

Frequently Asked Questions Bayou Corne Sinkhole Incident Updated: Oct. 30, 2012

The following questions represent the most frequently asked questions and issued submitted to the AskGOHSEP@la.gov e-mail address about the Bayou Corne sinkhole incident. This document was compiled using information from the responding local and state agencies.

SINKHOLE

Has the bubbling gas been compared with the gas from caverns adjacent to the one now known to have failed?

Yes, isotopic analysis of gas samples collected in the area is being conducted to match the gas back to operations occurring on the Napoleonville Salt Dome. Analysis of the results has linked the natural gas found in the failed Texas Brine cavern, at the sinkhole site and the closest bubbling sites as having come from the same source, a naturally occurring formation deep underground.

Are measurements being taken? How big is the sinkhole?

Yes, the sinkhole is being monitored regularly and currently encompasses an area of about 9 acres as of Oct. 30.

State and local officials monitoring the situation will continue with regular overflights throughout the duration of the incident.

Is the elevation of the land between highway 70 and the sinkhole being measure to see if there is any change in the land and how fast the change is taking place?

Yes, the elevations in the land around the sinkhole and near Hwy. 70 are being regularly monitored to detect any changes that take place.

Will the sinkhole continue to grow?

Yes, experts expect that the sinkhole will continue to gradually expand to the west. It is still smaller than the maximum size scientists predict it could grow. Even at that maximum size, it is not expected to impact any homes in the Bayou Corne community, which are about a half a mile from the site where the incident is occurring.

BRINE CAVERN / SALT DOME INTEGRITY

How is the stability of the Napoleonville salt dome being evaluated and monitored?

The stability of the Napoleonville salt dome is evaluated and monitored in several different ways. In order to monitor land subsidence above the Napoleonville Salt Dome, each year the salt cavern operators on the Napoleonville salt dome as a group contract with a land surveyor to do precision level surveys across the Napoleonville salt dome. Subsidence surveys have been performed since 1995 and include elevation surveys of 90 distinct benchmarks. The surveys show that rates of subsidence vary across the salt dome area ranging from about 0.25 inches per year on the east side of the salt dome, 0.5 inches per year on the

west side of the dome, to 1 inch per year near the center of the salt dome. These rates of subsidence are within the range of natural subsidence at around 1 inch per year for coastal Louisiana. Additionally, operators of solution-mined salt caverns continuously monitor their salt cavern operations including continuous monitoring of the internal well/cavern pressures. Depending on the salt cavern use—whether used for brine mining or storage—additional monitoring includes parameters such as observing the level or volume of product stored, the level of pad fluid below the cavern roof, the density and temperature of fluids in the salt cavern, visually inspecting property and equipment for signs of wear, subsidence, or anything out of the ordinary. Salt caverns must undergo a demonstration of mechanical integrity, which is done either through reporting regular pressure tests or continuous pressure monitoring.

BUTANE STORAGE CAVERN

How far from the Texas Brine storage cavern is the underground butane storage cavern operated by Crosstex? How much butane is contained in the cavern?

Crosstex operates a storage cavern that contained 940,000 barrels of butane, which is located 1,600 feet from the sinkhole, but has begun the process of transferring the butane to another cavern further from the sinkhole area.

What is the company and the state doing to monitor this cavern during the sinkhole response?

Crosstex is continuing operations and is continuously monitoring the well pressures, conducting mechanical integrity checks for all piping, performing hourly visual checks at each well and manning its facility 24 hours a day, seven days a week.

The company is already under an emergency order issued by the Department of Natural Resources on August 3, which directs it and other operators to take all necessary steps to protect their operations against damage due to the subsidence event in the Grand Bayou/Bayou Corne area. DNR has also required daily reports from Crosstex and continues to review seismic reports in the area of the Crosstex cavern that are being collected by USGS. These reports are also being sent to a science advisory group who are working closely with DNR to verify and monitor Crosstex's efforts.

What would the impact area be if one or more of the caverns storing LPG and Natural Gas near the Texas Brine Cavern #180708 were to explode?

After reviewing an updated plan from Crosstex, the state believes that the cavern poses little-to-no threat to the population living in Grand Bayou/Bayou Corne area. At DEQ's request, Crosstex Energy Services re-evaluated their worst case scenario analysis. Their initial analysis was based on the concept of a failure of the pipeline at the surface. Based on that analysis, the impact radius calculated was broken windows at 0.3 miles. It was noted that the quantity of butane was doubled for this calculation in order to be more protective of human health. At the state's request, Crosstex modified their worst-case scenario to consider that their butane-filled cavern was akin to an underground storage tank and calculations should be based on any failure of that system.

An important factor to understand is that the butane in this cavern is stored more than a half-mile below ground surface. At this depth and pressure, the butane is a liquid. The only way to get it to the surface is to pump salt water, which is heavier than butane, into the cavern in order to displace the butane to the surface. A failure of the cavern or piping would not cause this material to free-flow upward to the surface.

Concerns have been expressed regarding the possibility of the sink hole somehow expanding into the cavern holding the butane. It should be noted that the cavern containing the butane liquid is more

than a half-mile underground and deep in the stable salt dome. The sink hole, at the deepest depth known to this point, is several hundred feet.

While it is easy to simply convert the known quantity of butane into a blast scenario, that does not mean this scenario is possible. A blast scenario of the liquid butane stored at the pressure and depth at which it is stored in the absence of oxygen is not possible. If the piping failed, some vapors could come to the top of the well head. If there was an ignition source, there could be slow burn at the wellhead. Lacking pressure or some other driving force to push it rapidly to the surface, it would not be expected to create a violent reaction such as an explosion. If the salt dome were to fracture and cause the casing for the storage of the liquid butane to crack, the liquid butane would flow into the cracks of the salt dome and not come to the surface.

How far will we be impacted if the butane cavern explodes? Does Napoleonville have anything to worry about or will feel anything or should we evacuate?

The state has reviewed the worst case scenario analysis on the butane cavern done by Crosstex, the company that operates the cavern, and both the departments of Environmental Quality and Natural Resources agree with Crosstex's calculations that the cavern poses little-to-no threat to the population near where a slurry hole appeared in early August.

Prior to the drilling of the investigatory well into the Texas Brine cavern, DEQ requested that Crosstex Energy Services re-evaluate its worst case scenario analysis. Their initial analysis was based on the concept of a failure of the pipeline at the surface. Based on that analysis, the impact radius calculated was broken windows at 0.3 miles. To see Crosstex's letter explaining the calculations and the worst case scenario, go to www.deq.louisiana.gov.

PUBLIC UTILITIES AND INFRASTRUCTURE

I am concerned about the public utilities which pass thru the area of Bayou Corne/Grand Bayou. Is an alternate plan in the works for rerouting at this time if necessary?

All utility companies that provide services to this area (Grand Bayou/Bayou Corne) have been contacted and all service companies have plans in place should a disruption of any service take place due to the operations currently taking place in Bayou Corne. At this time, no such disruption is anticipated; however, plans have been developed and local service utility representatives are kept abreast of daily operations of the site.

What kind of monitoring is being done to make sure the roads are safe to drive on?

The Department of Transportation and Development continues to monitor the roads in the area and, at this time, has no concerns related to the integrity of its state roads, specifically La. 70 in Assumption parish. DOTD would like to remind motorists to practice caution while driving on La. 70 in Assumption Parish, as there may be heavy truck traffic entering and exiting the roadway.

Out of an abundance of caution, DOTD engineers are continuously monitoring the state road system in this area -- 24 hours a day with roving patrols and frequent surveys. If conditions change, DOTD crews are prepared to close roads immediately to ensure public safety and will announce appropriate detours. DOTD engineers are measuring elevation levels weekly using GPS technology at four locations along La. 70 - one on Highway 70 perpendicular to the site, and at the Bayou Choupique, Grand Bayou and Bayou Corne bridges. So far, no changes in elevation have been found at these locations.

Has DOTD put together a plan to reroute La. 70 if it would be closed? What is the plan for where the detour would occur?

DOTD, at this time, has no concerns related to the integrity of its state roads, specifically La. 70 in Assumption Parish. However, out of an abundance of caution, DOTD engineers are continuously monitoring the state road system in this area -- 24 hours a day with roving patrols and frequent surveys. If conditions change, DOTD crews are prepared to close the roads immediately to ensure public safety and will announce appropriate detours. The Department of Transportation and Development is monitoring LA 70 from the Bayou Corne Bridge east to LA 996. The Department is also monitoring a one-half mile stretch of LA 69 from its intersection with LA 70. In the event conditions develop that would make the road network unusable or unsafe, DOTD has planned the detour to be as follow:

Traffic traveling to Pierre Part and points south: Will be directed to LA 1 south to LA 398 west, to LA 662 west, to Hwy 90 west to LA 70.

Traffic traveling from Pierre Part and points south: Will be directed to US 90 east to LA 662 east, to LA 398 east, to LA 1 north to LA 70.

Local traffic (passenger vehicles and trucks below the posting of the bayou pigeon bridge (15/25)) will be able to take LA 997 to LA 75 to LA 404 to LA 69.

If the order is given to close the road, DOTD crews will install trailblazing signs to notify drivers of the detour. DOTD will also install Variable Message Signs (VMS) at LA 70 at LA 1 and LA 70 at LA 69. We will notify District 03 and they will install a VMS on LA 70 just north of Morgan City.

SCENARIOS

How much diesel remained in the Texas Brine cavern at the time its brining well was plugged and abandoned?

Texas Brine discontinued its brining operation in 2009 in preparation to do well work that would provide additional salt for solution mining above the cavern's existing roof. That operation began in September 2010 by removing the hanging strings and the diesel pad from the well. At the conclusion of the well work, the hanging strings and a diesel pad were placed back into the well to conduct a well mechanical integrity test. After determining the well would not demonstrate mechanical integrity, the decision was made to plug and abandon the well. Prior to plugging the well, water was circulated into the well to remove all diesel, and this continued until the water returns were clear. Approximately 10 barrels of diesel were unaccounted for following that final diesel removal process. However, based upon clear returns in the water circulated during the diesel removal it is assumed that the diesel had been removed from the cavern prior to plugging the well in June 2011.

I'm hearing a lot of conflicting information such as the risk of catastrophic explosions, excessive radiation and other alarming scenarios. How do I know what to believe?

The situation is being monitored around the clock by involved state agencies and, so far, extensive testing by the state Department of Environmental Quality has shown no harmful environmental releases. All of DEQ's data was reviewed by the state Department of Health and Hospitals, which certified in multiple letters to Assumption parish that no public health threats have been present so far.

The agencies participating in monitoring for harmful conditions must meet state and federal laws and regulations to make sure the testing results are of high quality. Official state samples have to meet rigorous checks and balances before they can become official, validated results that the scientists and others studying this incident can use as clues to solve the problem. A team of qualified scientists from state and federal agencies, academia and private industry are working together to make sure that sound science is being used to monitor this situation and to determine if the public is safe. There are many factors that play a role in collecting the proper water, air and/or soil sample. All state samples have to have the proper chain of custody and have to meet quality assurance and quality control requirements. To increase transparency, state agencies are publishing their results online. If you want to view the validated samples, they are available to the public through a variety of different Websites, including deq.louisiana.gov.

Is it true that wells are releasing gas that isn't visible to the eye, but shows up on an infrared camera?

The Department of Environmental Quality used its infrared camera in July to assist the Department of Natural Resources to check abandoned wells for possible releases of gasses, which are not visible to the human eye. While in the process of checking the wells, DEQ scientists also used the infrared camera to visually observe the bubbles in Bayou Corne.

There were no gases visible through the camera coming from the bubbles because any gas that was being emitted was at such low levels it could not be seen. However, we do know there is an industrial supply well on private property that was venting natural gas and that the slurry hole was also venting natural gas.

Isotopic samples, which are highly specialized, were taken at the venting well and the bubbles in the water in an effort to identify that gas to see if it was coming natural or industrial sources.

The DEQ also has sampled more than 95 homes looking for flammability as well as a variety of pollutants. None of the samples at any of the private properties have shown any sources of concern. The bubbles in the bayou were also tested for these same parameters. Low levels of methane were detected coming from the bubbling area. However, explosive levels of methane are in the 10,000 parts per million range and the levels DEQ detected were less than 1,000 ppm.

Daily, DEQ scientists conduct at least two air-monitoring runs in the nearby community. This person is conducting roving monitoring with a handheld monitor. If this person smells something, or picks up a hit on the monitor, then a canister is taken for further analysis. Odors and hits on the monitoring equipment do not mean there are pollutants at a level of concern. However, either one may mean additional sampling is needed. Out of an abundance of caution, DEQ personnel are instructed to take the canister sample. While odors have been detected, there have been no health risk levels of any pollutant. That does not mean the odors will not bother someone. People handle odors differently. Scientifically, it means the pollution levels are below health risk values.

The DEQ Mobile Air Monitoring Laboratory pulls two air canister samples daily between the slurry hole and the community. All samples have been below health risk values.

In addition, the U.S. Environmental Protection Agency deployed its ASPECT plane to make aerial monitoring runs for emissions in the area, and analysis of those results indicated no harmful accumulations.

Is it true that there is excessive radiation coming out of the slurry hole?

Rumors of radiation were addressed when the Department of Environmental Quality went to the slurry hole and used handheld monitors to take continuous readings for naturally occurring radioactive material. Scientists also took water and slurry samples. All surface sampling for NORM came back at background levels.

NORM only poses a risk when it is ingested or inhaled at increased levels over an extended period of time. DEQ scientists did not see NORM as a health risk because the levels were background and there was no identifiable exposure pathway.

In addition, the U.S. Environmental Protection Agency deployed its ASPECT plane to make aerial monitoring runs for emissions in the area, and analysis of those results indicated no harmful accumulations.

I've heard the water is incredibly polluted. Is that true?

Water samples in the slurry hole did show high salinity (salt) and elevated levels of pollutants related to crude oil. These would pose a health risk if ingested – but only if someone went to the slurry hole and drank the water. However, they do not pose a health risk for the nearby community.

Can you tell me if it is likely that the butane cavern will explode?

The state required a nearby facility, Crosstex, which stores liquid butane, to provide an updated worst-case scenario to the DEQ. This information was studied by DEQ, DNR and others before being made public for everyone's review. It was deemed that the liquid butane posed no threat at its current location and under the vapor pressure it was being stored. However, Crosstex has said it will move the liquid butane to another storage area further away to allay residents' fears.

LONG TERM IMPACTS

What kind of ecological impact can we expect if this cavern has collapsed as we feared? Will we be able to contain a hole that is 400 feet deep? Can we expect dead vegetation, dead trees, fish kills, etc?

Natural gas is not toxic, so fish kills or dying trees are not expected. There are crude oil fluids in the slurry pool, which has affected some of the smaller vegetation. That impact is very localized to the slurry pool and the crude oil is being contained in the slurry area by oil booms. DEQ scientists have looked for salt water associated with the bubbling in the bayou and not found any. All DEQ data is posted online at deq.louisiana.gov.

PUBLIC INFORMATION / MEETINGS

Who is representing Assumption parish residents at the Unified Command Group meetings?

The parish is well represented by the Police Jury President, the Sheriff and the director of the parish Office of Emergency Preparedness. Unified Command Group meetings are conducted to detail future planning and coordinating tasks and responsibilities for the operational period. The attendees are state agencies and local officials with technical responsibilities in controlling the situation.

What is the best Website to find upcoming meeting information?

The parish has been posting updates on its blog, assumptionla.wordpress.com and also online at <http://www.assumptionla.com/bayoucorne>. Texas Brine is also posting information online: <http://www.texasbrine.com/response/>

In addition, there are other resources available online from state agencies:

GOHSEP: <http://gohsep.la.gov/>

Assumption parish: <http://assumptionla.com/bayoucorne>

Department of Natural Resources:

<http://dnr.louisiana.gov/index.cfm?md=pagebuilder&tmp=home&pid=939&pnid=0&nid=172>

Department of Environmental Quality: <http://www.deq.louisiana.gov/portal/bayoucorne.aspx>

What is being done to educate people about risks that may be associated with this type of work?

State and local officials involved in the response to this incident have been making regular statements to the public via the press and are sharing a significant amount of information online. In addition, the parish is sharing information about the incident with those most directly affected by using its emergency alert text messaging system.