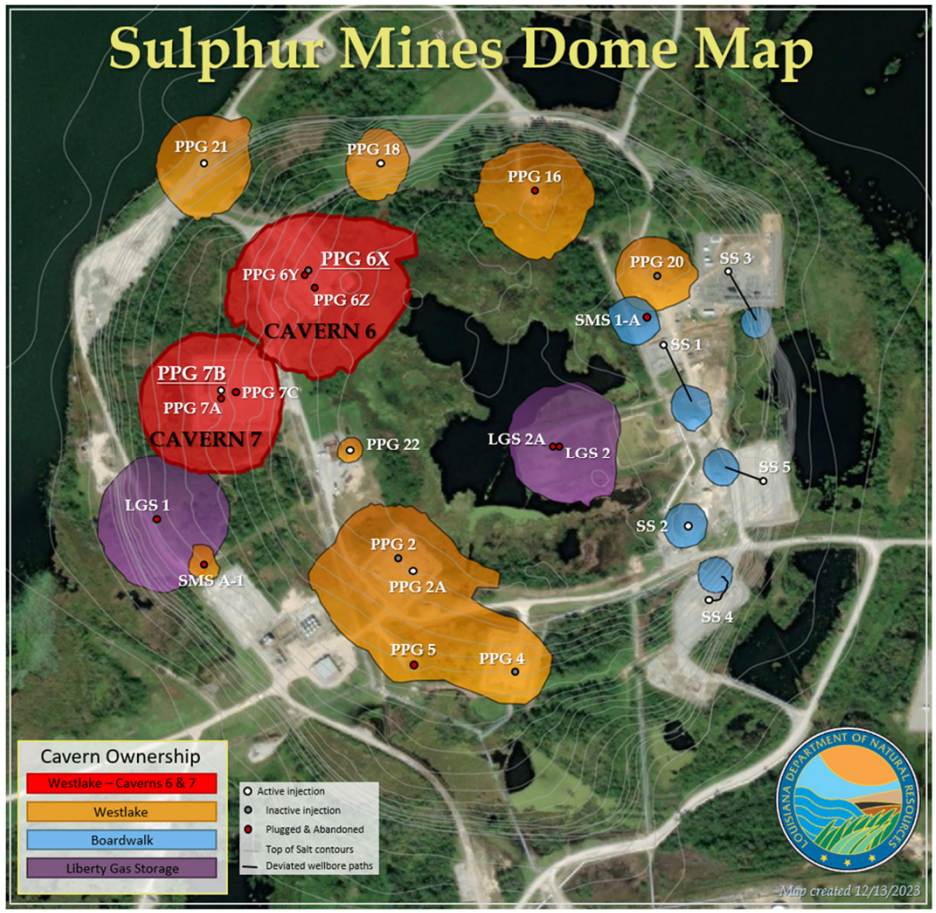
- **Westlake US 2 LLC**
  - Creates **brine** by dissolving the salt and pumping it out.
  - The brine is used to support manufacturing processes at chemical plants in the Lake Charles area.
- **Boardwalk Louisiana Midstream, LLC**
  - Uses **four** active underground caverns to store 3 million barrels of liquefied petroleum gas (LPG).
  - The products stored include **ethane, propane, and ethylene.**

One <u>inactive cavern operator</u>:

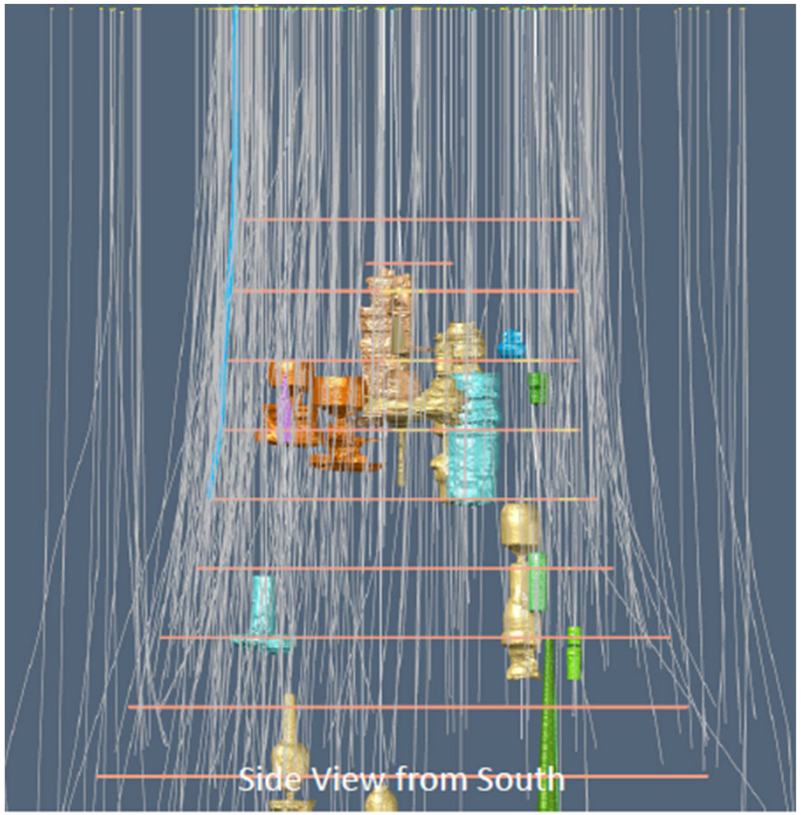
- **Liberty Gas Storage LLC**
  - Two caverns, LGS-1 and LGS-2, were **plugged** in 2016.

One <u>active oil and gas operator</u>:

- Yellow Rock, LLC

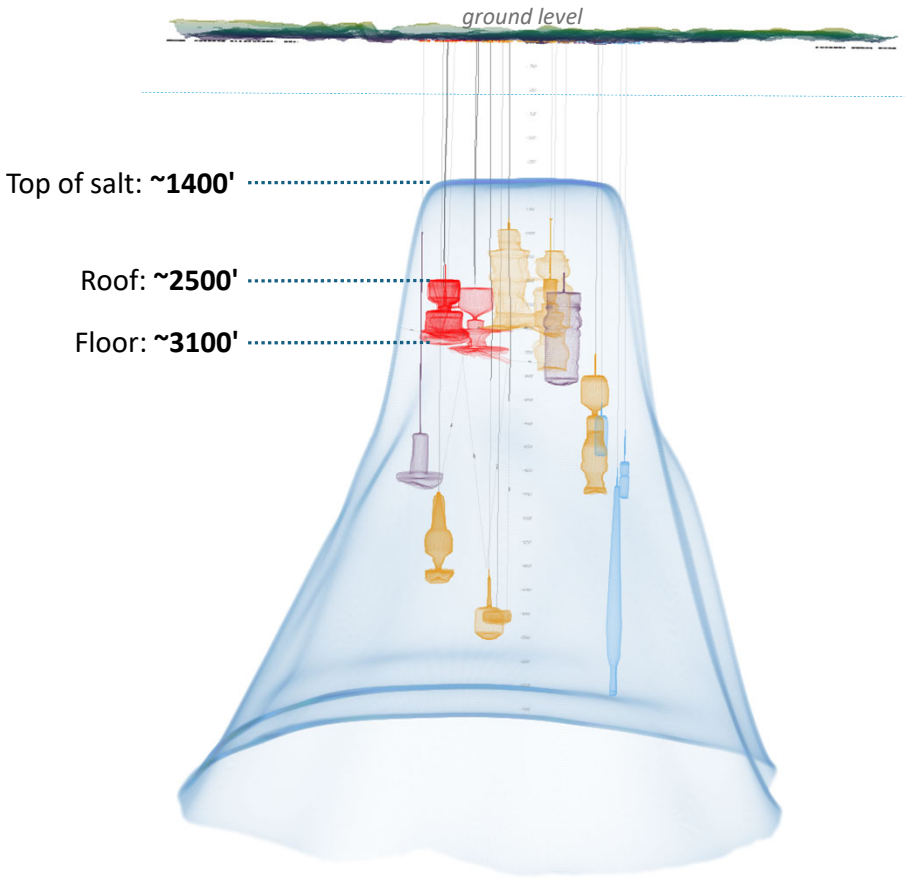


Below the Surface



3/12/2022

Lonquist

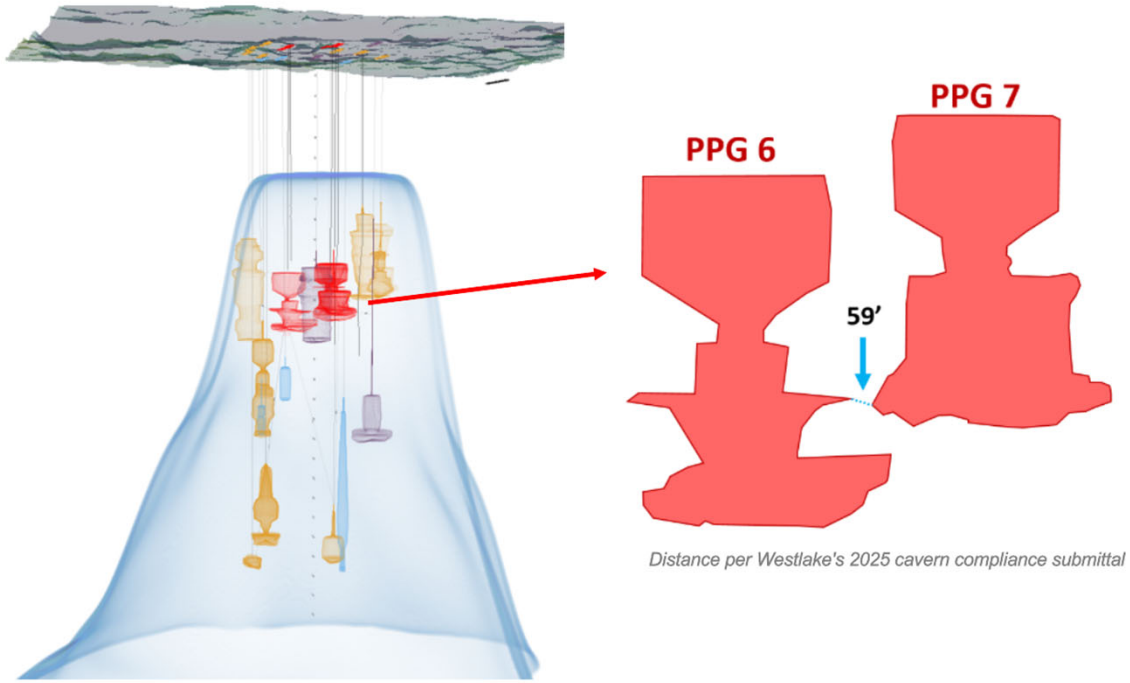


Caverns 6 and 7

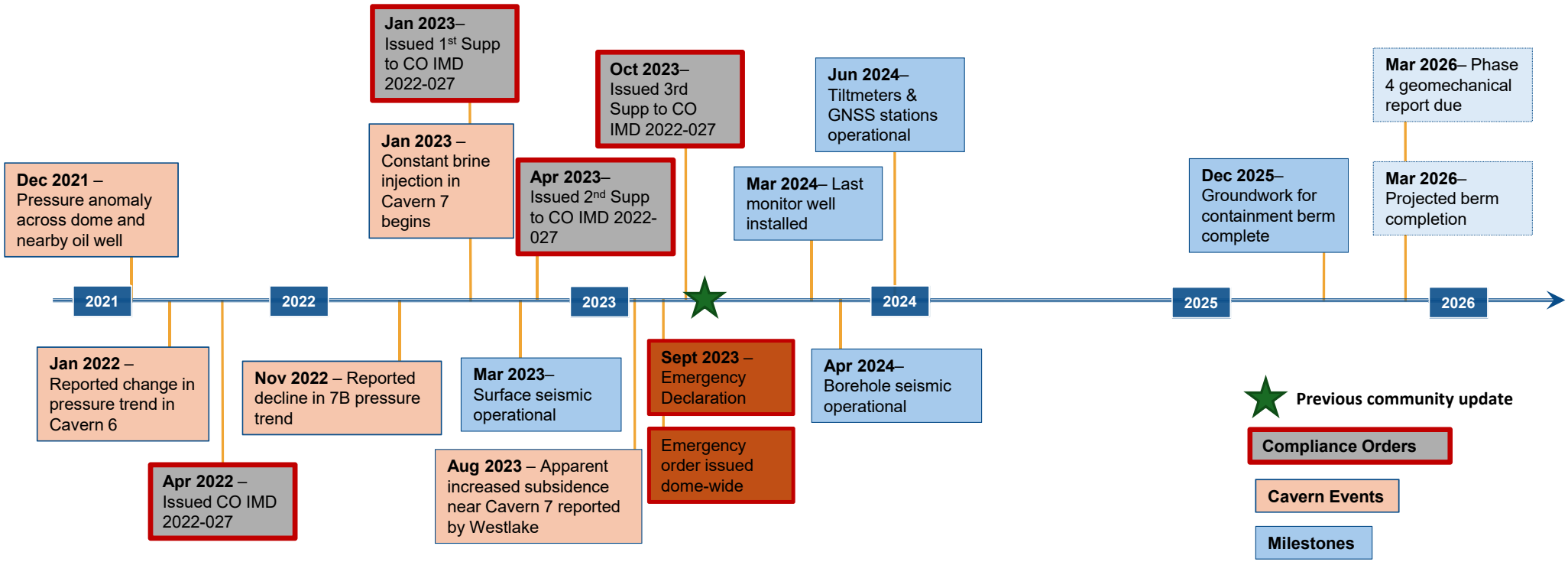
Caverns 6 & 7 were drilled in the 1950s and brine mined until the 1970s when the Department of Energy bought them (and the PPG 2-4-5 gallery) to store imported crude oil for the **Strategic Petroleum Reserve**.

PPG 6 and PPG 7 are only **59 feet** from each other, and it is presumed PPG 6 is leaking into PPG 7.

Cavern 7 is around 200 feet from the edge of the salt dome.



Timeline


Dec 2021 – Pressure anomaly across dome and nearby oil well
Jan 2023– Issued 1st Supp to CO IMD 2022-027
Jan 2023 – Constant brine injection in Cavern 7 begins
Apr 2023– Issued 2nd Supp to CO IMD 2022-027
Oct 2023– Issued 3rd Supp to CO IMD 2022-027
Mar 2024– Last monitor well installed
Jun 2024– Tiltmeters & GNSS stations operational
Dec 2025– Groundwork for containment berm complete
Mar 2026– Phase 4 geomechanical report due
Mar 2026– Projected berm completion
2021
2022
2023
2024
2025
2026
Jan 2022 – Reported change in pressure trend in Cavern 6
Apr 2022 – Issued CO IMD 2022-027
Nov 2022 – Reported decline in 7B pressure trend
Mar 2023– Surface seismic operational
Aug 2023 – Apparent increased subsidence near Cavern 7 reported by Westlake
Sept 2023 – Emergency Declaration
Emergency order issued dome-wide
Apr 2024– Borehole seismic operational
Previous community update
Compliance Orders
Cavern Events
Milestones

Sinkhole Projected Impact

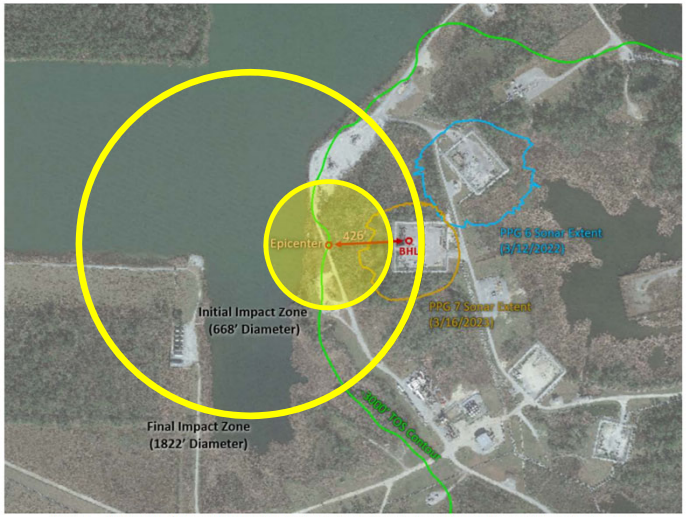


Figure 6 – Aerial View of Theoretical Sinkhole Projection Assuming Salt Dome Flank Collapse Involving Cavern 6 & 7.

Initial Impact Zone

Final Impact Zone

Theoretical Sinkhole Comparison

Bayou Corne (actual)

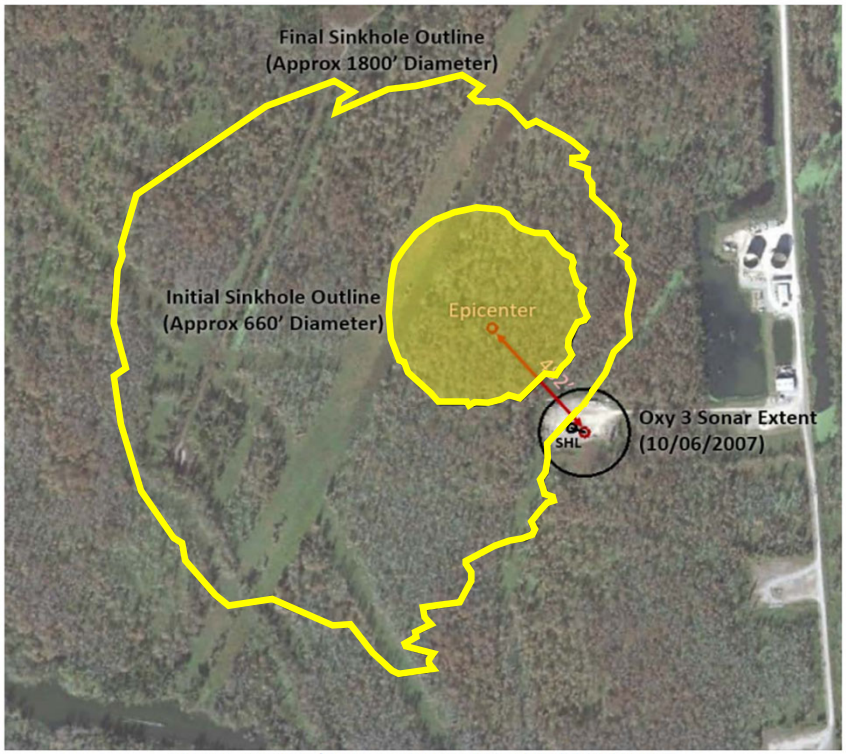


Figure 4 – Top View of Oxy Cavern No. 003 Initial and Final Sinkhole Extents

Sulphur Mines (projected)

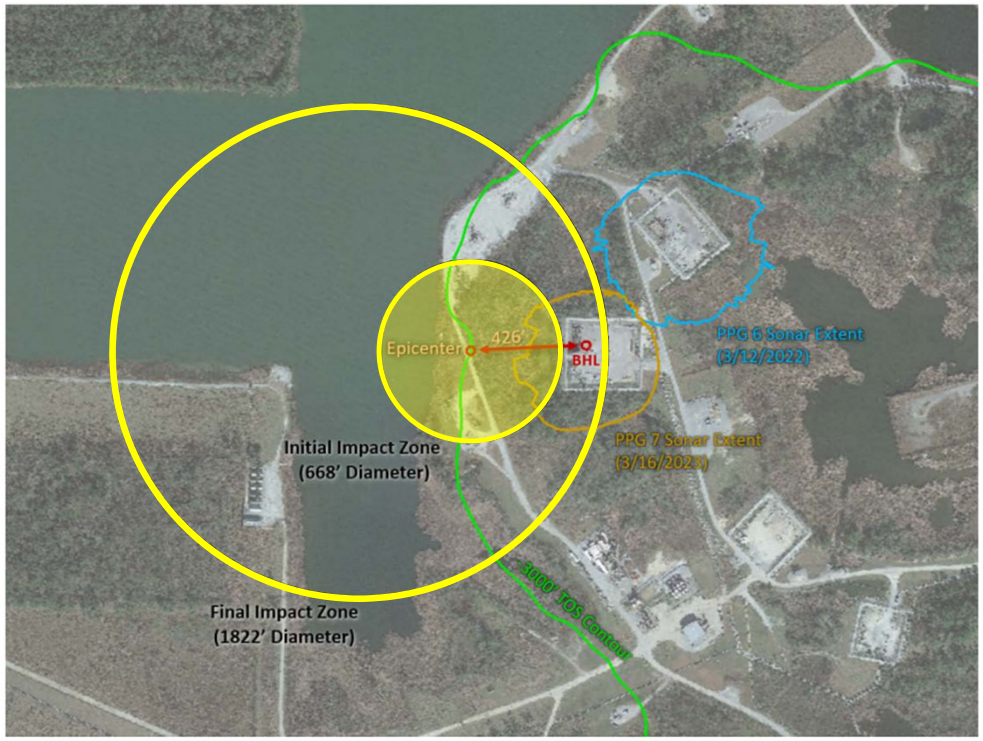
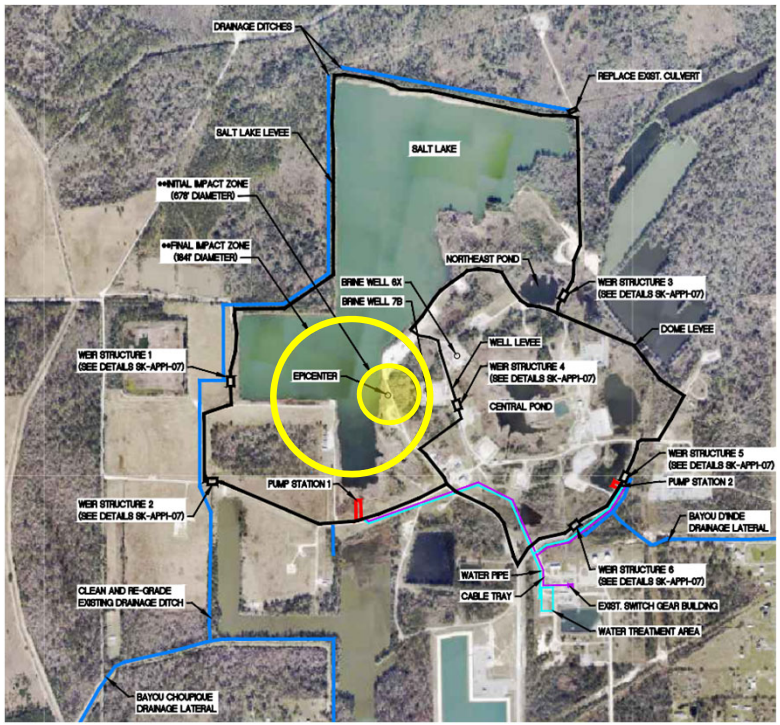


Figure 6 – Aerial View of Theoretical Sinkhole Projection Assuming Salt Dome Flank Collapse Involving Cavern 6 & 7.

Source: Technical Summary Report: Cavern No. 006 & No. 007 - submitted by Westlake 9/20/2023

Containment Levee



drainage

levee

Purpose:

- The levee acts as a barrier around the site to prevent flooding or any surface impact from getting offsite.
- It provides an extra layer of safety to the environment and community in the event of a collapse.

Project timeline:

- Groundwork: Completed December 31, 2025
- Pumping stations: Expected by the end of March 2026.

Monitoring

Groundwater Monitoring

Purpose:

- Protect the underground source of drinking water (USDW).

What is sampled:

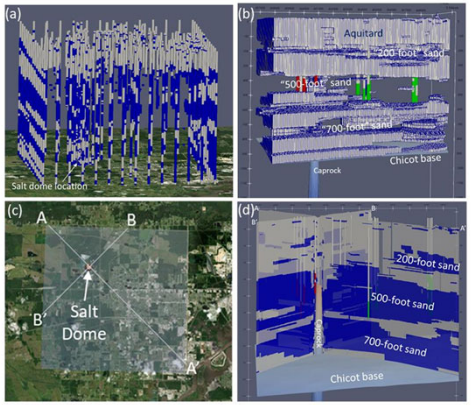
- Five Industrial wells to the west of the dome
- Nine dedicated monitor wells above the salt dome

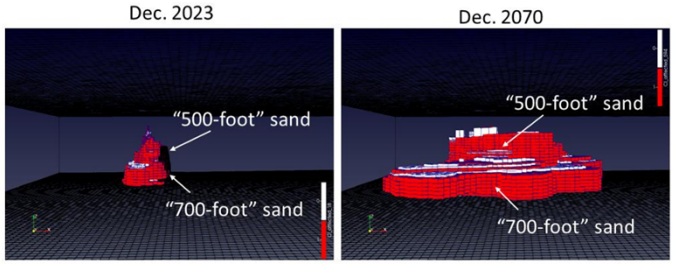
What the monitoring has shown so far:

- Sampling to date has not shown elevated results.

Groundwater Monitoring

- Three independent groundwater studies and modeling were performed:
  - **ERM** (on behalf of Westlake)
  - **LSU** – Chicot aquifer
  - **TetraTech** – Chicot + Evangeline aquifers
- Multiple modeling scenarios were run
  - Scenarios show similar results
    - 2070-earliest modeled impact to public supply wells
  - Installed monitor wells are placed to capture potential impacts





(b)

Subsidence Monitoring (Surface Movement)

Purpose:

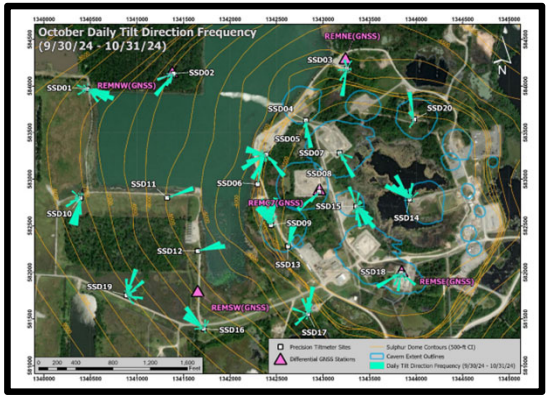
- Small ground movement will be detected that cannot be visually seen at surface.

How the system works

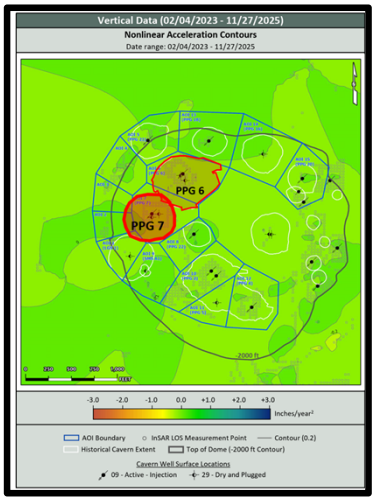
- Highly sensitive instruments (tiltmeters, GNSS stations, InSAR Monitoring, & Bathymetric surveys) collect data.

What the monitoring has shown so far

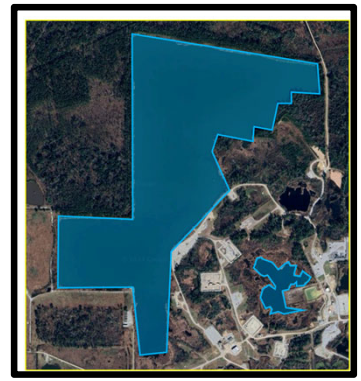
- No unusual ground movement related to Cavern 7.
- Minor changes detected are mostly related to natural or local factors like rainfall and levee construction



Tiltmeter & GNSS stations map



Latest InSAR results



Bathymetric survey coverage

Installed tiltmeter station

Installed InSAR corner reflector

Microseismic Monitoring

Purpose:

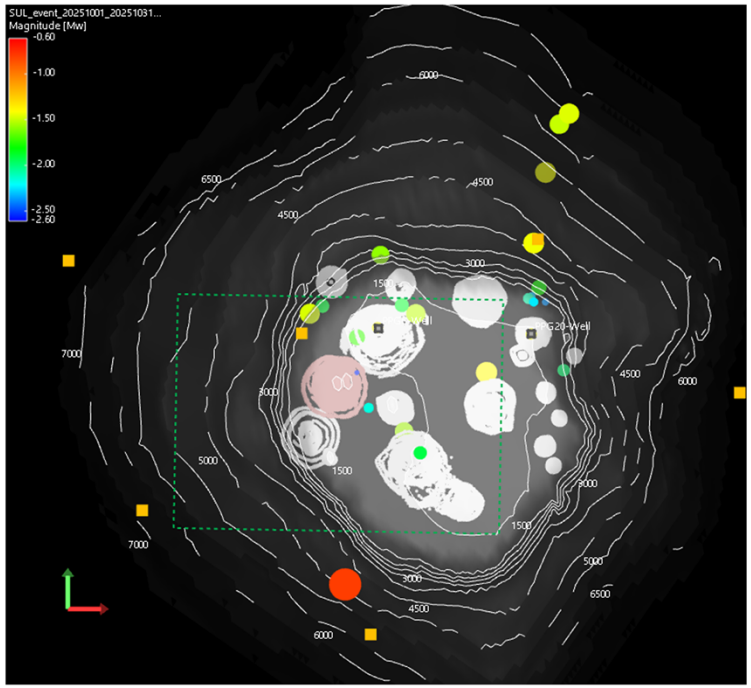
- A system that detects very small underground vibrations that are not felt at the surface.
- The events help identify movement or changes within the salt.

How the system works

- The sensors are installed at the surface and in two existing cavern wells.
- The sensors detect tiny movements within the salt.
- Data is collected and continuously reviewed by experts. Reports are sent to C&E monthly and posted to the website.

What the monitoring has shown so far

- Activity levels are compared to other monitored salt domes in Louisiana (such as at Bayou Corne).
- Alert levels help determine when closer view or action is needed.
- The largest magnitude event recorded to date is –0.3.



Geomechanical Study

Purpose:

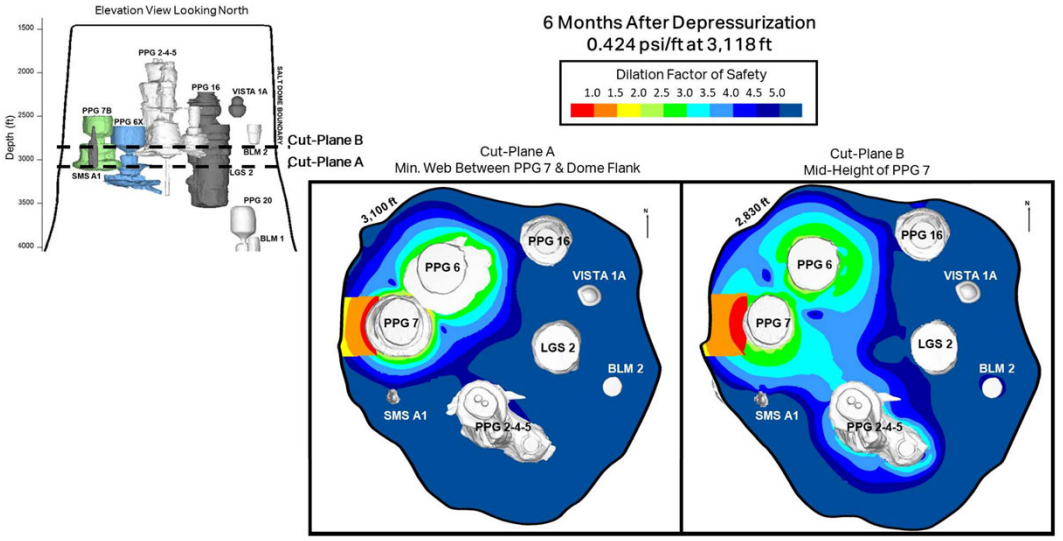
- A model to simulate how the salt responds to pressure changes across the dome.

Why the study is necessary

- The work helps C&E and operators understand what's happening underground to support decisions about monitoring, safety, and future actions.

What the study has shown so far

- Early results suggest weaker salt near the edge of the dome.
- The study is continuing in phases to refine the model.

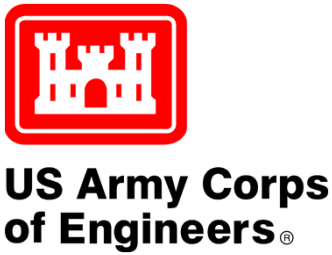


*The study is being performed on behalf of Westlake, and results are verified by C&E and its third-party contractors.

C&E Recap

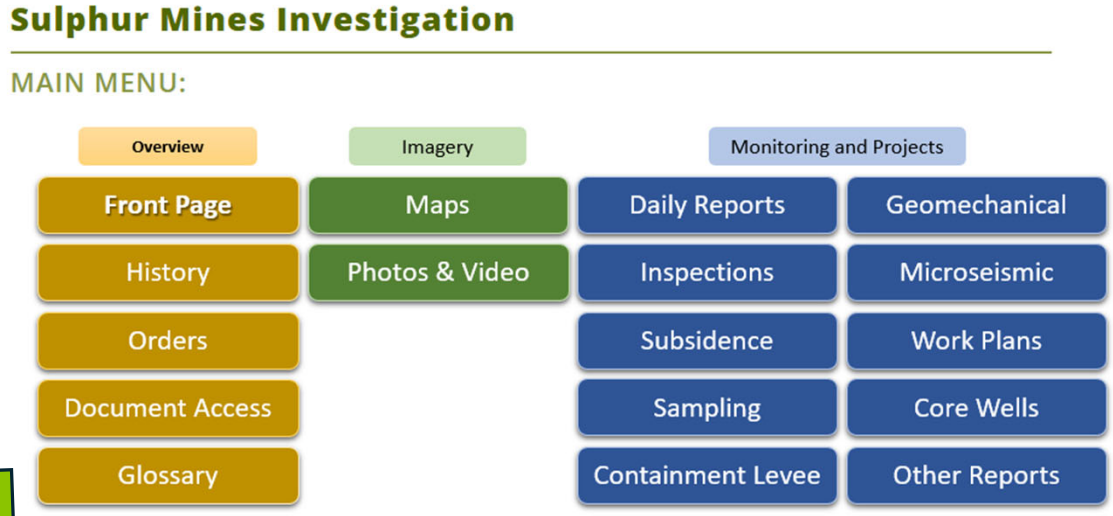
- Since 2022, C&E has issued **four** compliance orders to Westlake regarding PPG 7, including civil penalties.
- C&E has contracted three entities (LSU, TetraTech, and Agapito) to provide modeling and technical support to this ongoing emergency.
- C&E meets regularly with Westlake, dome operators, and other state and federal agencies.
- Office and inspection staff regularly visit the site to witness activities performed by Westlake
- C&E staff reviews all incoming data with the assistance of technical experts.

Coordinating Agencies & Consulting Experts



C&E Website Access

www.dce.louisiana.gov

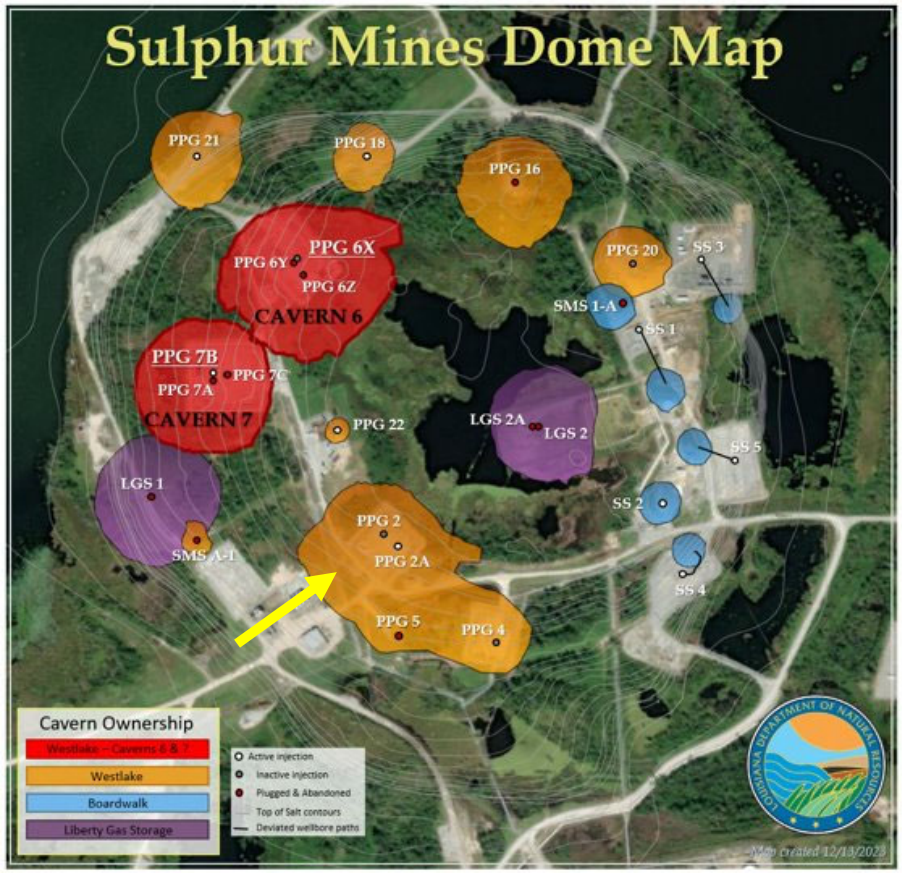


Or google "**DCE Sulphur Mines**"

PPG 2-4-5

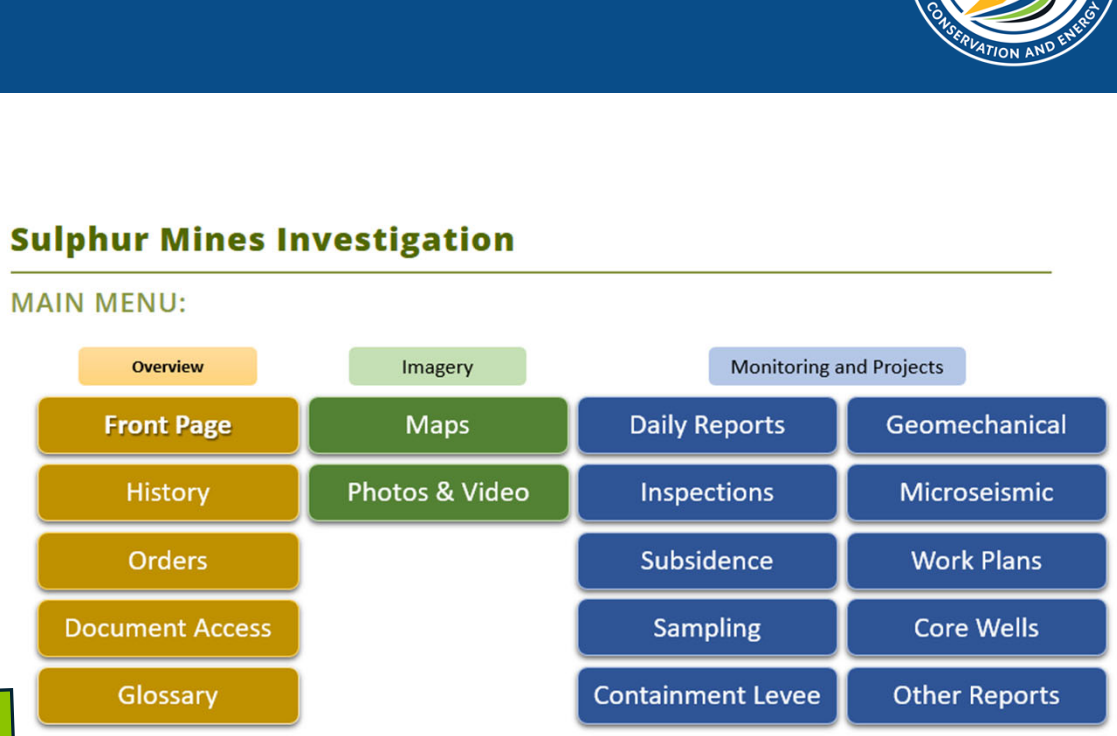
PPG 2-4-5

- Pressure decrease observed August 2025
- Casing inspection results indicated casing leak
- Temporary plug placed in wellbore to prevent brine from escaping the well
- Reviewing P&A options for PPG 2 wellbore



C&E Website Access

www.dce.louisiana.gov



Or google "**DCE Sulphur Mines**"

Email: Patrick.Courreges@la.gov
Phone: 225-342-0510

Westlake Compliance Items

Completed

- Emergency Response Plan
- Decommissioning Plan
- Analysis:
  - Historical sonar comparison
  - 3D Seismic
  - Failure
  - Groundwater
  - Thermal imagery
  - Subsidence

Monitoring/Ongoing

- Ground subsidence
- Groundwater
- Surface water
- Caverns
- Daily inspections and reports
- Geomechanical analysis
- Containment levee

Third-Party Contractors

Agapito Associates, Inc. ENGINEERS & GEOLOGISTS	LSU	TETRA TECH
• **Team of salt cavern experts** • Provide general scientific and engineering guidance regarding pressure data, deformation monitoring, geomechanical, and sampling.	• **Dr. Frank Tsai – Professor of Engineering and Groundwater modeling expert** • Modeled chlorides and H_2S transport in the groundwater through the different sands of the Chicot aquifer.	• **Environmental consulting firm with hydrogeologists that specializes in groundwater modeling with experience with Bayou Corne.** • Similar to LSU's groundwater transport model but focused on Chlorides and hydrocarbon transport through the Chicot and underlying Evangeline aquifer.