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"THE LEADER THE REST WILL FOLLOW"

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INDUSTRIAL SAFETY AND ENVIRONMENTAL PROFESSIONAL

TRAINING FOR THE WORK FORCE

2020-2021 MSHA REFRESHER

Contractor Minimum 8 Hour Safety Training.

You must get Site Specific Training at the Mine you work in and or employers site specific training.

CHICAGO SAFETY INSTITUTE ™

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(1) Mandatory Rights of Miners

Review in the statutory rights of miners and their representatives under the Act; authority and responsibility of supervisors. And Mandatory Health and Safety Standards

REFRESHER

1

30 CFR § 48.25 (b) (1)

- *Training: (1) Instruction in the statutory rights of miners and their representatives under the Act; authority and responsibility of supervisors. The course shall include instruction in the statutory rights of miners and their representatives under the Act, including a discussion of section 2 of the Act; a review and description of the line of authority of supervisors and miners' representatives and the responsibilities of such supervisors and miners' representatives; and an introduction to the operator's rules and the procedures for reporting hazards.*

2

YOUR RIGHTS AS A MINER

- **Introduction**
  - The Federal Mine Safety and Health Act of 1977 (referred to in this booklet as "the Act") gives individual miners the following rights:
- The right to have a representative of the miners accompany Federal inspectors during inspections at a mine.
- The right to obtain an inspection of the mine where there are reasonable grounds to believe that an imminent danger or a violation of the Act or a safety or health standard exists.
- The right to pay during certain periods of time when a mine or part of a mine has been closed because of a withdrawal order.
- The right to be protected against discrimination based on the exercise of rights given by this Act.
- The right to receive health and safety training.
- The right to be informed of, and to participate in, enforcement and legal proceedings under the Act.
  - In addition, miners' representatives also have specific rights under the Act to those rights given to individual miners. Also, applicants for mine work have the right not to be discriminated against in hiring because they have previously exercised rights given them by the Act.

3

FINDINGS AND PURPOSE SEC. 2. Congress declares that--

- SEC. 2. Congress declares that--
  (a) the first priority and concern of all in the coal or other mining industry must be the health and safety of its most precious resource--the miner;

4

FINDINGS AND PURPOSE SEC. 2. Congress declares that--

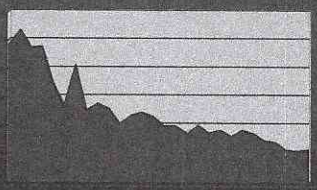
- (b) deaths and serious injuries from unsafe and unhealthful conditions and practices in the coal or other mines cause grief and suffering to the miners and to their families;

5

FINDINGS AND PURPOSE SEC. 2. Congress declares that--

- (c) there is an urgent need to provide more effective means and measures for improving the working conditions and practices in the Nation's coal or other mines in order to prevent death and serious physical harm, and in order to prevent occupational diseases originating in such mines;

6



All Mine Safety and Health Death Trends

7

FINDINGS AND PURPOSE SEC. 2. Congress declares that--

- (d) the existence of unsafe and unhealthful conditions and practices in the Nation's coal or other mines is a serious impediment to the future growth of the coal or other mining industry and cannot be tolerated;

8

FINDINGS AND PURPOSE SEC. 2. Congress declares that--

- (e) the operators of such mines with the assistance of the miners have the primary responsibility to prevent the existence of such conditions and practices in such mines;

9

FINDINGS AND PURPOSE SEC. 2. Congress declares that--

- (f) the disruption of production and the loss of income to operators and miners as a result of coal or other mine accidents or occupationally caused diseases unduly impedes and burdens commerce; and

10

FINDINGS AND PURPOSE SEC. 2. Congress declares that--

- (g) it is the purpose of this Act (1) to establish interim mandatory health and safety standards and to direct the Secretary of Health, Education, and Welfare and the Secretary of Labor to develop and promulgate improved mandatory health or safety standards to protect the health and safety of the Nation's coal or other miners; (2) to require that each operator of a coal or other mine and every miner in such mine comply with such standards; (3) to cooperate with, and provide assistance to, the States in the development and enforcement of effective State coal or other mine health and safety programs; and (4) to improve and expand, in cooperation with the States and the coal or other mining industry, research and development and training programs aimed at preventing coal or other mine accidents and occupationally caused diseases in the industry.

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(a)(1) *Miner* means, for purposes of §48.23 through 48.30 of this subpart B, any person working in a surface mine or surface areas of an underground mine and who is engaged in the extraction and production process, or who is regularly exposed to mine hazards, or who is a maintenance or service worker employed by the operator or a maintenance or service worker contracted by the operator to work at the mine for frequent or extended periods. This definition shall include the operator if the operator works at the mine on a continuing, even if irregular, basis.

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Short-term, specialized contract workers, such as drillers and blasters, who are engaged in the extraction and production process and who have received training under §48.26

(Training of newly employed experienced miners) of this subpart B, may in lieu of subsequent training under that section for each new employment, receive training under §48.31 (Hazard training) of this subpart B.
This definition does not include: (i) Construction workers and shaft and slope workers under subpart C of this Part 48; (ii) Any person covered under paragraph (a)(2) of this section.

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(2) *Miner* means, for purposes of § 48.3 (Hazard training) of this subpart B, any person working in a surface mine, including any delivery, office, or scientific worker or occasional, short-term maintenance or service worker contracted by the operator, and any student engaged in academic projects involving his or her extended presence at the mine. This definition excludes persons covered under paragraph (a)(1) of this section and subpart C of this part.

14

(b) *Experienced miner means*:
(1) A miner who has completed MSHA-approved new miner training for surface miners or training acceptable to MSHA from a State agency and who has had at least 12 months of surface mining experience; or
(2) A supervisor who is certified under an MSHA-approved State certification program and who is employed as a surface supervisor on October 6, 1998; or
(3) An experienced surface miner on February 3, 1999.

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(c) *New miner* means a miner who is not an experienced miner.

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(d) *Normal working hours* means a period of time during which a miner is otherwise scheduled to work. This definition does not preclude scheduling training classes on the sixth or seventh working day if such a work schedule has been established for a sufficient period of time to be accepted as the operator's common practice. Miners shall be paid at a rate of pay which shall correspond to the rate of pay they would have received had they been performing their normal work tasks.

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(e) *Operator* means any owner, lessee, or other person who operates, controls, or supervises a surface mine or surface area of an underground mine; or any independent contractor identified as an operator performing services or construction at such time.
(f) *Task* means a work assignment that includes duties of a job that occur on a regular basis and which requires physical abilities and job knowledge.
(g) *Act* means the Federal Mine Safety and Health Act of 1977.

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Complaints

Important Notice - All impoundment and dust fraud inquiries/complaints should now use the MSHA Codeaphone line on **(800) 746-1554.** This single automated line is now set up to accommodate each of the 3 previous complaint lines; Code-a Phone complaints, Impoundment Hot-line complaints, and the Dust Fraud Hot-line.

To report a hazardous condition at a mine to MSHA, call:

(800) 746-1554

You do not need to identify yourself!

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COVID-19

MSHA has received a high volume of questions regarding the Coronavirus/COVID-19 and both mine operator actions and MSHA actions in response. This information sheet provides practices for operators and miners to minimize the spread of Coronavirus/COVID-19 and actions MSHA is taking to do the same.

What should mine operators and miners do?

- **Avoid close contact: Put distance between yourself and other people (about 6 feet). This includes not crowding personnel carriers, hoists and elevators, or other means of transportation at the mine.**
- **Clean and disinfect: Wipe down equipment and other frequently touched surfaces.**
- **Wash hands: If soap and water are not readily available, use a hand sanitizer that contains at least 60% alcohol. Cover all surfaces of your hands and rub them together until they feel dry.**
- **Avoid touching your face, nose, eyes, etc.**
- **Stay at home if you are sick.**

See additional guidance on the CDC's Prevention page https://www.cdc.gov/coronavirus/2019-ncov/prepare/prevention.html

Mine Safety and Health Enforcement

MSHA works to prevent fatalities, illness, and injury from mining and secure safe and healthful workplaces for America's miners. Mine Safety and Health Enforcement is responsible for performing the Agency's enforcement activities including:

- **Conducting inspections, including mandatory quarterly and semiannual inspections of mines and facilities.**
- **Issuing citations and orders for any observed violations.**
- **Issuing a withdrawal order, removing equipment from service, and/or withdrawing miners in cases of imminent danger.**
- **Conducting health sampling of respirable dust and noise exposure at mines, as well as monitoring toxic materials and harmful physical agents.**
- **Investigating fatal and serious nonfatal accidents.**
- **Investigating complaints of hazardous conditions reported by miners.**
- **Investigating criminal violations.**
- **Examining complaints of discrimination reported by miners.**
- **Conducting safety and health conferences with mine operators on violations.**
- **Approving required roof control, ventilation, emergency response, and training plans.**
- **Reviewing mine operators' mining plans and education and training programs for miners.**

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Standards, Regulations, and Variances

The Office of Standards, Regulations, and Variances (OSRV) guides all of MSHA's rulemaking activities from the pre-proposal stage to publication of the final rule. OSRV serves as the point of contact with the public and other Federal agencies on regulatory matters. For example, OSRV is the Agency liaison with the [redacted] and is responsible for coordinating publication of all Federal Register documents and for updating [redacted]. In accordance with the requirements of Executive Orders 12866 and 13563, the Regulatory Flexibility Act, and the Paperwork Reduction Act, OSRV prepares cost-benefit analyses of proposed and final standards to determine their effect on businesses; and prepares and updates the Semiannual Regulatory Agenda and the Regulatory Plan which list MSHA's rulemaking projects selected for review or development during the coming year. OSRV also processes petitions from mine operators for variances from safety standards and oversees administration of the Privacy Act and the Freedom of Information Act (FOIA).

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Standards & Regulations

The Code of Federal Regulations (CFR) is published and updated annually by the Office of the Federal Register. MSHA rules are in Title 30 of the CFR, Mineral Resources, Chapter I.

REMINDER: Under 30 CFR §56.1000 - Notification of commencement of operations and closing of mines - before starting operations, the owner, operator, or person in charge of any metal and nonmetal mine shall notify the nearest MSHA district or field office of the approximate or actual date the mine operation will commence. Operator is defined in 30 CFR 41.1(a) as any owner, lessee, or other person who operates, controls, or supervises a coal or other mine or any designated independent contractor performing services or construction at such mine. For independent contractors, under 45.2(d), "production operator" means any owner, lessee, or other person who operates, controls or supervises a coal or other mine."

During the last several years, MSHA has experienced issues with both dredge operators and portable crushers complying with this requirement.

If you have any questions, please contact the appropriate District Manager.

30 CFR Online Edition

The electronic edition (eCFR) of Title 30 CFR is updated regularly as final rules become incorporated into the code.

Access the e-CFR

Standards & Regulations | Mine Safety and Health Administration (MSHA)

www.msha.gov/regulations/standards-regulations

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Electronic Code of Federal Regulations (eCFR)

SUBCHAPTER K—METAL AND NONMETAL MINE SAFETY AND HEALTH

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56.1 to 56.20014

SAFETY AND HEALTH STANDARDS—SURFACE METAL AND NONMETAL MINES

57

57.1 to 57.22608

SAFETY AND HEALTH STANDARDS—UNDERGROUND METAL AND NONMETAL MINES

58

58.1 to 58.620

HEALTH STANDARDS FOR METAL AND NONMETAL MINES

rule

SUBCHAPTER L [RESERVED]

SUBCHAPTER M—UNIFORM MINE HEALTH REGULATIONS

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THE END

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Thank you! For knowing your safety and rights!

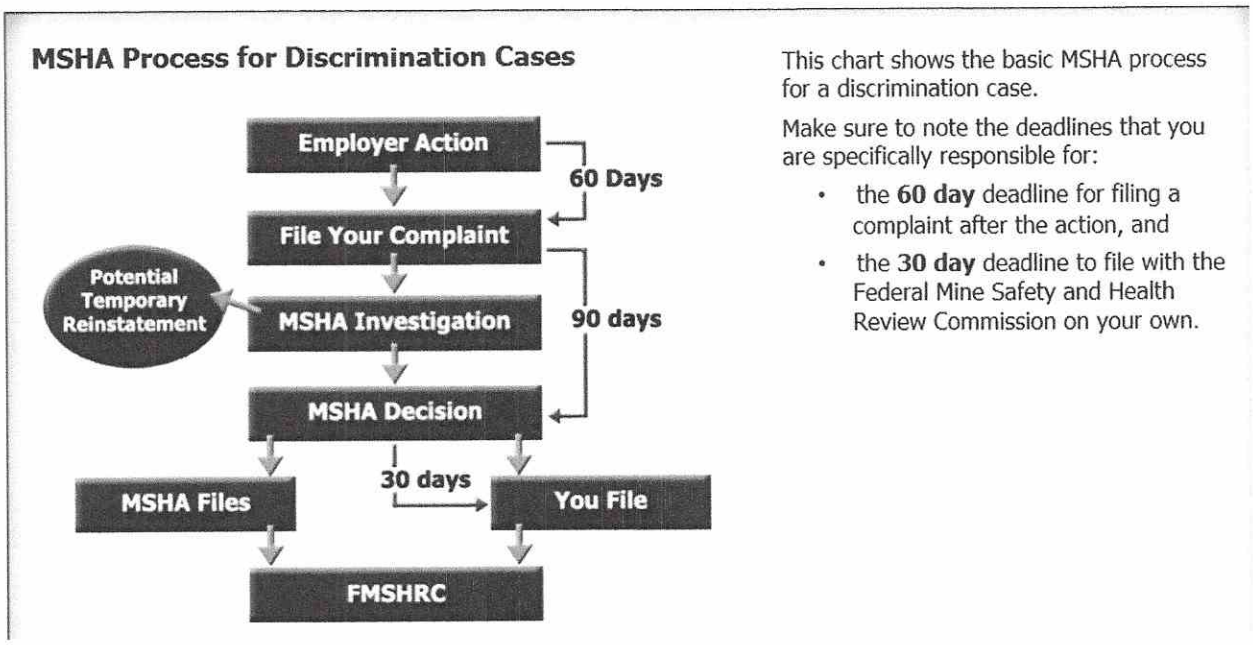
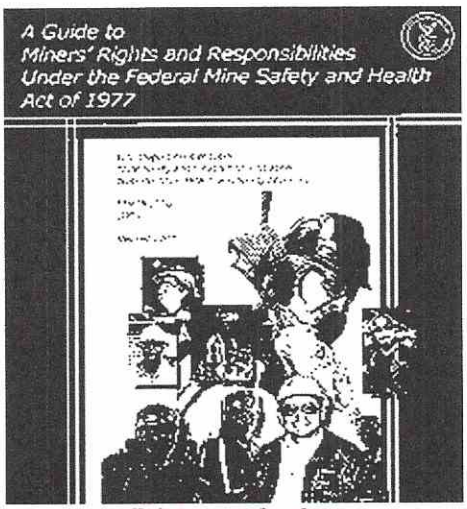


Figure 1 http://www.msha.gov/S&HINFO/minersrights/OnlineTraining/index.html



Click Image for Copy

MSHA's National Hazard Reporting Page

ONE CALL DOES IT ALL!

To report a hazardous condition at a mine to MSHA, call: 1-800-746-1553

or use the on-line filing option (For more information, see below).

You do not need to identify yourself!

To report an *imminent danger hazardous condition* call: 1-800-746-1553

(a condition that could cause a serious accident, injury, illness or fatality)

***For the Mine Maps Hotline, Impoundments Hotline, and Abandoned Mines* call: 1-800-746-1553**

http://www.msha.gov/S&HINFO/minersrights/minersrights.asp

(2) *Transportation controls and communication systems*

30 CFR § 48.25 (b) (3)

- *Training:* shall include instruction on the procedures in effect for riding on and in mine conveyances where applicable; the controls for the transportation of miners and materials; and the use of mine communication systems, warning signals, and directional signs.

Best Practices Fire Protection

- ***LOCATIONS***
- Working sections Strategic locations Belt drives
- *COMMUNICATIONS during a mine emergency are a critical part of fire fighting and evacuation activities.*
- *A successful evacuation or fire fighting operation is dependent on the*
- *quality of the information that is communicated.*
- *The sooner miners are notified of a problem, the greater the chance of escape and/or fire fighting activities can begin.*
- *TIME IS NEVER YOUR FRIEND during a mine fire.*
- **ALWAYS** provide accurate information to the surface
- regarding emergency situations.

Best Practices Fire Protection

- **ALWAYS** consider the use of personal communication devices that could provide key mine personnel early warning in the event of a fire or emergency situation.
- **ALWAYS** consider optional forms of remote communication such as; interlocking mine power or main belt operation the main mine fans.

Best Practices Fire Protection

- **NEVER** disregard or take lightly reports of a mine fire.
- **NEVER** assume anything has been completed during an emergency, ASK FIRST!
- **REMEMBER:**
- **TIME IS NEVER YOUR FRIEND!**
- ***Best Practices***
- ***Fire Protection***
- **Card No. BPFP-8**

Example of a communication station for dispatcher

Example of a mine wide monitoring control room

Cap Lamps Are Simple to Learn & Practice.

- There are three basic commands.
- Come forward.
- Move away.
- Stop.

3

Come Forward Command:

- This command is simple. Rotate head in a wide circular motion.

A CIRCULAR motion means MOVE TOWARD the source of light

Move Away Command:

- This command is made by moving the head up down like you nodding yes.

An UP AND DOWN vertical motion means MOVE AWAY from the source of light

The Stop Command:

- This command is simple.
- It means stop NOW!!!
- Move the head back and forth like your motioning "no" with the head.

A SIDE TO SIDE horizontal motion means to STOP.

Hindrances to Cap Lamp Communication.

- What barriers cause break downs in communication here & create hazards.
- Misunderstood signals.
- Illumination in haulage ways.
- Lack of training.
- Stubbornness.
- Belief that hand signals are visible in the dark.
- Laziness.

Overcoming Communications Hindrances.

- Don't rely on drift illumination as a communication catch all.
- If you don't understand signals stop & talk verbally.
- Overcome the deer in the headlight look.
- Work with one another, not against.
- Learn to use lamp signals they are more empowering than hand signals when used properly.

The End

- Remember always get Site Specific training and find out what communications the mine you are visiting is using.

REFRESHER MSHA
And Responders

(3) *Escape and emergency evacuation plans; firewarning and firefighting*

30 CFR § 48.25 (b) (5)

- *Training:* (5) *Escape and emergency evacuation plans; firewarning and firefighting.* The course shall include a review of the mine escape system, and escape and emergency evacuation plans in effect at the mine; and instruction in the firewarning signals and firefighting procedures.

Stacking and Storage Review

Practice good housekeeping, and keep aisles, passageways, and work areas clear to enhance escape and safety.

- Secure stacks by limiting height, stepping back layers, interlocking rows, cross-keying, banding, cross-ties, shrink wrap, flat material between tiers, blocking, chocking, and using racks.
- Follow fire safety precautions in storage.

FIRE EXTINGUISHER VIDEO NOTES

VIDEO AND LECTURE NOTES

FIRE EXTINGUISHER VIDEO NOTES

U.S. Department of Labor
MSHA
Mine Safety and Health Administration

MSHA's Accident Prevention Program
Safety Idea

"Fire Suppression Systems"

SAFETY IS A VALUE!

Category: Fire Safety
Mine Type: All Mines

Recently a miner was seriously burned when the equipment he was operating caught fire. The operator hit the manual fire suppression actuator, but did not pull the pin. Thus, it did not activate. There was an fire extinguisher in the cab and the operator was burned when he tried to get out by the normal egress route. He finally managed to get out on the opposite side.

The following suggestions may help avoid this situation:

- Training on fire suppression systems should be given to operators of trucks, bulldozers and other enclosed cab vehicles. A manual fire suppression actuator should be used as a training tool in this effort, if it is utilized. Special emphasis should be placed on activating the system in real-life conditions.
- All fire extinguishers and fire suppression systems including alarms, shutdowns and other associated equipment need to be thoroughly examined and periodically checked for proper operation by competent personnel in accordance with the manufacturer's recommended schedule. Any defective equipment needs to be repaired, replaced, and the system retested for proper operation. The manufacturers should be asked for their recommended maintenance schedules.

- A small fire extinguisher commensurate with the level of hazard should be located in the cab of all vehicles to be readily accessible to the operator. The fire extinguisher should be a Type ABC.

Proper training and maintenance of fire suppression systems can reduce injuries and fatalities.

Published: 04/20/2007
Text #: MP2007-SE15

Remember - Safety is a Value that you can LIVE with!

NOTES

(4) Escape, Emergency Evacuations and Firewarnings

REFRESHER TRAINING
FOR
OLD AND NEW MINERS

Recap All Mines Are Different and in all Mines Hazards change

- GET SITE SPECIFIC TRAINING AT MINE
- KNOW THE EVACUATION PLAN AND UNDERSTAND IT
- Involve Employees
- KNOW WAY OUT Evacuation Routes and keep Clear Walkways
- Clean up Spills but avoid fires
- Adhere to all firewarnings and alarms

SLIPS FALLS
Top 10 Industrial Minerals

- 34 – Ground
- 24 – Floor (not underground)
- 22 – Misc.
- 13 – Mine Floor
- 12 – Metal Covers/Pipe
- 10 – Steps
- 7 – Broken Rock
- 5 – Mobile Equip
- 4 – Conveyors
- 2 - Ladders

Human Factors

- Eye sight
- Age
- Balance
- Medications, Alcohol, Drug effects

FIREWARNING

VIDEO ESCAPE FROM MINE FIRE
OR SUNSHINE MINE VIDEO OR DISCUSSIONS

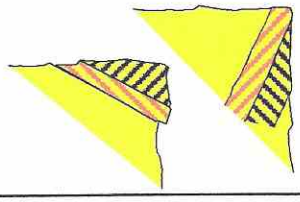
NOTES

LEL Lower Explosive Limit

Combustible Dusts Fire Prevention and

your responsibility to get out notify and warn others get help

Slips & Faults



Equipment Hazards

- **Pushed** Over Highwall
- **Pulled** Over Highwall
- **Driven** Over Highwall

Solutions

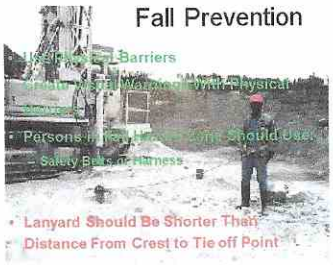
Plan Job Activities

Position Equipment and Operate Safely

Lockout and Tagout

Inspect and Maintain Equipment

Fall Prevention



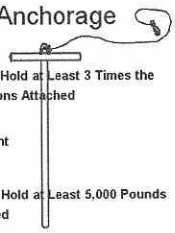
- Lanyard Should Be Shorter Than Distance From Crest to Tie off Point

Fall Arrest (The LAST Resort)

When You Can Fall Over the Edge

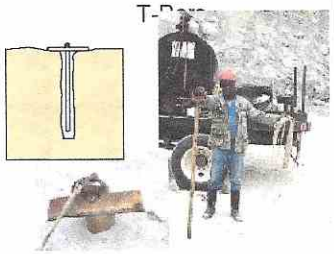
- Harness Preferred
- Tie off to Rear D-ring
- Use Decelerating or Shock Absorbing Lanyard

Tie Off Anchorage

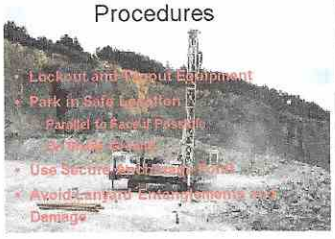


- **Fall Prevention**
  - Anchorage Should Hold at Least 3 Times the Weight of the Persons Attached
    - T-bars
    - Mobile Equipment
- **Fall Arrest**
  - Anchorage Should Hold at Least 5,000 Pounds Per Person Attached
    - Mobile Equipment

T-Bar



Equipment Tie Off Procedures



- Lockout and Tagout Equipment
- Park in Safe Location
  - Parallel to Face if Possible
  - On Flat Ground
- Use Secure Tie-off Points
- Avoid Lanyard Entanglements and Damage

Lockout/tagout

- Transmission in "Park" or In Gear
- Keyed off Person has Ignition Key
- Parking Brake Engaged
- Steering Wheel or Clutch Lock Installed
- Wheels Chocked

NOTES

Learning can save your life!

(4) *Ground control; working in areas of highwalls, water hazards, pits and spoil banks; illumination and night work*

30 CFR § 48.25 (b) (6)

- *Training:* (6) *Ground control; working in areas of highwalls, water hazards, pits and spoil banks; illumination and night work.* The course shall include, where applicable, and introduction to and instruction on the highwall and ground control plans in effect at the mine; procedures for working safely in areas of highwalls, water hazards, pits and spoil banks; the illumination of work areas; and safe work procedures during the hours of darkness.

NAME HAZARDS

procedures for working safely in areas of highwalls,

water hazards,

pits and spoil banks;

the illumination of work areas;

and safe work procedures during the hours of darkness

Notice Rock Bolts Ceiling and rock strata

Unstable Ground Solutions

- **Use Competent Persons**
- **Examine the Workplace**
  - From Base of Highwall
  - From Bench
- **Profile of Face**
- **Identify Hazardous Area**

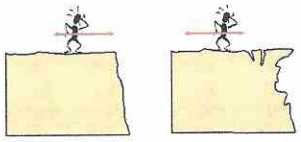
Slip/Trip/Fall Hazards

- **Working Close to Crest**
- **Bad Weather**
- **Boreholes**
- **Cracks**
- **Clutter**

Working Close to Crest

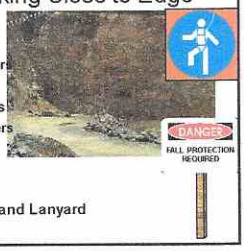
The Fall Hazard Zone

- 6 Feet or Less From Stable Crest
- 6 Feet or Less From Unstable Ground or Footing



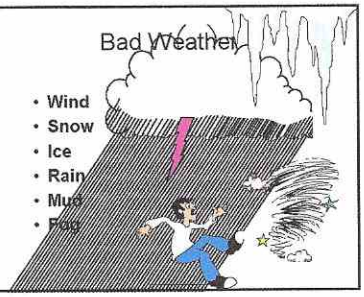
Working Close to Edge

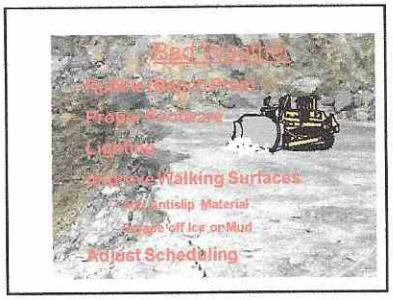
- Visual Warnings
  - Signs or Tape
  - Cones or Boulders
  - Paint or Chalk
- Physical Barriers
  - Berms or Boulders
  - Handrails
  - Fencing
  - Cables
- Belt or Harness and Lanyard
- Buddy System

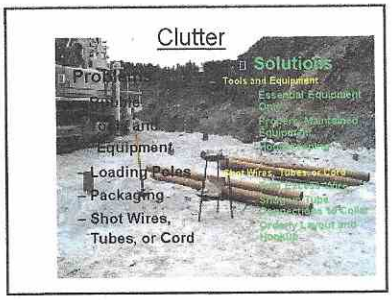


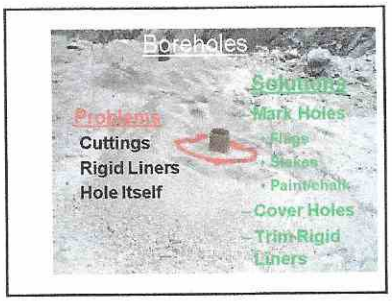
Bad Weather

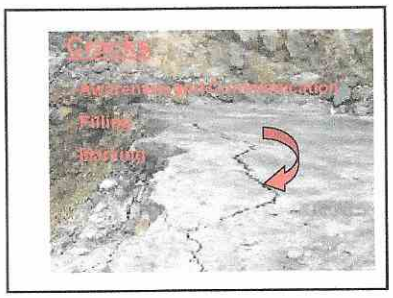
- **Wind**
- **Snow**
- **Ice**
- **Rain**
- **Mud**
- **Fog**





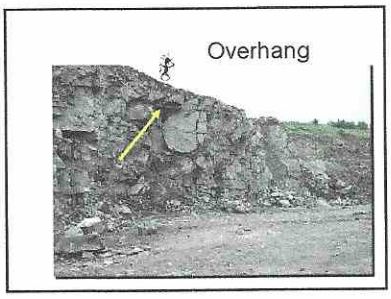


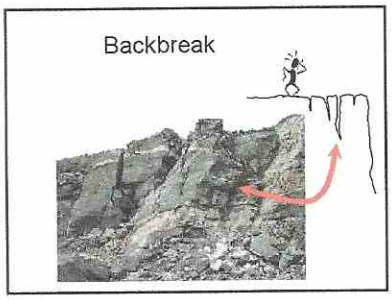


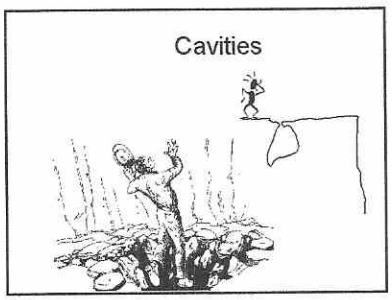


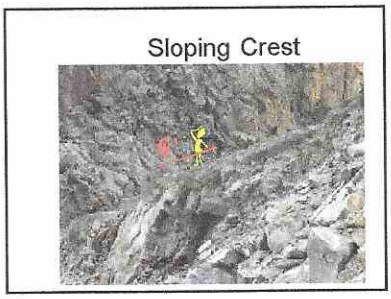
Unstable Ground Hazards

- **Overhangs**
- **Backbreak**
- **Cavities**
- **Sloping Crests**
- **Low Angle Slips**









(6) Electrical hazards

REFRESHER ELECTRICAL HAZARDS

30 CFR § 48.25 (b) (9)

- *Training:* (9) *Electrical hazards.* The course shall include recognition and avoidance of electrical hazards.

ELECTRICITY

HAZARD:

ELECTROCUTION
SHOCK
BURNS
DESTRUCTION OF TISSUES AND CELLS

Avoid Electrical Contact

Lock Out Tag Out

Electricity - The Dangers

- About 5 workers are electrocuted every week
- Causes 12% of young worker workplace deaths
- Takes very little electricity to cause harm
- Significant risk of causing fires

Electricity – How it Works

- Electricity is the flow of energy from one place to another
- Requires a source of power: usually a generating station
- A flow of electrons (current) travels through a conductor
- Travels in a closed circuit

Electrical Terms

- **Voltage** – The force of Electric
- **Amp** – Amount of Electron Flow
- **Current** – electrical movement (measured in amps)
- **Circuit** – complete path of the current. Includes electricity source, a conductor, and the output device or load (such as a lamp, tool, or heater)
- **Resistance** – restriction to electrical flow
- **Conductors** – substances, like metals, with little resistance to electricity that allow electricity to flow
- **Grounding** – a conductive connection to the earth which acts as a protective measure
- **Insulators** -- substances with high resistance to electricity like glass, porcelain, plastic, and dry wood that prevent electricity from getting to unwanted areas

Electrical Injuries

There are four main types of electrical injuries:

- Direct:
  - Electrocution or death due to electrical shock
  - Electrical shock
  - Burns
- Indirect - Falls

Electrical Shock

An electrical shock is received when electrical current passes through the body

You will get an electrical shock if a part of your body completes an electrical circuit by ...

- Touching a live wire and an electrical ground, or
- Touching a live wire and another wire at a different voltage.

Shock Severity

- Severity of the shock depends on:
  - Path of current through the body
  - Amount of current flowing through the body (amps)
  - Duration of the shocking current through the body
- LOW VOLTAGE DOES NOT MEAN LOW HAZARD

Dangers of Electrical Shock

- **Currents above 10 mA* can paralyze or "freeze" muscles.**
- **Currents more than 75 mA can cause a rapid, ineffective heartbeat – death will occur in a few minutes unless a defibrillator is used**
- **75 mA is not much current – a small power drill uses 30 times as much**


Defibrillator in use

* mA = milliampere = 1/1,000 of an ampere

Burns

- Most common shock-related injury
- Occurs when you touch electrical wiring or equipment that is improperly used or maintained
- Typically occurs on hands
- Very serious injury that needs immediate attention

Falls

- **Electric shock can also cause indirect injuries**
- **Workers in elevated locations who experience a shock may fall, resulting in serious injury or death**

Electrical Hazards and How to Control Them

Electrical accidents are caused by a combination of three factors:

- Unsafe equipment and/or installation,
- Workplaces made unsafe by the environment, and
- Unsafe work practices.

Control – Isolate Electrical Parts

- **Use guards or barriers**
- **Replace covers**


Guard live parts of electric equipment operating at 50 volts or more against accidental contact

Control – Isolate Electrical Parts - Cabinets, Boxes & Fittings


Conductors going into them must be protected, and unused openings must be closed

Control – Close Openings

- Junction boxes, pull boxes and fittings must have approved covers
- Unused openings in cabinets, boxes and fittings must be closed (no missing knockouts)


Photo shows violations of these two requirements

Hazard - Overhead Power Lines

- **Usually not insulated**
- **Examples of equipment that can contact power lines:**
  - Equipment You Bring In contact with electric
  - Tools
  - Metal Being Carried
  - Backhoe
  - Mining Equipment
  - Raised dump truck bed or Roll Off Boxes
  - Aluminum paint roller

Check with Supervisor who checks with competent person implements safety. Control - Overhead Power Lines

- 1926.1408(a)(2)
- Determine if any part of the equipment, load line or load (including rigging and lifting accessories), if operated up to the equipment's maximum working radius in the work zone, could get closer than 20 feet to a power line. If so, the employer must meet the requirements in Option (1), Option (2), or Option (3) of the regulations a competent person implements.
- Stay away from unprotected power and Power lines. Stay at least 20 feet away, but on high power like these at least 35 Feet but consult a qualified person because those lines could be as low.
- Check with the local utility (inexperienced personnel always stay back 20 Feet). However, higher voltages you may need further distances.
- Post warning signs.
- Assume that lines are energized
- Use wood or fiberglass ladders, not metal.
- Miners Handling Electric need to be qualified electricians by special training & PPE

Hazard - Inadequate Wiring

- **Hazard** - wire too small for the current
- **Example** - portable tool with an extension cord that has a wire too small for the tool
  - The tool will draw more current than the cord can handle, causing overheating and a possible fire without tripping the circuit breaker
  - The circuit breaker could be the right size for the circuit but not for the smaller-wire extension cord

Control – Use the Correct Wire

- Wire used depends on operation, building materials, electrical load, and environmental factors
- Use fixed cords rather than flexible cords
- Use the correct extension cord

Must be 3-wire type and designed for hard or extra-hard use

Hazard – Defective Cords & Wires

- **Plastic or rubber covering is missing**
- **Damaged extension cords & tools**

Hazard – Damaged Cords

- Cords can be damaged by:
  - Aging
  - Door or window edges
  - Staples or fastenings
  - Abrasion from adjacent materials
  - Activity in the area
- Improper use can cause shocks, burns or fire

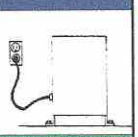
Control – Cords & Wires

- Insulate live wires
- Check before use
- Use only cords that are 3-wire type
- Use only cords marked for hard or extra-hard usage
- Use only cords, connection devices, and fittings equipped with strain relief
- Remove cords by pulling on the plugs, not the cords
- Cords not marked for hard or extra-hard use, or which have been modified, must be taken out of service immediately

Permissible Use of Flexible Cords

DO NOT use flexible wiring where frequent inspection would be difficult or where damage would be likely.

Flexible cords must not be . . .
- run through holes in walls, ceilings, or floors;
- run through doorways, windows, or similar openings (unless physically protected);
- hidden in walls, ceilings, floors, conduit or other raceways.



Stationary equipment-to facilitate interchange

Grounding

Grounding creates a low-resistance path from a tool to the earth to disperse unwanted current.

When a short or lightning occurs, energy flows to the ground, protecting you from electrical shock, injury and death.

Hazard – Improper Grounding

- Tools plugged into improperly grounded circuits may become energized
- Broken wire or plug on extension cord
- Some of the most frequently violated OSHA standards

Control – Ground Tools & Equipment

- Ground power supply systems, electrical circuits, and electrical equipment
- Frequently inspect electrical systems to insure path to ground is continuous
- Inspect electrical equipment before use
- Don't remove ground prongs from tools or extension cords
- Ground exposed metal parts of equipment

So what are we talking about?

"People Protection"

GFCI

Ground Fault Current Inte

Control – Use GFCI (ground-fault circuit interrupter)

- Protects you from shock
- Detects difference in current between the black and white wires
- If ground fault detected, GFCI shuts off electricity in 1/40th of a second
- Use GFCI's on all 120-volt, single-phase, 15- and 20-ampere receptacles, or have an assured equipment grounding conductor program.
- Shuts off at 5 to 7 mA

C.F Dalziel* and Others Define " LET-GO" current as:

•the Maximum current at which a person is able to release a conductor by commanding those muscles directly stimulated by shock.

Dalziel, C.F., and W.R. Lee (1969) LETHAL ELECTRIC CURRENTS IEEE Spectrum, July, pp. 44-50

According To Dalziel and Others The let go currents for 99.5 percent of the population is.

- For Children----------4.5mA
- For Women----------6.0mA
- For Man----------9.0mA

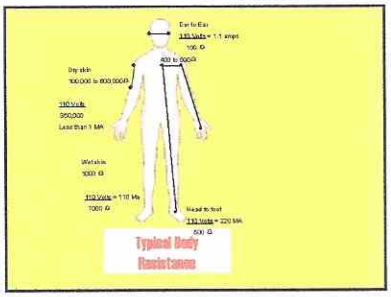
Table 14-1
Percentage of the Population Estimated to Be Protected Against Inability to Let Go for Several Levels of Shock Current

Level of Shock Current	6mA (rms)	10mA (rms)	20mA (rms)	30mA (rms)
Men	100%	98.5%	7.5%	0%
Women	99.5%	60%	0%	0%
Children*	92.5%	7.5%	0%	0%

*half of let-go threshold for men

Table 14-2
Implied Safe Voltage *Based on Several Published Values of Body Resistance and Selected Body Current Safety Criteria as Published by Dalziel

Criterion	Body Resistance 300 ohms	Body Resistance 500 ohms	Body Resistance 1500 ohms	Body Resistance 3000 ohms
"let-go" 4.5 mA for children	1.35 volts	2.25 volts	6.75 volts	13.5 volts
"let-go" 9 mA for adult males	2.7 volts	4.5 volts	13.5 volts	27 volts
fibrillation at 23 mA 5 sec. pulse of 60-Hz current for 18 kg children	6.9 volts	11.5 volts	34.5 volts	69 volts
fibrillation at 92 mA 5 sec. pulse of 60-Hz current for 50 kg adult	15.6 volts	26 volts	78 volts	156 volts



Ground-Fault Circuit Interrupter-

- A device intended for the protection of personal that function to de-energize a circuit or portion thereof within an established period of time when the a current to ground exceeds some predetermined value that is less than that required to operate the over-current protective device of the supply circuit.

The Underwriters Laboratories (UL) requirement for class A Ground-Fault Circuit Interrupters (GFCIs)

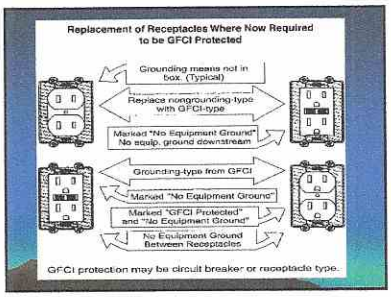
- **is that tripping shall occur when the continuous 60 – hertz differential current exceeds 6mA +or- 1 ma**

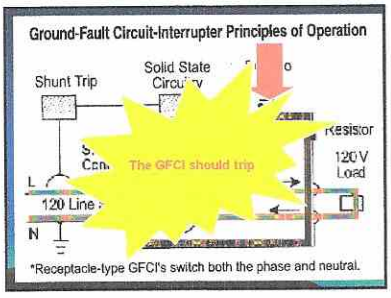
How does the GFCI work

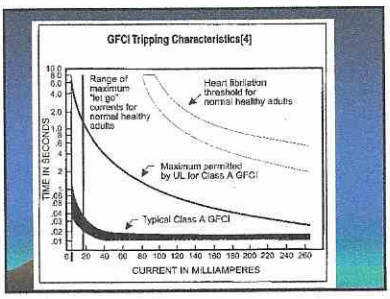
- GFCIs constantly monitor electricity flowing in a circuit.
- If the electricity flowing into the circuit differs by even a slight amount from that returning, the GFCI will quickly shut off the current flowing through that circuit.
- The advantage of using GFCIs is that they can detect even small variations in the amount of leakage current, even amounts too small to activate a fuse or circuit breaker.
- GFCIs work quickly, so they can help protect consumers from severe electric shocks and electrocution.

Do all GFCIs work in the same manner?

- All GFCIs work in the same manner to protect people against ground faults.
- However, unlike the receptacle GFCI, the circuit breaker type GFCI also provides overload protection for the electrical branch circuit.







- When a feed through receptacle- type GFCI is used a complete load circuit or only a portion of a load circuit, the load wires should be connected to the remaining receptacles in the branch.
- The LINE AND LOAD CONNECTIONS MUST NOT BE REVERSED.
- OTHERWISE THE GFCI's OWN RECEPTACLE WILL BE UNPROTECTED AND WILL REMAIN ENERGIZED AFTER THE UNIT HAS TRIPPED.

Control - Assured Equipment Grounding Conductor Program

Program must cover:

- All cord sets
- Receptacles not part of a building or structure
- Equipment connected by plug and cord

Program requirements include:

- Specific procedures adopted by the employer
- Competent person to implement the program
- Visual inspection for damage of equipment connected by cord and plug

Hazard – Overloaded Circuits

Hazards may result from:

- Too many devices plugged into a circuit, causing heated wires and possibly a fire
- Damaged tools overheating
- Lack of overcurrent protection
- Wire insulation melting, which may cause arcing and a fire in the area where the overload exists, even inside a wall

Control - Electrical Protective Devices

- Automatically opens circuit if excess current from overload or ground-fault is detected – shutting off electricity
- Includes GFCI's, fuses, and circuit breakers
- Fuses and circuit breakers are overcurrent devices. When too much current:
  - Fuses melt
  - Circuit breakers trip open

Power Tool Requirements

- Have a three-wire cord with ground plugged into a grounded receptacle, or
- Be double insulated, or
- Be powered by a low-voltage isolation transformer

Tool Safety Tips

- Use gloves and appropriate footwear
- Store in dry place when not using
- Don't use in wet/damp conditions
- Keep working areas well lit
- Ensure not a tripping hazard
- Don't carry a tool by the cord
- Don't yank the cord to disconnect it
- Keep cords away from heat, oil, & sharp edges
- Disconnect when not in use and when changing accessories such as blades & bits
- Remove damaged tools from use

Preventing Electrical Hazards - Tools

- Inspect tools before use
- Use the right tool correctly
- Protect your tools
- Use double insulated tools

Double Insulated marking

Temporary Lights

Protect from contact and damage, and don't suspend by cords unless designed to do so.

Clues that Electrical Hazards Exist

- Tripped circuit breakers or blown fuses
- Warm tools, wires, cords, connections, or junction boxes
- GFCI that shuts off a circuit
- Worn or frayed insulation around wire or connection

Lockout and Tagging of Circuits

- Apply locks to power source after de-energizing
- Tag deactivated controls
- Tag de-energized equipment and circuits at all points where they can be energized
- Tags must identify equipment or circuits being worked on

Safety-Related Work Practices

To protect workers from electrical shock:

- Use barriers and guards to prevent passage through areas of exposed energized equipment
- Pre-plan work, post hazard warnings and use protective measures
- Keep working spaces and walkways clear of cords

Safety-Related Work Practices

- Use special insulated tools when working on fuses with energized terminals
- Don't use worn or frayed cords and cables
- Don't fasten extension cords with staples, hang from nails, or suspend by wire.

Preventing Electrical Hazards - Planning

- Plan your work with others
- Plan to avoid falls
- Plan to lock-out and tag-out equipment
- Remove jewelry
- Employees shall not work where electric is in damp or wet locations
- and within 10 feet of overhead power lines. If you don't know the OSHA voltage charts stay 10 feet from high voltage

Avoid Wet Conditions

- **If you touch a live wire or other electrical component while standing in even a small puddle of water you'll get a shock.**
- **Damaged insulation, equipment, or tools can expose you to live electrical parts.**
- **Improperly grounded metal switch plates & ceiling lights are especially hazardous in wet conditions.**
- **Wet clothing, high humidity, and perspiration increase your chances of being electrocuted.**

Preventing Electrical Hazards - PPE

- Proper foot protection (not tennis shoes)
- Rubber insulating gloves, hoods, sleeves, matting, and blankets
- Hard hat (insulated - nonconductive)

Preventing Electrical Hazards – Proper Wiring and Connectors

- Use and test GFCI's
- Check switches and insulation
- Use three prong plugs
- Use extension cords only when necessary & assure in proper condition and right type for job
- Use correct connectors

Training

Train employees working with electric equipment in safe work practices, including:

- Deenergize electric equipment before inspecting or repairing
- Using cords, cables, and electric tools that are in good repair
- Lockout / Tagout recognition and procedures
- Use appropriate protective equipment

Summary – Hazards & Protections

Hazards

- Inadequate wiring
- Exposed electrical parts
- Wires with bad insulation
- Ungrounded electrical systems and tools
- Overloaded circuits
- Damaged power tools and equipment
- Using the wrong PPE and tools
- Overhead powerlines
- All hazards are made worse in wet conditions

Protective Measures

- Proper grounding
- Use GFCI's
- Use fuses and circuit breakers
- Guard live parts
- Lockout/Tagout
- Proper use of flexible cords
- Close electric panels
- Arc Flash PPE
- Training

ACCIDENT PREVENTION

(7) *Accident prevention for Miners and in Hazard Areas*

30 CFR § 48.25 (b) (11)

- *Training:* (12) *Health and safety aspects of the tasks to which the new miner will be assigned.* The course shall include instructions in the health and safety aspects of the tasks to be assigned, including the safe work procedures of such tasks, the mandatory health and safety standards pertinent to such tasks, information about the physical and health hazards of chemicals in the miner's work area, the protective measures a miner can take against these hazards, and the contents of the mine's HazCom program.

Review your activities job hazard analysis and pre-job briefings.

Accident Prevention is everyone's responsibility in the mine.

TASKS YOU DO

HAZARDS YOU ENCOUNTER IN THE MINE

Gaseous or Dusty Areas you must avoid explosive and flammable atmospheres.

HAZARDS YOU BRING INTO THE MINE

Equipment that could be an ignition source, and such equipment must be designed intrinsically safe or controlled. Such as ensuring no sparks creating tools, static electrical or electrical ignition sources are present.

MANDATORY HEALTH AND SAFETY STANDARDS PERTINENT TO SUCH TASKS

OTHER ACCIDENT PREVENTION NOTES
Video or Lecture

Discussions Start:_____

End

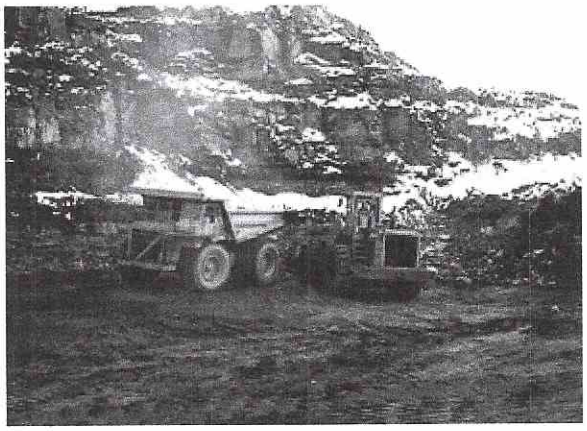
U.S. Department of Labor
MSHA
Mine Safety and Health Administration

MSHA's Accident Prevention Program
Safety Idea

SAFETY IS A VALUE!

"Task Training"

Category : All Mines
Mine Type: Training



In my mind, Grandma's apple butter was the best ever made. Whenever I asked her how she made it come out perfectly every time, she always answered, "I had to make it not so perfect until I learned better." The safe operation of mining equipment is pretty close to that. You can't operate the equipment safely or efficiently until you 'learn better'. Proper task training on large surface mining equipment must be more than a five or ten minute run through of what control does what. The more complicated the machinery, the more task training is required. Regardless of how long you have worked in the mines, if you are assigned to run a piece of equipment that is new or unfamiliar, get proper task training. Your safety and the safety of your co-workers depend on it.

Reissued:	**04/30/2002**
Tag #	**AP2002-M015**

Remember ~ Safety is a Value that you can LIVE with!

Accident Prevention with FALL PREVENTION

Only you can prevent fall and other hazards know the safety procedures, PPE, Fall prevention planning, and your jobsite.

plan

1. Address all aspects of hazards
2. Identify all Fall hazards
3. Train employees to recognize Fall hazards
4. Perform a job hazard analysis for each task
5. Provide appropriate equipment
6. Conduct safety inspections at the site
7. Encourage employee participation

Types of Falls

Same Level
Elevated

Fall Prevention

"The eyes have it"

Look where you're going
My granny always said don't walk
where your eyes have not seen!

Fall Prevention

Traction

Wear the correct shoes for the job.

Provide shoe cleaning devices

Slip resistance walk surfaces

Ice melt or sand

Steps and Inclined Walkways

- Substantial hand rails
- Slip resistant treads
- Corrosion
- Lighting

Walkways

- Identify
- Keep clear of obstructions
- Clean up spills
- Provide good lighting

Equipment

While Climbing on and off

- Ladders
- Handrails
- Steps
- Shoe cleaner

Ladders

- Long enough to reach
- Non-conductive side rails
- Stable level surfaces
- 3 Feet above the upper landing
- Height-to-base ratio 4 feet to 1 foot
- Assistance during ascent or decent
- Never lean more than 12 inches beyond side rail
- Carry tools in a tool belt
- Three points of contact

Passive Fall Protection

Passive systems protect workers without additional action on their own behalf.

- Guardrails and Railings
- Personal Fall Arrest System (PFAS)
- Safety nets
- Hole Covers (Marked as such Hole Cover) capable of with standing any load imposed.

Active System

Requires worker to take positive action to prevent falls

- Full body harness – distributes fall forces to minimize injury.
- Lanyard – shock absorbing.
- Attached to a proper anchorage point – sufficient to support 5000 pounds.

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(8) *Health*

NEW MINERS MUST BE TRAINED

30 CFR § 48.25 (b) (7)

- *Training:* (7) *Health.* The course shall include instruction on the purpose of taking dust measurements, where applicable, and noise and other health measurements, and any health control plan in effect at the mine shall be explained. The health provisions of the Act and warning labels shall also be explained.

WHAT RIGHTS DO YOU HAVE AND HOW CAN YOU PROTECT YOUR HEALTH?

MSHA and Hazard Communication

http://www.msha.gov/hazcom/hazcom.htm

Define the following:

TOXICOLOGY-

Study of Poisons

INDUSTRIAL HYGIENE

Recognition, Evaluation and Control of stressors in the workplace.

Biological Hazards: These include bacteria, viruses, fungi, and other living organisms that can cause acute and chronic infections by entering the body either directly or through breaks in the skin. Occupations that deal with plants or animals or their products or with food and food processing may expose workers to biological hazards. Laboratory and medical personnel also can be exposed to biological hazards. Any occupations that result in contact with bodily fluids pose a risk to workers from biological hazards (**Etiologic Agents**).
In occupations where animals are involved, biological hazards are dealt with by preventing contact and handling. Don't disturb bees.

Also, effective personal hygiene, particularly proper attention to minor cuts and scratches, especially those on the hands and forearms, helps keep worker risks to a minimum.
In occupations where there is potential exposure to biological hazards, **workers should practice proper personal hygiene, particularly hand washing.** Instances of particularly contagious diseases such as Flu Cold Viruses and worse tuberculosis: isolation, provide proper ventilation, proper personal protective equipment such as gloves and respirators, adequate infectious waste disposal systems, and appropriate controls including. WHERE A MASK OR STAY HOME UNTIL YOUR WELL AVOID CONTACTING OTHERS.

Chemical Hazards

Harmful chemical compounds in the form of solids, liquids, gases, mists, dusts, fumes, and vapors exert toxic effects by inhalation (breathing), absorption (through direct contact with the skin), or ingestion (eating or drinking). Airborne chemical hazards exist as concentrations of mists, vapors, gases, fumes, or solids. Some are toxic through inhalation and some of them irritate the skin on contact; some can be toxic by absorption through the skin or through ingestion, and some are corrosive to living tissue.

The degree of worker risk from exposure to any given substance depends on the nature and potency of the toxic effects and the magnitude and duration of exposure.

RIGHT TO KNOW AND UNDERSTAND CHEMICALS

Information on the risk to workers from chemical hazards can be obtained from the Safety Data Sheet (SDS) that OSHA'S *Hazard Communication Standard* (HCS) and Global Harmonization Standard (GHS) requires be supplied by the manufacturer or importer to the purchaser of all hazardous materials. The SDS is a summary of the important health, safety, and toxicological information on the chemical or the mixture's ingredients. Other provisions of the *Hazard Communication Standard* require that all containers of hazardous substances in the workplace have appropriate warning and identification labels with Signal Words and Pictograms aid to know.

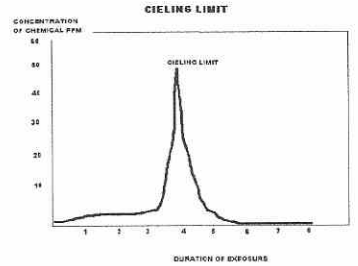
OSHA: www.osha.gov

Permissible Exposure Limit (PEL) - Based on an 8-hour workday and a 40-hour workweek, PELs are exposure levels below which OSHA does not require respiratory protection. When exposures surpass this level, certain administrative, engineering controls and or any combination respiratory protection & PPE requirements determined by a competent industrial hygienist or other technically qualified person must be met.

Time-Weighted Average (TWA) - This exposure limit is based on acceptable contaminant concentrations for a normal, 8-hour workday and a 40-hour workweek.

Short-Term Exposure Limit (STEL) - This is a 15-minute TWA exposure that should not be exceeded at any time during a workday.

Ceiling Limit – Not to be exceeded instantaneously and instant.



CIELING LIMIT VALUE OR C-LIMIT

THE AMOUNT OF EXPOSURE THAT CAN NOT BE EXCEEDED EVEN INSTANTANEOUSLY.

GAS	SYMBOL	GAS DENSITY	COLOR, ODOR OR TASTE	FLAMMABLE / EXPLOSIVE	SOURCE(S)	ROUTE OF ENTRY	TLV (PPM)*	TOXIC EFFECTS	FIRST AID
Air	--	1.0000	None	No	Atmosphere	Inhalation	--	--	--
Nitrogen	N2	0.967	None	No	About 4/5th of atmosphere. Rock strata from some mines.	Inhalation	--	Asphyxiant from oxygen deficiency.	Move victim to fresh air. Perform artificial respiration if needed.
Oxygen	O2	1.105	None	No	1/5th of atmosphere.	Inhalation	--	Oxygen deficiency Below 17%-yawning Below 15%-dizziness Below 9%-collapse Below 7%-death	Move victim to fresh air. Perform artificial respiration if needed.
Carbon Dioxide	CO2	1.529	Low concentration - none. High concentration - slightly acidic taste	No	Oxidation of coal. Rotting mine timbers. Breathing, blasting, explosions, fires, diesel engines, and rock strata in some mines.	Inhalation	5,000	Concentrations of 5% can produce shortness of breath and headaches. Concentrations of 10% can produce death due to oxygen deficiency.	Move victim to fresh air. Perform artificial respiration if needed.
Methane	CH4	0.5545	None	Yes 5% - 15% with at least 12% Oxygen	Coal and rock strata, carbonaceous shale, and rotting mine timbers.	Inhalation	--	Oxygen deficiency	Move victim to fresh air. Perform artificial respiration if needed.
Carbon Monoxide	CO	0.967	None	Yes 12.5% - 74%	Diesel engines, fires, explosions, and blasting	Inhalation	50	Low concentrations can produce headache, dizziness and drowsiness. Higher concentrations can produce nausea, vomiting, collapse, coma and death.	Move victim to fresh air. Perform artificial respiration if needed.
Nitric Oxide	NO	1.036	Colorless in low concentrations. Reddish-brown in high concentrations. Odorless and tasteless.	No	Blasting or burning of dynamite, diesel engines, and electrical discharge.	Inhalation, skin and eye contact.	25	Irritation of eyes, nose and throat. Drowsiness and unconsciousness	Move victim to fresh air. Perform artificial respiration if needed.

Nitrogen Dioxide	NO2	1.589	Colorless in low concentrations. Reddish-brown in high concentrations. Sharp sweet odor and tasteless.	No	Blasting or burning of cyanamite, diesel engines, and electrical discharge	Inhalation, skin and eye contact.	5	Gas can irritate eyes and mucous membranes and cause pulmonary irritation. Extremely corrosive when inhaled - cause severe burns to skin, eyes and mucous membranes.	Irrigate eyes immediately. Flush skin with water. Move victim to fresh air. Perform artificial respiration if needed. If swallowed, get medical help, give large amounts of water - do not
Sulfur Dioxide	SO2	2.263	Colorless, strong sulfur odor and acidic taste	No	Fires involving iron pyrites. Some diesel fuels.	Inhalation, skin and eye contact.	5	Respiratory irritation. Corrosi burns.	Irrigate eyes immediately. Flush skin with water. Move victim to fresh air. Perform artificial respiration if needed.
Hydrogen Sulfide	H2S	1.1910	Colorless and an odor of rotten eggs.	Yes 4.5% - 45% with enough Oxygen	Refining mine gases, mine water and rock strata in some mines.	Inhalation, skin and eye contact.	10	Irritation of eyes and respiratory tract. Acute exposure may cause immediate coma and rapid death from respiratory paralysis.	Irrigate eyes immediately. Flush skin with water. Move victim to fresh air. Perform artificial respiration if needed.
Hydrogen	H2	0.0695	None	Yes 4.1% - 74% with as little as 5% Oxygen	Fires, explosions, battery charging. Water or steam contacting hot carbonaceous material. Strong acids on metals.	Inhalation	--	Oxygen deficiency	Move victim to fresh air. Perform artificial respiration if needed.

* 300 - parts of gas per million parts of the gas air mixture

Silicosis: Learn the Facts!

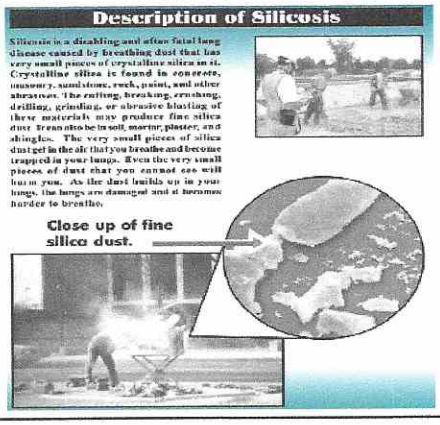
Do you work in construction or do abrasive blasting?

If so, here are some important facts you need to know:

- Since 1968, more than 14,000 workers in the U.S. have died from a disease called silicosis.
- In the U.S. each year more than 200 workers die with this disease while hundreds more become disabled.
- Many workers with silicosis are only in their thirties; some are as young as 22 years old. Many of them are unable to take care of themselves and their families.

Description of Silicosis

Silicosis is a disabling and often fatal lung disease caused by breathing dust that has very small pieces of crystalline silica in it. Crystalline silica is found in concrete, masonry, sandstone, rock, paint, and other abrasives. The cutting, breaking, crushing, drilling, grinding, or abrasive blasting of these materials may produce fine silica dust. Breathing in soil, mortar, plaster, and shingles. The very small pieces of silica dust get in the air that you breathe and become trapped in your lungs. Even the very small pieces of dust that you cannot see will hurt you. As the dust builds up in your lungs, the lungs are damaged and it becomes harder to breathe.



Silica- It's not just dust

- Loader operators and others using mobile
- equipment are exposed to more dust than
- the typical mine employee. Because so
- much mine dust has **silica** in it, you
- should take steps to protect yourself
- against a possible health hazard.

- **Silicosis can be Deadly**
- Some dust is stopped by the body's
- natural defense system, but the smallest
- dust particles can penetrate deep into the

- Cont. **silica**
- lungs. The harm from dust depends on
- what it's made of, what size it is, and how
- much and how long you breathe it. If
- you're exposed to enough dust with silica,
- you can get a disease called silicosis.
- Silicosis can be a disabling, even fatal,
- illness that can't be reversed once a
- person has it. Lung tissue becomes
- scarred and inflexible and breathing
- becomes harder and harder.
- **If it's silica... It's not just dust.**

THE END

GAS	SYMBOL	GAS DENSITY	COLOR, ODOR OR TASTE	FLAMMABLE / EXPLOSIVE	SOURCE(S)	ROUTE OF ENTRY	TLV (PPM)*	TOXIC EFFECTS	FIRST AID
Air	—	1.0000	None	No	Atmosphere	Inhalation	—	—	—
Nitrogen	N2	0.967	None	No	About 4/5th of atmosphere. Rock strata from some mines.	Inhalation	—	Asphyxiant from oxygen deficiency.	Move victim to fresh air. Perform artificial respiration if needed.
Oxygen	O2	1.105	None	No	1/5th of atmosphere.	Inhalation	—	Oxygen deficiency Below 17%-panting Below 15%-dizziness Below 9%-collapse Below 7%-death	Move victim to fresh air. Perform artificial respiration if needed.
Carbon Dioxide	CO2	1.529	Low concentration - none. High concentration - slightly acidic taste	No	Oxidation of coal. Rotting mine timbers. Breathing, blasting, explosions, fires, diesel engines, and rock strata in some mines.	Inhalation	5,000	Concentrations of 5% can produce shortness of breath and headaches. Concentrations of 10% can produce death due to oxygen deficiency.	Move victim to fresh air. Perform artificial respiration if needed.
Methane	CH4	0.5545	None	Yes 5% - 15% with at least 12% Oxygen	Coal and rock strata, carbonaceous shale, and rotting mine timbers.	Inhalation	—	Oxygen deficiency	Move victim to fresh air. Perform artificial respiration if needed.
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Sulfur Dioxide	SO2	2.264	Colorless, strong sulfur odor and acidic taste.	No	Fires involving iron pyrites. Some diesel fuels.	Inhalation, skin and eye contact.	5	Respiratory irritation. Corneal burns.	Irrigate eyes immediately. Flush skin with water. Move victim to fresh air. Perform artificial respiration if needed.
Hydrogen Sulfide	H2S	1.1910	Colorless and an odor of rotten eggs.	Yes 4.5% - 45% with enough Oxygen	Rotting mine timbers, mine water and rock strata in some mines.	Inhalation, skin and eye contact.	10	Irritation of eyes and respiratory tract. Acute exposure may cause immediate coma and rapid death from respiratory paralysis.	Irrigate eyes immediately. Flush skin with water. Move victim to fresh air. Perform artificial respiration if needed.
Hydrogen	H2	0.0695	None	Yes 4.1% - 74% with as little as 5% Oxygen	Fires, explosions, battery charging. Water or steam contacting hot carbonaceous material. Strong acids on metals.	Inhalation	—	Oxygen deficiency	Move victim to fresh air. Perform artificial respiration if needed.

* PPM - parts of gas per million parts of the gas-air mixture

U.S. Department of Labor
MSHA
Mine Safety and Health Administration

Personal Noise Measurements

Noise is unwanted sound. There are many noise sources in coal and metal/nonmetal mines, such as drills, crushers, diesel engines, grinding mills, trucks, and other vehicles and machinery. When noise exposure is too intense, too shrill, or too prolonged, such exposure may cause harm to miners. The adverse effects of noise exposure include temporary or permanent hearing loss, interference with speech and audible warning signals, and physical and psychological effects such as fatigue, irritability, tension, anxiety, and circulatory effects. Sudden blasts of noise can rupture the ear drum or damage the bones of the middle ear. Noise-induced hearing loss is the gradual loss of hearing that may occur on long or repeated exposure to intense noise. Such damage occurs at the organ of Corti in the inner ear and may become permanent. There is no known medical treatment to correct such hearing loss - emphasizing the importance of prevention. One of the first symptoms of noise-induced hearing loss is loss of hearing at the higher frequencies including 4000 Hz. Such loss may go unnoticed, but with increasing exposure, the loss increases and may involve the speech frequencies (500 to 3000 Hz). The MSHA noise standard has three levels of noise exposure where corrective action must be instituted. These limits are the Action Level (AL), Permissible Exposure Level (PEL), and the Dual Hearing Protection Level (DHPL). The corrective actions differ for each limit. The lowest level is the AL. Whenever a miner's noise exposure equals or exceeds 85 dBA for 8 hours or equivalently a dose of 50% based on an 80 dBA threshold measurement, the miner must be enrolled in a Hearing Conservation Program (HCP). A miner in the HCP must undergo training on the noise rule and the effects of noise on a person and the care fitting and use of hearing protectors. In addition the miner must be offered a choice of hearing protector and audiometric testing.

The PEL is 90 dBA for 8 hours or equivalently a dose of 100% based on a 90 dBA threshold measurement. Readings greater than 100% indicate exposure above the allowable limit. An exposure of 200%, for example is twice the allowable limit and corresponds to a continuous noise exposure of 95 dBA for 8 hours. Mine operators would be required to implement feasible engineering and/or administrative controls to reduce the noise exposure to the PEL. If the noise exposure cannot be reduced to the PEL, the mine operator would be required to continue to use all feasible engineering and administrative controls to reduce the miner's exposure to the lowest level feasible, and to have the miner wear hearing protection. Also, the miner would be enrolled in a HCP.

The DHPL is 105 dBA for 8 hours or equivalently a dose of 800% based on a 90 dBA threshold measurement. This level requires more protective measures be instituted to protect the hearing sensitivity of miners. Besides the requirements for exceeding the PEL, mine operators would be required to have their miners exposed above this level wear ear muff and ear plugs simultaneously.

Most noises at mining operations vary in level and frequency during a working shift. The allowable level varies with the time of exposure; as the time of exposure decreases, higher levels are permitted. For example, the maximum allowable level for 4 hours exposure per day is 95 dBA, and for 2 hours, 100 dBA, with a final maximum allowable level of 115 dBA for exposure of 15 minutes or less per day. In other words, for every 5 dBA increase in the sound

(9) *Explosives*

MINERS MUST KNOW HAZARDS OF EXPLOSIVES

VIDEO NIOSH/MSHA or PowerPoint

EXPLOSIVES AND BLASTING WARNINGS FOR ANY MINE THAT USES EXPLOSIVES LAWS AGAINST STEALING FEDERAL AND NO SMOKING NEAR EXPLOSIVES MAGAZINES AND GASEOUS AREAS

Disclaimer

- {Disclaimer this is for training ONLY ACTUAL SITUATIONS AND SAFETY INSTRUCTIONS WILL CHANGE ALWAYS CONSULT Mine Safety Plan, Site Specific Plan and your employers instructions on explosives. ALWAYS FOLLOW THE EXPLOSIVES MANUFACTURER INSTRUCTIONS AND WARNINGS] we are not responsible for contents of this material for educational purposes only.,
- **[By use of this material you consent to indemnification of us under any circumstances and hold us harmless for any accidents or any circumstances.]**
- Warning Failure to follow Mine Safety Plan or Manufacturers Instructions Can Result in DEATH or Serious injury.
- You agree to hold instructor and any affiliate harmless. Including NIOSH/MSHA VIDEOs as they may not be relative to your site specifically or Mine.

30 CFR § 48.25 (b) (11)

- *Training:* (11) *Explosives.* The course shall include a review and instruction on the hazards related to explosives. The only exception to this course component is when no explosives are used or stored on mine property.

IME institute of makers of explosives

MSHA

Metal and Nonmetal Mine Safety Alert

Explosives and Blasting Safety

Blasting safely demands the highest level of attention among employees working in metal and nonmetal mining. Since 2010, seven miners have died at mines as a result of flyrock, misfires and toxic fumes. Two miners died in one incident in 2013. All mine operators, independent contractors and miners must follow strict explosives safety procedures to prevent fatalities.

Best Practices

- Follow manufacturers' guidelines for the storage, handling, transportation and use of explosive materials.
- Keep all explosive storage areas clean, dry and orderly.
- Rotate the inventory of explosive materials, making sure to use the oldest stock first
- Never use damaged or deteriorated explosive materials, including initiation (detonating) devices, boosters, dynamite and blasting agents. Contact the explosives manufacturer if damaged, deteriorated or outdated explosives are discovered.
- Ensure that all locations where explosives are stored or used are properly ventilated before miners enter.
- Utilize technology such as face profilers and borehole probes to obtain specific details about areas of weak burden and potential borehole deviation.
- Communicate with the driller and understand the geology of the blast site.
- Review and follow the site-specific blast plan prior to loading any explosives. Develop a drill pattern appropriate for the location, and adjust stemming depth and/or decking to maintain adequate burden for the blast.
- Establish the blast area and remove all persons from the area before the blast is fired.
- Guard or barricade all access routes to the blast area to prevent people and vehicles from entering.
- Before firing a blast, give ample warning to allow all persons to be evacuated from the blast area.
- Conduct a post-blast inspection to be certain the blast area is safe before anyone re-enters.

EXPLOSIVES
In the U.S.A.: Lost & Stolen Explosive Materials
Call The ATF Toll Free at: 1-800-800-3855
Presented By David Hendy Chicago Safety Institute
Works Cited Courtesy of Commonwealth of Pennslyvania
http://www.depweb.state.pa.us/deepminesafety/lib/deepminesafety/training/explosives.htm

WARNING
LOCK UP
DETONATIORS
KEEP FROM CHILDREN

"ALWAYS AND NEVERS"
WARNINGS AND INSTRUCTIONS
ADOPTED BY THE INSTITUTE OF
MAKERS OF EXPLOSIVES, JUNE 1997

- All explosives are dangerous and must be carefully handled and used following approved safety procedures either by or under the direction of competent, experienced persons in accordance with all applicable federal, state, and local laws, regulations and ordinances. If, after carefully reading this entire leaflet, you have any questions or doubts as to how to use any explosive product, do not use it before consulting your supervisor, or the manufacturer if you do not have a supervisor. If your supervisor has any questions or doubts, he should consult the manufacturer before use.
-
- The explosives in this package were manufactured and packed under careful supervision and inspection. However, the contents may become damaged by improper handling or storage beyond the control of the manufacturer, therefore, they should be carefully inspected before using.
- **WARNINGS AND INSTRUCTIONS**
- For transporting, Storing, Handling, and Using Explosive Materials

ANFO

- **WARNING: READ THIS FOLDER BEFORE USING ANY EXPLOSIVE MATERIALS.**
- **PREVENTION OF ACCIDENTS IN THE TRANSPORTATION, STORAGE, HANDLING, AND USE OF EXPLOSIVE MATERIAL.**
- **The misuse of any explosive material can kill or injure your or others.**
- Prevention of accidents depends on careful planning and the use of proper procedures.
- This folder is designed to help you use explosive materials safely.
- **GENERAL WARNINGS**
- All explosive materials are DANGEROUS and must be carefully transported, handled, stored, and used following proper safety procedures or under competent supervision.
- ALWAYS follow Federal, State, and local laws and regulations.
- ALWAYS lock up explosive materials and **keep from children** and unauthorized persons.

- **EXPLOSIVE MATERIALS COVERED IN THIS FOLDER:**
- High Explosives and Permissible Explosives Blasting Agents
- Electric and Non-electric Detonators Safety Fuses
- Slurries, Water Gels and Emulsions Detonating Cord
- Primers & Boosters
-
- **QUESTIONS ON THE USE OF EXPLOSIVE MATERIALS:**
- THESE WARNINGS AND INSTRUCTIONS CANNOT COVER EVERY SITUATION, WHICH MIGHT OCCUR. IF YOU HAVE ANY QUESTIONS ON THE USE OF AN EXPLOSIVE MATERIAL, CONTACT YOUR

- **DEFINITIONS**
- The words "Detonator" and "Blasting Cap" shall be considered interchangeable and synonymous in this document.
- 1. **Blasting Agent**: An explosive material, which meets prescribed criteria for sensitivity to initiation.
- For storage, Title 27 Code of Federal Regulations (CFR), Section 55.11 defines a blasting agent as any material or mixture, consisting of fuel and oxidizer, intended for blasting, not otherwise defined as an explosive. Provided that the finished product, as mixed for use or shipment cannot be detonated by means of a number 8 test blasting cap (detonator) when unconfined. (Bureau of Alcohol, Tobacco, & Firearms Regulation)
- For transportation, Title 49CFR Section 173.50, defines Class 1, Division 1.5 (Blasting Agent)as a substance which has a mass explosion hazard but is so insensitive that there is very little probability of initiation or of transmition from burning to detonation under normal conditions of transport.
- 2. **Booster.** An explosive charge, usually of high strength and high detonation velocity, designed to be used in the explosive initiation sequence between an initiator or primer and the main charge.

- 3. **Detonator.** Any device containing any initiating or primary explosive that is used for initiating or primary explosive that is used for initiating detonation in another explosive material. A detonator may not contain more than 10 grams of total explosive by weight, excluding ignition or delay charges. The terms includes, but is not limited to, electric blasting caps of instantaneous and delay types, blasting caps for use with safety fuses, detonation cord delay connectors, and nonelectric instantaneous and delay blasting caps which use detonating cord, shock tube, or any other replacement for electric leg wires. Unless specifically classified otherwise, detonators are classified 1.1 (class A explosives).
- 4. **Explosive Materials:** These include explosives, blasting agents and detonators. The term includes, but is not limited to dynamite and other high explosives, slurries and water gels, emulsions, blasting agents, black powder, pellet powder, initiating explosives, detonators, safety fuses, squibs, detonation cord, igniter cord and igniters.
- 5. **Explosive:** Any chemical compound, mixture, or device, the primary or common purpose of which is to function by explosion.

- 6. **Magazine:** Any building or structure or container, other than an explosives manufacturing building, approved for the storage of explosive materials.
- 7. **Primer:** A unit, package, or cartridge of explosives used to initiate other explosives or blasting agents, and which contains:
- 1) A detonator, or
- 2) Detonating cord to which is attached a detonator designed to initiate the detonating cord.
- 8. **Safety Fuse:** A flexible cord containing solid flammable material by which fire or flame is conveyed at a continuous and relatively uniform rate from the point of ignition to a cut end. A fuse detonator is usually attached to that end, although safety fuse may be used without a detonator to ignite material such as deflagrating explosives.
- 9. **Shock Tube:** A small diameter plastic tube used for initiating detonators. It contains only a limited amount of reactive material so that the energy that is transmitted through the tube by means of a detonation wave is guided through and confined within the walls of the tube.

STORING EXPLOSIVE MATERIALS

LOCATION OF MAGAZINES

- **ALWAYS** separate magazines from other **magazines, inhabited buildings, highways,** and **passenger railways.** See IME Safety Library Publication No. 2. **American Table of Distances.**
- **ALWAYS post normal access roads to explosive storage magazines with the following warning sign:**

- **DANGER**
- **NEVER FIGHT EXPLOSIVE FIRES**
- **EXPLOSIVES ARE STORED ON THIS SITE**
- **CALL (Emergency Phone #)**

- **This sign shall be weather resistant with a reflective surface and lettering at least 2" (50mm) high. The first two lines shall be in red lettering and remaining portion in black.**
- **NEVER allow combustible material to accumulate within 25 feet of the magazine.**
- **NEVER allow any lighters, matches, open flame or other sources of ignition or volatile materials within 50 feet of the magazine.**
- **NEVER attempt to make any repairs to the inside or outside of a magazine containing explosive materials.**

CONSTRUCTION OF MAGAZINES

- **ALWAYS** be sure magazines are **solidly built** and **securely locked**, in accordance with federal regulations, to protect from weather, fire, and theft. Protect from penetration by bullets and missiles, as required by the classification of the explosive material.
- **ALWAYS** keep the inside of the magazine **clean, dry, cool** and **well ventilated**.
- **ALWAYS** post clearly visible "**EXPLOSIVES—KEEP OFF**" signs outside of the magazine. Locate signs so that a bullet passing directly through them cannot hit the magazine.

CONTENTS OF MAGAZINE

- **ALWAYS clean up spills** promptly. Follow manufacturer's directions.
- **ALWAYS** store only explosive materials and other approved blasting materials and accessories in a magazine.
- **ALWAYS** rotate stocks of explosive material so the oldest material in the magazine is used first. Consult with the manufacturer to assure that the recommended storage time for the explosive material is being followed.
- **NEVER** store **detonators** with other **explosive materials.**
- **NEVER** use explosive materials which seem deteriorated. Before using consult your supervisor or the manufacturer.
- **NEVER** exceed recommended storage conditions and temperatures for explosive materials. Check with your supervisor or the manufacturer.
- **NEVER** perform any type of operation in a magazine other than inspection, inventory or bringing in or taking out explosive material.

TRANSPORTING EXPLOSIVE MATEIALS

- **ALWAYS** keep **matches, lighters, open flame** and **other sources of ignition** at least **50 feet** away from parked vehicles carrying explosive materials.
- **ALWAYS** follow federal, state, and local laws and regulations concerning transportation.
- **ALWAYS** load and unload explosive materials carefully.
- **NEVER** park vehicles containing explosive materials **close to people** or congested areas.
- **NEVER** leave a vehicle containing explosive material unattended.

HANDLING EXPLOSIVE MATERIALS

- **GENERAL**
- **ALWAYS** use permissible explosive materials in flammable, gassy, or dusty atmosphere, when required by applicable federal, stat and local laws and regulation.
- **ALWAYS** keep explosive materials **away from children,** unauthorized persons, and livestock.
- **NEVER** use explosive materials unless **completely familiar** with safe procedures or under the direction of a qualified **supervisor.**
- **NEVER** handle explosive materials during or during the approach of an electrical storm. Find a safe location away from the explosive materials. When a storm is approaching, consult your supervisor. This applies to both surface and underground operations.
- **NEVER** fight fires involving explosive materials. Remove yourself and all other persons to a safe location and guard the area.
- **NEVER** put explosive materials in pockets of your clothing.

- **PACKAGING**
- **ALWAYS close partially used packages** of explosive materials.
- **ALWAYS** store explosives in their original package.
- **NEVER touch metal fasteners with metal slitters** when opening packages of explosive materials.
- **NEVER** mix different explosives in the same package.
- **NEVER** remove explosive material **from its package** unless designed to be used in **that manner.**

PROTECTING EXPLOSIVE MATERIALS

- **ALWAYS** insure that there are no foreign objects, loose powder or moisture in a fuse detonator before inserting the safety fuse.
- **ALWAYS** avoid the use of "shot breaks" must be used all loaded holes should be considered in determining the size of the blast are.
- **NEVER insert** anything into a **fuse detonator**, except safety fuse.
- **NEVER** use explosive materials that have been water soaked, even if they now appear to be dried out.
- **NEVER investigate the contents** of a detonator.
- **NEVER pull** wires, safety fuse, shock tube, plastic tubing, or detonating cord out of any detonator or delay device.
- **NEVER take apart, or alter** the contents of any explosive materials.
- **NERVER** expose explosive materials to sources of heat exceeding 150 degrees F. or to open flame, unless such materials, or procedures for their use, have been recommended for such exposure by the manufacturer.
- **NEVER strike** explosive materials with, or allow them to be hit by, objects other than **those required in loading**.
- **NEVER** subject explosive materials to excessive impact or **friction.**
- **NEVER** allow loaded firearms in the vicinity of, nor shoot near, explosive materials, magazines, or vehicles loaded with explosive materials.

USING EXPLOSIVE MATERIALS:

- **DRILLING, LOADING, & TAMPING**
- **DRILLING**
- **ALWAYS check** for **unfired explosive materials** on the surface or face before drilling.
- **NEVER drill into explosive materials,** or into a blast hole that as contained explosive materials.
- **NEVER** start a drill hole in a bootleg.

LOADING

- **ALWAYS** inspect the highwall and crest conditions before loading.
- **ALWAYS** check each borehole to assure it is **safe** for loading.
- **ALWAYS** load the face holes in such a manner that you can see the crest at all times.
- **ALWAYS** take **precautions** during **pneumatic loading** to prevent the accumulation of static electric charges.
- **NEVER** place any parts of the body in **front** of the borehole except those required for the loading, tamping, or stemming operations.
- **NEVER force** explosive materials **into a borehole**.
- **NEVER load** a borehole containing **hot or burning material**. Temperatures above 150 degrees F. could be dangerous.
- **NEVER** spring a borehole near other holes loaded with explosives materials.
- **NEVER stack more explosive materials** than needed near working areas during loading.
- **NEVER** drop large diameter rigid cartridges (4 inch [102mm] or larger) **directly** on the primer.

TAMPING

- **NEVER** tamp a primer or explosive material removed from its cartridge.
- **NEVER** tamp explosive materials with **metallic devices**, except jointed non-sparking poles with nonferrous metal connectors.
- **NEVER** tamp **violently**.
- **NEVER kink** or **damage** safety fuse, detonating cord, shock tube, plastic tubing, or wires of detonators when tamping.

USING EXPLOSIVE MATERIALS:

- GENERAL INSTRUCTIONS FOR PRIMERS
-
- GENERAL
- NEVER prepare **more primers** than immediately needed.
- NEVER prepare primers in **a magazine** or near large quantities of **explosive materials.**
- NEVER **slip, drop, twist, or tamp** a primer.
-
- PREPARING THE PRIMER
- ALWAYS **insert the detonator completely** into a hole in the explosive material made with a non-sparking punch designed for that purpose, or in the cap well of a manufactured booster.
- ALWAYS **secure the detonator** within the primer.
- ALWAYS **point the detonator** in the direction of the main explosive charge.
- ALWAYS **secure the detonator** to a primer cartridge so that no tension is placed on the leg wires, safety fuse, shock tube, plastic tubing, or detonating cord at the point of entry into the detonator.
- ALWAYS be certain the detonator is **fully** inserted in the primer cartridge or booster and does not protrude from it.
- NEVER use a cast primer or booster if the hole for the detonator is **too small.**
- NEVER **enlarge** a hole in a cast primer or booster to accept a detonator.
- NEVER punch explosive material that is **very hard or frozen.**
- NEVER **force** or attempt to force a detonator into explosive material.

LOADING THE BOREHOLE

- **ALWAYS** use the **first cartridge** in the borehole as the primer cartridge where two inch diameter or smaller cartridges are used.
- **NEVER drop** large diameter, rigid cartridges (4 inch [102mm] or larger) **directly** on the primer.

MAKING PRIMERS WITH ELECTRIC DETONATORS

- **SMALL DIAMETER CARTIIDGES (**Less than four inches in diameter**) – Figure 1**
- Step 1: Punch a hole straight into one end of cartridge,
- Step 2: Insert the detonator into the hole.
- Step 3: Tie leg wires around the cartridge using a half hitch.
- **NEVER pull** the wires too **tightly.** This may break them or damage the insulation.

Warning Failure to follow Mine Safety Plan or Manufacturers Instructions Can Result in DEATH or Serious injury

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LARGE DIAMETER CARTRIDGES

- (Four inches and larger in diameter) – **Figure 2**
- Step 1: Punch a slanting hole from the center of one end of the cartridge coming out through the side two or more inches from the end.
- Step 2: Fold over the leg wires about 12 inches from the detonator to form a sharp bend.
- Step 3: Push the folded wires through the hole starting at the end of the cartridge and coming out through the side.
- Step 4: Open the folded wires and pass the loop over the other end of the cartridge
- Step 5: Punch another hole straight into the end of the cartridge beside the first, insert the detonator in this hole, and take up all the slack in the wires.

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CAST BOOSTERS – Figure 3

- **ALWAYS** follow the manufacturer's recommendations for the attachment and use of detonators with cast or manufactured boosters.
- **PLASTIC FILM CARTRIDGES – Figure 4**
- **MAKING PRIMERS WITH FUSE OR NONELECTRIC DETONATORS**
- **SIDE PRIMING METHOD – Figure 5**
- Step 1: Punch a hole in the side of the cartridge. Make the hole deeper than length of detonator and pointed downward rather than across the cartridge.
- Step 2: Insert the detonator.
- Step 3: fold back the fuse, shock tube or plastic tubing over the end so that it lies along the length of the cartridge.
- Step 4: tape the fuse, shock tube or plastic tubing over the end so that it lies along the length of the cartridge.
- **CAUTION:** If miniaturized detonating cord is used, the explosives must be insensitive to initiation by the detonating cord for this method to work.
- **PLASTIC FILM CARTRIDGE PRIMER – Figure 7**

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MAKING PRIMERS WITH DETONATING CORD

- **DETONATING CORD WITH CAST BOOSTERS – Figure 8**
- **ALWAYS** follow manufacturer's recommendations for using detonating cord with cast or manufactured boosters.
- **MISCELLANEOUS TYPES OF PRIMERS**
- **ALWAYS** follow manufacturer's recommendations for preparation of primers not covered elsewhere in these recommendations.
- **USING EXPLOSIVE MATERIALS: GENRAL PROCAUTIONS**
- **PROTECTING YOURSELF**
- **ALWAYS** keep explosive materials away from **food, eyes or skin. Flush areas of contact** with large quantities of water.
- **ALWAYS avoid** exposure to **excessive noise** from blasting. Comply with federal, state, and local laws and regulations.
- **ALWAYS** fire the shot from a position **outside the blast area** (away from where flyrock might occur), or if necessary to be in the blast area, from an adequate blast shelter that provides protection from flying material.
- **ALWAYS** remain in position away from the blast area post blast until fumes dusts or mists have subsided.
- **NEVER** handle any explosive materials or position yourself near any explosive materials when initiating a blast.
- **NEVER** fire the shot from in **front** of the blast.
- **NEVER** breathe **dust or vapors** from explosive materials.

Warning Failure to follow Mine Safety Plan or Manufacturers

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PROTECTING OTHERS

- **ALWAYS clear** the immediate area of persons.
- **ALWAYS post guards** to prevent access to the blast area.
- **ALWAYS sound** adequate **warning** prior to the blast.
- **ALWAYS** use a **blasting mat** or other protective means when blasting close to residences or other occupied buildings or other locations where injury to persons or damage to property could occur as a result of flyrock.
- **NEVER** fire a blast without a **positive signal** from the person in charge.
- **NEVER** permit anyone to handle explosive materials or position themselves near explosive materials when a blast is to be initiated.

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PROTECTING THE BLAST AREA

- **ALWAYS clear the immediate area** of vehicles, equipment, and extra explosive materials.
- **ALWAYS** design a blast to **avoid excessive air blast, ground vibration,** and **flyrock.** Comply with federal, state and local laws and regulations.
- **NEVER** allow any **source of ignition** within 50 feet of a blast site except approved safety fuse lighters.

Warning Failure to follow Mine Safety Plan or Manufacturers Instructions Can Result in DEATH or Serious injury

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USING EXPLOSIVE MATERIALS: ELECTRIC INITATION

- **PREPARING THE ELECTRIC BLASTING CIRCUIT**
- **ALWAYS** test the circuit for **continuity** and proper **resistance**, using a blasting galvanometer or an instrument specifically designed for testing electric detonators and circuits containing them.
- **ALWAYS** fire electric detonators with **firing currents** in the range recommended by the manufacturer.
- **ALWAYS** keep electric detonator wires or lead wire **disconnected** from the power source and shunted until ready to test or fire.
- **ALWAYS** keep the firing circuit completely **insulated** from ground or other conductors.
- **ALWAYS** be sure that all **wire ends** are clean before connecting.
- **NEVER** use any instruments, such as electrician's meters, that are not specifically designed for testing blasting circuits or detonators. Such meters produce sufficient electrical energy to prematurely initiate electric detonators, which can result in injury or death.
- **NEVER** mix electric detonators of **different manufacturers** in the same circuit.
- **NEVER** mix electric detonators of **different types** in a circuit, even if made by the same manufacturer, unless such use is approved by the manufacturer.
- **NEVER** use aluminum wire in a blasting circuit.
- **NEVER** make final hookup to power source until all personnel are clear of the blast area.

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PROTECTING AGAINST EXTRANEOUS ELECTRICITY

- **ALWAYS** check for stray current.
- **NEVER** load boreholes in open work **near electric power lines** unless the firing lines and detonator wires are anchored or are too short to reach the electric power lines.
-
- **NEVER** handle or use electric detonators:
- a) When stray currents are present.
- b) During electrical storms.
- c) If static electricity is present.
- **NEVER** use electric detonators (electric blasting caps) near **radio-frequency transmitters** unless in accordance with IME Safety Library Publication No. 20, "Safety Guide for the Prevention of Radio Frequency Radiation Hazards in the Use of Electric Detonators (Blasting Caps)."
- **NEVER** have electric power wires or cables near electric detonators or other explosive materials except at the time and for the purpose of firing the blast.
- **NEVER** open blasting machines or handle batteries near electric detonators.

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USING EXPLOSIVE MATERIALS: DETONATING CORD INITIATION

- **ALWAYS** use a detonating cord matched to the blasting methods and type of explosive **materials** being used.
- **ALWAYS** handle detonating cord as **carefully** as other explosive materials.
- **ALWAYS cut the detonating cord from the spool** before loading the rest of the explosive material.
- **ALWAYS** use a sharp knife, razor blade or instrument designed for cutting detonating cord.
- **ALWAYS** make **tight connections**, following manufacturer's directions.
- **ALWAYS attach** detonators to detonating cord with **tape** or methods recommended by the manufacturer.
- **ALWAYS point** the detonators toward the **direction of detonation**. See Figure 9 below.
- **ALWAYS** attach the cord initiating detonation at least six inches from the cut end of the detonating cord.
- **ALWAYS** use a suitable booster to initiate wet detonating cord.
- **NEVER** make **loops, kinks,** or **sharp angles** in the cord, which might direct the cord back toward the oncoming line of detonation.
- **NEVER** cut detonating cord with devices such as scissors, pliers type cutters, or similar instruments.
- **NEVER damage** detonating cord prior to firing.
- **NEVER** attach detonators for initiating the blast to detonating cord until the blast area has been cleared and secured for the blast.
- **NEVER** use **damaged** detonating cord.

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USING EXPLOSIVE MATERIALS: NONELECTRIC INITIATION

-
- **GENERAL**
- **ALWAYS** follow manufacturer's warnings and instructions, especially hook-up procedures and safety precautions.
- **ALWAYS** discontinue operations during the approach and progress of electrical storms.
- **NEVER** hold nonelectric leads during firing. This may cause **injury** or **death**.
- **NEVER** use tubing or detonating cord leads for **any purpose other** than that **specified by manufacturer.**
-
- **MINIATURIZED DETONATING CORD SYSTEM**
- **ALWAYS** use explosives that are insensitive to initiation by the miniaturized detonating cord.
- **NEVER** join two sections of miniaturized detonating cord. A detonation will not pass through such a connection.

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GAS INITIATED SYSTEM

- **ALWAYS stay away** from the blast area **after connections** are prepared for firing, unless the entire system is properly purged and disconnected from the primary ignition source.
- **ALWAYS** use **tube protectors** or specially designed boosters.
- **NEVER kink** tubing.
- **NEVER smoke** or allow **open flame** within 50 feet of blasting machines used for gas-initiated systems.

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SHOCK TUBE SYSTEM

- **ALWAYS** insure that shock tubing connections to detonating cord are at right angles to prevent angle cut-offs.
- **ALWAYS** avoid situations where initiation system components can become entangled in machines, equipment, vehicles or moving arts thereof.
- **ALWAYS** lead shock tube to the hole in a straight line and keep it taut.
- **ALWAYS** follow the manufacturer's recommendations when cutting and splicing lead-in trunk line shock tube.
- **ALWAYS** unhook surface delay connectors prior to handling a misfire.
- **ALWAYS** protect surface delay connectors from unintended energy sources such as impact from falling rock, impact from track vehicles or other mobile equipment, drilling equipment, flame, friction, electrical discharged from power lines, static electricity and lighting.
- **NEVER** hook up any surface delay connector before you are ready to fire the blast.
- **NEVER** hook up a surface delay connector to it's own shock tube.
- **NEVER** leave an unhooked surface delay connector in close proximity to the shock tube of a loaded blast hole.
- **NEVER** remove the detonator from a surface delay connector block.
- **NEVER** attempt to initiate detonating cord with a surface delay connector designed for the initiation of shock tub only.
- **NEVER** drive any vehicles over shock tube.
- **NEVER tie together two lengths** of shock tubing. A initiation signal will not pass through a knotted connection.
- **NEVER** pull, stretch, kink or pull tension on a shock tube such that the tube could be caused to break or otherwise malfunction.

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USING EXPLOSIVE MATERIALS: FUSE DETONATOR AND SAFETY FUSE INITIATION

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GENERAL

- **ALWAYS** handle fuse carefully to avoid damaging the covering. In cold weather, warm slightly before using to avoid cracking the waterproofing.
- **ALWAYS** know the burning speed of the safety fuse by conducting a test burn of the fuse in use, to make sure you have time to reach safety after lighting
- **NEVER** use lengths of safety fuse less than three feet.
- **NEVER** insert anything but safety fuse in the open end of a fuse-type detonator.
- **NEVER** use fuse, which has been kinked, bent sharply, or handled roughly in such a manner that the powder train may be interrupted.

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STEPS FOR ASSEMBLING FUSE DETONATOR AND FUSE

- Step 1: Wait until you are read to insert fuse into fuse detonators before cutting it.
- Step 2: Cut off an inch or two to insure a dry end.
- Step 3: Measure correct length of fuse from roll and cut squarely across with a fuse cutter designed for this purpose; **not a knife**.
- Step 4: Visually inspect inside of detonator for foreign material or moisture; if wet or if foreign matter cannot be removed by pouring, do not use the detonator. Dispose of detonator in an approved manner.
- Step 5: Put the safety fuse gently against the powder charge.
- Step 6: Crimp the end of the fuse detonator where the fuse enters, using a cap crimper.
- **ALWAYS** cut off an inch or two to insure a dry end. Cut fuse squarely across with the **proper** tool designed for this purpose; **not a knife**.
- **ALWAYS** seat the fuse lightly against the detonator charge and avoid twisting after it is in place.
- **ALWAYS** insure that the detonator is securely crimped to the fuse.
- **ALWAYS** use waterproof crimp or waterproof the fuse-to-detonator joint in **wet work**
- **ALWAYS** use cap crimpers to crimp the detonator to the safety fuse.
- **NEVER twist** the fuse inside the detonator.
- **NEVER** use a **knife** or **teeth** for crimping.
- **NEVER** use an open fuse detonator for a booster.
- **NEVER** cut fuse until you are ready to insert it into the detonator.
- **NEVER** crimp detonators by any means except a cap crimper designed for the purpose.
- **NEVER** attempt to remove a detonator from the fuse it is crimped to.

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LIGHTING SAFETY FUSE

- Step 1: Make sure you can reach a safe location after lighting with sufficient time before initiation.
- Step 2: Place sufficient stemming over the explosive material to protect it from fuse-generated heat and sparks.
- Step 3: Have a partner before lighting the fuse. One person should light the fuse, and the other should time and monitor the burn.
- Step 4: Light the safety fuse, using a specially designed lighter.
- **Single-fuse** ignition – hot wire lighters, pull-wire lighters or thermalite connectors.
- **Multiple-fuse** ignition – ignited cord with thermalite connectors.
- **ALWAYS** light fuse with a fuse lighter designed for the purpose.
- **ALWAYS** use the "buddy system" when lighting safety fuse – one lights the fuse, the other times and monitors.
- **NEVER** light fuse until sufficient stemming has been placed over the explosive to prevent sparks from coming into contact with the explosive.
- **NEVER hold explosives** in the hands when lighting fuse.
- **NEVER drop** or load a primer with a lighted safety fuse **into a borehole**.
- **NEVER** use a safety fuse in agricultural blasting.
- **NEVER** use **matches, cigarette lighters, cigarettes, pipes, cigars, carbide lamps**, or other **unsafe means to ignite safety fuse.**

Warning Failure to follow Mine Safety Plan or Manufacturers 40

USING EXPLOSIVE MATERIALS: AFTER-BLAST PROCEDURES DISPOSAL OF EXPLOSIVE MATERIALS

- **ALWAYS** Treat **deteriorated or damaged** explosive materials with **special care.** They may be more hazardous than explosives materials in good condition.
- **ALWAYS** dispose of explosive materials using **proper methods.** Check with your supervisor or the manufacturer. If the manufacturer is not known, check with an IME member company listed in the front of this booklet.
- **NEVER reuse** any explosive material packaging.
- **NEVER burn** explosive materials packaging in a confined space.

Warning Failure to follow Mine Safety Plan or Manufacturers 41

MISFIRES

- **ALWAYS** wait at least 30 minutes with fuse detonator misfires and at least 15 minutes with electric and other nonelectric detonator misfires, unless the manufacturer recommends otherwise, before returning to the blast area. Comply with federal, state and local laws and regulations.
- **ALWAYS** shunt the **bare** wires of a misfired electric detonator by twisting them together and **taping** them to the metal shell to protect against extraneous sources of electrical energy.
- **NEVER drill, bore, or pick out** any explosive materials that have been misfired. Misfires should **only** be handled by a competent experienced person knowledgeable of the blast design, including the location and type of all explosive materials.

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BLAST-GENERATED FUMES

- **ALWAYS** assume toxic fumes are present from all blasts or burning explosive materials and stay away until they have dissipated.
- **ALWAYS** comply with applicable federal, state and local laws and regulations for safe fume levels before returning to blast area.

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REDUCING POST-BLAST FUME HAZARD

- **ALWAYS** use the largest diameter cartridge that fits the job.
- **ALWAYS** use water resistant explosive materials in wet conditions, and fire the blast as soon as practicable after loading.
- **ALWAYS** spray the muckpile with water in accordance with federal, stat and local laws and regulations.
- **ALWAYS** avoid conditions that might cause explosive materials to burn rather than detonate.
- **NEVER** use explosive materials that appear deteriorated or damaged.
- **NEVER** use more explosive material than necessary.
- **NEVER** add combustible materials to the explosive material load.
- **NEVER** use combustible materials for stemming.

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USING EXPLOSIVE MATERIALS: SEISMIC PROSPECTING

- **ALWAYS** secure explosive material at a safe depth in the borehole. Use shot anchors when needed.
- **ALWAYS** secure any casing that might blow out of the borehole.
- **ALWAYS** place the detonator and/or primer near the top of the explosive column, in the side or in the cap well of one of the top two cartridges.
- **NEVER** approach explosive material thrown out of the borehole by an explosion until you are sure that it is not burning
- **NEVER** drop a seismic charge containing the primer cartridge.

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DESTRUCTION OF COMMERCIAL EXPLOSIVE MATERIALS"

- " At times it may be necessary to destroy commercial explosive materials. These may consist of explosives or blasting agents from containers, which have been broken during transportation or may be materials that have exceeded their recommended shelf life or are believed to be overage or are no longer needed.
- Due to the many developments in explosive technology over the past few years the appearance and characteristics of products have undergone marked changes. To be sure that you are familiar with the prosperities of the product that you plan to destroy, the manufacturer of that product should be consulted for the most current product information and the recommended method of disposal and/or destruction.
- The member companies of the Institute of Makers of Explosives have agreed to supply advice or assistance in destroying explosives. If the manufacturer is known, seek his assistance. If the manufacturer is not known, a member company of the Institute of Makers of Explosives will provide advice or assistance.
- The above policy of IME member companies related only to commercial explosive materials. It does not include handling improvised explosive devices or bombs, military ordinance, military explosives or homemade explosive materials.
- IME member companies also cannot become involved in destroying explosive materials which have been used for illegal purposes are reportedly stolen property or are considered as evidence in any potential civil litigation or criminal prosecution.

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THE END

{Disclaimer this is for training ONLY ACTUAL SITUATIONS AND SAFETY INSTRUCTIONS WILL CHANGE ALWAYS CONSULT Mine Safety Plan, Site Specific Plan and your employers instructions on explosives. ALWAYS FOLLOW THE EXPLOSIVES MANUFACTURER INSTRUCTIONS AND WARNINGS] we are not responsible for contents of this material for educational purposes only.,

[By use of this material you consent to indemnification of us under any circumstances and hold us harmless for any accidents or any circumstances.]

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Donning Instructions for MSA W-65 Filter Self Rescuer

If the protective boot is covering the device, remove it.

Release the locking device by pressing the thumb under the red release lever and pushing up ...

... until Tamper Evident Seal is broken.

Grip the red release lever between thumb and forefinger and pull up hard. This should break the seal and release the locking mechanism to loosen the cover.

Remove the cover from the container and discard it.

Grip the head harness of the respirator, and pull the respirator out of the container. *(If the container is dented, preventing release, see step 14.)* Discard container.

Pull the noseclip away from the mouthpiece.

Insert mouthpiece lugs into mouth bite the lugs firmly.

Close the lips tightly around the mouthpiece. A tight seal must be maintained throughout escape to safety.

Pull the pads of the noseclip apart and position pads over the nostrils.

When released, the pressure of the pads seal the nasal passage.

Take off headgear and pull harness over head. Put lower strap behind the head, and upper band above the forehead as shown. The head harness will support the weight of the respirator.

Replace headgear. Be sure not to dislodge the head harness.
The Self-Rescuer is now ready for use. Breathing through the device is obviously somewhat more difficult than breathing under normal conditions. This will become more apparent under extreme exertion. Therefore, when escaping, keep calm and avoid exerting yourself too much. If possible, rest for short periods.

Before going underground, every miner should examine his Self-Rescuer for any external damage.
If the container is dented, it may not be possible to remove the respirator from the container. In this case, the wearer can still breathe with the filter and the inner wall in the container. The space between the filter and the inner wall is large enough to allow normal breathing. Because of the greater weight, it would be advisable to ease the load on the teeth and jaw by supporting the container with one hand.

Inspection

The Self-Rescuer should be periodically checked for air tightness by immersing it in warm water and looking for escaping air bubbles as you would check an inner tube for a leak. Another method is to weigh the apparatus periodically. The weight-as-shipped, which includes the metal name plate weight, is indicated in grams on the bottom of each unit; any leakage will result in heavier weight due to moisture absorption. An increase of up to 10 grams is considered acceptable. If the weight increase more than that, dispose of unit.

Also check each Self-Rescuer periodically for dents, and damage to seals.

Approvals

The Self-Rescuer Respirator W65 is approved by the Mine Safety and Health Administration and the National Institute of Occupational Safety and Health (Approval No. TC-14G-82) for self-rescue from carbon monoxide. (Previously assigned Bureau Approval No. 14F-76.)

Service life

The Self-Rescuer exceeds government-specified (NIOSH/MSHA) service-life requirements of 60 minutes against 1% carbon monoxide in air.

Discard the W65 Self-Rescuer if it has been used or the seals are broken. Replace with a new factory-sealed unit.

MSA
The Safety Company

Corporate Headquarters
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U.S. Customer Service Center
Phone: 1-800-MSA-2222
Fax: 1-800-967-0398

10 2711-82-MFG / Mar 2001

HEALTH & SAFETY DAILY CHECKLIST

SITE: _____

DATE: _____ HEALTH/SAFETY OFFICER: _____

	YES	NO	N/A
1. Copy of H & S Plan at site			
2. H/S Safety Plan signed by all personnel			
3. Copy of H/S Plan given to contractors			
4. Designated H/S Officer present			
5. Documented fit testing on all personnel			
6. Personnel issued correct respirator size			
7. Documented 40 hr. training on all personnel			
8. Fit for Duty forms on all personnel			
9. MSDS available:			
a. Spilled/hazardous chemicals			
b. Neutralizing/containment chemicals			
c. Decon solutions			
10. Compatibility charts on all available PPE			
11. Workers dressed in specified PPE:			
a. _____			
b. _____			
c. _____			
d. _____			
12. Clearly Designated Zones:			
a. Support			
b. Contamination reduction			
c. Exclusion			
13. Personnel suiting up in Support Zone			
14. No eating/smoking in Exclusion Zone			
15. Newly assigned personnel requiring briefing: _____			
16. New H/S Hazards: _____			
17. Amendments made to H/S Plan			

	YES	NO	N/A
18. Emergency phone numbers posted			
19. Emergency route to hospital posted			
20. H/S Supplies present and functional			
a. Cascade System			
b. Fire extinguisher			
c. Emergency eye wash/decon source			
d. First Aid supplies			
e. _____			
f. _____			
g. _____			
h. _____			
21. Monitoring equipment calibrated/records available:			
_____			
_____			
_____			
22. Responsible personnel know how to operate monitoring equipment			
23. Environmental/Personnel monitoring performed			
a. Work begins on a different portion of site			
b. New contaminants are being handled			
c. Different type of operation is initiated			
d. Leaking containers are being handled			
e. Work is conducted in areas with liquid cont.			
24. Decon conducted according to H/S Plan.			
a. Equipment available			
b. Decon solution/available			
c. Decon area clearly laid out			
d. Gross Decon			
e. Boot Wash/Rinse			
f. Glove Wash/Rinse			
g. Decon procedures enforced breaks/lunch/end of day			
h. Water source available			
i. Drums/containers for dirty Decon water/solution			
j Clean/dirty water storage areas segregated			
25. Heat stress provisions/plan in place			
a. Resting stations			
b. Fluids			
c. Monitoring equipment			
26. Accident report completed for every accident/injury			
27. Heavy equipment operated IAW H/S Plan			
28. Daily Health/Safety Meeting conducted and documented			
29. Comments:			
_____			
_____			
_____			
_____			