Teacher's Guide for Stay Out and Stay Alive Movie

Suggested Questions to ask your students:
How many abandoned mines are there nationwide?
Answer: Thousands of abandoned mines.

One of the three people who enter the mine at the very beginning of the video says, "I am scared. I don't want to be in here, guys." Why do you think she went into the abandoned mine even though she was afraid to go?
Answer: Peer pressure, wanting to be part of the group and not admitting her fear.

What were some of the excuses you heard for entering an abandoned mine?
Answer:
"I didn't want to be a chicken, so I went in."
"I do this a lot. It's no big deal."
"It looked really inviting. I didn't know it was dangerous."
"My dad does it, so why not? It's a family thing."
"We went in and thought we would just come back out."
"We started going into mines when I was ten years old. Big deal."
"Sometimes you do stupid things, and I couldn't back out now. I had to do it."
"It was raining. I thought the mine would be safe."
"My friends dared me to go in so that's what I did."
"I've done it a million times."
"I just went into the mine because I was curious. I didn't know anything bad could happen."

Is there any acceptable excuse to enter an abandoned mine?
Answer: No. It is too dangerous and not worth the risk of getting hurt or killed. They are unstable, unpredictable, and unsafe.

How many people are killed exploring abandoned mine lands on a yearly basis?
Answer: Each year about 30 people are killed exploring abandoned mine lands.

What are the dangers of abandoned mines?
Answer: Timbers used for wooden supports, ladders, shaft covers can rot. Mine roof, side walls and opening can collapse trapping the unsuspecting explorer or even worse, they could crush you. You can get lost in underground mine workings. Old explosives and blasting caps are extremely unstable. Equipment can roll trapping a person or causing serious cuts, broken bones or death. Bad air, no air or toxic gases may be presence since the mine is no longer ventilated. Natural decay of radioactive minerals can result in a buildup of radon which can cause damage to your lungs and other organs like your eyes. Hazardous waste may have been left at an abandoned mine site. Mine waste dumps can contain toxic elements that can cause cancer. Mines can contain deep pools of water. Water from an abandoned mine can be polluted. You can fall down a shaft. You can drown in water-filled pits or quarries. Unstable slopes can crumble underneath your feet. There are many other hazards that you can't even see.

How are mines created?
Answer: Mines are man made by drilling, blasting and digging with big machines.

Are mines the same thing as a cave?
Answer: No! Natural forces (Mother Nature) create caves. Caves are naturally ventilated. Mines need big fans to push air through them.

Why are explosives so dangerous at an abandoned mine site?
Answer: They are extremely unstable. If you touch them they may explode.

What should do if you find dynamite at an abandoned mine?
Answer: Don't touch it and call the sheriff.

What are some of the animals that use abandoned mines for their habitat?
Answer: Black bears, mountain lions, snakes, and bats.

What is "bad air?"
Answer: Toxic gas or not enough oxygen to breathe.

How can people affect the supply of air in an abandoned mine?
Answer: Building a campfire near the entrance to a mine (tunnel or portal) can use up all the oxygen so you can't breathe.

Should you drink water flowing out of an abandoned mine?
Answer: No! It might be acid water and/or be polluted with heavy metals. Both are harmful to your health.

Why are water filled pits or quarries so dangerous?
Answer: Things like rocks, abandoned equipment with sharp edges, ledges, steep slopes and glass are hidden under the water. Also, the temperature is icy cold and can cause hypothermia which is when your body temperature drops and you get so cold you can't function normally.

What could/should you say if your friend(s) or family want to explore an abandoned mine?
Answer: Abandoned mines are unstable, unpredictable and unsafe. Stay out and stay alive.

What can you do to help?
Answer: You can:

- Warn others about the dangers of abandoned mines.
- Respect private property and do not trespass signs.
- Do not go in abandoned mines.
- Do not vandalize an abandoned mine closure.

- Report abandoned mines to your local federal land managing agency or the local state abandoned mine program or the Office of Surface Mining.

Why are there abandoned mines?
Answer: These mines were abandoned when there were no reclamation laws. People just left the mining operation intact and walked away. Not until January 1, 1981 were there regulations requiring the reclamation of mining operations on public lands. Most State reclamation laws were adopted in the middle to late 1970's.

Why do we need mining?
Answer: You use things from mines everyday: the house you live in, the bike you ride, the television you watch, the compact disk you listen to, the computer you use. Without mining you couldn't have these things. Other examples of things made with the material that comes from mining are: cars, refrigerators, medicines, washers, etc. Mining is an integral part of the world's economy.

Classroom Exercises:

- A mine skit is provided under the icon Additional Abandoned Mine Land Information. You could also have your students write their own skit on the dangers of abandoned mines and act it out.

- Fill a pan with water. Sprinkle as much fine dirt on the water's surface as it can hold. Use this as a visual aid to discuss how in an abandoned mine you could think you were walking on solid ground but then when you step on this kind of surface you could be falling into a deep pool of water. Explain that they could drown.

- Take a small group of children out of the classroom. Make a maze by rearranging the room using the desks and chairs. Bring the students back into the room blindfolded and have them make their way through the maze. Relate this activity to trying to find the way out of an underground mine if you are lost inside. Rearrange the maze and repeat with different students.

- Create your own mine safety booklet.

- To demonstrate what is meant by "insufficient oxygen to sustain life," do the following exercise:
    - (1) Get a metal pie plate, place it on a trivet;
    - (2) Light a candle and drip a small amount of wax in the center of the pie plate. Stick the candle in the wax while it is still hot or warm. This will hold the candle in place upright.
    - (3) Light the candle and then place a glass jar over the candle.
    - (4) Watch what happens. Explain to your students that fire needs oxygen in order to continue to burn. If there is no oxygen, the fire will go out. When the jar was placed over the candle, all the oxygen in the jar gets

used up. As the candle burns, gases such as carbon monoxide replace the oxygen and when the oxygen is gone the candle goes out. Often the air in abandoned mines does not have enough oxygen to keep you alive.

- Create your own mine safety signs.

- Make your own memory game using abandoned mine terms for the picture cards. Draw pictures of abandoned mine hazards or write the word for the associated abandoned mine hazard. Have two students join together to play the memory game. Mix their cards up and then place them face down on a desk. Have them take turns finding the matching pairs. Each player may turn over two cards when it is their turn. When a match is found it is removed from play. Cards are matched until they are all gone. Whoever matches the most number of pictures wins.

- For additional class room activities see the National Energy Foundations Primer entitled "Mines and Quarries are Not Playgrounds Act Responsibly: Stay Out – Stay Alive."

Discussion points for older students and suggested research paper topics for additional study:

Hazards of abandoned mine lands—See list of hazards under the "What are the dangers of abandoned mines?" in the list of questions above. Discuss each of these hazards in detail as presented in the movie.

Difference between a mine and a cave—Stress the difference between a cave and a mine. See questions above for several differences noted in the movie.

Explosives and blasting caps—Explosives become unstable over time. Have a group of students research blasting methods used in mining, mining and blasting technology, different blasting techniques used for open pit, quarrying, or underground mining. What is the difference between dynamite, water gels, ANFO prills, boosters, detonator cord, etc? It is common to find these types of explosives at an abandoned mine site. Have the students research why and how these materials deteriorate over time.

Heavy metals (pollution)—Some times heavy metals are associated with abandoned mines. They can be found in tailings (mine materials that have been processed) or waste dumps (material that was not ore). These heavy metals can be leached out by natural forces. Heavy metals can be toxic to wildlife and people depending on the concentration. Research could be done by students for a specific toxicity levels for a list of species they are given to research.

Acid Rock Drainage (ARD) also called Acid Mine Drainage (AMD) —This can happened when the pH of the water is acidic (below a pH of 7) and the water dissolves metals from the minerals exposed in a mine. Heavy metals are particularly toxic to fish. How does ARD/AMD affect mining cost? How does ARD/AMD affect the

environment? How does ARD/AMD affect recreational opportunities? Can ARD/AMD be mitigated?

Mined materials we use in our everyday lives. See questions above for mined material examples. Additional examples can be researched by students.

Reclamation—Reclamation is returning disturbed land to a condition so it can be used for other activities once mining has stopped. This could be wildlife habitat, a housing subdivision, rangeland, recreational sites or many other uses. When did mining operations start reclaiming their mining activity? Answer: Reclamation was not required on public lands (lands administered by BLM) until January 1, 1981. Most State reclamation laws were adopted in the middle to late 1970's. What is reclamation? It is part science and part art. What goes into the development of a reclamation plan?

Toxic gases—Active mines are ventilated to prevent the build up of toxic gasses. There are several types of toxic gases that can be found in abandoned mines. These are: oxygen deficient air; carbon monoxide, methane, too much oxygen (potentially explosive in high concentrations), carbon dioxide, hydrogen sulfide (extremely toxic) and radon gas. The students could be introduced to terms such as part per million (ppm) concentration, explosive limits, symptoms and effects of these types of gases, etc.

Radiation—Radioactive elements contain an unstable configuration of protons and neutrons in their nuclei. As they decay, stray alpha and beta particles are discharged because they are not tightly held by the nucleus. These extra discharged particles are called radiation. Gamma rays may accompany either of these processes. The harmful effects of alpha, beta and gamma radiation are primarily related to their ability to penetrate and alter living tissue. At a typical abandoned mine site, alpha and gamma radiation are of primary concern, but beta radiation should not be a problem. Discuss the uranium 238 decay series, standard units of measure for radiation (i.e., gamma-millirems (rem = roentgen equivalent man); radon daughters-working levels, etc.); and the basic principal of limiting exposure, which are: limiting your time in an exposure situation, keeping your distance from the exposure source and wearing protective shielding.