

TerranearPMC Safety Share

Week of August 26, 2013 – Sinkholes

Over the past weeks, there have been numerous stories coming out of the media focusing on sinkholes throughout the country. A sinkhole is a natural depression or hole in the Earth's surface that can occur quite suddenly. They are common where the rock below the land surface is limestone or other carbonate rock, or salt beds which can dissolve, resulting in underground spaces and caverns. These sinkholes can be dramatic, because the surface land usually stays intact until there is not enough support. The result is a collapse of the land surface.

While there have always been sinkholes, over the past few years it seems like both the severity and the number of giant sinkholes has been increasing dramatically. Just recently, large sinkholes forced roads to close in New Jersey and in Arizona. And in central Florida, a major sinkhole incident just occurred at a resort community that could have resulted in multiple deaths if it were not for the quick actions of the security guard. Indeed, the occurrence of sinkholes has been happening with such regularity that they may even be considered as common. Nevertheless, the results can be devastating.

Sinkholes vary in size from 1 to 600 m (3.3 to 2,000 ft) both in diameter and depth, and vary in form from soil-lined bowls to bedrock-edged chasms. They may be formed gradually or suddenly, and are found worldwide. Some are caused by the phenomenon referred to as the karst processes - the chemical dissolution of carbonate rocks or suffosion processes in sandstone (process where loose soil or non-cohesive material that lies on top of sandstone is gradually washed away by rain or surface water and transported through fissures or pathways and ultimately causing a surface depression). An example of this process is when groundwater dissolves carbonate which acts like cement that holds the sandstone particles together and then carry away the lax particles, gradually forming an underground void.

Sinkholes can be the result of both natural occurrence or through human activity. The typical natural processes involve erosion or gradual removal of slightly soluble bedrock (such as limestone) by percolating water, the collapse of a cave roof, or a lowering of the water table. Occasionally a sinkhole may exhibit a visible opening into a cave below. In the case of exceptionally large sinkholes, such as the Minyé sinkhole in Papua New Guinea or Cedar Sink at Mammoth Cave National Park in Kentucky, an underground stream or river may be visible across its bottom flowing from one side to the other.

Sinkholes can also be the result of human activity, such as the collapse of abandoned mines and salt cavern storage in salt domes in places like Louisiana, Mississippi and Texas. More commonly, sinkholes occur in urban areas due to water main breaks or sewer collapses when old pipes give way. They can also occur from the over-pumping and extraction of groundwater and subsurface fluids.

Sinkholes can form is when natural water-drainage patterns are changed and new water-diversion systems are developed. Some sinkholes form when the land surface is changed, such as when industrial and runoff-storage ponds are created; the substantial weight of the new material can trigger an underground collapse of supporting material.

So the question must be asked, “why are so many giant sinkholes appearing all over America all of a sudden?” Is something happening to the earth’s crust, or is there some other explanation? The “experts” are blaming this epidemic on things like loose soil, acidic groundwater, new construction, leaky water pipes, coal mines, fracking, long periods of drought followed by rain (possibly global warming affects?), and depletion of underground aquifers. At this point, one can only speculate as to the actual increased occurrences, but nevertheless, those of us that have taken an interest in the sudden increased sinkhole episodes must be asking if what we are experiencing is “normal.” It would be one thing if this was just an isolated incident, but the truth is that giant sinkholes have been appearing with increasing frequency all over the planet. Could this be an indication that major earth changes are on the way? Or more importantly, is there anything that can be done to help control sinkhole damage?

In Florida, where it seems that sinkholes have become an all-too-prevalent occurrence, a number of measures have been proposed and include the following steps:

Redirecting or blocking water: Properly designed man-made drain systems can direct surface water away from structures.

Treating underground limestone: While limestone seems to be a key factor in the formation of sinkholes, it is known that the ancient Egyptian pyramids contain 95% limestone, yet the stones are impervious to water and acid rain. The ancient Egyptians developed a process to alter the limestone, making it siliceous (containing silica). This is an inexpensive process; however, workers would need to be protected from silica exposure.

Construction measures: Revise existing building codes to reduce the risk of sinkhole damage to structures. Such revisions should include soil testing to determine the existence of sinkholes or caverns prior to construction. If a sinkhole/void is discovered, the space may be filled in with concrete or it may be decided not to build at that specific location.

Avoid construction on Wetlands: Just stop it! Building on wetlands can adversely affect ground water supplies while building on previous wetland areas has demonstrated an increased risk to sinkholes.

Seawater treatment facilities: Creating fresh, potable water from the sea will reduce the demand on ground water supplies and therefore, help reduce the risk of creating sinkholes.

Recycling grey water run-off: Grey water runoff recycling is the harvesting of rainwater, bath water, and other waste-water for the purpose of watering lawns and gardens. However, grey water runoff should not be consumed or used in food preparation due to bacteria and other pathogens.

While some of these solutions may not be as feasible as others (due to economic and cost/benefit analysis), there is merit in a number of these approaches. If such measures are properly implemented, we could help the environment while preventing further catastrophes. Sounds like a WIN-WIN!

He who pays in advance always ends up being badly served.

Jose’ Saramago (Author and Nobel Laureate for Literature)