

# **The Hockley Salt Dome, Harris County, Texas**

**by  
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Recently, two groups of geoscientists from Phillips Petroleum Company toured the United Salt Corporation mining operations at the Hockley Salt Dome in Hockley, Texas. The purpose of our trip was to see salt formation and deformation structures from a different perspective: from inside the dome with the structures in place. In the end we saw those plus a lot more.

Safety is a top priority at Phillips, so we appreciated the fact that Chris DuPlooy, the mine supervisor, gave us a quick topside review of how to operate the respirators each of us were required to carry on our belts during the trip, in case of fire in the mine. It was a little disquieting when we each had to sign out a numbered metal tag and carry it in our pocket for possible post-fire identification purposes, but Mr. DuPlooy assured us that in the 68 years of salt mining operations at that site, there had never been an accidental fire. He said the only combustible material down in the mine was their equipment, as the salt itself will not burn. So we piled into the main shaft elevator and down we went, 1,540 feet into the mine.

The mine elevator is a story in itself, because everybody and everything going down into the mine has to fit either inside the elevator or be able to hang below it. Its dimensions are only 5 feet 5 inches wide by 5 feet deep by 10 feet high, so we were quite amazed at the fleet of vehicles and equipment we saw when we got down into the mine: pickup trucks, dump trucks, drilling equipment, front-end loaders, salt crushing and processing equipment, golf carts, buildings for equipment storage, and much more. Each item that was too big to fit into the elevator was disassembled at the top, brought down in pieces and reassembled down in the mine. One dump truck was so huge that the bed on it had to be cut into nine pieces and welded back together once down in the mine.

The salt crushing and processing equipment are near the main shaft so the air was very dusty as we left the elevator. We climbed onto the back of a flatbed pickup truck (complete with benches for us tourists) and proceeded on our guided tour of the mine. Temperatures in the mine are constantly in the upper 90s and each worker drinks an average of three gallons of water on their shift. We soon understood why. It was very hot and stuffy, especially when the truck stopped for us to get out and look at some aspect of their operations.

One job in the mining operation is to drill the shotholes into the wall for the next section of salt to be removed. The driller takes one entire 8-hour shift to drill 123 ten-foot deep holes across a wall with dimensions of 20 feet tall by 60 feet wide. Each shothole is about 2.25 inches in diameter. The next day is spent loading the holes with diesel-mixed ammonium nitrate and connecting the charges. After everyone is out of the mine late in

the day, the charges are set off and a ten-foot deep section of salt wall comes down. The dust settles overnight and salt removal begins the following day.

The salt rooms are quite cavernous, with an average size of about 60 feet wide by 20 feet tall. Large pillars of salt are left behind in-between rooms in a regularly shaped pattern to create a set of north-south and east-west interconnected hallways. These hallways (roadways, really) are big enough for the trucks to drive through with room to spare.

The operations of the mine were fascinating, but our main reason to take the mine trip was to see the salt itself. Most of the salt is massive in form with a fairly uniform color and is 95% pure halite, but in several places where the impurities (calcium sulfate) increased, significant banding was present. The banding could be traced up a wall, across a ceiling, down the opposite wall, and then we'd go around the corner and pick it up again in the next room. Shear features in cracks in the salt showed evidence of salt movement, and in a few places, very clear evidence of recent salt movement could be seen. A door frame was significantly warped from salt movement over the last ten years (Photo 1) and a pipe lying on the floor had been overridden by salt flow (Photo 2). Mr. DuPlooy monitors the salt ceiling-to-floor convergence in several rooms by using a spring device and has on occasion observed this convergence to be as much as one-eighth of an inch in a week.

Crystalline halite can be found in one part of the mine. We were able to collect beautiful cubic salt crystals, some three to four inches square. And we could take as much as we could carry, so we brought more than a few heavy bags out with us at the end of the tour. The sense of scale in the mine is very impressive. Their operations have been going on since 1931, with average salt production being 300 tons per day in the off-season, and as much as 900 tons per day during the high-demand wintertime. (The product is mainly used in animal-feed). The operations have been at the same depth within the mine since its origin, and there is enough salt left at that level to continue on for another 300 years. They are mining at a depth of 1,540 feet and various interpretations of seismic data in the area indicate the salt could reach 14,000 feet in depth. The total volume of salt is hard to imagine, but it is probably very typical of Gulf Coast salt domes.

From an exploration perspective, minor oil production took place around the Hockley Dome from the 1940s through the 1960s, although production was never prolific (Canada, 1962; Kyle and Price, 1986). Total cumulative production was less than 1 million barrels of oil.

In 1995, a broad-band seismometer station was installed in the mine. It is operated and maintained by The University of Texas Institute for Geophysics. All data recorded are transmitted to the National Earthquake Information Center (NEIC) in Golden, Colorado, where the United States National Seismic Network (USNSN) monitors earthquake activity. Prior to installation of the Hockley site, the nearest broad-band stations were located in Albuquerque, Tucson, and Mexico City, and so this station fills in a large gap across the Gulf Coast area. More information can be obtained from the [Hockley Seismic Station Website](#).

Each geoscientist in attendance agreed that the trip had given them new insight in several areas: the size and scale of salt domes as a whole, the mobility of the salt within a single dome and the creativity which can be applied to safely recover and utilize these and other natural resources for the benefit of society.

More information about the mine, its operations and its products can be obtained from [United Salt Corporation's Website](#).

### References:

Canada, W.R., 1962, Hockley Field, Harris County, Texas, in Typical Oil and Gas Fields of Southeast Texas, Volume 1, Houston Geological Society, pp. 76-79.

Kyle, J. R., and Peter E. Price, 1986, Sulfide mineralization in salt dome cap rocks of the Houston diapir province, in Seni, S.J. and J.R. Kyle, eds., Guidebook, 1986 Annual Meeting, Geol. Soc. Amer., pp.43-63.

Gypsum Mining near Hockley, Harris County, Texas, by H. B. Stenzel, 35 p., 1946.  
UTGEG: MC0035, OP [\$3.50]

Note: Tour Report Originally Published by HGS in 1998(?):  
<http://www.hgs.org/oldwebsite/www/artcpics/salt998.htm>

2006:

Field Trips: AAPG Annual Convention ( <http://www.aapg.org/houston/pdf/fieldtrips.pdf> )  
Field Trip to Hockley Salt Dome Tour: ( <http://www.aapg.org/houston/fieldtrips02.cfm> ).

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### Photos



Photo 1: A door frame was significantly warped from salt movement over the last ten years.



Photo 2: A pipe lying on the floor had been overridden by salt flow.