

ISSUE BRIEF

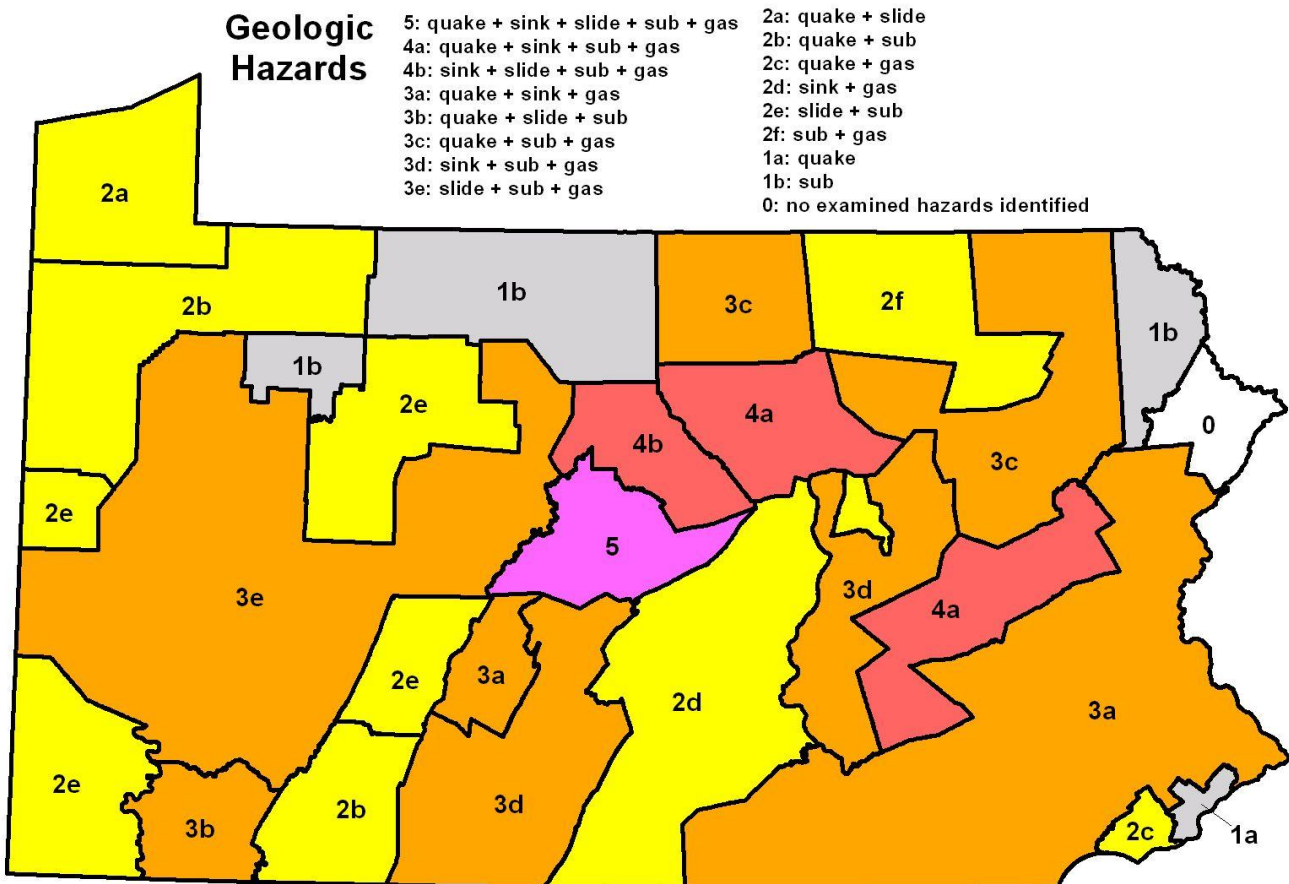
SENATE POLICY DEVELOPMENT AND RESEARCH OFFICE

PREPARED IN CONJUNCTION WITH THE SENATE REPUBLICAN POLICY COMMITTEE

Geologic Hazards

A geologic hazard is a naturally occurring or man-made geologic condition or phenomenon that presents a risk or is a potential danger to life and property, according to the *Glossary of Geology* (American Geological Institute). Pennsylvania is prone to many [geologic hazards](#), including earthquakes, sinkholes, landslides, mine subsidence, and earth-derived gases, principally radon.

The following map places the preceding hazards in spatial context, based on county-level data. The five factors mapped are presence of at least one earthquake epicenter (quake), great potential for sinkholes due to presence of massive limestone and/or dolomite (sink), great to moderate potential for landslides (slide), potential for mine subsidence inferred from presence of coal (sub), and great potential for elevated levels of indoor radon (gas).



Earthquakes do occur in Pennsylvania, although rarely. On September 25, 1998, Jamestown and Greenville, near Pymatuning Lake in Mercer County, experienced a moderate earthquake (magnitude 5.2). Although the most powerful ever recorded in the Commonwealth, this temblor caused only minor structural damage. However, the “quake” did affect groundwater in the area. Investigation by the US Geological Survey revealed, “Within hours ... local residents reported wells becoming dry, wells beginning to flow, and the formation of new springs. About 120 household-supply wells reportedly went dry within 3 months after the earthquake.”

Sinkholes are subsidence features. William Kochanov of the Pennsylvania Geological Survey (PGS) defines a sinkhole as, “a roughly circular hole in the ground in an area underlain by limestone bedrock, which varies in depth, acts as a drain for surface water, and is a result of periodic flushing of material (soil, rocks, or other surface materials) by water down into voids either in the limestone bedrock or soil profile.” Sinkholes occur dominantly in central and eastern Pennsylvania, in areas underlain by carbonate bedrock, mainly limestone and dolomite. Sinkholes can damage property; in 1994, a sinkhole caused so much damage to the Corporate Plaza building in Allentown that it had to be demolished.

Landslides are geological processes that shape the Earth’s surface. The PGS indicates a landslide is a “general term for [downward] mass movement of soil, rock, or a combination of materials on an unstable slope.” Southwestern Pennsylvania is most susceptible to landslides, especially, Allegheny, Fayette, Greene, Washington, and Westmoreland counties. Landslides can be costly. On September 19, 2006, a massive landslide occurred at a commercial development site in Kilbuck Township, Allegheny County, disrupting both road- and rail-based transportation; associated remediation costs totaled \$2 million and the site was lost to commercial development. [Senate Bill 279](#) (Costa) and [House Bill 1934](#) (DeLuca) would have established the Landslide Insurance and Assistance Program to protect Pennsylvanians from property losses caused by landslides. Neither bill received any action prior to the end of the 2007-08 Legislative Session.

[Mine subsidence](#) is movement of the surface of the ground due to readjustments of overburden (material overlying a mined coal seam) in response to collapse or failure of underground mine workings. Subsidence can cause structural damage, such as cracking of masonry walls; and draining of lakes and wells. The [Bituminous Mine Subsidence and Land Conservation Act](#) protects Pennsylvanians from the impacts of mine subsidence.

Three earth-derived gases – radon, methane, and carbon dioxide (CO₂) – are an unusual geologic hazard found in Pennsylvania, according to the PGS. Radon is a naturally occurring radioactive gas, evolved from the decay of uranium; this gas can harm living tissue, for example, the lungs. Methane, found mainly in the coal and gas fields of the Commonwealth, can migrate into structures. Methane is volatile; in 1997, a methane explosion destroyed a house in Greene County. Elevated concentrations of CO₂ coupled with depressed levels of oxygen in buildings is an emerging hazard in the coalfields of Pennsylvania. Exposure to heightened amounts of CO₂ can cause hyperventilation, headache, and in extreme cases (CO₂>10%), death by asphyxiation.

In the aftermath of the Kilbuck Landslide, House Resolution 297 of 2006 authorized the Joint State Government Commission to create a Task Force and Advisory Committee to investigate this disaster. The resultant report, [The Kilbuck Township Landslide: Findings and Recommendations](#), contains draft legislation to address geologic hazards. The proposal would:

- (1) Protect people and property from the dangers and damage associated with earth disturbance activity in geologically hazardous areas that may be prone to landslides or sinkholes and other hazardous conditions, such as hazardous rock and soil slippage, and other soil management problems.**
- (2) Recognize and minimize the man-made conditions that increase the potential for:**
 - (i) Landslides and other gravity-driven movements of susceptible rock and soil.**
 - (ii) Sinkhole development and related subsidence in soluble units.**
 - (iii) Degradation of surface and groundwater resources associated with the alteration of geologic conditions.**
- (3) Authorize a comprehensive and coordinated program to regulate earth disturbance activity in geologically hazardous areas using sound land use practices, designed to prevent damage to and destruction of private and public property and structures, prevent the disruption of commerce and preserve and restore the natural ecological systems.**
- (4) Encourage administration, management and stewardship of geologically hazardous areas consistent with the obligation to avoid unnecessary expenditure of public moneys, the Commonwealth’s duty as trustee of natural resources and the people’s constitutional right to the preservation of the natural, scenic, aesthetic and historic values of the environment.**