NEW MINERS

DEEP METAL/NONMETAL

INTRODUCTION TO THE WORK ENVIRONMENT

1981

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DEEP METAL/NONMETAL

COURSE PLAN: INTRODUCTION TO THE WORK ENVIRONMENT

I. GOAL: The goal of this module is to enable the miner to understand the components of the work environment and the procedures necessary to maintain a safe and healthful environment.

II. BACKGROUND: In 1979 there was a total of 5,501 accidents in deep metal/nonmetal underground mines, 2,429 resulting in personal injury and days lost from work, and 29 resulting in death. This module presents important information introducing miners to operations and hazards.

III. OBJECTIVES:

A. Trainer will do the following:

1. Explain the operations and processes of mining used in obtaining, transporting and processing ore at the facility, and the procedures for ground control.
2. Explain of hazards particular to the specific operations and processes used and safety precautions to be taken.
3. Describe equipment used and explanation of the function of each piece of equipment.
4. Discuss company safety policy and rule book.
5. Present a general description of the mine and the components of it. Conduct a tour showing locations of various components, both surface and underground with an emphasis on emergency equipment and first aid facilities. Describe and point out method of mining used.

B. Trainees will be able to do the following:

1. Describe operations and processes employed in the mine. Given terms used the miner should state what each means.
2. Identify hazards involved in operations and processes of the mine. Describe appropriate safety precautions.
3. State name of equipment and explain its functions either on site or when given pictures or drawings.
4. Describe steps of obtaining, transporting and processing ore at the particular mine.
5. State company safety policy pertaining to any given operation trainees will be assigned to do.
6. When presented with terms used to describe components of the mine, the miners should state the general functions of the components. Trainees should be able to indicate the location of various facilities in the mine.

IV. ACTIVITIES:

A. Instructor completes questions asked in mine specific introduction (to be found at end of course plan).

B. On site

1. Tour of mine and surface facilities
2. Use checkin-checkout station
3. Locate emergency equipment and first aid station
4. Other activities associated with other courses

V. MATERIALS:

A. Visual aids

1. Mine map
2. Diagrams of mine processing steps
3. Photos, slides, etc. of equipment used in mine

B. Simulations or actual objects: Equipment used in mine

VI. EVALUATION

A. Demonstrate, describe, or identify:

1. Mining method and major equipment used
2. Steps of mining process
3. Locations of first aid and emergency equipment

B. Self-Checks

1. Anytime hands on evaluation such as operating equipment or walking prescribed routes is possible it should be used.
2. Eliminate the use of self-checks if too difficult for your class.
3. Change written self-check items where necessary to fit your local mine situation.

VII. RESOURCES:

A. Training standards: CFR 30 Part 48.5-4

B. Textual materials: Company safety policy and rule book

C. Applicable MSHA fatalgrams.

TOPICS COVERED

I. MINING METHOD

A. Reaching the ore body

1. Shaft
2. Slope or incline
3. Outcrop or drift
4. Portal entries

B. Extracting ore

1. Room and pillar
2. Stopes
3. Raises
4. Block caving

C. Ground control

1. Timber
2. Rock bolts and split sets
3. Concrete and shotcrete

D. Haulage

1. Rubber tired
2. Track

E. Processing facilities

1. Grizzly and crusher
2. Mills

II. MINING HAZARDS AND ACCIDENT PREVENTION

A. Unsafe conditions

1. Ground hazards
2. Electrical hazards
3. Gas hazards
4. Explosives and fuel hazards

B. Unsafe acts

1. Taking risks in operating or maintaining equipment
2. Bending and lifting
3. Slips and falls

III. MINING EQUIPMENT AND THEIR FUNCTIONS

A. Equipment for reaching the ore body

1. Hoist
2. Boss buggy
3. Man trip
4. Walking

B. Equipment for extracting ore

1. Stoper drill
2. Jack-leg drill
3. Jumbos
4. Muckers

C. Equipment for ground control

1. Stoper drill
2. Jack-leg drill
3. Jumbo drill
4. Rock bolts and split sets
5. Timbers

D. Equipment for haulage

1. LHD
2. Slusher
3. Muckers
4. Youngbuggies
5. Locomotives and ore cars
6. Skip

IV. COMPANY SAFETY POLICY AND RULE BOOK

A. Management commitment to safety
B. Safety rules

V. MINE TOUR

A. Locations of mine portals
B. Methods and equipment for extracting ore
C. Methods and equipment for ground control
D. Methods and equipment for haulage of ore
E. Grizzly, crusher, and other ore processing done at the mine.
F. Escapeways, hazards, refuge centers, and first aid.
G. Check-in and check-out station

MINE SPECIFIC INTRODUCTION

INTRODUCTION TO THE WORK ENVIRONMENT

INSTRUCTOR'S NOTE: THIS OUTLINE CAN BE USED ALONG WITH THE COURSE PLAN AND LESSON GUIDE AND MATERIALS TO PROVIDE A THOROUGH AND SPECIFIC INTRODUCTION TO YOUR PARTICULAR MINE. THIS OUTLINE CONSISTS OF A SERIES OF QUESTIONS ON DIFFERENT TOPICS THAT WOULD BE OF MOST CONCERN AND INTEREST TO THE MINERS. AS YOU READ THROUGH THEM YOU CAN WRITE-IN A SHORT ANSWER TO EACH QUESTION. THEN WHEN YOU ARE PRESENTING THESE MATERIALS TO YOUR CLASS YOU CAN READ THE QUESTION AND THEIR ANSWERS. FOLLOW-UP BY ASKING THE CLASS IF THEY HAVE ANY OTHER QUESTIONS YOU CAN HELP THEM WITH.

1. How long has the mine been in operation?

2. What is the product mined and how is it used? (e.g. salt is used for food preparation or in highway maintenance during the winter). How "pure" is the deposit in terms of any waste materials also contained in it?

3. How large is the surface area of the mine (in acres)?

4. How deep is the mine? How many underground levels are there?

5. What is the size of the deposit being mined? How was the deposit originally formed?

6. What is the life expectancy of the mine (that is, how long will it continue to operate at its current production rate)? Are there any plans for expanding the size of the mine?

7. How many employees work at the mine? How many shifts are there and what are their working hours?

8. How many pieces of powered haulage or machinery does the mine run?

9. In general terms, what is the safety philosophy and the safety record of the mine?

10. What will happen to the underground workings when the mine closes down?

DEEP METAL/NONMETAL

LESSON GUIDE AND MATERIALS: INTRODUCTION TO THE WORK ENVIRONMENT

I. MINING METHODS

A. Geology of the deposit

INSTRUCTOR NOTE: AS AN AID IN FITTING THIS INTRODUCTION TO YOUR MINE YOU CAN USE THE "MINE SPECIFIC INTRODUCTION" TO START OFF YOUR LECTURE. YOU MAY ALSO WANT TO REVIEW THE FOLLOWING AREAS WITH THE MINE GEOLOGIST TO CLARIFY ANY QUESTIONS YOU MAY HAVE ABOUT THE GEOLOGY AT YOUR MINE. THE GEOLOGIST MAY BE WILLING TO COME AND SPEAK TO YOUR CLASS.

1. Concentrations and types of minerals in the deposit and contents of waste material after the product is removed.

2. Formation of the deposit

3. Location of the deposit

VISUAL NOTE: USE VISUAL 39 AS A HANDOUT FOR TRAINEES OR HAVE IT MADE INTO A TRANSPARENCY FOR USE ON AN OVERHEAD PROJECTOR, OR DO BOTH FOR AN EFFECTIVE PRESENTATION. IT IS INTENDED TO BE USED AS AN INTRODUCTION TO MINE TERMINOLOGY. THE 3-DIMENSIONAL ASPECT WILL AID TRAINEES IN DEVELOPING A CONCEPT OF THE UNDERGROUND AND SURFACE FEATURES OF MOST MINES. ORE REMOVAL AND VENTILATION CAN BE MORE EASILY EXPLAINED TO THE NEW TRAINEE WITH A VISUAL AID, SUCH AS VISUAL 39.

B. Reaching the ore body can be accomplished by several methods. The method used at the mine depends upon the location of the ore body underground and the size of the mine.

INSTRUCTOR'S NOTE: ALTHOUGH ONLY ONE OR TWO OF THE FOLLOWING METHODS OF REACHING THE ORE BODY PERTAIN TO YOUR MINE, YOU MAY WANT TO MENTION THE OTHERS SO THE TRAINEES ARE AT LEAST AWARE OF THEM.

1. A vertical shaft is one way to reach the ore body. This tunnel runs from the surface, or is directly accessible from the surface, to most underground levels. The shaft transports miners and machin-

ery into and out of the mine on a cage. A skip is used to haul ore out of the mine.

2. A slope or incline is a tunnel cut through rock that leads downward to reach the ore body. Although the grade of the slope may be steep at points, it always allows safe access for miners and machinery. Ore is hauled out of the mine by rubber tired or track haulage.

3. Ores found on the rock surface are called outcrops. Mining begins on the ore body at the outcrop, and follows it underground. The underground tunnel is called a drift. Miners and machinery move into and out of the mine along the drift. Ore is hauled out of the mine by rubber tired or track haulage or by conveyor belts.

4. Moving from the surface to underground means passing through an opening or entrace to the mine called a portal, portal entry or adit. Every underground mine has at least one portal, but larger mines may have several portals. Portals are assigned names or numbers to identify them.

C. Extracting ore is achieved by different kinds of mine development. The method of ore extraction used at the mine depends on the structure of the ore body.

INSTRUCTOR'S NOTE: TO INCREASE RETENTION OF MINE TERMINOLOGY & ADD VARIETY TO YOUR CLASS, PASS OUT THE MINE MAP CROSSWORD. AS AN IN-CLASS EXERCISE HAVE TRAINEES FILL IN THE PUZZLE IN GROUPS OF 3 OR 4.

VISUAL'S NOTE: YOU MAY WANT TO SHOW AN ILLUSTRATION DISPLAYING THE METHOD(S) OF EXTRACTING ORE USED AT YOUR MINE. THE ILLUSTRATION IS INTENDED TO BE AS SIMPLE AS POSSIBLE TO CONVEY THE GENERAL CONCEPT. YOU WILL NEED TO DEVELOP YOUR OWN ILLUSTRATIONS HERE IN ORDER TO TAILOR THESE MATERIALS TO YOUR MINE.

1. Room and pillar extraction occurs with a flat-lying body of ore. The mined areas are rooms which are separated by pillars of approximately equal size. Pillars contribute some support to the roof.

2. Stopes are underground excavations made by extracting ore. Stopes may be considered the workshop of the mine because they are major production sites. After the ore is mined out, stopes resemble caverns in the rock. The more common stope methods include the following:

   a. Cut-and-fill stope permit breaking the ore material, taking it away and replacing it with backfill. The backfill is usually brought down a raise from the level above. Planks are laid on top of the fill, and then another slice of ore is blasted down on top of the planks. The ore is loaded off the planks into chutes.

b. Shrinkage stope begins with enough ore being hauled out to allow working space in the stope for the next layer to be drilled and blasted. About one-third of the broken ore is hauled out, so that once a stope is started continuous production can be maintained. Backfill is seldom attempted.

c. Other stoping methods include sublevel stopes, open-stope mining in gently dipping veins, slice timbered stope, and top-slice stoping.

3. A raise is an underground opening driven upward through the rock from one level to another. Raises may be developed for exploration, to service a stope, to serve as ore passes or escapeways. There are a variety of methods of mining raises, including timber sets, stulls, and mechanical raise-climbing machines.

4. Block caving is used with ores that readily cave or collapse under its own weight, and the ore body contains sufficient tonnage.

   a. Caving is a large-production low-cost method.

   b. An opening is created above finger raises and then blasted. Systematic drawing of ore from the raises pulls ore away from the back of the stope, causing the back to crack and fall to the pile of broken ore. Because the ore increases in volume when broken, the broken ore fills up to the back, which in turn gives support to the back and stops the caving.

   c. Fingers must be carefully drawn to insure even caving action and to prevent overlying waste from coming through the fingers before all the ore is pulled out.

D. The purpose of ground control is to provide a safe work place by supporting the back and ribs to prevent unintentional rock falls. The need for ground control measures in underground non-coal mines varies widely from mine to mine. Geological conditions, mining methods and the skill of the miners themselves are the primary determinants of the need for ground control.

INSTRUCTOR'S NOTE: METHOD OF GROUND CONTROL ARE MORE THOROUGHLY DISCUSSED IN THE MATERIALS ON GROUND CONTROL. YOU MAY WANT TO USE VISUALS FROM THOSE MATERIALS TO SUPPLEMENT THIS DISCUSSION.

1. Timbering is known as the conventional method of ground control. Timber serves both temporary and permanent support of the back. One hazard with timbers is that it is a fuel for underground fires.

2. Rock bolts and split sets are metal supports inserted in holes drilled into the back and ribs. Bearing plates, wire matting, and trusses are used to distribute the weight of the back on one or more supports.

3. Concrete and shotcrete provide support and keep moisture from the rock. They are used in and around drifts, draw points, and ore passes. They are only infrequently used in various parts of the underground workings.

E. Haulage or transportation of ore is done with a variety of rubber tired and track haulage machinery, as well as conveyors.

1. Rubber tired haulage equipment includes muckers and youngbuggys as well as haulage trucks which may be bottom dumps or rear dumps.

2. Track haulage equipment includes ore cars and diesel, electric, or battery operated locomotives.

3. Conveyors are sometimes used if ore is being moved long distances through the mine. They must be regularly inspected and maintained to assure their safe operation.

F. Ore goes through several stages in processing in order to obtain particular minerals. Equipment used in these stages are located at the mine or at the mill.

1. A grizzly is a steel grating placed over an ore pass or chute to stop overly large rocks from passing through. A miner uses a pick or sledge hammer to break up the rock. A crusher is a machine for crushing rock into small gravel.

2. Processing facilities located in mills are used for the recovery of valuable metals, or concentration of the valuable minerals into a smaller bulk for shipment to a smelter or other reduction works.

EVALUATION NOTE: HAVE TRAINEES ANSWER SELF-CHECK NUMBER ONE INDIVIDUALLY OR IN GROUPS OF THREE OR FOUR. REVIEW CORRECT RESPONSES AND CLARIFY INCORRECT ANSWERS. THESE QUESTIONS CONCERN ALL PHASES OF MINING METHODS.

YOU MAY WISH TO USE THE MINE MAP CROSSWORD AS A TAKE HOME ASSIGNMENT OR AS AN IN-CLASS EXERCISE FOR REVIEW OF MINING TERMINOLOGY. IF USED AFTER LUNCH OR IN THE LATE AFTERNOON IT COULD BE USED TO EFFECTIVELY FIGHT CLASSROOM FATIGUE. IF YOU WISH, YOU CAN INCLUDE THIS PUZZLE AS PART OF SELF CHECK 1.

II. MINING HAZARDS AND ACCIDENT PREVENTION

A. Unsafe conditions can cause accidents. These are conditions not under the direct control of miners. However, good accident prevention procedures, such as work place inspection and equipment maintenance, can minimize unsafe conditions. The following are common unsafe conditions.

1. Ground hazards include falls of back or rib.

2. Electrical hazards include faulty insulation, splices, and grounding.

3. Gas hazards include fumes from diesel-powered equipment, fires, batteries and blasting.

4. Hazards with explosives and fuels are always present but are minimized through safe work practices. Transportation of explosives and diesel fuel require additional care.

INSTRUCTOR'S NOTE: ALTHOUGH THESE UNSAFE CONDITIONS ARE MORE THOROUGHLY DISCUSSED IN OTHER MODULES, YOU MAY WANT TO ELABORATE MORE ON THEM NOW, AND USE VISUALS FROM THOSE SECTIONS TO AID YOUR LECTURE.

B. Unsafe acts are usually the result of taking unnecessary risks and/or trying to take short cuts in proven safe work procedures. Your motivation to work safely will reduce the likelihood for accidents and injury by minimizing unsafe acts.

1. Taking risks in operating or maintaining equipment means that it is only a matter of time before an accident occurs. Always drive safely. Use your seat belt. Do not give rides in buckets or other areas not intended for transportation.

2. Much of a miner's work involves bending and lifting. Always follow safe procedures by bending your knees and using them, rather than your back, to lift. If the load is too heavy or awkward get help. Avoid lifting while your body is twisted or turned. Remember to use tall enough ladders, reach safely, and avoid lifting heavy items overhead.

VISUALS NOTE 1 and 2: SHOW THE ILLUSTRATION DISPLAYING CORRECT PROCEDURES FOR LIFTING AND CARRYING LOADS.

3. Wet or oily surfaces, protruding objects, or inattention can cause slips and falls.

III. MINING EQUIPMENT AND THEIR FUNCTIONS

INSTRUCTOR'S NOTE: THE FOLLOWING KINDS OF MINING EQUIPMENT ARE ORGANIZED ACCORDING TO THEIR FUNCTION. BRIEFLY DESCRIBE THOSE KINDS OF EQUIPMENT USED AT YOUR MINE.

A. Equipment for reaching the ore body

1. Hoist or cage
2. Boss buggy
3. Man trip or truck
4. Walking

B. Equipment for extracting ore

1. Stoper drill
2. Jack-leg drill
3. Jumbos
4. Muckers
5. Explosives

C. Equipment for ground control

1. Stoper drill
2. Jack-leg drill
3. Jumbo drill
4. Rock bolts and split sets
5. Timbers

D. Equipment for haulage

1. LHD
2. Slusher
3. Loaders
4. Youngbuggies
5. Skip
6. Locomotive and ore cars
7. Conveyors

IV. COMPANY SAFETY POLICY AND RULE BOOK

INSTRUCTOR'S NOTE: YOU SHOULD PREPARE A DISCUSSION OF THE MINE'S SAFETY POLICY. YOU WILL ALSO NEED COPIES OF THE MINE'S SAFETY RULE BOOK FOR DISTRIBUTION TO STUDENTS, IF AVAILABLE.

A. Management is committed to safety. Unsafe conditions should be reported to supervision. Unsafe acts should be corrected by the miner or reported to supervision.

B. The miner is responsible for himself and for other miners. Safety rules were developed for the welfare of everyone and should always be observed.

V. CHECK-IN AND CHECK-OUT STATION AND PROCEDURES.

INSTRUCTOR'S NOTE: MATERIAL IN THIS SECTION IS MORE THOROUGHLY DISCUSSED IN THE MODULE ON ENTERING AND LEAVING THE MINE.

A. Location of the check-in and check-out board at the mine.

B. Procedures for check-in and check-out.

1. When entering the mine, check-in by placing brass tag on hook. When checking out of the mine, remove brass tag from hook.

2. Check-in and check-out procedures are used as a record of all personnel and visitors in the mines at any time. This information is essential in the event of a mine emergency.

EVALUATION NOTE: HAVE TRAINEES ANSWER SELF-CHECK NUMBER TWO. TRAINEES MAY ANSWER QUESTIONS INDIVIDUALLY OR IN GROUPS OF THREE OR FOUR. REVIEW CORRECT ANSWERS AND CLARIFY INCORRECT ANSWERS. THESE QUESTIONS CONCERN MINING HAZARDS, MINING EQUIPMENT, THE COMPANY SAFETY POLICY, AND CHECK-IN AND CHECK-OUT PROCEDURES.

VI. MINE TOUR

INSTRUCTOR'S NOTE: THE TOUR OR WALK-THROUGH OF YOUR MINE CAN BE CONDUCTED IN CONJUNCTION WITH THIS TRAINING MODULE, OR AS A SEPARATE TRAINING EXERCISE. THE FOLLOWING MATERIALS ARE INTENDED TO COVER ALL ASPECTS OF THE TOUR REGARDLESS OF HOW IT IS ORGANIZED. THESE MATERIALS LIST EQUIPMENT AND LOCATIONS YOU SHOULD POINT OUT TO YOUR TRAINEES.

VISUALS NOTE: JUST PRIOR TO THE MINE TOUR, YOU SHOULD SHOW THE TRAINEES YOUR EXPECTED ROUTE OF TRAVEL ON THE MINE MAP. THIS WILL AID IN THEIR ORIENTATION TO THE LAYOUT OF THE MINE AND TO THE LOCATIONS OF UNDERGROUND FACILITIES.

A. Location of the mine portal, hoist, and skip.
B. Methods and equipment of extracting ore.
C. Methods and equipment for ground control.
D. Methods and equipment for haulage of ore.
E. Grizzly, crusher, and other ore processing done at the mine.
F. Escapeways, refuge centers, dinnerhole, and first aid stations. Abandoned work areas. Hazardous areas due to poor ventilation, ground control, or other conditions.
G. Check-in and check-out station.

EVALUATION NOTE: HAVE TRAINEES ANSWER SELF CHECK NUMBER THREE INDIVIDUALLY OR IN GROUPS OF THREE OR FOUR. REVIEW RESPONSES AND CLARIFY INCORRECT ANSWERS. THESE QUESTIONS CONCERN THE MINE TOUR AND THE INSTRUCTOR IS RESPONSIBLE FOR DEVELOPING SELF CHECK #3 SPECIFIC TO HIS/HER MINE. SUGGESTIONS APPEAR LATER IN THIS MODULE.

SELF CHECK #1 SOLUTIONS

1. Answers will vary
2. Answers will vary.
3. Geologic conditions, mining methods, and skill of the miners.
4. Timbering, rock bolts, and concrete or shotcrete
5. False
6. Answers will vary.

SELF CHECK #2 SOLUTION

1. Possible answers might include ground hazards, electrical hazards, bad weather, gas hazards, explosives, and fuel hazards.
2. Accident
3. Possible answer: One foot to the side, one foot behind, back straight, chin tucked in, grasp object with whole hand, and lift.
4. a. IV.
   b. II.
   c. IV.
   d. I.
   e. III.
   f. III.
   g. I.
   h. IV.
5. True

SELF CHECK #1: MINING METHODS

1. Name and describe the method(s) of extracting ore most often used at your mine.

2. What types of machinery are used to extract and remove ore from your mine?

3. The need for ground control in your mine is determined primarily by _____, _____, and _____.

4. Name 3 common methods of ground control.

5. A grizzly is the name for a machine which crushes rock into small gravel. (True, False)

6. When working around a grizzly a miner: (Circle answers appropriate to your mine.)

   a. Uses a pick or sledge hammer.

   b. Wears a restraining belt.

   c. Works only when the crusher is off.

   d. Always wears a hardhat.

   e. Remains alert and safety conscious.

Self Check #2 Mining Hazards, Mining Equipment, Safety Policies, and Check-in and Check-out Procedures.

1. Name 4 unsafe conditions that can be minimized by work place conditions and equipment maintenance.

   a.

   b.

   c.

   d.

2. Taking unnecessary risks or short cuts in proven safe work procedures means it is only a matter of time before an _____ occurs.

3. Describe the safe procedure for lifting heavy objects.

4. Are the following pieces of equipment for I. reaching the ore body, II. extracting ore, III. ground control, or IV. haulage?

   ___ a. conveyor

   ___ b. muckers

   ___ c. skip

   ___ d. hoist

   ___ e. rock bolts

   ___ f. timbers

   ___ g. man trip

   ___ h. locomotive and ore cars

5. The miner is responsible for himself and other miners. (true, false)

Suggestions for Self Check #3

1. Pass out unlabeled mine maps. Ask trainees to write in any locations you feel necessary for the health and safety of your miners. These locations should be listed at the bottom of the map or on the back. Possibilities include:

escapeways	guard shack
lunch room	parking lot
first aid stations	access roads
abandoned work areas	shop and yard areas
mine telephones	haulage roads and hazards
fuel and explosive depots	lube bay
power station	bathhouse

2. Ask miners to imagine themselves at a specific location in the mine. Direct them to tell how they would reach another specific location.

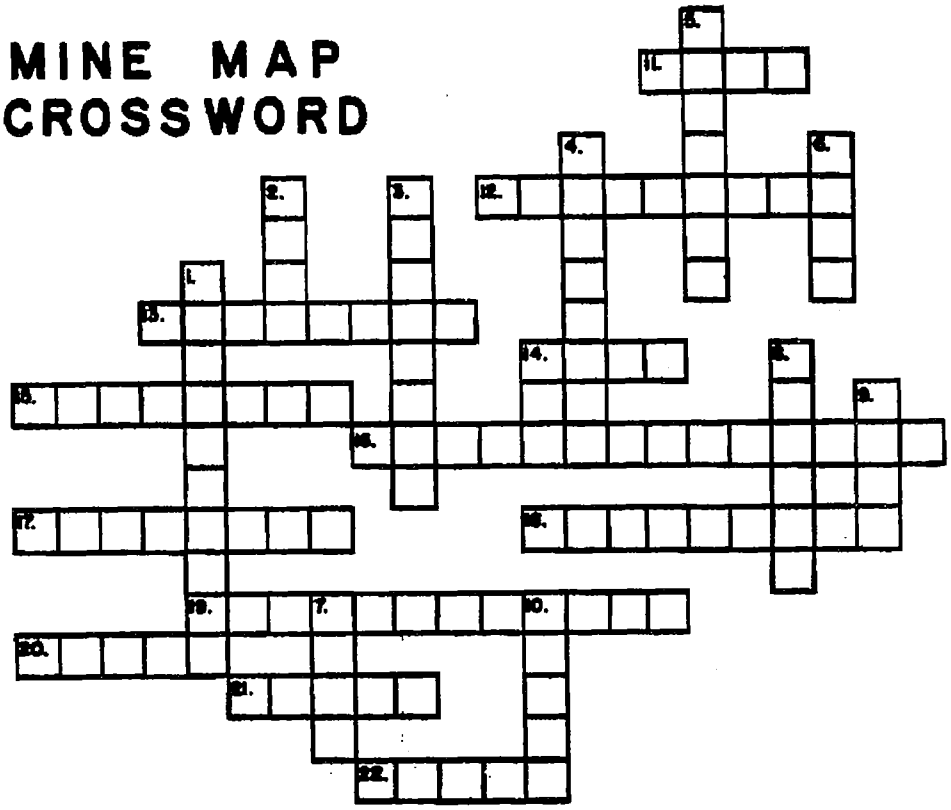
   Sample:

   A. You are at explosives depot A and smell fuel. Find the nearest telephone.
   B. You are on the main haulageroad and cut yourself badly on a broken thermos. Find the first aid station.
   C. Go from the power station to the repair shop.

3. Cite mine accidents, either actual or potential, and ask trainees to describe route to nearest help.

4. Have trainees verbally tell each other how to go from one location to another in your mine.

MINE MAP CROSSWORD



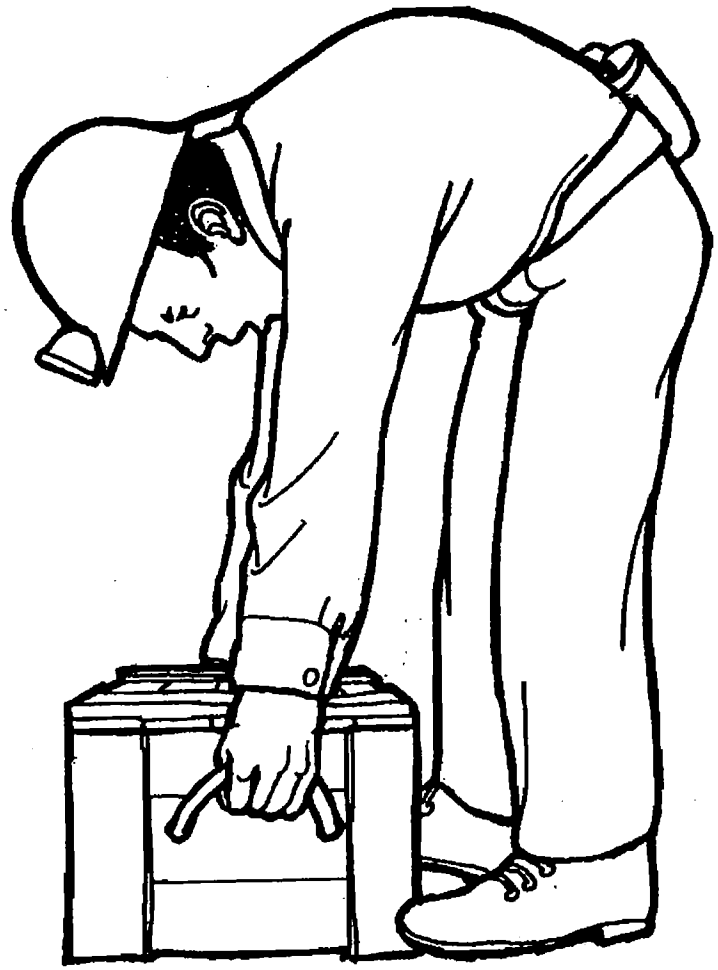
Down

1. Building which houses the machine used for raising and lowering the cage or skip.
2. A nearly horizontal passage from the surface through which a mine is entered.
3. An intermediate horizontal opening in a mine opened between main levels.
4. Waste sand or rock used to support the roof after removal of the ore from the stope.
5. The part of a rock formation that appears at the surface of the ground.
6. A zone or belt of mineralized rock lying within boundaries clearly separating it from neighboring rock.
7. A self dumping type of bucket used for hoisting ore or waste.
8. A passage into or out of a mine used as a footpath for workers.
9. The end of a adit, drift, crosscut, or stope where work is progressing or was last done.
10. A mine opening driven upward from a level to connect with another level.

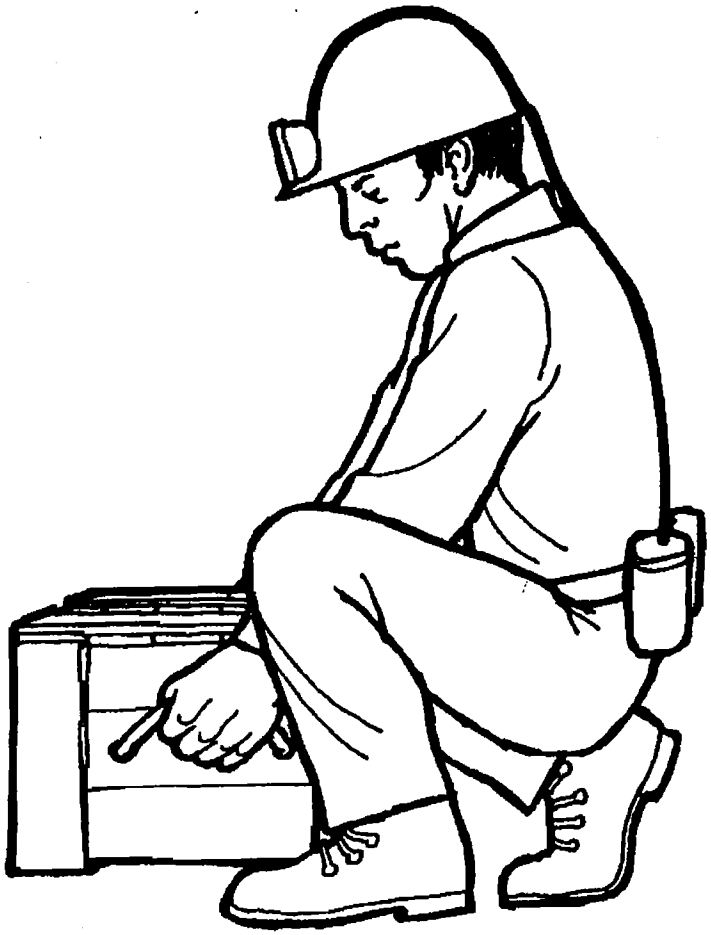
Across

11. An excavation to collect mine water for pumping to the surface.
12. Structure at the top of the shaft which houses all equipment used for hoisting.
13. The wall on the underside of an inclined vein or mine opening.
14. Processing plant that produces a concentrate of valuable minerals.
15. Horizontal mine opening driven across the direction of the main vein system.
16. A motor driven disc for blowing or exhausting air to provide ventilation of a mine.
17. A building where miners shower and change clothes.
18. Airtight walls built across older non-production areas.
19. Drift above haulage level where ore is removed by slusher.
20. A vertical or inclined opening built from the top down to the next lower level.
21. Horizontal underground passage that follows the direction of a vein or rock formation.
22. An excavation in a mine other than development workings, made for extracting ore.

PROPER LIFTING



NO



YES

VISUAL 1

IF THE LOAD IS TOO HEAVY:

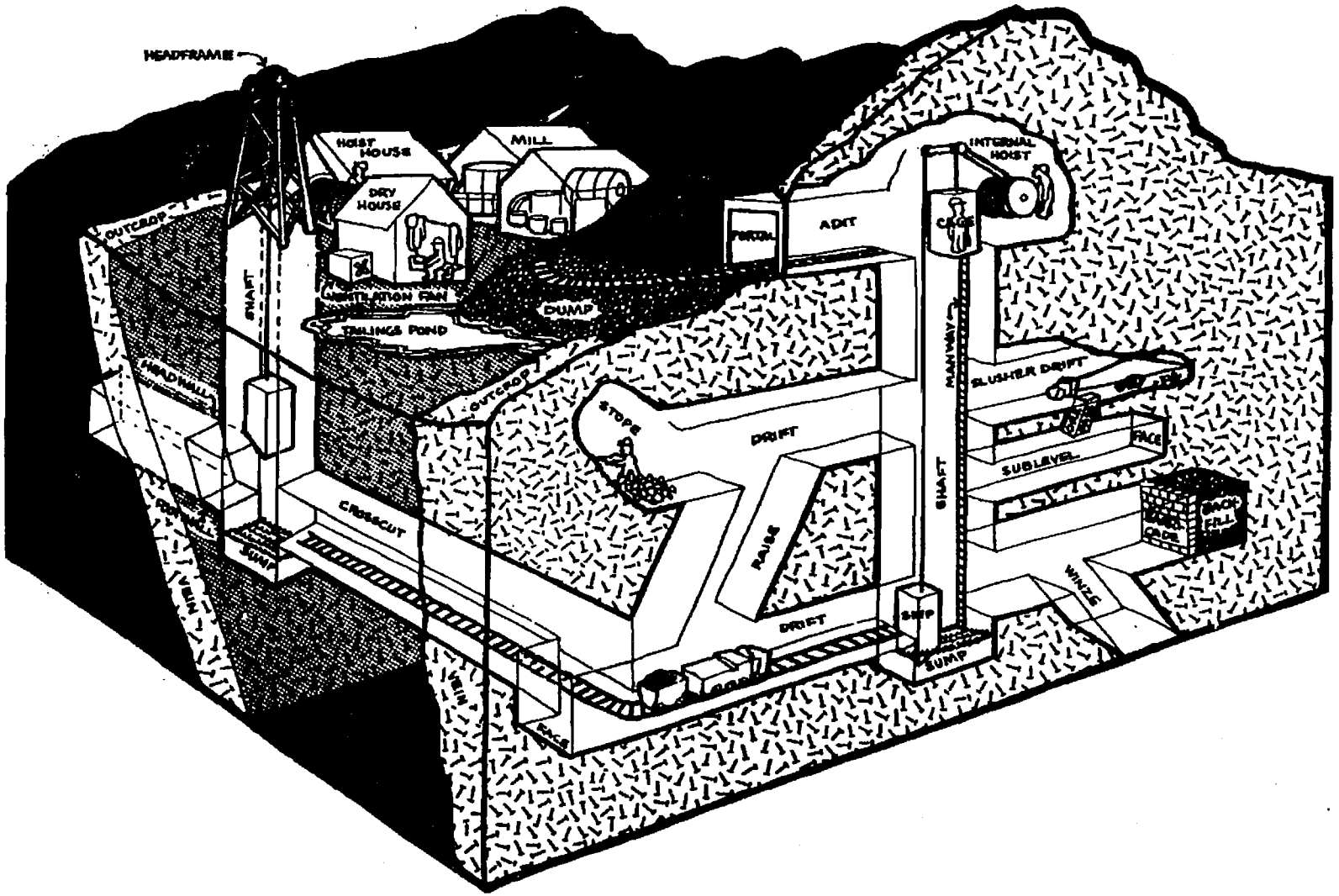
GET HELP! Both face in direction of travel.

LIFTING IN CONFINED AREAS

ON HANDS AND KNEES:

Lift object with one hand, balance with the other.

VISUAL 2


HEADFRAME
HOIST HOUSE
MILL
DRY HOUSE
INTERNAL HOIST
ADIT
CAGE
OUTCROP
SHAFT
VENTILATION FAN
DUMP
TAILINGS POND
MANWAY
SLUSHER DRIFT
STOPE
DRIFT
SUBLEVEL
FACE
CROSSCUT
RAISE
SHAFT
SUMP
VEIN
WINZE

VISUAL 39