

MINE SUBSIDENCE – Hazard Description

What is mine subsidence?

(from: “Approaches to Mine Subsidence in Four U.S. Communities”)

“Mine subsidence is the collapse of the ground surface over areas where coal or mineral ores were removed. Subsidence causes ground surface deformation resulting in a range of problems from deep holes with vertical sides that pose physical threats to people, to more subtle forms of subsidence characterized by sagging of the ground surface producing more damage, over larger areas, affecting nearly all man made structures.

Subsidence is an onerous problem. The underground mine lays dormant and forgotten until, one day, failure within the mine has progressed upward far enough that it reaches the ground surface. Subsidence damages, therefore, tend to be sudden and unexpected. History has demonstrated that nearly any undermined area regardless of depth, where significant volumes of coal or mineral ore were extracted, is susceptible to subsidence.”

There are two types of subsidence. Pit subsidence creates a hole 6 to 8 feet deep and 2 to 40 feet across (although most are less than 16 feet in diameter). Sag subsidence creates a depression over a broad area up to several hundred feet long and a few hundred feet wide.

What are the consequences of mine subsidence?

(from: Mine Subsidence: A Guidebook for Local Officials)

Following are the consequences to buildings caused by mine subsidence.

- A homeowner hears popping, creaking, and cracking sounds.
- Cracks start to appear in the foundation and exterior walls.
- Sections of a building begin to tilt. The doors swing open and shut.
- Windows begin to stick, jam, and even break.
- A hairline crack appears in the basement or garage floor and begins to widen.
- Separations between walls and floors develop.
- The foundation starts pulling away from the frame of the house.
- Long continuous cracks in the ground are seen.

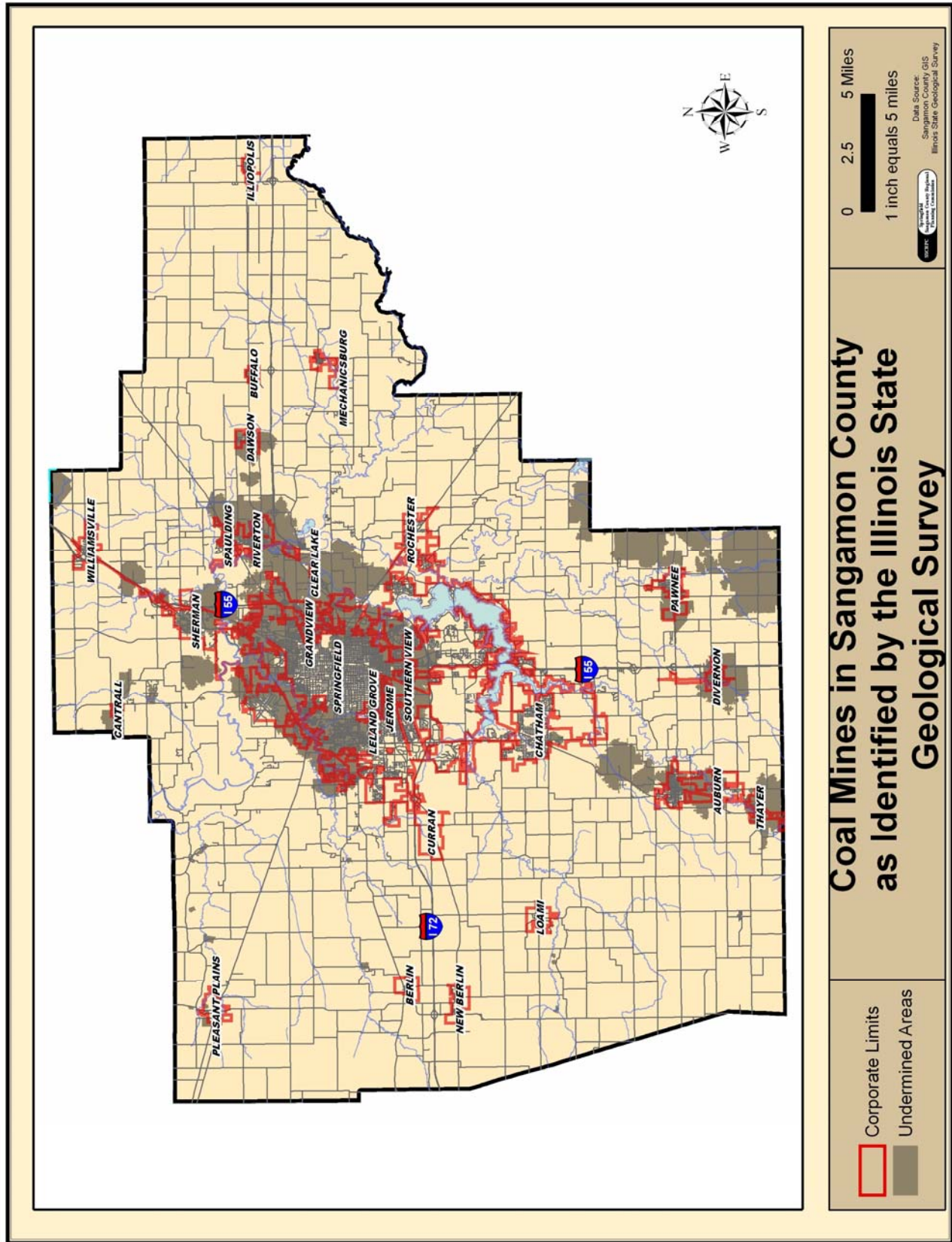
Subsidence can also buckle roadways and break waterlines, gas lines, telephone lines, and sewer lines. Damage can occur adjacent to undermined lands as well.

Mining in Sangamon County.

The first coal mine in Springfield began operation in 1867 and the last one was abandoned in 1964. A total of 53 coal mines have operated in Sangamon County. It appears that most, if not all, of these mines used the room-and-pillar technique which leaves pillars to support the mine roof after 30-80% of the coal has been extracted. Unfortunately the pillars do not provide permanent structural support and subsidence can occur when:

- pillars become weak and fail
- the floor beneath the pillars fail, causing the pillars to sink
- the mine roof collapses

Figure 4-1



The locations affected by mine subsidence.

It should be noted that although a State law required all mine owners to record maps of coal mines, this law was not strictly enforced as mine safety was a bigger concern. Consequently, the mines identified by the Illinois State Geological Survey may not be all inclusive or necessarily accurate.

As seen on the previous page, the known coal mines in Sangamon County are concentrated in the central area from north to south. Mines were often located in close proximity to cities, which offered labor and a market. At times towns were established near coal mines to provide housing for miners. Therefore, several participating communities are located near or directly over mines: Auburn, Cantrall, Chatham, Dawson, Divernon, Jerome, Pawnee, Pleasant Plains, Riverton, Sherman, Southern View, Springfield, Thayer, Williamsville, and unincorporated Sangamon County.

The extent of previous occurrences of mine subsidence in Sangamon County.

There is no database of previous occurrences of mine subsidence in Sangamon County. However, there have been many instances when damage has occurred, although exact costs related to specific structures are not available. Vertical settlement of a structure is usually 2-4 feet.

Previous occurrences of mine subsidence.

Figure 4-2 shows places in the vicinity of Springfield where mine subsidence has occurred from 1867 - 1998 based on information available to the IDNR Office of Mines and Minerals. (It is believed that the number of subsidence events is underestimated on this map.) Approximately one-half of the data was collected from reports prepared prior to 1930. The remaining data is based on aerial imagery or direct observation and measurements.

The property taxes in Sangamon County are reduced on property that has been damaged by mine subsidence although no centralized records are maintained to identify these properties. Anecdotal information suggests that homes in Divernon and Riverton have been given reduced taxes because of subsidence damage.

Probability of future mine subsidence events.

With no data available on mine subsidence events in Sangamon County, a probability of occurrence cannot be calculated. However, with coal mines under 94.4 square miles of land in the planning area there is a high likelihood that subsidence will continue to occur. Robert Gibson with the IDNR, Office of Mines and Minerals believes that on average 3 mine subsidence events are experienced each year in Sangamon County.

MINE SUBSIDENCE –Assessing Vulnerability

There are many areas in Sangamon County that have been mined leaving homes, businesses, critical facilities, and infrastructure vulnerable to damage from subsidence. Generally, when a subsidence event occurs there is a relatively small area (a few acres) affected compared to other natural hazards. Besides doing damage to buildings, there is also the accompanying decrease in property values for those properties affected, as well as nearby properties.

If there is a mined out area subsidence will occur, but the location or timing of mine subsidence cannot be predicted. The length of a subsidence event is also unpredictable and can happen quickly over a few hours or days or slowly over years.

Robert Gibson with the Illinois Department of Natural Resources, Office of Mines and Minerals, Abandoned Mine Land Reclamation Division states that the average cost for repairs paid out by insurance companies for homes damaged by mine subsidence is \$60,000 while the repair costs to larger structures, critical facilities and infrastructure can approach the cost of the structure.

Figure 4-2

Historic Distribution of Known and Suspected Subsidence Events Springfield, Illinois 1867-1998

