

# **Bubble, Bubble, Tremors, and Trouble: The Bayou Corne Sinkhole in Assumption Parish, Louisiana**

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## **ABSTRACT**

In May 2012, thermogenic methane bubbles were observed in Bayou Corne in Assumption Parish, Louisiana. Additional sites of methane bubbling have been discovered over time. As of March 2014, 103 bubbling sites have been identified. Gas was also found in the top of the Mississippi River Alluvial Aquifer (MRAA) about 125 ft below the surface. Vent wells drilled into the MRAA have flared more than 26 million standard cubic ft (SCF) of gas. Trace amounts of hydrogen sulfide also have been detected. Bayou Corne flows above the Napoleonville Salt Dome which has been an active area for oil and gas exploration since the 1920s. The dome is also a site of dissolution salt mining which has produced large caverns with diameters of up to 300 ft and heights of 2000 ft. Some caverns are used for storage of natural gas. Microseismic activity was confirmed by an Earthscope seismic station in White Castle, Louisiana, in July 2012. An array of microseismic stations set up in the area recorded more than 60 microseismic events in late July and early August, 2012. These microseismic events were located on the western side of the dome. Estimated focal depths are just above the top of salt. In August 2012, a sinkhole developed overnight just to the northwest of a plugged and abandoned brine filled cavern. The sinkhole continues to grow in area to more than 29 ac and has consumed a pipeline right of way. The sinkhole is more than 750 ft deep at its center. Microseismic activity was reduced for several months following the formation of the sinkhole. Microseismic events have reoccurred episodically since then with periods of frequent events preceding slumping of material into the sinkhole or a “burp” where fluid levels in the sinkhole drop and then rebound followed by a decrease in microseismic activity. Some gas and/or oil may appear at the surface following a “burp.” Very long period events also have been observed which are believed to be related to subsurface fluid movement. A relief well drilled into the abandoned brine cavern found that it was filling with sediment. From September 2012 to March 2013, the floor of the cavern rose 600 ft and was 90% filled. However, the sediment fill level dropped more than 300 ft in June 2013. Sediment fill went up again in late 2013 and is now near the top of the cavern. A 2007 seismic survey suggests that the bottom of the abandoned cavern is close to the edge of the salt dome, potentially allowing direct contact with permeable formations. A 3D seismic survey was shot in 2013 to better characterize the subsurface. Long term microseismic, subsidence, water quality and air quality monitoring programs have been established.