Underground Mining

Mine Subsidence in Pennsylvania

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Get Mine Subsidence Insurance.

www.paMSI.org

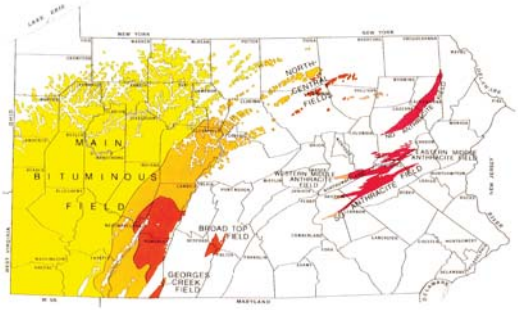
This brochure contains general information about underground mining and mine subsidence. If your home is in an area where underground coal and clay mining has occurred, there is a chance that collapsing mines could damage your dwelling or other buildings on your property.

Mine subsidence causes millions of dollars of damage each year. Standard homeowners' insurance policies usually exclude coverage for losses caused by mine subsidence.

In 1961, the Commonwealth of Pennsylvania established the Mine Subsidence Insurance Fund to provide a reliable source of insurance against losses caused by underground coal and clay mine subsidence. The Mine Subsidence Insurance Board, through the Pennsylvania Department of Environmental Protection (DEP), administers this non-profit Insurance Fund, which is sustained by its policyholders' premiums.

All residents of Pennsylvania are encouraged to inquire into the mining conditions in their area (www.paMSI.org) and to apply for insurance if they believe they are at risk from loss caused by subsidence.

Areas Affected By Mine Subsidence



There are two distinct coal fields in Pennsylvania known as the Bituminous and Anthracite coal regions. The Bituminous (soft coal) region lies mostly in the western half of the state and the Anthracite (hard coal) region lies in the northeastern part of the state. Extensive underground mining has been conducted throughout the coal regions, and as a result, there is a high potential for mine subsidence. In some areas, underground mining is still being conducted, especially in southwestern Pennsylvania where both longwall mining and room and pillar mining are common.

Find out if you're on top of an abandoned mine and apply for MSI coverage.

Go to www.paMSI.org or call 1-800-922-1678.

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Mine Subsidence Insurance is a non-profit fund administered by the Commonwealth's Mine Subsidence Insurance Board.
Cover photo courtesy of Robin G. Lighty.

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Underground Mining

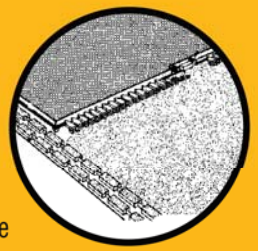
Coal has been mined underground in Pennsylvania for more than 200 years. While mining techniques have changed throughout the years, and in some cases have been modified by local mining conditions, two basic methods have been used: room and pillar mining, and longwall mining.

Room and Pillar Mining

Room and pillar mining is the most common method of underground coal mining practiced in Pennsylvania. In room and pillar mining, blocks of coal are formed by developing a network of entries or tunnels into the coal seam. The entries are referred to as rooms and the blocks of coal are referred to as pillars. In many cases, the pillars are partially or totally removed during later stages of mining, generally known as retreat mining or pillar recovery.

The number of pillars removed during retreat mining depends on various factors including: safety, convenience, production requirements, geologic and mining conditions, and availability of the coal reserves.

Longwall Mining



In longwall mining, large rectangular blocks of coal known as panels are developed by room and pillar mining methods. These panels are usually several hundred feet wide and several thousand feet long. After development, the panels are totally removed in a systematic manner. A long row of hydraulic roof supports protect the mine workers and equipment. As the mining system progresses through the panel, the mine roof and overlying rock collapse and cave into the newly created void behind the roof supports.

The vast majority of abandoned mines in Pennsylvania were mined with the room and pillar method.

Mine Subsidence

Mine subsidence is a movement of the ground surface as a result of the collapse or failure of underground mine workings. In active underground mining operations using longwall mining or high extraction pillar recovery methods, subsidence can occur concurrently with the mining operation in a planned and predictable manner.

In abandoned mines where rooms and unmined pillars are often left in various sizes and patterns, it may be impossible to predict if and when subsidence will occur. Mine subsidence resulting from abandoned room and pillar mines can generally be classified as either sinkhole subsidence or trough subsidence.

Mine Subsidence Damage

Damages to structures from mine subsidence may include cracking of foundation walls and floors, cracking of brick veneer, severe tilting, and in some instances, complete structural failure requiring replacement of the building. Costs to repair mine subsidence damage can easily approach or reach the replacement cost of the structure.

Other Causes of Damages

Property damage can result from many factors other than mine subsidence. The following are some common causes of structural damage which may be mistaken for mine subsidence.

- Settlement under surface loads
- Landslides and soil creep
- Shrinking and swelling of soils
- Freezing and thawing of soils
- Surface and subsurface erosion
- Poor construction methods
- Structural movements
- Structural deterioration

Eligibility for Insurance

Structures, which are defined by the Mine Subsidence Insurance Fund as complete buildings with walls, a roof and a foundation sufficient to firmly attach the building to the earth, are eligible for coverage. If your structure is located in an area with a record of past or recent problems, an inspection will be required. Structures with significant damage can be insured if the damages are first repaired or if an estimate of the cost to repair the damages is provided to the MSI Fund.

Prior to 1966, underground mine operators were not liable for damages caused by mine subsidence to overlying structures.

In 1966, laws were passed which held bituminous underground coal mine operators liable for mine subsidence damage to certain dwellings and structures in the bituminous coal region. Substantial amendments were made to this law in 1994. All structure owners in the bituminous coal region should check with their local Mine Subsidence Insurance office to see if their structures are covered by these laws. If a structure is covered by these laws, Mine Subsidence Insurance may provide secondary coverage only.

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Illustrated Effects of Mine Subsidence

Mine Drainage

Mine drainage occurs when old underground mine workings gradually fill up with water, and the water breaks out onto the ground surface usually near a coal outcropping on or near a hillside. Sometimes heavy rains or melting snow can raise the water level in a mine and trigger a mine water breakout.

If such a breakout occurs suddenly and unexpectedly near a building, substantial damage can occur. Although this is not considered mine subsidence, under certain circumstances, building damage from such a mine water breakout would be covered by Mine Subsidence Insurance.

Sinkhole Subsidence

Sinkhole subsidence occurs in areas overlying underground mines which are relatively close to the ground surface. This type of subsidence is fairly localized in extent and is usually recognized by an abrupt depression evident at the ground surface as overburden material collapses into the mine void. Sinkhole subsidence is perhaps the most common type of mine subsidence and has been responsible for extensive damage to many structures throughout the years.

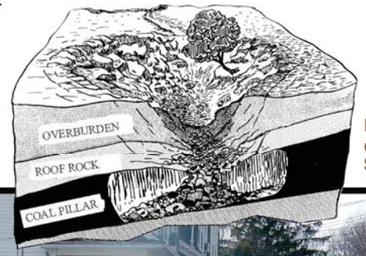
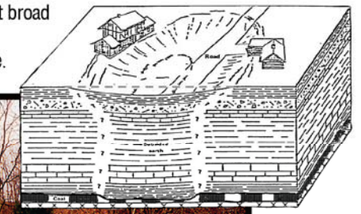


Illustration of Sinkhole Subsidence.

Trough Subsidence

Subsidence troughs over abandoned mines usually occur when the overburden sags downward due to the failure of remnant mine pillars or by punching of the pillars into a soft mine roof or floor. The resultant surface effect is a large, shallow yet broad depression in the ground which is usually elliptical or circular in shape.

Subsidence is usually greatest at the center of the trough and it progressively decreases until the limit of the impacted surface area is reached. Horizontal ground movements also occur within a subsidence trough. Structures near the center of the trough can experience damage caused by the compression of the ground surface, and structures near the edges can be damaged by tension or stretching of the surface. Ground movement within a subsidence trough can result in damage to buildings, roadways, bridges, railroads, underground pipelines and utilities, and practically any other structure or surface feature that may be present. In addition, the flow of streams may be altered or disrupted, and surface cracks may occur, particularly near the edges of the trough.



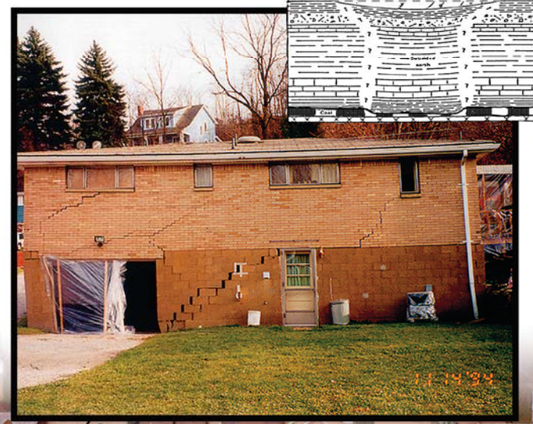


Illustration of Trough Subsidence.

The illustration depicts the typical surface effects of mine subsidence. It is important to note that mine subsidence can occur as a result of mining at any depth. As a general rule, the total surface area affected by subsidence increases as the depth of mining increases. This means a structure can be damaged by subsidence even if is located directly above a pillar or solid block of coal.

Mine Water Breakout
Sinkhole Subsidence
Overburden
Trough Subsidence
Coal Pillars
Mine Entries or Rooms
Underclay
Collapse Stopped by Strong Rock Strata
Coal Outcrop

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