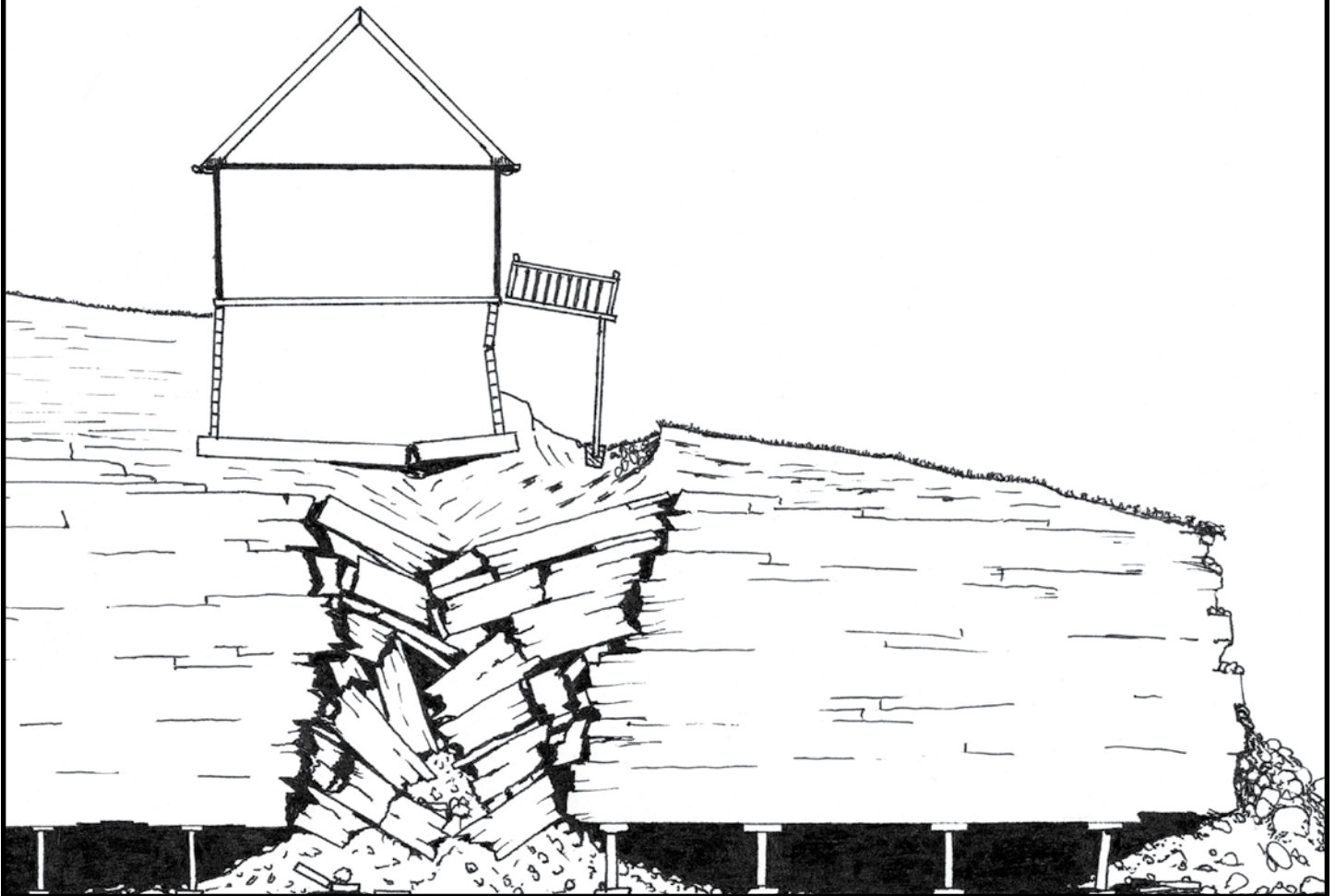




ASK BEFORE YOU BUILD

ABANDONED MINE LAND DEVELOPMENT GUIDE

A guide for landowners, developers, and officials to better assess the hazards of abandoned mine land before building



WHAT'S THE NEED?

Landowners in Ohio often experience site development problems associated with building on abandoned mine lands (AML). These problems can lead to expensive repairs when settling occurs, landslides develop or mine gases are encountered. As rural areas are developed for residential and/or recreational purposes, abandoned mine land is becoming more attractive to purchase.

WHAT'S THE PURPOSE OF THE GUIDE?

The AML program has created the "Ask Before You Build" guide as an educational outreach resource for the public and local officials to assist in evaluating past mining sites for house and road placement or other development. The guide includes descriptions and illustrations of AML land development problems along with program eligibility guidelines for funding. Also included are the names of other ODNR divisions and federal, state and local agencies that can assist with providing information during the development phase of building on abandoned mine land. The public, developers and local officials should review the contents of this guide as the AML program does not fund reclamation or stabilization projects if the landowner fails to address the AML problems prior to development.

WHAT IS AML?

AML (Abandoned Mine Land) areas were coal mined prior to August 3, 1977, between August 4, 1977 and August 16, 1982 where performance security is not sufficient to provide for adequate reclamation, or between August 4, 1977 and November 5, 1990 where the surety of the mining operator became insolvent and no money was available from the proceedings to provide for adequate reclamation for which the mine operator has no continuing reclamation responsibility. AML problem types from surface and underground mining operations include: dangerous highwalls and impoundments, landslides, mine spoil, mine subsidence, mine openings, flooding, mine drainage, mine gas and other mining related hazards.

WHAT ABOUT ACTIVE MINING SITES?

Active mining sites are defined as areas permitted by the state regulatory authority that have been mined after August 3, 1977, between August 4, 1977 and August 16, 1982 where performance security is not sufficient to provide for adequate reclamation, or between August 4, 1977 and November 5, 1990 where the surety of the mining operator became insolvent and no money was available from the proceedings to provide for adequate reclamation and fall under the federal Surface Mining Control and Reclamation Act (SMCRA) regulations. These more recently reclaimed mining sites can have unique qualities that call for special design and construction techniques to address the settling of mine spoil, prevention of hillside slippage and overly-compacted soil layers. Before building on these areas, always consult a trained professional who can provide design advice to avoid problems that can occur as a result of site development on reclaimed land.

WHO SHOULD READ THESE GUIDELINES?

- | | | |
|-----------------------------|-------------------|--------------------------------|
| √ Prospective buyers | √ Homeowners | √ Realtors |
| √ Construction-design firms | √ Developers | √ State and federal agencies |
| √ Landowners | √ Local officials | √ Community planners |
| √ Zoning board members | √ Engineers | √ Township and county agencies |

STAY OUT-STAY ALIVE CAMPAIGN

Ohio, along with other states, participates in the federal "Stay Out-Stay Alive" national public awareness campaign to warn children and adults about the dangers of exploring and playing on active and abandoned mine sites. For more information go to <http://www.msha.gov/SOSA/SOSAhome.asp> or call 614-265-6633.

DISCLAIMER

The Division of Mineral Resources Management always recommends that the landowner or developer **contact an experienced, qualified engineering firm to assist in site evaluation of AML when being considered for development.** Some AML sites are not suitable for development or are not suitable without the properly-engineered site development work prior to construction. **This analysis is deemed necessary as site stabilization or building repairs on developed AML areas are not eligible for reclamation funding under the AML program.**

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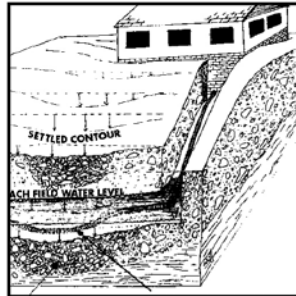
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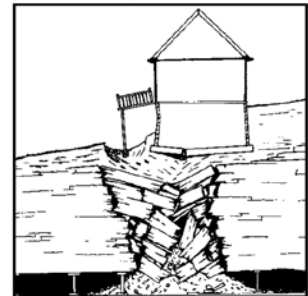
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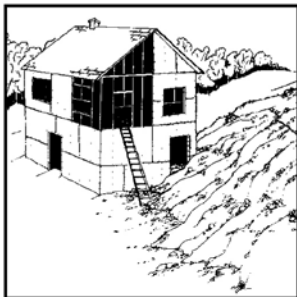
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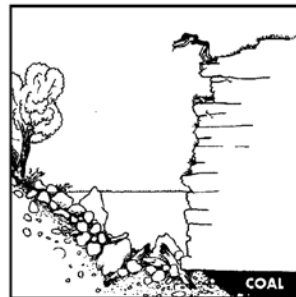
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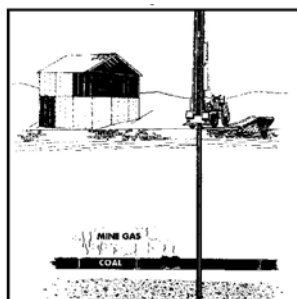
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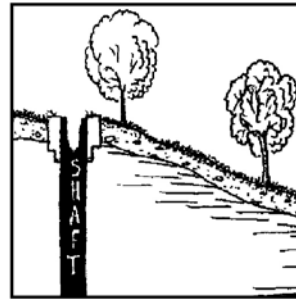
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Dear Customers!

The “Ask Before You Build Guide” has been created to assist the public and local officials in identifying development and building problems associated with abandoned mine land (AML). The guide should be used as an informational resource before you build. The goal of this educational outreach effort is to inform our customers about building and development problems associated with AML *before* construction begins, so that AML concerns can be accommodated as part of the land planning and development decision-making process.

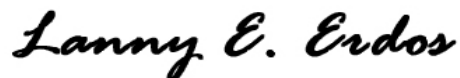
Ohio has a long mining history which began around 1800. Underground and surface mining were the two primary methods for coal and industrial minerals mining in Ohio. Mining legislation was first enacted in Ohio in 1947 and gradually increased until the passage of the 1972 Ohio Strip Mining Law. This law required regrading to approximate premining contour of the land, replacement of topsoil and the establishment of a successful vegetation cover by the mine operator prior to the state’s release of reclamation bond. On August 3, 1977, the United States Congress passed the Surface Mining Control and Reclamation Act (SMCRA). This act established stringent national standards for coal mining and reclamation.

With the creation of SMCRA came the federal Abandoned Mine Land (AML) Program. Since 1977 a federal tax has been imposed on each ton of coal mined and that tax is used to administer the programs that regulate coal mining and the reclamation of AML. The Division of Mineral Resources Management maintains an inventory of more than \$350 million worth of restoration costs for AML areas, excluding streams polluted by acid mine drainage. The state receives an annual grant from the federal Department of Interior, Office of Surface Mining to reclaim only the highest priority AML sites listed on the inventory.

This AML “Ask Before You Build Guide” is another tool for the AML program to serve the public and protect them from the hazards created by past mining. Ohio’s rural areas are being developed and many past mining areas look attractive because of their locations, aesthetic qualities and price. Landowners and developers who build on these AML areas find that significant problems can develop as a result of subsurface conditions created by past mining. The following problems can be found on AML: underground mine subsidence, landslides, flooding, dangerous highwalls and impoundments, polluted water and other mining related conditions. The AML program is unable to assist individuals who knowingly build over these areas when they failed to address these site conditions in the design of their home, road, well or other structures. As referenced earlier, the goal of this educational outreach effort is to inform the public about these mining hazards *prior to* building and developing these AML sites, so abandoned mine conditions can be taken into account to avoid future, more costly problems.

The AML educational information is available on the web at <http://www.minerals.ohiodnr.gov>. Your input on this important subject is greatly appreciated.

Sincerely,



Lanny E. Erdos, Chief
Division of Mineral Resources Management

Abandoned Mine Land Program Eligibility Guidelines

BACKGROUND

The Division of Mineral Resources Management's Abandoned Mine Land Program is responsible for abating the highest priority public health and safety and environmental problems associated with abandoned mines. These problems include, but are not limited to, subsidence, mine gases, mine drainage, landslides, dangerous highwalls and pit impoundments, flooding, open mine portals and shafts.

AML SITE DEVELOPMENT PROBLEMS

Buildings are prohibited from being repaired and/or replaced under the AML program. Site stabilization and water replacement on newly developed AML areas are also not eligible for reclamation funding. Consult a trained professional prior to site development who can provide design advice to avoid problems that can occur as a result of site development on AML areas.

FUNDING

State and federal funds provide resources for the Division's Abandoned Mine Land Program to investigate environmental, public health and safety problems to design and construct projects to address the problems related to abandoned mines. The Division maintains an inventory of abandoned mine problems and has valued the cost of their remediation at more than \$350 million, excluding streams polluted by acid mine drainage. As this cost far exceeds anticipated program revenues, only the highest priority public health and safety and environmental problems are selected.



GENERAL PROBLEM ELIGIBILITY AND PROJECT SELECTION CRITERIA

Problem eligibility and project selection considerations include the following criteria:

- **The date of mining and abandonment.** For *state* funds, mining must have occurred prior to April 10, 1972. To be eligible for *federal* funds, the mining responsible

for a specific problem must have been abandoned prior to August 3, 1977, between August 4, 1977 and August 16, 1982 where performance security is not sufficient to provide for adequate reclamation, or between August 4, 1977 and November 5, 1990 where the surety of the mining operator became insolvent and no money was available from the proceedings to provide for adequate reclamation.

- **The availability of cooperative funding and in-kind services.** Due to limited in-house funds, the availability of funds and in-kind services from other agencies, private sources and non-profit organizations can elevate the status of a problem for project consideration.
- **The probability of successfully abating the problem.** The abandoned mine land problems that have the highest probability of successful completion with minimal or no maintenance will be given higher consideration.
- **Determination of the existence of a party responsible for the presence of an abandoned mine land problem.** Mining companies are not held responsible for the existence of the vast majority of abandoned mine problems, as the reclamation requirements in existence at the time of mining and abandonment were minimal. Even if deemed responsible, however, most of the companies in existence prior to the dates of effective reclamation laws no longer exist. Current landowners, however, can be deemed responsible for creating public health and safety problems primarily as a result of poor development decisions.

- **Priority Designations.** Each problem site is field reviewed and evaluated based upon site characteristics. Depending on site severity, a site is classified as either an emergency or a Priority 1, 2 or 3. All problems deemed an emergency are granted immediate funding. Those identified as Priority 1 public health and safety problems are placed in the next available annual grant. Only the most serious Priority 2 public health and safety concerns and Priority 3 environmental problems compete for funding annually. Additional eligibility discussion may be noted in the following pages for specific abandoned mine problems.

AML Problem Type: Highwall

BACKGROUND

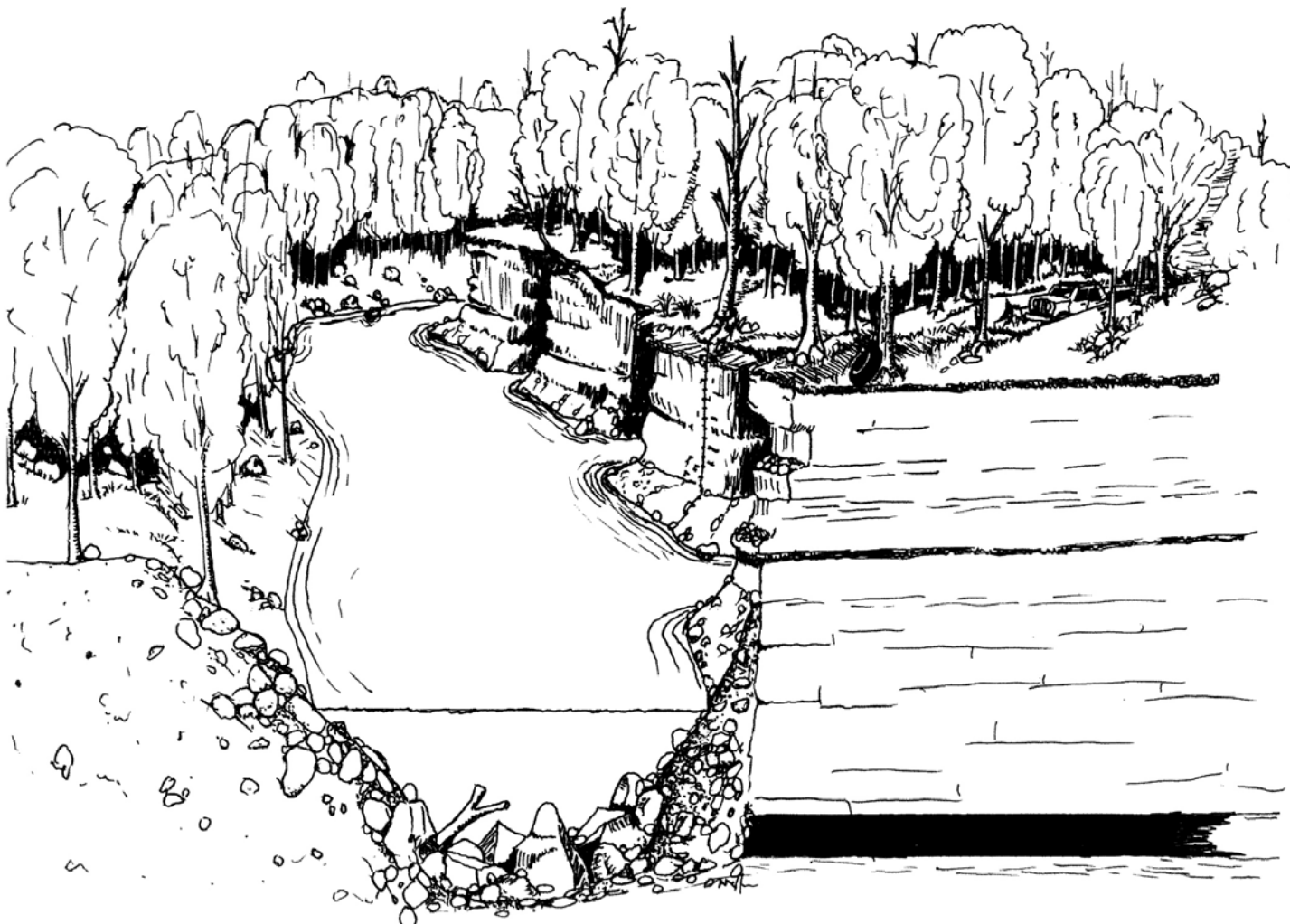
Prior to the requirement of returning mine land to approximate original contour, vertical rock faces, called highwalls, were left as the last cut of the strip mining operations. Some highwalls exceed 100 feet in height. Depending on the rock strata composition, highwalls can be unstable. As a result, highwalls can present a significant danger when in close proximity to occupied structures, public roads and frequently visited sites.

HIGHWALL SITE DEVELOPMENT PROBLEMS

- Structures built below highwalls may be damaged by falling rock. Highwalls are inherently unstable due to the deterioration of the geologic formation by weathering and erosion.
- Building near a highwall can also increase safety concerns. Injuries can result from pedestrians walking above or below highwalls and rock faces giving way causing physical harm.



Home built on mine spoil next to dangerous highwall.



Dangerous highwall created by mining operation.

FUNDING AND ELIGIBILITY CRITERIA

Funding may be available through the Division's Abandoned Mine Land Program to safeguard against dangerous highwalls. Eligibility and selection of sites are evaluated on a site by site basis and are subject to funding availability. The primary criteria for establishing eligibility for funding abatement of dangerous highwalls include the following:

1. The highwall height must exceed six feet. Its slope must be greater than 50° from the horizontal or the slope must exceed 35° if loose material exists on the face.
2. The highwall is composed of unstable material and occupied structures, roadways and improved property are located below the highwall and endangered as a result of falling material.
3. There is an improved road within 40 feet of the highwall or an unimproved road within 15 feet of the highwall.
4. There is an occupied structure within 500 feet of the top of the highwall or frequent visitation to the top of the highwall is evident.
5. There is a public recreation area within 500 feet of the highwall with evidence of intensive public visitation.
6. There is a mine-related water body (pit impoundment) adjacent to the highwall used for recreation and the public is exposed to danger traversing the highwall to access the water or uses the highwall as a diving platform or the area above the highwall as a parking area or rest area.
7. **A dangerous highwall will not be considered eligible for funding if:**
 - Structures have been placed within a 500-foot distance above a pre-existing highwall.
 - Roads and other property improvement have been placed near an unstable, pre-existing highwall.

AML Problem Type: Mine Spoil

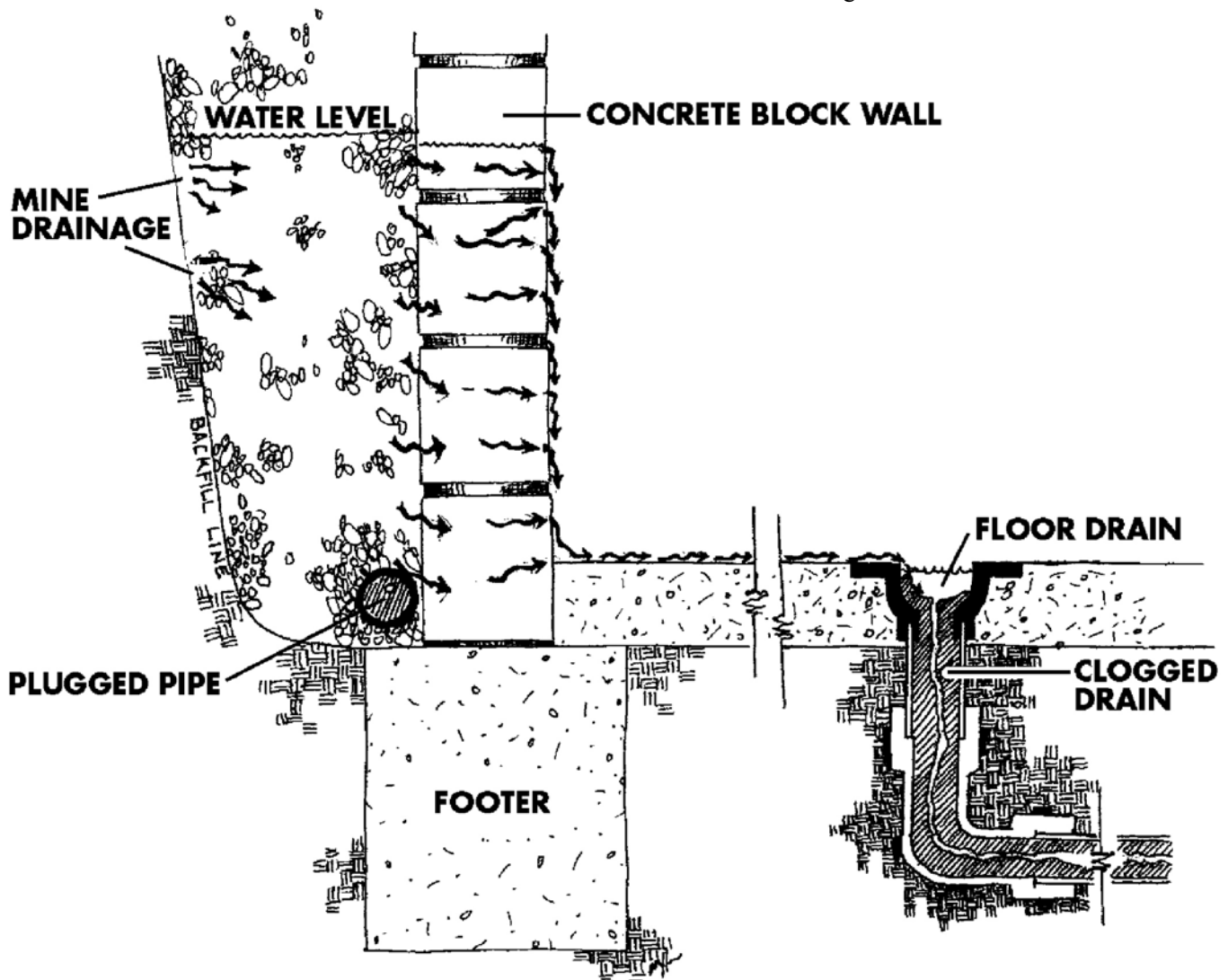
BACKGROUND

Mine spoil is intermixed unconsolidated rock, rock fragments and soil that result from a surface mining operation. Coal refuse is waste coal, with some crushed rock impurities, left as a result of coal processing. In its post-mining state, mine spoil and coal refuse, if unvegetated, can be highly erodible, and can be a source of significant sediment and acid mine drainage to streams. If the flow capacity of a stream is significantly reduced due to sediment accumulation, the stream will flood more frequently, possibly damaging structures and overflowing roadways. Mine spoil and coal refuse, even if reclaimed, are prone to settlement and are subject to movement by freeze-thaw cycles.

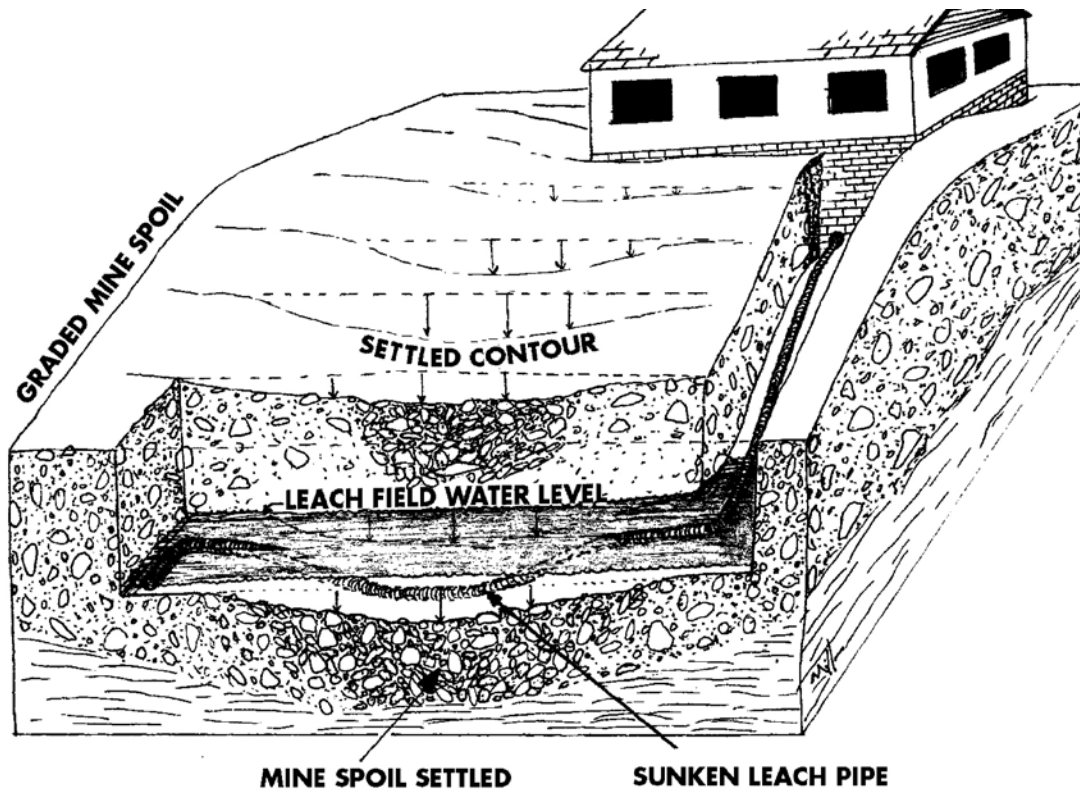
MINE SPOIL SITE DEVELOPMENT PROBLEMS

Buildings, septic systems and other such features located on mine spoil may settle, move or have leachate problems.

1. Buildings can be damaged as a result of mine spoil settling under the foundation.
2. A building's footer drains can stop functioning as a result of mineral leachate clogging the drainage system. Coal refuse and certain types of mine spoils have high amounts of minerals, which are susceptible to leaching when introduced to air and water.
3. Septic systems can be damaged as mine spoil settles. The leach field of the septic system settles and no longer functions as designed.



Mine water clogging foundation drainage system.



Home with settlement problem built on mine spoil.

The following problems can occur to houses, garages, septic systems and other types of structures from spoils settling or to footer drains not operating properly: Interior or exterior wall cracking, bowed basement walls, cracks in walls, water leaks or non-functioning leach fields.

FUNDING AND ELIGIBILITY CRITERIA

Funding may be available through the Division's Abandoned Mine Land Program to reclaim mine spoil and coal refuse. Eligibility and selection of sites are evaluated on a site-by-site basis and are subject to funding availability. The primary criteria for establishing eligibility for funding the reclamation of mine spoil and coal refuse includes the following:

1. There is a previous record of unusually frequent flooding or a high probability of an occurrence of flooding of a stream laden primarily with sediment from an abandoned strip mine or refuse pile.
2. Occupied structures, improved property, roads or public facilities are located in the flooding limits and would be subject to destruction or water damage as a result of abnormally increased flood frequency and levels resulting from reduced channel capacity. **New development in flood-prone areas, however, will not provide sufficient justification to establish a higher priority.**

3. There is a deteriorated water retention structure or pit impoundment on the abandoned mine site that is currently impounding a large quantity of water and sediment that, if suddenly discharged, could result in immediate flooding and sediment deposition downstream.
4. As mentioned previously, mine spoil or coal refuse, even if reclaimed, is subject to settling and to the freeze-thaw cycle. Further, acid mine drainage may be generated in the spoil material or coal refuse as surface water infiltrates into and through the spoil. Structures constructed on mine spoil, without proper consideration of the unstable nature of the spoil material or the caustic nature of acid mine drainage, could be damaged. **It is the Division of Mineral Resources Management's policy that a landowner is responsible for determining the presence of mine spoil or coal refuse when considering a site for development. Further, a landowner will be solely responsible for adopting construction methods that will insure stability and intercept and divert acid mine drainage should an abandoned site, either in a reclaimed or unreclaimed state, be developed.**

Consult a trained professional who can provide design and construction techniques for minimizing mine spoil related problems prior to site development. This may include, but is not limited to, compaction of mine spoil to prevent settling or selecting certain soil types for sanitary leach fields.

AML Problem Type: Mine Subsidence

BACKGROUND

The room and pillar method of extracting coal from deep mines can result in mine subsidence when the pillars of coal and the roof supports that were left in the mine can no longer support the bedrock above the mine. This loss of support is transferred to the ground surface which also drops, creating structural problems for houses, roads or utilities in the subsidence area as well as public safety concerns on other improved property. When buildings are damaged as a result of mine subsidence most insurance policies do not automatically cover the damage to your home. The Ohio legislature enacted a law in October 1987 that established the **Ohio Mine Subsidence Insurance Fund**. It allows individuals residing in certain counties to purchase insurance for protection from structural losses due to mine subsidence. For more information, see the Resources section on page 17 of this guide.

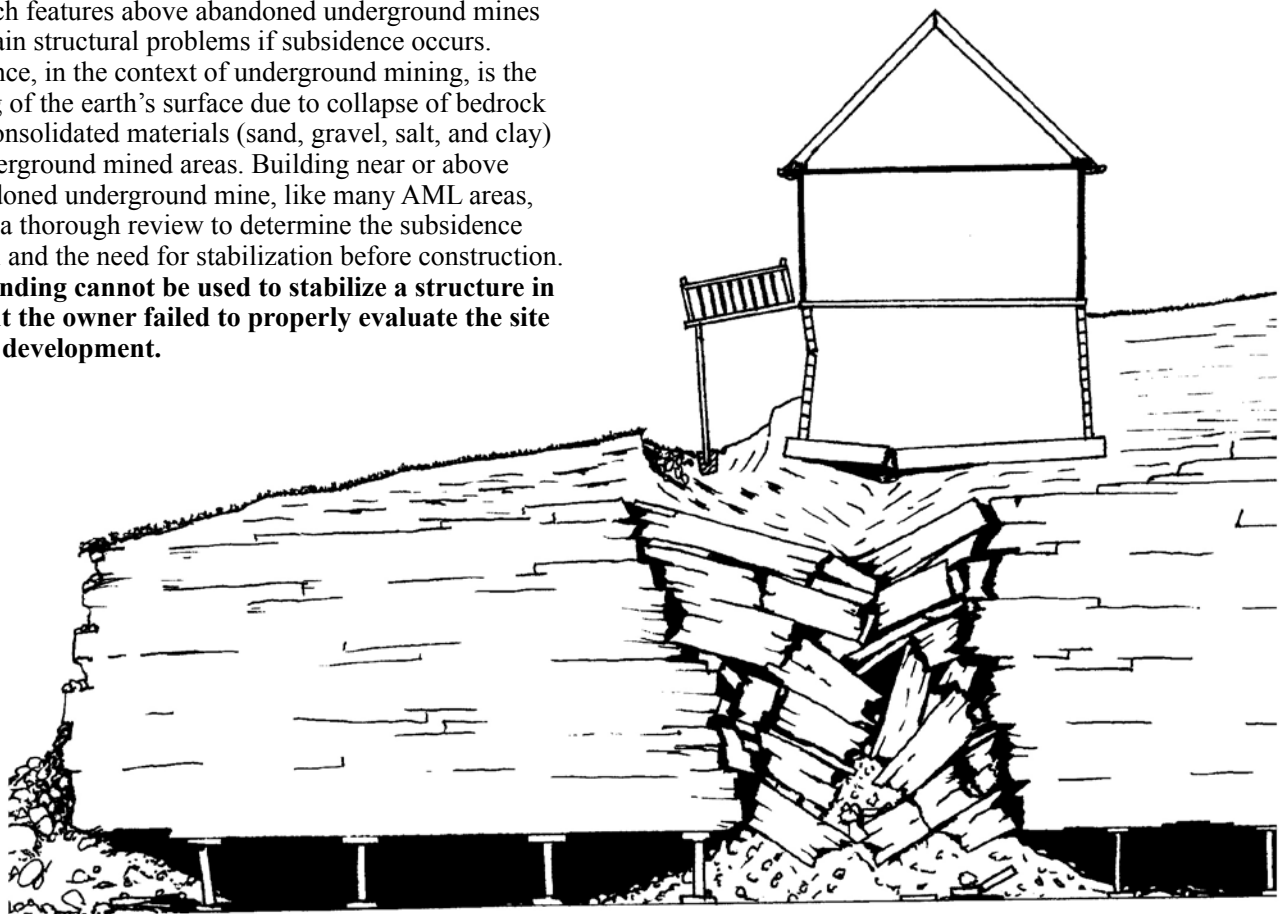
MINE SUBSIDENCE SITE DEVELOPMENT PROBLEMS

Building homes, garages, roads, septic systems and other such features above abandoned underground mines can sustain structural problems if subsidence occurs. Subsidence, in the context of underground mining, is the lowering of the earth's surface due to collapse of bedrock and unconsolidated materials (sand, gravel, salt, and clay) into underground mined areas. Building near or above an abandoned underground mine, like many AML areas, requires a thorough review to determine the subsidence potential and the need for stabilization before construction. **AML funding cannot be used to stabilize a structure in the event the owner failed to properly evaluate the site prior to development.**

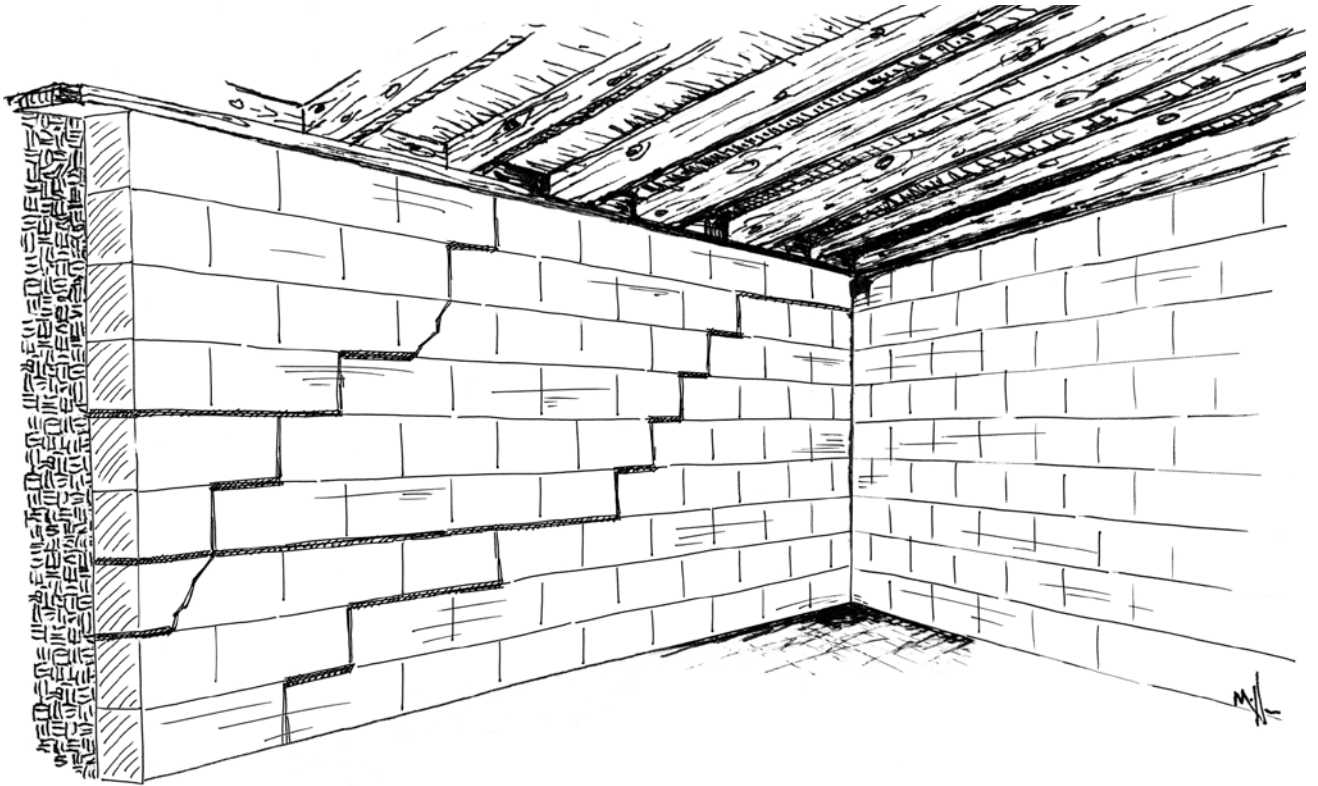
FUNDING AND ELIGIBILITY CRITERIA

Funding may be available through the Division's Abandoned Mine Land Program to stabilize mine subsidence. Eligibility and selection of sites are evaluated on a site-by-site basis and are subject to funding availability. The primary criteria for establishing eligibility for funding includes the following:

1. The actual or potential subsidence must be related to an underground coal mine abandoned prior to August 3, 1977, between August 4, 1977 and August 16, 1982 where performance security is not sufficient to provide for adequate reclamation, or between August 4, 1977 and November 5, 1990 where the surety of the mining operator became insolvent and no money was available from the proceedings to provide for adequate reclamation.
2. An actual subsidence has occurred beneath or immediately adjacent to an inhabited structure, roadway, public facility or public utility.



House impacted by mine subsidence.



Interior basement wall impacted by mine subsidence.

3. The near-term potential exists for subsidence beneath or immediately adjacent to an inhabited structure, roadway or public facility which could result in serious injury or excessive economic loss. Investigative drilling by the Division must establish a significant potential for near-term subsidence that could result in serious injury or economic loss.
4. An evaluation must be completed by the Division to determine if the landowner, public agency or public utility is responsible for actual or potential mine subsidence damage. **If it is determined by the Division that, under reasonable circumstances, a landowner, public agency or public utility should have known about the presence of an abandoned mine and the potential for mine subsidence prior to constructing an inhabited structure, roadway or public facility over an abandoned underground mine, the actual or potential subsidence problem will not be eligible for program assistance.** If, under reasonable circumstances, the potential for mine subsidence should be known, the local political entity, if applicable, shall require a landowner, public agency or public utility to evaluate the potential for mine subsidence and to adopt, where appropriate, preventative measures under or within the angle of draw of the structure, roadway or utility. The angle of draw is used to define the limits of the area of potential surface effect for subsidence. It is based on the

type of geology, depth of the mineral and seam height. The angle of draw can affect areas up to 35 degrees away from the mineral extraction area. If there is no political entity responsible for issuing development permits, a landowner, public agency or public utility must perform subsidence evaluation in conjunction with other site development considerations. **Consult a trained professional prior to site development, who can provide design and construction techniques for the stabilization of underground mining areas to avoid mine subsidence problems. This may include, but is not limited to, drilling and injecting grout and/or concrete into the mine void.**

Reasonable circumstances include, but are not limited to:

1. The presence of past mine subsidence in the general vicinity of the site in question;
2. The media coverage of past subsidence event(s) in the general vicinity of the site in question;
3. The completion of educational outreach programs by the Division regarding the Abandoned Mine Land Program;
4. The availability of technical information for pre-development evaluation purposes;
5. The date of specific development or construction relative to items 1 through 4 above.

AML Problem Type: Mine-Related Landslide

BACKGROUND

The indiscriminate placement of steeply sloped unconsolidated mine spoil, prevalent on abandoned surface mines, can result in landslides that impact existing roads, structures and streams. Drainage from deep mines and strip mine impoundments can also saturate native soil units on unmined slopes and result in the instability of these slopes.

MINE-RELATED LANDSLIDE SITE DEVELOPMENT PROBLEMS

Mine spoil is the earthen material located above the coal seam that must be excavated to extract or mine the coal. In some cases mine spoil is not a stable material based on type, particle or rock size, subsurface water and mining method. Buildings and roadways, if not constructed properly on or near mine spoil, can cause hillside movement, also known as a landslide. Grading and/or removing the spoil material and associated vegetative cover on hillsides can cause instability.

1. Constructing a bench or a level area on a hillside composed of mine spoil for a road, house, mobile home or other outbuilding can result in the following problems:
 - Undercutting the spoil material on a hillside may reduce toe or base support for the upper portion of the slope.
 - Excavating spoil material and improperly placing it can overload a slope. This activity can cause a landslide because the excavated spoil material may add additional weight to the slope, which can make the entire hillside unstable.
2. Subsurface waters or springs can cause mine spoil to become saturated and eventually unstable. Grading mine

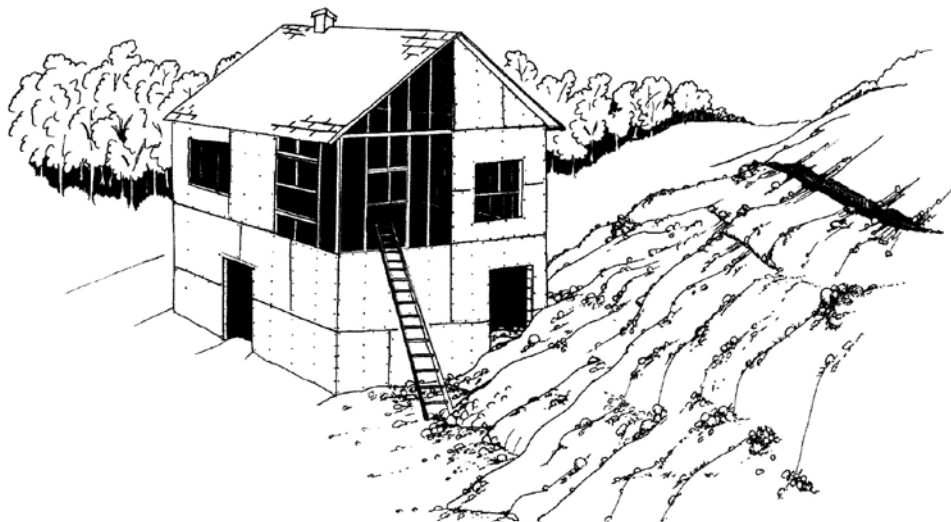
spoil on a hillside without installing the proper surface and/or underdrain system can cause slope instability.

FUNDING AND ELIGIBILITY CRITERIA

Funding may be available through the Division's Abandoned Mine Land Program to stabilize a landslide endangering an occupied dwelling, improved property, road or public facility. Eligibility and selection of sites are evaluated on a site-by-site basis and are subject to funding availability. The primary criteria for establishing eligibility for funding include the following:

1. The landslide material is composed of mine-generated spoil or coal refuse. The material could also be composed of native soil that has become saturated and slip-prone as a result of mine drainage from an abandoned deep mine or strip mine.
2. An occupied structure, improved property, public road or public facility is endangered because it is located above, below or adjacent to the unstable land mass or a potentially unstable land mass.
3. A stream is located at the toe or base of an unstable or potentially unstable landslide and, if blocked by landslide material, would result in flooding that could endanger occupied structures, roadways or public facilities.
4. Landowners can influence the stability of mine spoil that has been stable since mining by undertaking certain site development activities. By removing material from a hillside to place a road or structure, a hillside's support is lessened at the location of the disturbance. This could result in a landslide or incremental creep, especially on a slope composed of mine spoil or one influenced by mine drainage. The placement of a septic system

in mine spoil can also increase landslide potential by discharging water into unconsolidated spoil. **Landowner-induced slope instability will not be considered eligible for program funding. It is the landowner's responsibility to evaluate slope stability prior to affecting a slope or locating above or below it and to take appropriate stabilization measures (retaining structure and/or subsurface drainage placement) prior to construction.**



Site grading for house construction creates landslide in mine spoil.

AML Problem Type: Dangerous Impoundment

BACKGROUND

Prior to the requirement of returning mine land to approximate original contour, the final cut of a strip mining operation often left a pit between the highwall face and a spoil pile. Depending on the area of surface drainage and the configuration of the spoil material, these pits can impound water. If the water quality is good, these impoundments can be an attractive nuisance to recreational enthusiasts. Pit and slurry impoundments can also present a flooding potential if the spoil or dam retaining the water is unstable. These impoundments can retain large quantities of water, sediment and slurry that, if suddenly discharged, may result in immediate flooding and deposition downstream.

DANGEROUS IMPOUNDMENT SITE DEVELOPMENT PROBLEMS

Impoundments left behind by a mining operation can pose many problems for site development, such as:

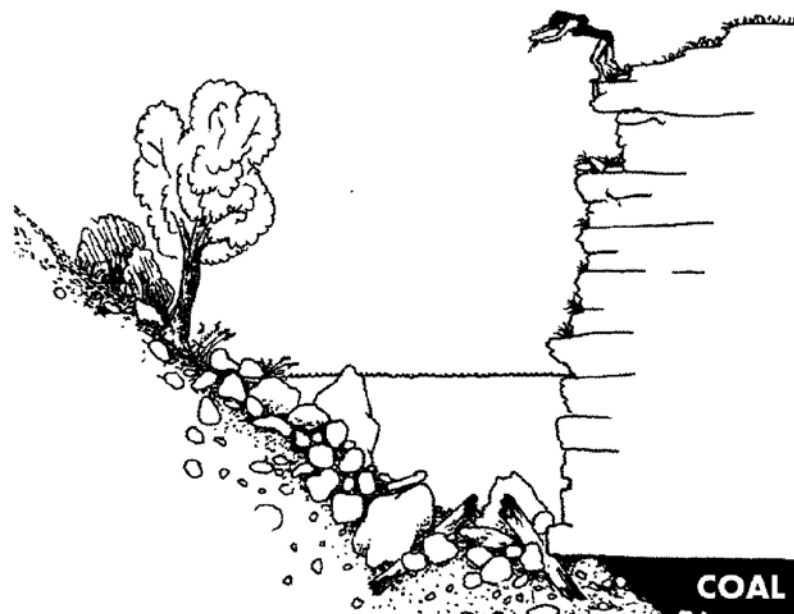
- Potential flooding problems due to heavy seasonal rains.
- Impoundments can saturate surrounding areas and create seeps, which can cause hillside instability.
- Impoundments can be very dangerous for swimmers due to unstable vertical rock faces, and steep drop-offs or large rocks beneath the water surface.
- Water quality problems can make the impoundment unsuitable for aquatic life or swimming. Impoundments can also be breeding grounds for mosquitoes.
- Impoundments can also become attractive nuisances to the public, which brings unwelcome visitors to the area.

FUNDING AND ELIGIBILITY CRITERIA

Funding may be available through the Division's Abandoned Mine Land Program to eliminate dangerous impoundments. Eligibility and selection of sites are evaluated on a site by site basis and are subject to funding availability. The primary criteria for establishing eligibility for funding include the following:

1. There is documented evidence of serious injury and/or loss of life attributable to the impoundment.
2. There is an occupied structure, public use facility, improved public road or park or recreational area located within 300 feet of the problem area.
3. There is evidence of either frequent visitation or an easy access capable of carrying vehicles to the impoundment area.
4. There is an occupied structure, improved property, improved road or public facility located within the flood path that would potentially be subjected to destruction or damage in the event that the impoundment retention structure should fail.
5. **If an occupied structure, public use facility, improved public road or park or recreational area are placed within 300 feet of a pre-existing impoundment that could reasonably be known to exist, the impoundment will not be eligible for program funding to abate present or potential dangers. Further, if similar development occurs downstream of and within the potential flood path of an impoundment with a failing or potentially failing retention structure and**

its presence could be reasonably known to exist, the problem will be deemed ineligible for funding.



Underwater dangers of swimming in an impoundment created by mining.

AML Problem Type: Flooding and Mine Drainage

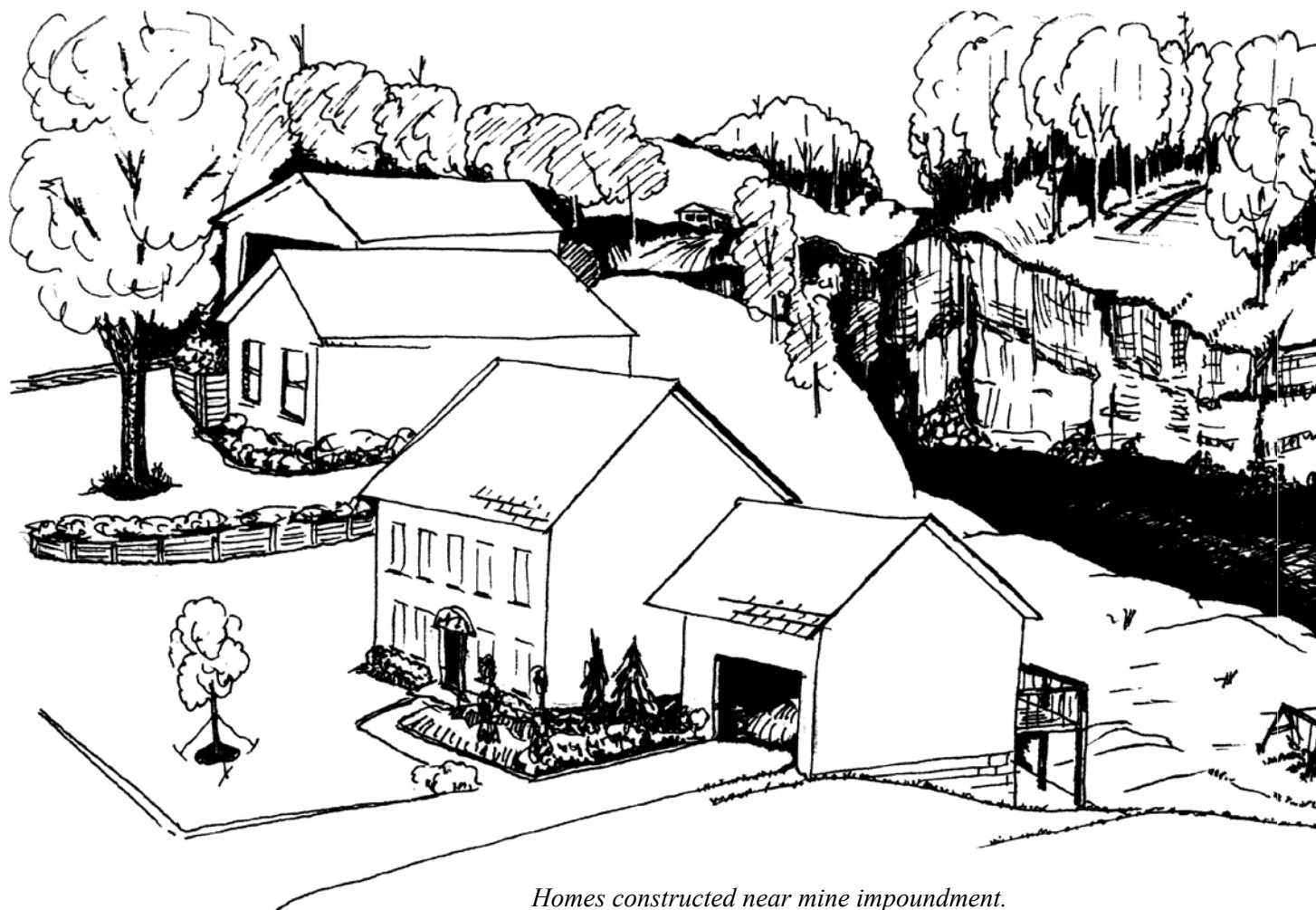
BACKGROUND

Surface and subsurface drainage patterns and flow rates may be altered as a result of land use practices, development and vegetative cover changes. Past mining is one activity which may have impacted these long established drainage patterns and flow rates.

Poorly vegetated mine spoil has significantly higher erosion rates than vegetated spoil or undisturbed land. This situation has resulted in increased sediment in streams, which has reduced channel capacity and increased the frequency of flooding. Even areas reclaimed to grasses prior to 1977 can be responsible for increasing flooding frequency in watersheds that have been heavily mined. This increased flooding frequency is due to higher runoff rates resulting from soil compaction and a change in vegetative cover from trees to grasses.

Mining that occurred prior to existing regulations altered pre-existing watershed drainage patterns to which certain land uses had been accustomed. With reduced channel capacity, higher runoff rates and altered drainage patterns, occupied structures, public roads and farmland can be subject to more frequent, dangerous flooding events and mine drainage damage.

Subsurface drainage can also be impacted by abandoned deep and strip mines. A pit impoundment can act as a reservoir for groundwater and increase its quantity and elevation. Deep mines, if located above drainage, can also store and discharge a significant amount of water to both surface and groundwater flow. This increased elevation and flow of groundwater can damage structure foundations, seep into basements and cause additional damage as well as contribute to slope instability.



Homes constructed near mine impoundment.

FLOODING AND MINE DRAINAGE SITE DEVELOPMENT PROBLEMS

Flooding events and mine drainage problems are associated with abandoned surface and underground mines. Abandoned surface mines can change the landform, which can redirect drainage and cause flooding. Impoundments left behind by mining operations can retain and discharge water, which also alters drainage patterns. These changes in landforms present flooding problems for structures, roads and farmland.

Mine drainage from abandoned underground mines or from impoundments can increase the base flow into streams, saturate mine spoils and contaminate groundwater. These problems can cause streams and aquifers to be polluted. Seepage to foundations or basement areas can create structural or nuisance problems. Seepage can also cause hillside instability. **Extreme caution should be exercised when excavating near mine entries or seepage areas near the coal outcrops to avoid intercepting a flooded underground mine. These underground mines can store large volumes of water and if suddenly discharged, could result in immediate physical harm, downstream flooding and water pollution problems.**



FUNDING AND ELIGIBILITY CRITERIA

Funding may be available through the Division's Abandoned Mine Land Program to address mine-related drainage and flooding posing public health and safety problems. Eligibility and selection of sites are evaluated on a site-by-site basis and are subject to funding availability. The primary criteria for establishing eligibility for funding include the following:

1. There is either a potential danger of flooding, a high probability of occurrence or a previous record of flooding in a problem area where a pre-existing occupied structure, improved property, public road or public facility is located within the flood path.
2. The majority of the potential, probable or historical flooding problems must be related to abandoned mine land-related sediment in the stream, increased runoff rates, and/or altered sub-watershed drainage patterns affecting structures, improved property, roads or public facilities and the problem was caused by mining that took place before August 3, 1977, between August 4, 1977 and August 16, 1982 where performance security is not sufficient to provide for adequate reclamation, or between August 4, 1977 and November 5, 1990 where the surety of the mining operator became insolvent and no money was available from the proceedings to provide for adequate reclamation.
3. An occupied structure, public facility or public road whose foundation stability is impacted by mine-related groundwater must have existed prior to the mining that resulted in the drainage problem. Mine drainage in a basement must result in or have a high probability of causing structural damage, damage to utilities and appliances or health problems related to dampness and mold.
4. Landowner responsibility for flooding and mine drainage problems must also be considered when eligibility determinations are made. These considerations include:
 - Was a structure placed subsequent to the abandonment of the mining feature and alteration of the pre-existing drainage pattern?
 - Was a structure placed subsequent to the mining in the revised flood path limit?
 - Is the landowner contributing to the flooding problem by adopting poor land management practices like allowing cattle in a stream or over grazing?
 - Has the landowner properly sized culverts? Has the public road authority properly sized culverts?
 - Is the landowner maintaining a stream course by removing major debris such as logjams?
 - Was the landowner's pre-existing structure placed in a flood plain and subject to flooding prior to mining in the watershed?
 - Is the landowner addressing surface drainage around the structure (presence of gutters, establishing proper surface grades and placement of underdrains to minimize foundation seepage)?

AML Problem Type: Mine Gas

BACKGROUND

Abandoned deep and strip mines can be sources of gases, especially methane and carbon dioxide. Methane, primarily from deep mines, can be an explosive gas in certain concentrations. Carbon dioxide can be liberated from coal seams, be a product of the decomposition of organic matter in mine spoil or result from the dissolution of carbonate rock in mine spoil by acid mine drainage. Carbon dioxide will replace oxygen, especially in low areas such as basements. It can be transmitted through improperly abandoned wells, fissures in rock strata related to mine subsidence and through basement floors and foundations. If oxygen levels decline sufficiently in occupied unventilated areas, persons exposed can become unconscious and be asphyxiated. Toxic gases can also be discharged from burning coal refuse piles and underground mine fires. These gases can be especially hazardous to those people with respiratory problems.

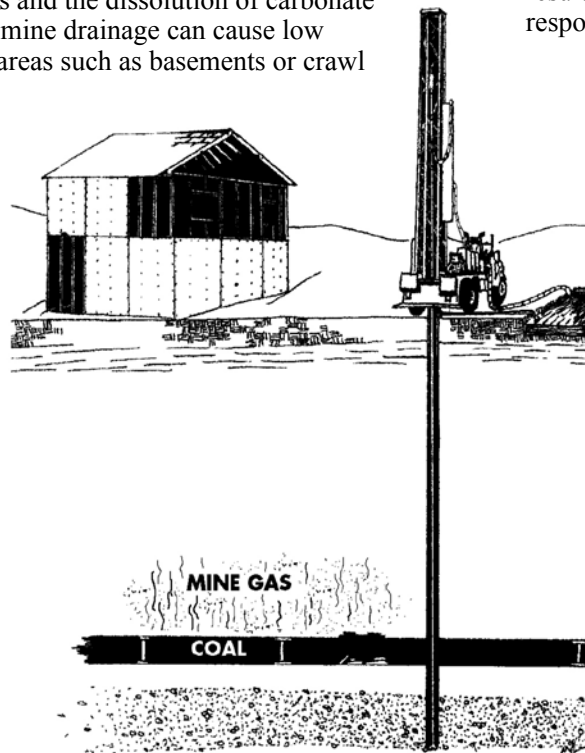
MINE GAS SITE DEVELOPMENT PROBLEMS

Mine gases need to be considered in the site development for occupied buildings. Methane and carbon dioxide are the primary mine gases generated from abandoned underground mines which pose a threat to public safety. Burning coal refuse and underground mine fires can generate toxic fumes and present a serious threat. Although not a common problem in Ohio, the decomposition of organic material in certain types of mine spoils and the dissolution of carbonate rock in mine spoil by acid mine drainage can cause low oxygen levels in confined areas such as basements or crawl spaces.

FUNDING AND ELIGIBILITY CRITERIA

Funding may be available through the Division's Abandoned Mine Land Program to reduce the levels of mine-related gases posing public health and safety concerns. Eligibility and selection of sites are evaluated on a site-by-site basis and are subject to funding availability. The primary criteria for establishing eligibility for funding include the following:

- The concentration of gases must indicate the potential for or the presence of a public health and safety problem. This may result from low oxygen levels, explosive levels of methane or smoke and noxious gas from a venting deep mine fire or burning coal refuse pile. The hazardous gas concentrations must be measured within or adjacent to an occupied structure, public facility or frequently visited area.
- Landowner responsibility for the presence of mine gases must also be considered when eligibility determinations are made. Landowners will be solely responsible for abating hazardous mine gas concentrations if the following apply:
 - If a landowner constructs a dwelling or other structure on program eligible pre-existing mine spoil, the landowner will be responsible for venting hazardous gas concentrations if present.
 - If a landowner burns debris on a coal refuse pile resulting in ignition of the pile, the landowner will be responsible for its extinguishment.

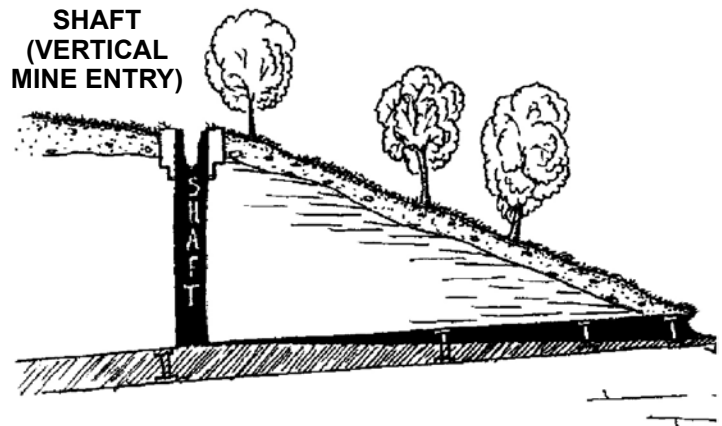


Site being drilled to monitor for mine gas.

AML Problem Type: Portals and Vertical Mine Openings

BACKGROUND

Deep mines are entered through horizontal or sloped entrances (portals) or vertical openings (shafts). Until the 1940s, the sealing of these openings was not statutorily required. Though sealed since the 1940s, many portals and shafts have fallen into disrepair. With no provision for continuous maintenance, these previously sealed entrances, as well as unsealed openings, can pose serious public health and safety problems. These problems include the presence of explosive methane gas and a low level of oxygen. These gas levels are especially dangerous if access to abandoned underground mines is made. The collapse of mine shafts and tunnels leading away from the portals and slope entrances can also have catastrophic consequences.



PORTALS AND VERTICAL MINE OPENINGS SITE DEVELOPMENT PROBLEMS

Mine openings that are open or improperly sealed are inherently unsafe. These entries can be easy to see or could be concealed by years of vegetative growth or past landscaping practices. Some portals (horizontal entries) are sources of mine drainage discharge. Problems with developing or building near mine entries include:

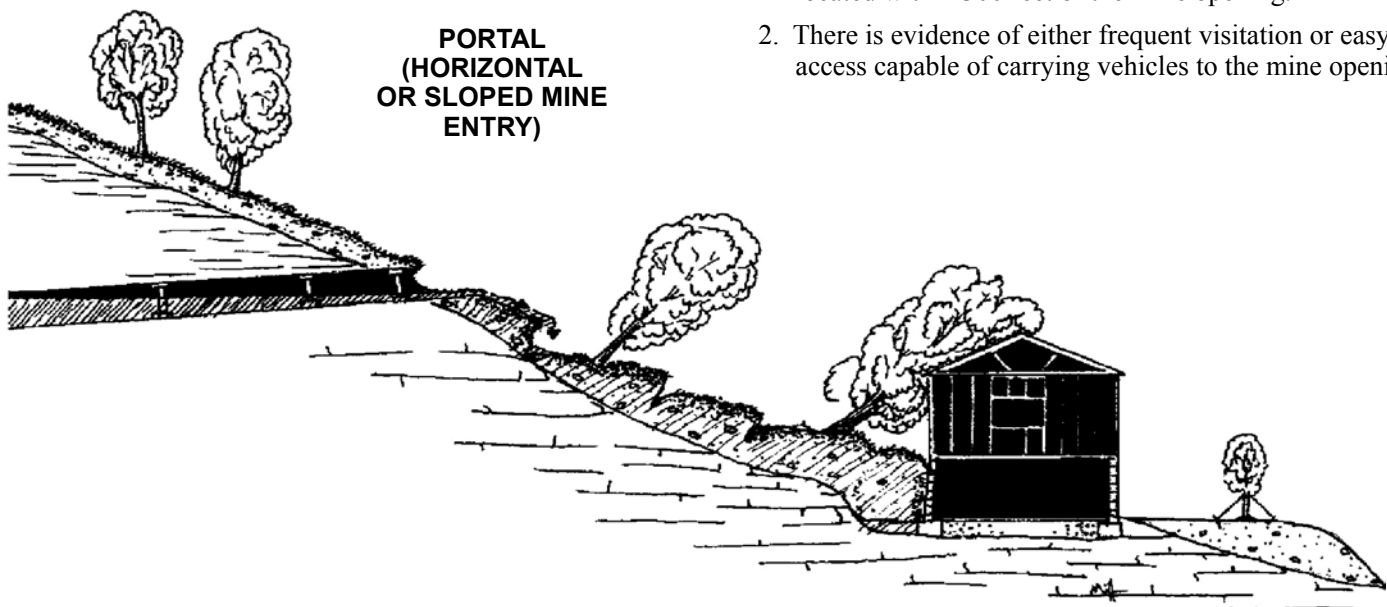
- Foundation problems in the event of a collapse.
- Mine drainage seepage into foundations or basement areas.
- Hillside instability due to mine drainage seepage.
- Toxic mine gas infiltration.

Mine openings are considered dangerous attractive nuisances. Developing near these openings increases public visitation. Portals and vertical mine openings are dangerous to these visitors because of cave-ins, mine gases and flooded conditions.

FUNDING AND ELIGIBILITY CRITERIA

Funding may be available through the Division's Abandoned Mine Land Program to seal mine openings. Eligibility and selection of sites are evaluated on a site-by-site basis and are subject to funding availability. The primary criteria for establishing eligibility for funding include the following:

1. There is an occupied structure, public use facility, improved public road or public park or recreational area located within 300 feet of the mine opening.
2. There is evidence of either frequent visitation or easy access capable of carrying vehicles to the mine opening.



Landslide created by mine water discharge.

Abandoned Mine Land Development Educational DVD

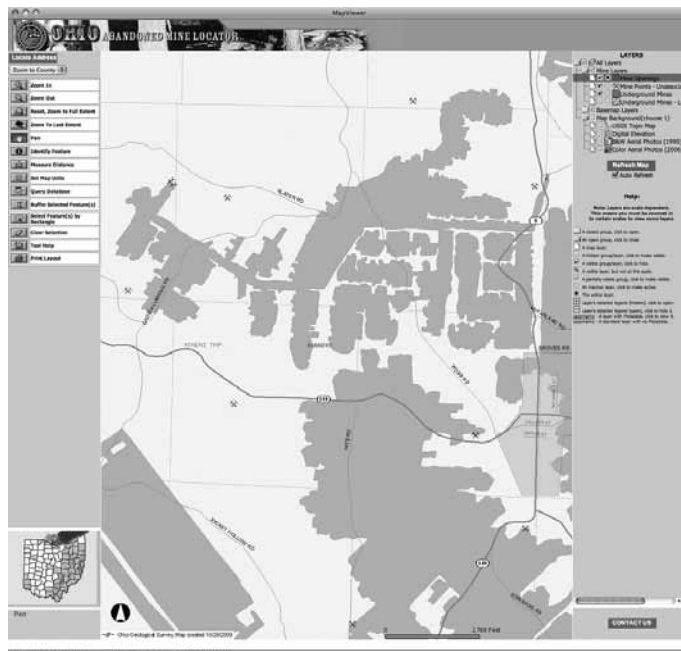
A supplemental AML development educational DVD is available and may be used in conjunction with the *Ask Before You Build Development Guide* as another resource to assist developers and landowners in assessing a property's mining history and strategically planning for potential problems associated with abandoned mine areas **before construction begins**. Contact the Ohio Department of Natural Resources (ODNR) Division of Mineral Resources Management or access/download the free DVD at www.minerals.ohiodnr.gov.

Ohio's Abandoned Underground Mine Locator

Since 1969, the ODNR has actively mapped known locations of abandoned underground mines (AUMs) and subsidence issues related to underground mines. Over 4,700 AUMs exist within 43 Ohio counties. Much of this mining took place before mining and reclamation laws existed. These mines underlie an area of over 800 square miles of the state. Additionally, over 625 square miles of Ohio land are affected by abandoned surface mines.

To reduce risks associated with abandoned mine lands, detailed knowledge of their location, extents, and geology is essential when developing plans for residential and commercial development, highway construction, mining, and drilling for water, oil, and natural gas. The ODNR actively researches and maintains the most comprehensive inventory possible of all historic mine lands.

This collection of AUM maps is available to the public via a free online interactive map known as the *Ohio Mine Locator*. The locator receives tens-of-thousands of visits each year from government agencies, realtors, land owners, and nongovernmental organizations. The online locator is available on the ODNR website at www.minerals.ohiodnr.gov/abandoned-mine-land-reclamation/mine-locators.



Recommendations to Local Zoning, Land Use Planning and Development Officials

- Advise developers and homeowners to use the interactive Ohio Abandoned Underground Mine Locator.
- Make underground mine maps available at county offices and encourage their use.
- Incorporate underground mine maps into your comprehensive planning process and direct development to areas that are geologically stable.
- Use subdivision regulations to ensure that developers have provided for geologic stability if underground mines are in the area. Specifically cite “underground mines” in your regulations. Areas more susceptible to subsidence can be set aside as open space if mine subsidence stabilization is cost prohibitive.
- Add “underground mines” and “surface mines” to your site review checklists.
- Be aware that not all mines are mapped, particularly old mines pre-dating 1874. Mine maps are only a general planning tool.
- Gather detailed information about subsurface conditions through geotechnical investigations (core borings and analysis). In many cases this expense can be borne by the developer, who wants to ensure that stable geologic conditions exist.
- Compile a list of geotechnical firms operating in your region.

“Ask Before You Build” Resources

1. **Consult a qualified experienced geotechnical and/or engineering firm to assist in site development.**
2. **Ohio Department of Natural Resources (ODNR)**
www.ohiodnr.gov
 - a. **ODNR Division of Geological Survey**
614-265-6576; *www.geosurvey.ohiodnr.gov*
 - Staff informed about Ohio mining history.
 - Topographic maps showing locations of underground mines. Call for pricing information.
 - Detailed, individual mine maps with costs ranging from 25¢ to \$4.
 - Drilling records and other geological information for the area.
 - All maps and printed information can be ordered by telephone or email: Geo.Survey@dnr.state.oh.us
 - b. **ODNR Division of Mineral Resources Management**
614-265-6633; *www.minerals.ohiodnr.gov*
 - Information concerning abandoned mine land reclamation programs.
 - History of abandoned mine land complaints.
 - Drilling records and geotechnical evaluations for some abandoned mines areas.
 - Abandoned Underground Mine Locator Web Site allows anyone with internet access to create a map showing the location of the abandoned underground mines in Ohio.
www.minerals.ohiodnr.gov/abandoned-mine-land-reclamation/mine-locators
 - c. **ODNR Division of Water Resources**
614-265-6620
 - Water well logs and drilling reports.
 - Ground water resources maps and information.
 - Floodplain management information.
 - Soil data.*
 - Watershed planning.*
 - Storm water management and erosion control.**
3. **Soil & Water Conservation Districts and the USDA Natural Resources Conservation Service**
(see local listing)
 - Provides technical home site development information to perspective buyers on soils, subdivision, storm water management and erosion control. Also a source for historic site development information.***
4. **County and/or City Engineers**
Road maps or aerial mapping, maintenance information on roads, culverts and bridges and historic site development information.* Also a resource for the names of qualified experienced geotechnical and engineering firms to assist in site development.
5. **Regional, County or City Planners**
Site reviews for individual houses or subdivisions, floodplain management and planning services to local governments. Also a resource for the names of qualified experienced geotechnical and engineering firms to assist in site development.
6. **County and City Health Departments**
Issue permits for water wells and residential sewage system designs and historic site development information.*
7. **Township Trustees**
Zoning and historic site development information.*
8. **Ohio Mine Subsidence Insurance Program**
614-839-6446 or 800-282-1772
www.ohiofairplan.com
 - Information available from the Ohio Mine Subsidence Insurance Underwriting Association on past underground mine subsidence claims.
 - Most insurance policies do not cover structural damage to a home due to mine subsidence. The Mine Subsidence Insurance Fund provides low cost insurance coverage in 37 Ohio counties for homes damaged due to mine subsidence.
 - Report your claim to an agent or the insurance company. The company will notify the Ohio Mine Subsidence Insurance Underwriting Association, who administers and adjusts the claim.
 - Insurance coverage is mandatory in 26 of the 37 counties, with a low annual premium.
 - Available for 1- to 4-family dwellings having at least 50% of the living area occupied. Mobile homes and farmhouses are also eligible.
 - Coverage is the lesser of \$300,000 or the amount of insurance coverage for the dwelling.
 - Coverage includes costs of excavation, foundations, and underground utilities.
 - Annual premium is \$1 in mandatory counties and \$5 in optional counties.

* Available through the Ohio Department of Agriculture's Division of Soil and Water Conservation.

** Available through the Ohio Environmental Protection Agency's Storm Water Management Program.

*** Historic site development information is usually information you will receive from local officials on area land use problems such as flooding, poor soils, landslides, AML, etc.



**The Ohio Department of Natural Resources
Division of Mineral Resources Management**

www.minerals.ohiodnr.gov