

HAZARDS

The physical hazards associated with former exploration and mining operations often remain as unsecured vertical shafts, adits and horizontal tunnels, inclined shafts or declines, test pits and trenches, unstable rock slopes and subsidence and caving features. Injury or death can result to anyone venturing into or near one of these hazards by falling, drowning in flooded workings or by the collapse of old workings.

In addition to the physical hazards, other hazards can be found on abandoned mine sites and in unsecured mine openings. These hazards which also present a safety concern can include dangerous mine gases, dilapidated buildings and structures, mechanical and electrical equipment, and explosives.

Unsecured Mine Openings

Unsecured mine openings present the greatest physical hazard on abandoned mine sites. Mine openings were not designed to remain open and stable forever. Over time, mine openings and the ground and rock around them can become very unstable for the following reasons:

- Supports and roof spans weaken and deteriorate, and can fall without warning.
- The rock around vertical mine openings can fracture and become unstable.
- Timber supports and covers around and over shafts deteriorate and weaken.
- Underground workings mined close to surface can cave and collapse.

Entry into abandoned mine workings may present other, less visible, hazards such as the unexpected presence of vertical openings (raises and winzes) which may be water-filled, the presence of toxic or explosive gases, unstable explosives, and oxygen deficiencies. Potentially explosive methane gas is often associated with coal mines in Nova Scotia. Water within mines or flowing from mine openings may be contaminated. Underground workings are complex, and anyone venturing in may become disoriented and lost.

Typical examples of unsecured, abandoned mine openings common to Nova Scotia are shown on Figures 4 through 7.



Figure 4: Adit into side of hill showing weakened and fractured rock around entrance of the opening.



Figure 5: A mine stope extending through to surface with weak, fractured rock around the perimeter of the opening.



Figure 6: A water filled stope along a gold vein which has partially caved through to surface.

Figure 7: Vertical shaft which is open at surface showing deteriorating and rotting timber.



Open Pit Mines and Quarries

Mining in open pits and quarries often results in steep rock slopes. The primary concern at these abandoned sites is the risk of injury from falls. The risk is directly related to the height, slope, stability, and visibility of the highwalls. Additionally, flooded sumps, pits and trenches may be associated with open pit mines and quarry sites.

Subsidence and Caving Features

Subsidence and caving can occur when underground openings collapse. These features are particularly common in areas of shallow mine workings. Failure can be rapid or slow, and can be represented at surface as either an opening or a depression. Figure 8 shows the depth of a caving feature being measured by Nova Scotia Department of Natural Resources staff. A typical subsidence feature, common to Nova Scotia is shown on Figure 9.

Other Hazards

Explosives and Detonators

Undetonated explosives and detonators are occasionally found on abandoned mine sites and in unsecured mine openings. Depending upon the age of the workings, the explosives could include black powder, dynamite, or an ammonium nitrate and diesel fuel explosive, commonly known as ANFO. Both explosives and detonators present a hazard.

Although black powder has not been used extensively since the late 1880s, it may be present in older mine workings, stored in metal cans, wooden kegs or paper bags in cardboard cases. Black powder is a free flowing, black granular material with a high lustre. Regardless of its age, black powder represents an explosive hazard.

Dynamite is manufactured in round sticks approximately 200 mm long and 25 mm in diameter, and is composed of nitroglycerin and an inert filler wrapped in a paper roll. Initially packaged in wooden cases, more recently cardboard boxes have been used. Over time, nitroglycerine can seep out of the filler and appear as beads on the outside of the sticks or accumulate nearby. The nitroglycerine is extremely unstable and can explode if disturbed.

ANFO is an explosive which resembles a granular garden fertilizer with a distinctive orange colour and a fuel oil smell. It is normally found in plastic bags, but can also be packaged in paper bags. Although ANFO is relatively stable, it can still represent an explosive hazard.



Figure 8: Water filled subsidence features

Figure 9: Nova Scotia Department of Natural Resources staff measuring depth of a caving feature.



Detonators which may be found on abandoned mine sites consist of electric and non-electric blasting caps. Typically, they are 25 to 50 mm long metal tubes about the diameter of a pencil. Electric blasting caps have two thin wires extending from one end and can be detonated with a very small electrical charge including static electricity. Non-electric blasting caps are attached to a fuse and can be detonated by igniting the fuse. Both types of blasting caps can also be detonated by impact or heat. If explosives or anything resembling explosives are found - **DO NOT HANDLE**. Report your finding immediately to one of the government departments identified in Chapter 8.

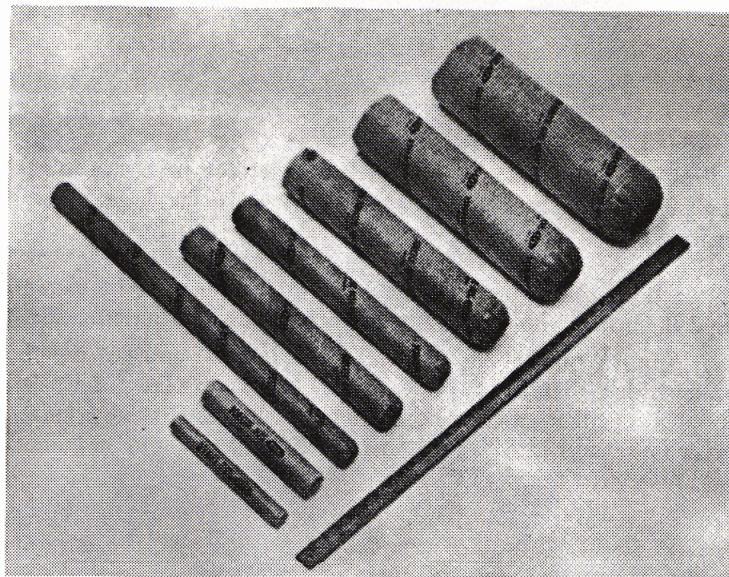
Typical examples of explosives and blasting caps which may be found around abandoned mine openings in Nova Scotia are shown on Figures 10 and 11.

Abandoned Structures and Equipment

Old buildings and equipment located on abandoned mine sites can present hazards. Through weathering and lack of use, structures become unstable and may collapse. Particular dangers exist in old headframes where a shaft may be covered over with wood.

Over time, equipment can become detached from foundations and supports. This equipment could fall or shift causing injury to anyone climbing on or walking around it. Equipment may also be found in abandoned mine openings. Entering the openings to retrieve or inspect this equipment can result in injury or death.

• Notes •



Various sizes of dynamite and cardboard
box packaging
Figure 10



Typical examples of blasting caps
Figure 11



Figure 12: Abandoned mill foundation and structure -
former Forest Hills gold mine



Figure 13: Deteriorated abandoned mine structure -
former gold mining operation