

Bayou Corne Cavern Collapse Technical Summary

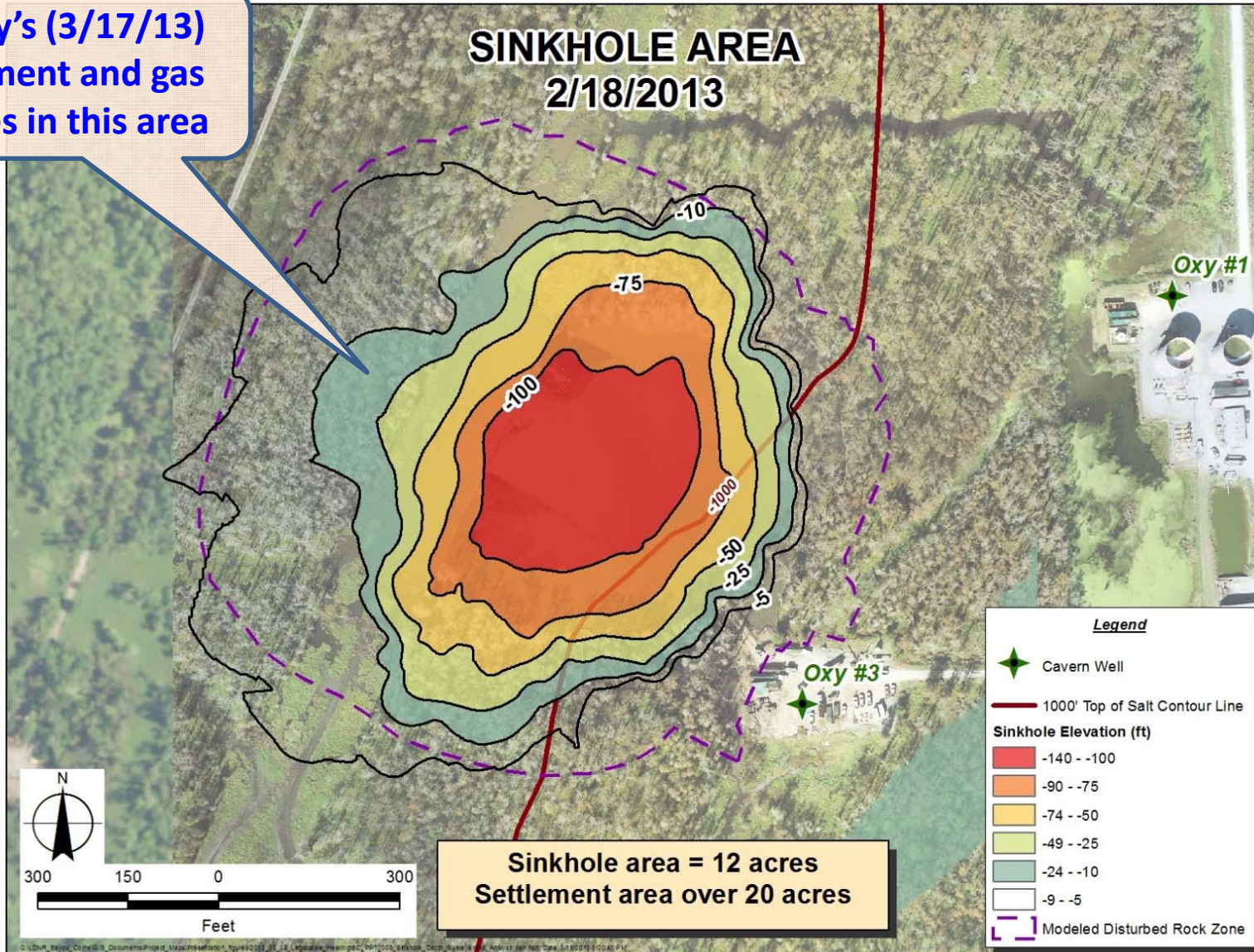
Gary R. Hecox, Ph.D., PG

CB&I

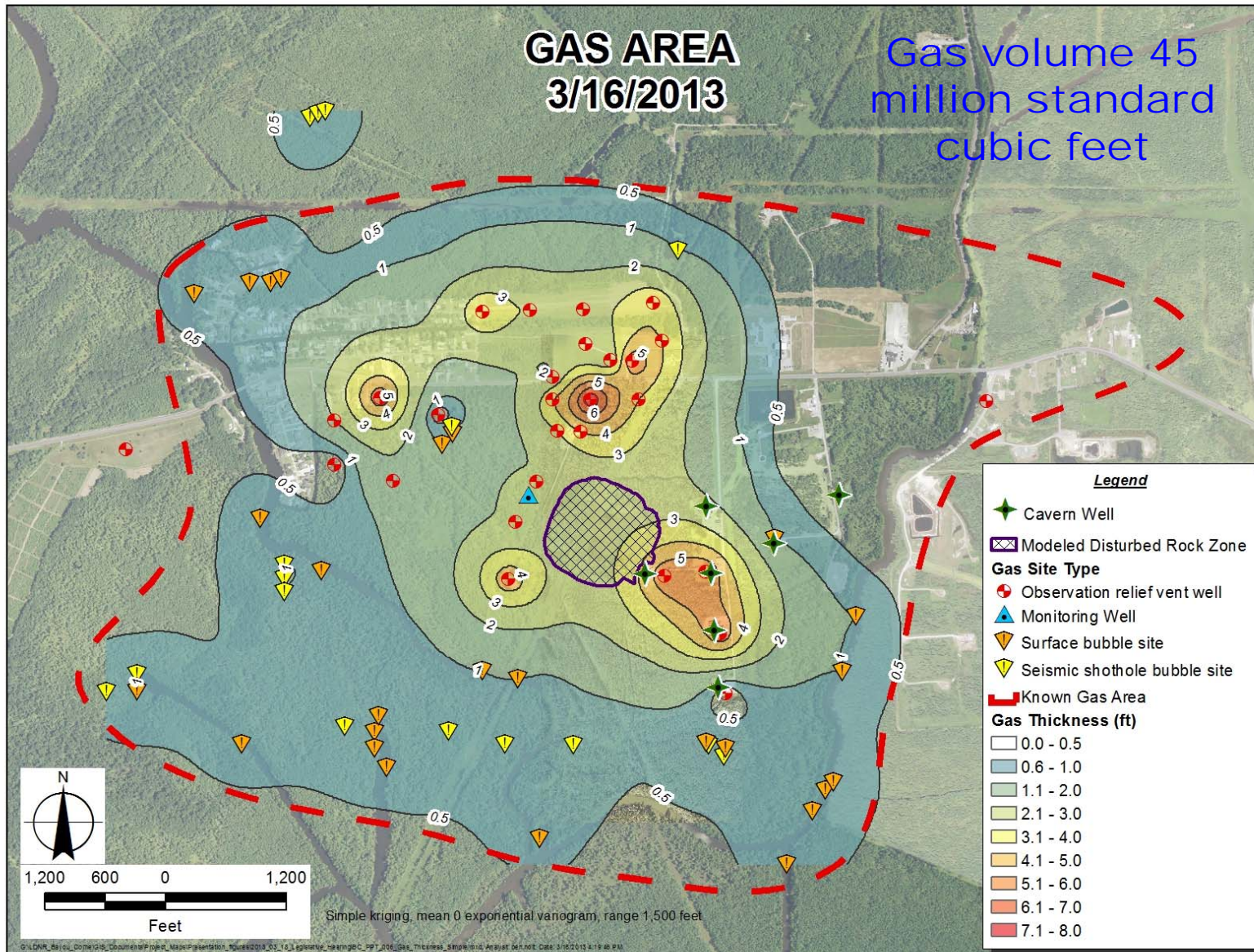
March 18, 2013

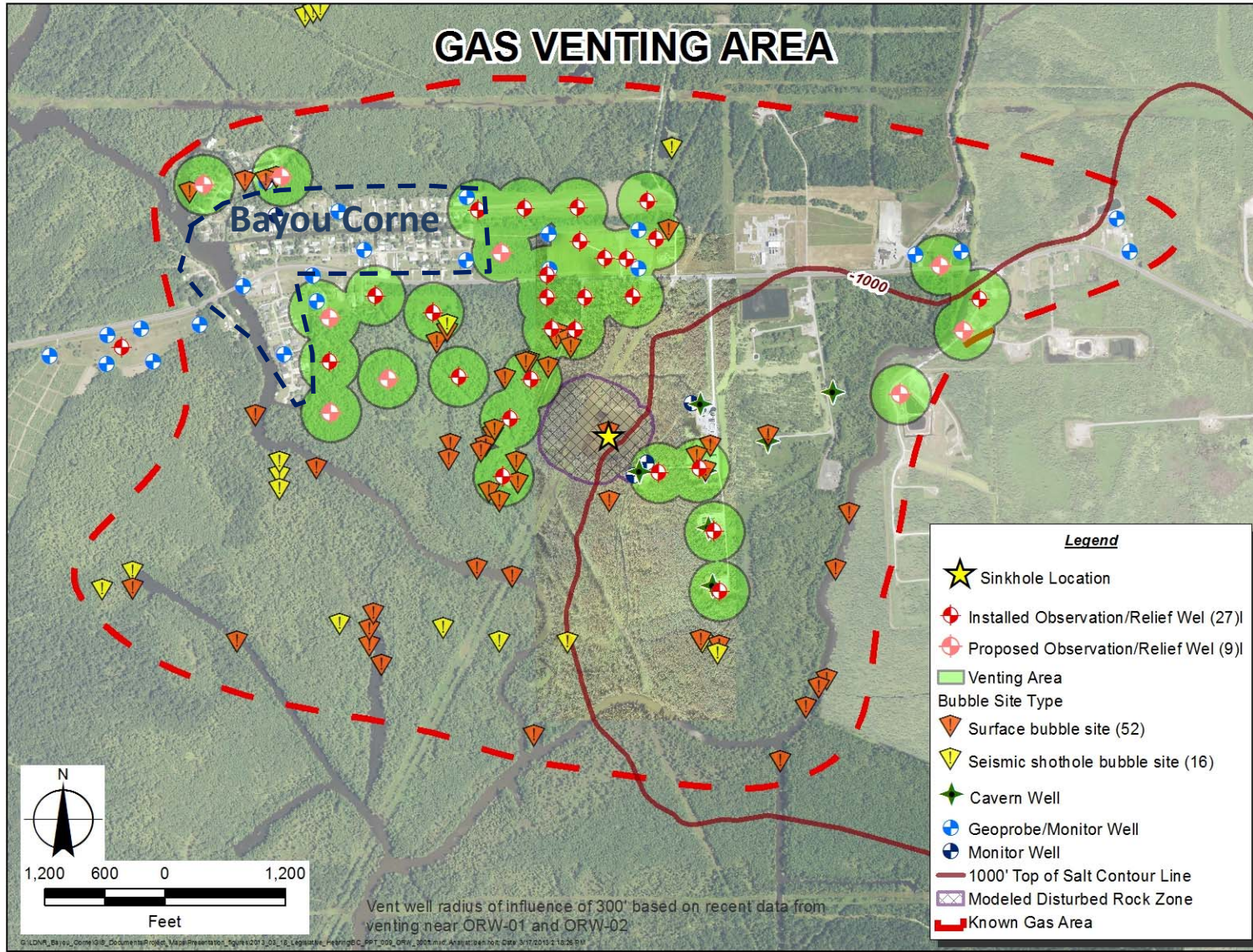
Louisiana State Legislative Committee Hearing

Sunday's (3/17/13) settlement and gas bubbles in this area

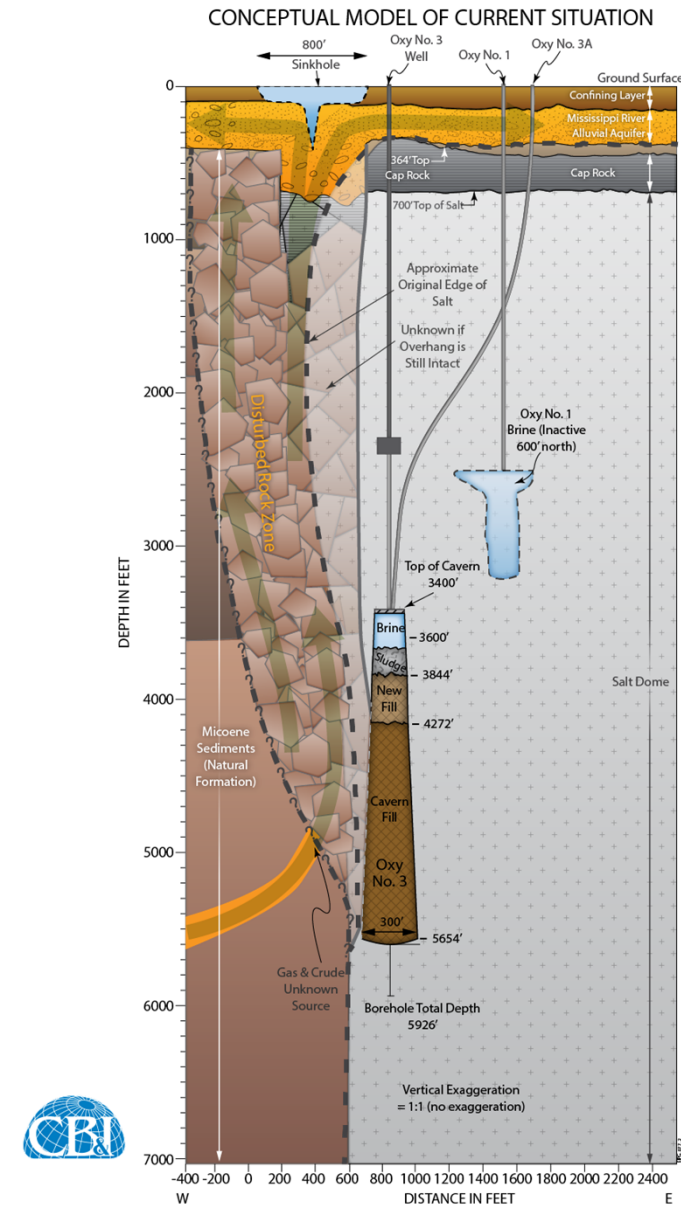


- Remediation goal: *Reduce gas pressures so gas can no longer migrate to the surface*
- 19 wells venting in MRAA; 8 shut in
 - Venting ~120 mcf/d
 - Stable wellhead pressures,
 - Effective radius of influence ~250-300 feet
- Install additional vent wells below Bayou Corne and Grand Bayou communities
- *Gas migrating into MRAA requires long-term management*

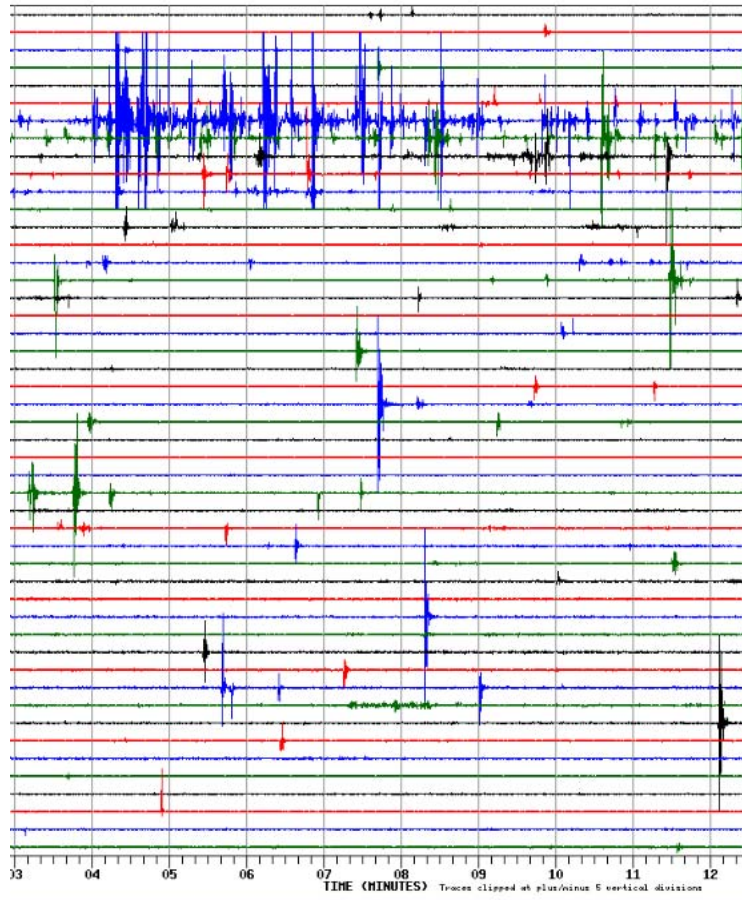




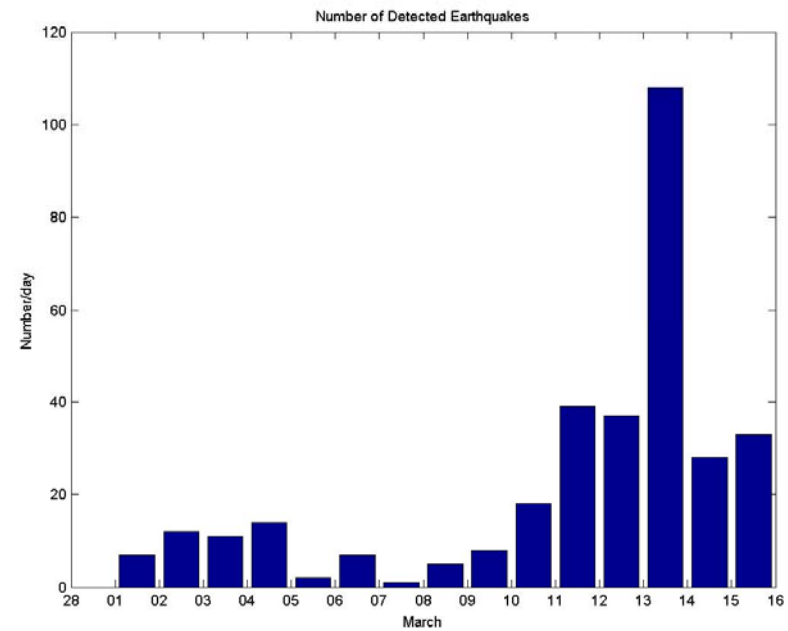
- Collapse still ongoing
- Cavern almost full
- Void space concern reduced
- Collapse being monitored with seismic array
- Implemented 3-level alert system based on rate of seismic events



DATA

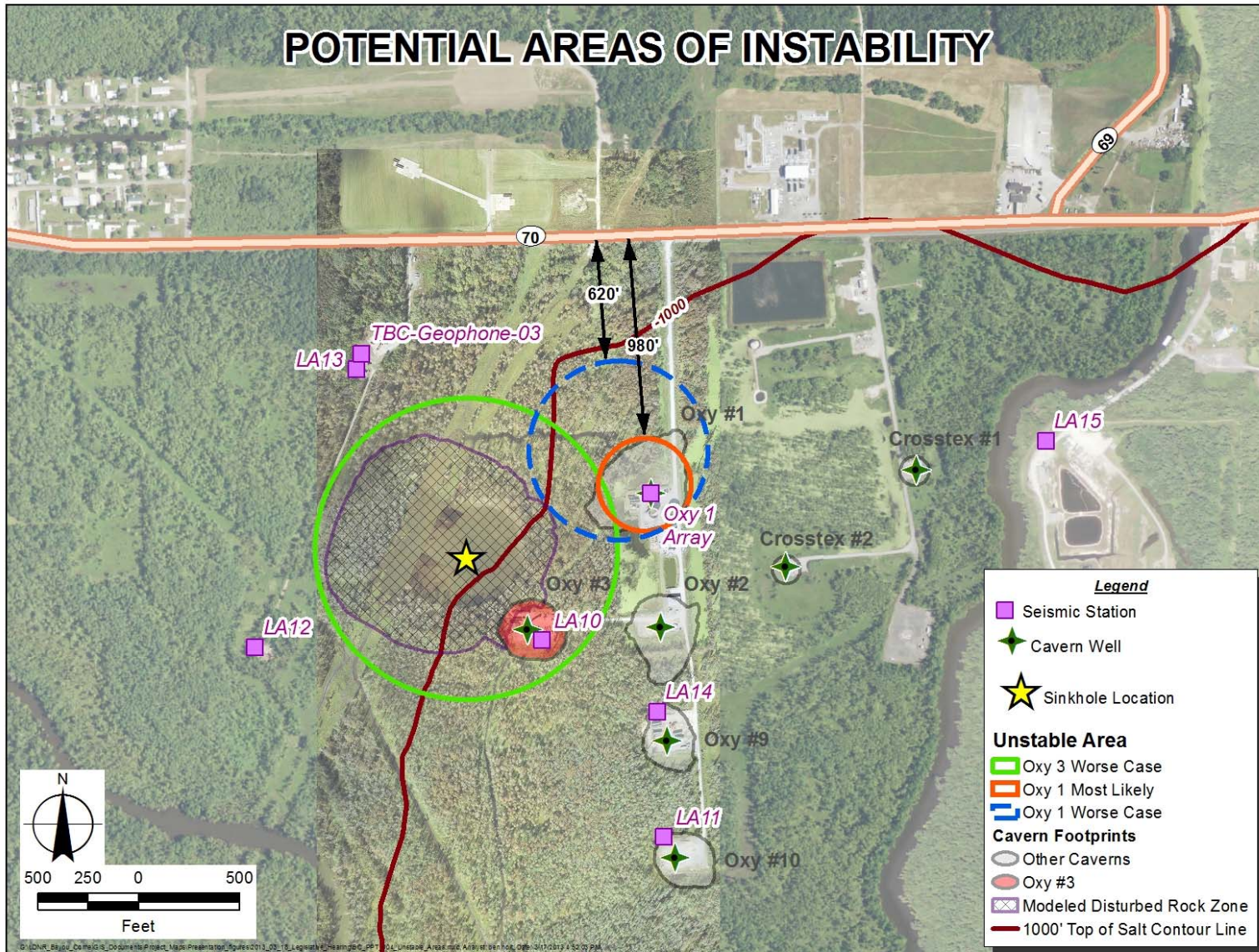


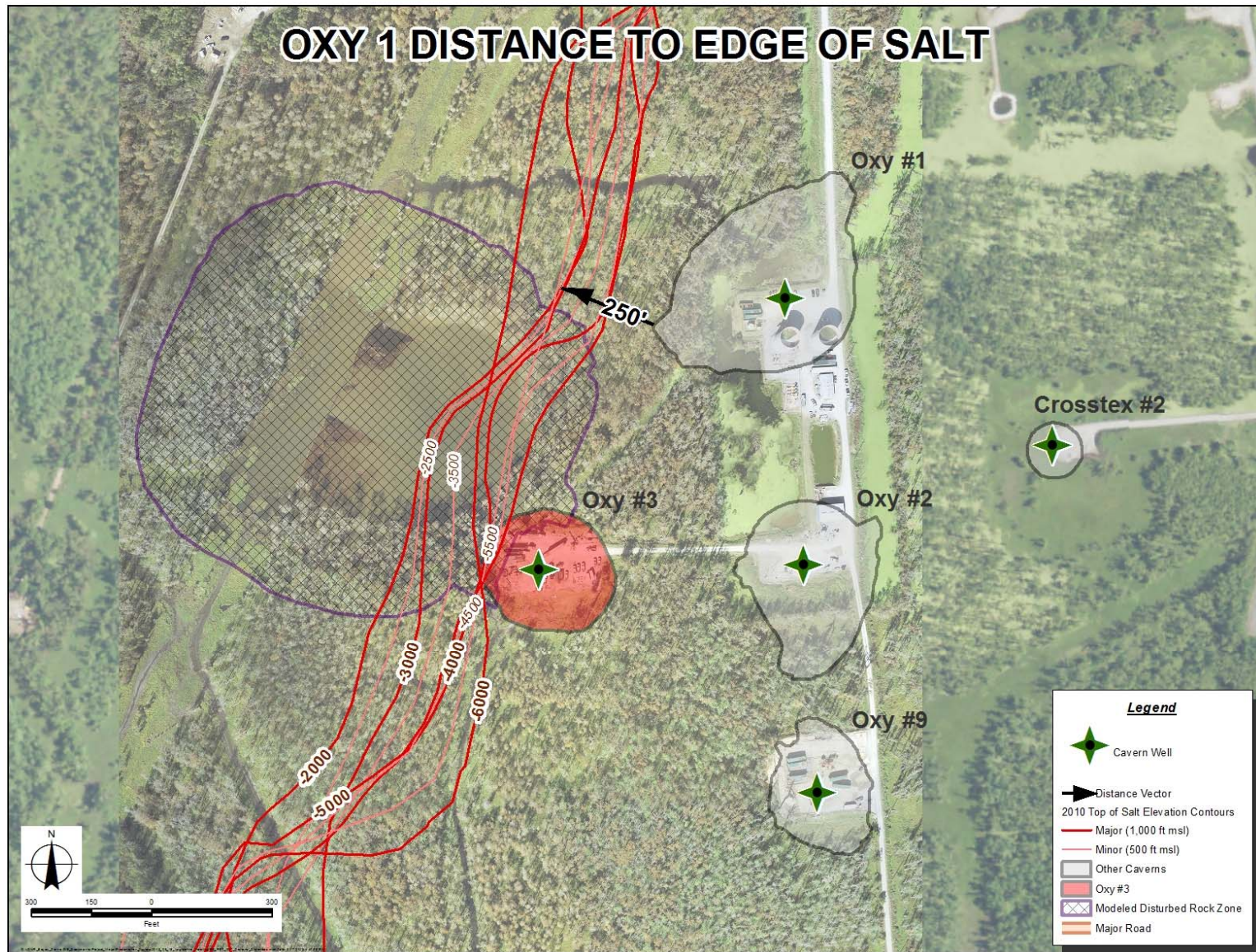
ANALYSIS



Data processed and analyzed by Dr. Horton, CERI, and Dr. Pettitt, Itasca; March 13, 2013 event

- 2013 VSP data delivered March 2013 indicates Oxy 1 near edge of salt. Approximately 250 feet.
- Situation similar to June 1—Start of hurricane season
- Initial sinkhole analysis of potential Oxy 1 failure completed
- Oxy 1 has been evaluated by DNR's four cavern experts—no indication of instability at present
- Most seismic events adjacent to Oxy 3
- Best thing to do with Oxy 1 is maintain pressure and monitor micro-seismic activity
- ***Any future collapse would be preceded by months of seismic activity near Oxy 1***





- ***Current surface & borehole seismic array is sufficient to monitor activity near Oxy 3 including Oxy 1***
- Micro-seismic borehole array in Oxy 1 cavern well proven to not be viable
- Micro-seismic borehole array in salt needed for long-term monitoring of salt movement at depth as conditions stabilize once Oxy 3 finishes collapsing
- DNR experts working in coordination with OEP and directing TBC on redesigned micro-seismic array



BAYOU CORNE CAVERN COLLAPSE AN UNPRECEDENTED EVENT

