Louisiana DNR
Office of Conservation
Assumption Parish 2012
Ongoing Investigation and Response
Bayou Corne/Napoleonville Salt Dome

- Slurry Area
- Area of potential instability
- Known area of instability
Sinkhole – Immediate Response/Orders

Received report of sinkhole/slurry in early hours of Aug. 3 – by end of day, DNR/Conservation had:

• Identified Texas Brine cavern as potential cause
• Issued emergency order to Texas Brine to evaluate cavern integrity and remediate
• Issued orders to pipelines to empty and shut in – Crosstex pipeline experienced deflection
• Issued notice to cavern gas storage operators to take precautions
• Formalized Science Work Group and set up meeting at LSU
• Made initial determination of potential area of instability
Aug. 9 – DNR/Conservation ordered Texas Brine to drill investigatory well to the abandoned cavern

- Permit submitted and approved on Aug. 13 deadline
- Science Work Group concurs with need for investigatory well
- All cavern operators instructed to report daily activities and monitoring efforts
- Conservation/DEQ began joint effort to evaluate potential hydrocarbon/saltwater impact on aquifer
Advised Texas Brine of permit requirement to provide public assistance when sinkhole formed

- Ordered Texas Brine to provide assistance retroactive to date of evacuation order
- Commissioner announces potential penalties for failure to comply with assistance order
Drill Rig On Site – Investigatory Well
Investigatory Well

**Current status:** At 600’ – surface casing being set – directional drilling will be at about 1,000’

- Drilling from nearby cavern pad
- S-Curve directional drilling to intersect cavern from the top
- Expected 40-day drill
- Blowout preventers and diverter system in place
- Conservation agents on site 24/7
Proposed Testing Upon Cavern Entry

• **Caliper Log from 3000’ to top of cavern at 3395’**
  – Data on condition of the salt immediately above the cavern roof

• **Temperature/Pressure log**
  – Temperature and pressure conditions in cavern and possible information on natural gas and brine in the cavern

• **Reservoir Performance Monitoring Log**
  – Data on stratification of natural gas, brine or other contents of the cavern
Proposed Testing Upon Cavern Entry

- **Sonar Survey**
  - In order to determine any change in cavern configuration
- **Shear Wave log**
  - Data related to condition of salt outside cavern and improving accuracy of seismic analysis
- **Direct Sampling**
  - Pressure, fluid and gas in cavern
- **Installation of geophone array**
  - Long-term seismic monitoring if deemed necessary
- **Confirmed as appropriate by Science Work Group**
## Science Work Group

### State and Local Government Participants

<table>
<thead>
<tr>
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# Science Work Group

## Federal Government and Industry Advisors

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Science Work Group Activity

- Meetings were held on:
  - August 6th
  - August 14th
  - August 17th
  - August 22nd

- Ongoing information exchange via emails and conference calls
Science Work Group Activity

Current theories for possible causes for slurry hole / bubbling

- Salt dome movement
- Regional tectonic activity
- Failed casing on OXY #3 well
- Cavern failure
- Salt or caprock instability
- Natural gas seepage
  - Into OXY #3 Cavern
  - Along flank of salt dome
- Combination of the listed theories
Work Group studied and reached consensus on:

- Commissioner’s decision to order drilling of investigatory well
- Evaluation/testing of existing water wells necessary and appropriate
- Tests proposed by Texas Brine for investigatory well are appropriate
- Crosstex determination that storage caverns had not been compromised
Response to Concerns Raised
Nearby Storage Caverns

Chevron Natural Gas Storage Cavern
• Chevron has already begun drawdown on cavern

Crosstex LPG No. 2
• Relocating butane load to Crosstex No. 1, located 800’ further away
• Conservation/DEQ reviewed expanded risk management plan submitted by Crosstex at request of DEQ
• Assessment indicates worst-case scenario of release and explosion at Crosstex No. 2 site would create force strong enough to break windows only to approximate 1,600’ radius – does not include Bayou Corne community
Distance Between Caverns

Most recent integrity test – July 2010
Crosstex # 2 Worst Case – Area of Maximum Impact

Radius
0.3 miles
Crosstex # 1 Worst Case– Area of Maximum Impact

Radius
0.3 miles
Existing ground water wells evaluated – sampling does not indicate presence of hydrocarbon or increased salinity in alluvial aquifer at these locations.
Ground Water Observation Well Plan

Observation well action plan for the Mississippi River Alluvial Aquifer developed as extra measure to ensure public safety

- Observe aquifer conditions
- Monitor water quality
- Monitor water level

Site identified and driller under contract to drill initial observation well

- Ready to drill - pending access authorization from landowner
- Information gathered from initial well will dictate next steps in the investigation
- Also evaluating installation of vent wells in the alluvial aquifer
Site selected based on several factors

- Positioned between area of concern and populated area – best location to ensure public safety
- Area where top of aquifer shallow with overlying clay – gas more likely to be in shallowest spots and linger longest under heavy clay
Path Forward

**Investigatory Well**

- Ongoing oversight of drilling progress and safe operations
- Applying guidance and recommendations from Science Work Group in testing cavern
- Assessing condition of salt above cavern roof
- Testing temperatures and pressures within cavern
- Sonar survey of cavern configuration
- Sampling of cavern contents
Path Forward

Other Operations

• Ongoing review of reporting on cavern operations in nearby area
• Continued monitoring for evidence of renewed seismic activity
• Continued review of records and data to identify potential alternative causes of natural gas bubbling and subsidence
• Subsidence surveys reviewed
• Coordination with Science Work Group on theory and analysis of information gathered and data required
Path Forward

Public Safety

• Continued testing of ground water, and identifying sites for observation wells
• Continue to make information readily available to public and local officials
• Coordinate with EPA and DEQ on use of EPA plane equipped to detect natural gas and other releases
EPA FLIGHT PLAN

- Will be flying low to ground – about 300 feet
- Multiple passes over the area with detection equipment
- Flight will take several hours
Continuing Commitment

• DNR/Office of Conservation is committed to providing all necessary staff and resources to this situation until the causes are identified and problems resolved
• All residents and officials are always welcome to contact us with concerns and questions
• Information is made available on our website
• Please visit our Bayou Corne website for more information at

http://dnr.louisiana.gov/