

2001 COAL MINE RESCUE, FIRST AID AND BENCH RULES



SECTION I

MINE RESCUE

**2001 MINE RESCUE CONTEST RULES
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GENERAL INFORMATION FOR CONDUCTING 2001 MINE RESCUE CONTESTS

1. Mine rescue teams must be composed of persons who are bonafide employees of mining companies or persons who are designated or contracted by mining companies to fulfill the requirements of 30 CFR Part 49 mine rescue coverage.
2. All mine rescue teams must report to isolation at 6:30 a.m. on each day of their participation. The number of persons in isolation will be limited to eight uniformed team members.
3. Teams are required to bring with them a sufficient supply of materials and apparatus accessories.

Teams cannot expect recharging materials and facilities, apparatus parts, and accessories for the several types of apparatus to be made available at the contest site.

4. In mine rescue ties, B cards will be the first tie breaker; mine maps will be the second tie breaker; written examinations will be the third tie breaker; time cards will be the fourth tie breaker; and actual time to work the problem will be the fifth tie breaker.
5. Mine rescue teams shall be notified by posting when they may review their map and scorecards. Within one hour of posting, the team captain, team trainer, and map man shall report to a designated location. Teams will have 20 minutes to review and prepare any written protests. All protests will be considered by the Final Appeals Committee. Under no circumstance will video tape recordings or photographs be introduced as supplementary material for consideration by the Final Appeals Committee.
6. For a combination team, the three working First Aid team members and benchmen will be chosen from the registered mine rescue team members.

The final ranking of combination teams will be determined from a composite of the final day mine rescue scores, first aid team scores and benchman scores. In the event a team enters more than one first aid team or benchman, the final ranking will be determined by the team with the lowest score from each event. In the event of ties in the Combination Contest, the final Mine Rescue ranking will be the tie breaker.

RULES GOVERNING 2001 MINE RESCUE CONTESTS

1. Each team shall be composed of a minimum of seven persons (five working team members, a briefing officer, and a patient) and shall be limited to a maximum of eight persons. In the event of an emergency, the Contest Co-Director may exempt a team from the seven person minimum, and allow only the replacement of a patient. Each member shall wear a different number, from one to eight, on the arm, at or near the shoulder, with No. 1 assigned to the captain. Any means of affixing legible numbers on the sleeve of the uniform will be acceptable. After the clock is started only the five working members and the briefing officer will be permitted to do work.

Each team shall have a briefing officer. The briefing officer will accompany only one participating team and may assist that team with any of the functions normally performed on the surface or at the fresh-air base. Switching of team members including the briefing officer from one team to another is prohibited. The briefing officer will be stationed at the fresh-air base during the working of the problem and will be permitted to communicate with the team via telephone and may mark the briefing officer's map from information received from the team. The briefing officer's map will be identified by the Chief Judge and shall not be used for scoring purposes. All maps shall be turned in at the completion of the problem.

The briefing officer will remain at a designated location when the team is working in by the fresh-air base except when it is necessary to perform work outside that location in the fresh-air base. When required work is completed, the briefing officer must return to the designated location. Briefing officers meeting the physical requirements may substitute for any team member if so desired.

2. Each team shall provide its own breathing apparatus for each member of the team. A breathing apparatus approved for at least two hours shall be used in mine rescue contest problems. Other approved breathing apparatus may be used on patients. Each team member must wear safety boots, an MSHA approved protective hat and cap lamp, and members must be similarly dressed. During the working of the problem, the cap lamps may or may not be turned on. The wearing of self-rescuers is not required for Contest work. Each team member must have a metal identification tag attached to his/her belt.
3. Each team must have its own breathing apparatus approved under either Bureau of Mines Schedule 13 or Subpart H of Part 11, Title 30, Code of Federal Regulations. Any team that anticipates using a breathing apparatus not listed in the rules must provide, at the time of registration, written instructions outlining the proper donning procedures for such apparatus.

4. Gas testing devices used by teams shall be approved by MSHA, and only instruments which give an accurate reading for percent by volume or parts per million shall be used. Any team that anticipates using an instrument not listed in the rules shall provide, at the time of registration, written instructions outlining the proper procedures for checking and testing with such instruments.
5. Teams must assure themselves that before they report to the mine entrance or fresh-air base all apparatus are fully assembled, airtight, and ready to wear. Cylinder pressures must be within specifications of approval. Spare apparatus are not required to be tested as part of the equipment check at the fresh-air base. Full practice canisters or other acceptable canisters must be in place in the apparatus. Each team will be responsible for the proper removal of all waste material from the Fairground property (i.e. canisters or chemicals).
6. Teams shall be equipped with and use a portable mine rescue communications system approved by MSHA or a sound powered communication system. The wires or cable shall be of sufficient tensile strength to be used as a manual communication system. Teams may use standard signals if the communication system fails. Wireless communication systems may be used, provided they are designed and used in such a manner that the integrity of the Contest is not jeopardized, as determined by the Contest Co-Directors. Anyone anticipating using wireless communication shall notify the Contest Co-Directors by August 1, 2001. Wireless communication systems will be prohibited in the isolation area. This includes personal pagers, cellular phones, radios, laptop computers, etc.
7. Each team must be under guard, in a designated location, before the start of the Contest. Teams must remain continuously under guard until time to work the problem. Teams that have performed will not be permitted to return to the isolation area or communicate with any teams awaiting their turn to perform.
8. Any team or member receiving information concerning a Contest problem prior to arriving at the fresh-air base will be disqualified by the Chief Judge and Co-Directors.

Any team or member receiving unauthorized information concerning a Contest problem after arriving at the fresh-air base may be disqualified by the Chief Judge and Co-Directors or discounted under Rule 37.
9. Teams will not be permitted to furnish or make placards indicating materials or equipment and then simulate their use.

WRITTEN EXAMINATION

1. During isolation, contest officials will select one team member from the five working team members and the briefing officer to take the written examination. One number will be drawn which will apply to all teams. The written examination will be ten statements of fact taken verbatim from the contest rules which will be fill in the blank and each blank space shall represent a key word with no more than one blank per statement.

A maximum of fifteen minutes will be allowed for the team member to take the test.

2. Team members taking the written examination will not be permitted to take any written material or information into the testing area.
3. There will be no discussion during the time that written examinations are being taken.

FRESH-AIR BASE PROCEDURES

1. The person in charge of the fresh-air base will introduce himself/herself to the team captain and briefing officer upon arrival of the team at the mine portal or fresh-air base. Teams will be allowed to position (this means unloading stretcher) their equipment and lay out lifeline across the fresh-air base prior to the introduction. The person in charge of the fresh-air base will read and present a prepared statement to the team but will not answer questions regarding the problem or conditions in the mine. The prepared statement will include information relating to the mine or section of the mine to be explored. A maximum of five minutes will be allowed for discussion and preparation after the team receives the written statement. The team will be confined to the fresh-air base during this time period. A video presentation may be used in lieu of reading a prepared statement.
2. Each team will be given a written problem and maps. The timing clock will be started by the team captain immediately after the team receives the blank map and problem. Time required for studying the problems, checking equipment and getting under oxygen and/or air will be included in the total problem working time.

MISCELLANEOUS

1. To rescue people, teams may be required to change existing ventilation, energize power circuits, pump water, or support unsafe roof if it can be done safely. Other methods of recovery will not be accepted (i.e. roping, hooking, etc.).
2. Only judges, Contest officials, news media, and working team members will be permitted in the working areas. Unauthorized persons must stay out of the working area. Photographers who wish to take pictures of the working teams must receive permission from the Co-Director of the Contest.
3. Solid lines on a map denote actual and accurately measured workings. A solid line means there will be no openings from above, below or on the same plane that are not shown on the map.

Dotted lines, on a map, denote projections and may or may not be accurate.

INTERPRETATIONS OF A CARDS

1. For each incorrect answer on written examination. ___1
2. Failure to examine gauges and apparatus at not more than 20 minute intervals. This must be done at a team stop. One point for each minute or fraction thereof. (Total discounts are not to exceed 5 points)___1

The zero point for the timekeeping process for apparatus checks will begin with the completion of the last person checked during the first apparatus examination and this will be the procedure that will be used throughout the problem. This means that all team members must be checked before the next twenty minutes have elapsed.

3. Failure to complete the problem in the calculated time, for each three minutes overtime, or fraction thereof (not to exceed 10 points)___1

The calculated time will be determined by averaging the working time of all teams participating in the Contest.

The working time for a problem will start when the team captain starts the recording timing device at the fresh-air base and will continue until the team captain stops the timing device. The team captain must start the timing device immediately after receiving the maps and problem and before any work is done. In the event the captain fails to start or stop the timing device, working time will be determined by the timekeeper and the team will be discounted

under Rule 26 (B Card). When the captain stops the timing device, the maps must be submitted to the judges. (No work will be permitted on the map after the timing device has been stopped.)

4. When submitted to the map examiners, conditions and/or objects marked on the map in any area of the mine not explored by the team, each infraction ___1

Conditions and/or objects that are in advance of the point that the captain has traveled shall not be recorded on the map, except for the following conditions when they extend from rib to rib: unsafe roof, caved areas, and water over knee deep. This also includes inextinguishable fires. The captain will examine these areas as close as practical, and this will require them to be located on the mine map.

Objects or conditions passed by the team in the same opening or intersection shall be marked on the map.

5. Failure to locate and record accurately (verbatim) on the map objects/conditions that should have been found and were indicated to be in the mine, for each omission ___2

Verbatim means that the card information only has to be in sequence not stacked or oriented like the card.

The team is not responsible for locating and mapping objects/conditions that are initially found in the fresh-air base.

This discount shall be assessed for all objects/conditions that are not mapped in an area of the mine that the team should have explored if the problem had been worked systematically and correctly or for mapping objects/conditions not found in the mine.

Objects/conditions located in areas of elongated unsafe roof, unsafe rib, and areas where unsafe roof extends diagonally from rib to rib must be mapped if passed by the team.

The legend developed by MSHA and furnished to the teams shall be used by all teams to mark their respective mine maps. Objects/conditions not covered by the legend will be written in by the team and the location of the object/condition indicated by the symbol "X". The team may place any additional information on the mine map concerning objects/conditions found in the mine if it does not adversely affect the legibility of the items/conditions required to be mapped.

The marked map as submitted by the team will be compared with the problem and key map by the map examiners. Objects/conditions located on the map must be within six feet of accuracy and the six foot allowance will be measured from the center point of the object/condition drawn in. All objects/conditions mapped by the team must be shown in the entries, crosscuts and openings. If a team fails to explore the entire mine, the farthest point of advance shall be indicated on the map submitted to the map examiners except at locations where the following objects/conditions are encountered: faces, caved areas, water over knee deep, unsafe roof across an opening, seals, stoppings, barricades, closed regulators, and inextinguishable fires. Objects/conditions must be indicated on the team's map submitted to the map examiners. This does not include statements read by the patient or notes given to the team.

Information found on notes in lunch boxes, at barricades and any other location must be recorded on the mine map. The map shall reflect an X for each note found. (e.g. one X for the lunch box and one for the note.) These X's cannot be stacked one on top of the other.

Additional information placed on the map by the team cannot be existing symbols that are presently denoted in the legend, regardless of color coding used by the team in mapping.

The six foot tolerance will not apply to pillar blocks drawn in projected areas, but discounts will be assessed for improperly located objects/conditions in these areas including faces denoted by placards.

A placard indicating person that is located by the team in an area of elongated unsafe roof, but cannot be reached due to a lack of roof support, shall be mapped as an X with the word person written out. If the team subsequently reaches the person placard and the placard is changed to a body or live person, the proper symbol shall be used in conjunction with the original X.

The following changes need to be noted on the mine map to indicate the conditions left in the mine and the fresh-air base: changes to ventilation structures (i.e. stoppings, doors, regulators, etc.); victims removed from the mine; electrical circuits energized or de-energized; fires extinguished; water pumped; roof supports installed; and in the areas reentered by team, smoke cleared, gases removed, and permanent changes in direction of ventilation.

Ventilation structures such as stoppings, doors, etc. that are initially located and mapped, will remain on the map and any removal of such structure will be reflected by a notation indicating removed. If rebuilt, a notation, such as rebuilt, will suffice. If a check curtain is converted to a temporary stopping, a notation indicating such will suffice.

All newly erected, intact and airtight structures built by the team, except for frames erected for a line curtain, will be considered to be temporary stoppings. Regardless of their use or intention (i.e. ventilation, airlock, seals, etc.) they shall be treated and mapped as a temporary stopping.

A temporary stopping is considered to be airtight, thus a regulator built or rebuilt by the team would be mapped as such and not as a temporary stopping.

Walls of overcasts/undercasts cannot be removed or altered by the team.

INTERPRETATIONS OF B CARD

A. Apparatus

1. Apparatus improperly assembled, each apparatus___ 3

Failure to fasten covers, snaps, etc.

Full practice canisters or other acceptable canisters must be in place and used in the apparatus.

2. Apparatus improperly adjusted to the wearer, each person___1

If required, patient must have apparatus on and properly adjusted, even if on stretcher.

This ONLY applies to shoulder straps, chest straps, and head straps that are not properly fastened, are twisted or rolled (separate discount for each strap).

3. Failure to follow prescribed procedures for going under oxygen or air, each person, excluding patient___3

This will depend on type of apparatus used.

4. Apparatus part or parts worn or deteriorated so as to be dangerous to the wearer, each person___8

Holes that are in the breathing tubes and straps that break after the wearer goes in by the fresh-air base are discounts.

5. Oxygen or air supply of team members over specified limitations___2

This will apply to oxygen or air supply prior to starting work and be determined by the type of apparatus worn.

It does not mean minimum at end of problem.

6. Failure of captain to examine gauges, apparatus, and to have his/her gauges, apparatus examined before entering the mine, each apparatus___2

7. Failure to make proper apparatus examination during any required apparatus check, each infraction___1 (Maximum 5 Points)

Each team captain will examine gauges and apparatus of team members and have his gauge and apparatus examined by a team member.

A proper apparatus examination will include a visual examination of the gauge, facepiece, hoses, and determine by sight or feel, that the protective cover is secure. If the gauge has a protective holder, the gauge must be put back into the holder after viewing.

The team member making the check must obtain assurance from the person being checked that the person is all right. A verbal response from the person that he/she is all right will suffice.

8. Not wearing goggles in conjunction with an SCSR when smoke is encountered, each patient, each infraction___2

Means any smoke.

9. Team members breathing external air inby the fresh-air base, each team member, each infraction (excluding patient)___8

10. Team members breathing irrespirable air, each team member, each infraction___10

11. Team not following proper procedure in case of apparatus failure, each infraction ___6

Proper procedure would depend on type of apparatus; however, team must proceed to fresh-air base immediately.

Proper procedure for returning simulated malfunctioning apparatus to use would be to take apparatus off and set it on the ground at the fresh-air base, then put it back on following the prescribed procedures for getting under oxygen.

12. Failure to properly protect patient, secure patient to stretcher, cover patient with blanket, or placing patient on stretcher in such a way as to foul proper operation of apparatus, each omission ___2

Failure to properly protect the patient shall be assessed when the team drops the patient.

Patient should be secured to stretcher by at least two bandages or straps, one around trunk of body and one around legs, covered with blanket from the neck to and including the feet and placed so as not to crimp air hoses. The bandages or straps shall be fastened perpendicular to the patient's body.

All unconscious patients must be brought to the fresh-air base on stretchers.

B. Auxiliary Equipment and Testing Devices

13. Failure to take necessary equipment and gas-detecting devices to work the problem, each omission ___2

Failure to take necessary equipment or testing devices underground; discount should be assessed even if team returns to fresh-air base to pickup necessary equipment.

14. The following equipment must be tested after the clock is started and before the entire team goes underground or in by the fresh-air base 2
Stretchers: stretchers must be completely unloaded. Then, with a team member wearing an apparatus lying in a prone position, both ends of the stretcher must be lifted simultaneously. The stretchers cannot be lifted until the clock is started.

Team member can lie on stretcher prior to starting the clock for stretcher test but stretcher cannot be lifted prior to starting the clock.

Communication system: communications between the team and briefing officer shall be tested before the team advances in by the fresh-air base.

Fire extinguishers: extinguishers need not be activated, but a visual examination is necessary. Fire extinguishers shall be 2A10BC Rating and a minimum 5 pound capacity.

All gas detecting instruments used or taken in by the fresh-air base must be tested in the presence of a judge. (Gas detecting instruments will be left on during the working of the problem.)

15. Equipment failing to function properly upon testing, if not corrected before entering the mine, each infraction ___4

Faulty equipment must be left at the fresh-air base.

16. Failure to secure extra apparatus to stretcher ___2

Extra apparatus must be secured to stretcher to prevent it from falling off.

C. Communication and Signaling

17. Failure to arrange standard lifeline pull signals ___3

A team must arrange standard lifeline pull signals with the judge handling the lifeline after the clock is started and before the entire team goes underground or in by the fresh-air base.

18. Failure to give proper notification to the briefing officer with lifeline or communication system of team's intentions, (total discounts not to exceed 6 during working of problem) each infraction ___1

The following verbal or standard lifeline pull signals shall be used between the No. 5 team member and the briefing officer or lifeline judge:

Signal	Meaning
1 pull or "Stop"	Stop if traveling or "All Right" if team is at rest.
2 pulls or "Advance"	Team will advance and take lifeline from fresh-air base.
3 pulls or "Retreat"	Team will retreat and give lifeline to fresh-air base. If this signal is made from the fresh-air base to team, then team should return to fresh-air base at once.
4 pulls or "Help"	Team is in distress.

A team using a telephone or a mine rescue communication system must report its intentions to the briefing officer. Constant communication shall be maintained with the briefing officer unless a malfunction occurs.

A team will not be discounted if the communication system fails, if they change to using the standard lifeline pull signals. If the lifeline breaks, the team must immediately repair the lifeline or return to the fresh-air base.

Failure to notify the briefing officer with phone or lifeline of team's intentions would include advancing or retreating team prior to notifying the briefing officer and receiving a reply. If the team is stopped and gives a signal to retreat or advance, the No. 5 team member must await return signal from the briefing officer prior to moving. When traveling and the No. 5 team member gives signal to stop, the No. 5 team member may not move more than two steps after receiving return signal from the briefing officer.

Signals need not be initialed by the Captain.

Improper signals would apply only to signals transmitted between the No. 5 team member and the briefing officer. If an improper signal is corrected prior to team moving, the team shall not be discounted. To correct an improper signal, the No. 5 team member gives a "Stop" signal prior to moving, then gives corrected signal and receives the reply from the briefing officer.

All team members must hold or be attached to the team lifeline while traveling. The team lifeline shall be not more than 28 feet in length and a nonextendable tagline not more than 36 inches in length may be used from a team member to the team lifeline.

19. The team must notify the briefing officer and obtain his or her permission before ventilation changes are made or power circuits energized___2

Ventilation changes will be considered as starting, stopping, or redirection of the air current or changes of the constituents. Dropping a line curtain, extinguishing a fire, or opening a valve, is not considered to be a ventilation change. Boreholes cannot be used for ventilation purposes. The removal of any contaminant by the use of a line curtain and ventilating air current will require the inby end of the line curtain to be within five feet of the extent of the contaminant. If the extent of the contaminant is less than five feet inby the rib line, then the line curtain must break the imaginary rib line. If an existing check curtain is used to direct ventilation, the check curtain must first be converted into a temporary stopping. If water is being pumped, teams must wait until placards have been changed by the Contest officials before assuming the water has been lowered.

20. Failure to take lifeline or other communication system into the mine___10

This would apply only if all team members were inby the fresh-air base.

21. In air clear of smoke, none of working team members having hold of lifeline___2

Lifeline dropped by all members.

Does not apply on the surface or at the fresh-air base unless otherwise required by the Rules.

22. In smoke, any team member not having hold of lifeline, telephone line, or having either firmly attached to his/her person, each infraction___2

Applies to any smoke. All team members must be in air clear of smoke before any team member drops lifeline. Would include checking entrances or portals inby the imaginary line of the openings. Any part of a team member (hand, etc.) in smoke, team member is in smoke.

D. Gas and Roof Testing

23. Failure of captain to test the roof, face, and/or ribs by the sound and vibration method, each infraction (maximum - 6 points at any one location except fires) ___2

Roof and rib tests need to be made only once where the roof is designated as unsafe, caved areas, prior to building a temporary stopping, building frames for a line curtain, rebuilding a stopping that is completely destroyed, converting an existing check curtain to a temporary stopping, and at faces.

No team member may perform work or move into any area during a team stop until the captain makes the appropriate roof examination for that area. This would include either a sound and vibration method or a visual examination by the captain's physical presence. The one exception would be for designated areas of unsafe roof which are located in or on the imaginary line of an intersection. In these cases, the sound and vibration method must be made as soon as the captain discovers the placard indicating the unsafe roof. Team members may be in the intersection prior to the test being made.

Team member can follow directly behind the captain and make appropriate gas test as the captain makes roof test. (Roof test does not have to be completed for whole area.)

If it can be done safely, all roof tests shall be made from rib to rib, and the face, roof, and each rib at faces of places. Where conditions permit, the full extent of the condition requiring roof and/or rib tests shall be tested. All roof and rib tests shall be made using the sound and vibration method. No sound and vibration method roof and rib tests are required at the areas of overhanging brows or unsafe ribs.

The proper way to make roof tests along an extended area of unsafe roof would be to make roof tests from rib to rib at the outby end of the unsafe roof, zigzag between the edge of the unsafe roof and the adjacent rib, and make tests from rib to rib at the inby end. See Figure 1(a) and 1(b).

Prior to extinguishing a fire, roof and rib tests shall be made from rib to rib. When a fire is in an intersection, the tests must be made from imaginary rib line to imaginary rib line, perpendicular to the direction of team travel in the area the team member(s) work to extinguish a fire. The initial roof test, prior to extinguishing a fire, will suffice until the team advances (meaning that the No. 5 person passes the fire) or the team retreats and returns to the fire area; at which time a roof test will be required. Thereafter, roof and

rib tests perpendicular to the route of travel must also be made prior to each time a team member(s) travels through the area where the fire was located. The entire team traveling through the area as a unit would only require one test. (This test must be made by the captain before any team member travels past the location of the fire.) One test will suffice at each team stop after the fire is extinguished.

Roof test of fire at intersection must be perpendicular and from imaginary line to imaginary line. However, a zig zag roof test will be acceptable as an alternative test on subsequent trips through the fire area if a diagonal ventilation structure has been installed. (Diagonal structure will not have to be removed and the test will be comparable to the roof test illustrated for diagonal unsafe roof).

The roof and rib test must be made at all fires, including inextinguishable fires.

24. Failure to make necessary gas tests where required, each omission ___2

- A. If conditions permit, tests for carbon monoxide, methane, and oxygen deficiency shall be made at each team stop that is required by the problem or rules during initial exploration in unexplored areas and at the following normal areas to be tested: all mine entrances; entrances to sections of the mine to be explored; faces; walls of overcasts or undercasts, stoppings, ventilation doors, barricades, and seals, (if intact and airtight); all fires; sample pipes or tubes in airtight seals (valves must be opened before testing if closed); open boreholes; and exhaust fans.

Gas tests made during apparatus checks are not normal areas to be tested.

- B. Carbon monoxide, methane, and oxygen deficiency tests shall be made in each opening to an intersection before the team advances from that intersection. Gas tests need not be made from rib to rib. Tests may be made at any location in the opening within 25 feet from the original stopping point of the captain or No. 5 team member if conditions permit. In order to properly check an opening, mine entrance, or section entrance, the gas detecting instruments used shall be extended in by the imaginary line of the rib lines of the openings or entrances. However, openings or entrances containing unsafe roof, caved areas, water over knee deep from rib to rib at or outby the imaginary line to the opening shall be tested immediately outby the condition.

Teams passing an opening without first checking that opening and making necessary gas tests shall be discounted. Teams advancing inby an opening to a point that the No. 5 team member is at or inby the rib will be considered to have passed that opening.

- C. Teams must check all entrances to the area to be explored prior to the entire team going underground or inby the fresh-air base. Entrances may be checked in air clear of smoke without the use of a lifeline so long as the entire team does not go underground or inby the fresh-air base. The captain shall not advance more than 25 feet inby the imaginary line of the opening prior to the entire team advancing underground or inby the fresh-air base.

Teams will be assessed two points for each required gas test that is not taken, thus if team fails to test for all gases in an opening this will be a six point discount.

- D. The constituents of the air enclosed by separations intended or indicated to be airtight will be considered unknown and must be determined by the Captain before other team members enter such area. Actual constituents may be indicated by the use of placards. If a stopping has a hole in it, a gas test is not required prior to entry.
- E. When smoke is encountered, it will be considered to extend to a placard indicating the smoke is cleared or a separation intended or indicated to be airtight. If carbon monoxide, methane, or oxygen deficiency is found in an opening containing a separation intended or indicated to be airtight, the gas will be considered to extend to the airtight separation unless otherwise indicated. If carbon monoxide, methane or oxygen deficiency is encountered in other locations, it will be considered to extend to the next normal area to be tested for that gas, at which time the continuance or discontinuance of the gas will be determined by placards or by results of the tests. See Figure 4.
- F. Areas in which gas tests have been performed need not be retested when a team re-enters the area unless ventilation has been changed. Upon re-entry into any area where the ventilation has been changed, including subsequent ventilation changes, teams shall make examinations for carbon monoxide, methane and oxygen deficiency at the location of all placards where any of these gases were encountered on the initial exploration into the area. These tests shall be made prior to the entire team passing the placard. Tests are not required at other locations upon re-entry.

25. Improper procedure when testing with gas detectors, testers, and indicators, total discounts not to exceed 6 points per team member during working of problem___2

A proper test for methane, carbon monoxide and oxygen shall require the following actions by the team:

METHANE - Detector shall be held at eye level or higher

CARBON MONOXIDE - Detector shall be held at chest level

OXYGEN DEFICIENCY - Detector shall be held at waist level or below

The team member shall verbally identify each test.

E. Miscellaneous

26. Failure of team captain to legibly mark date, initials, and team number on the check board at mine portal or fresh-air base or to start timing device promptly after receiving the problem and map, each omission___2

Captain must legibly mark date, initials, and team number on check board after clock is started but before the entire team travels in by the fresh-airbase.

Team number means the team's working position number drawn during registration at the Contest.

27. Failure of the captain to mark legibly, with chalk, the date and his/her initials at or on all faces, caved areas, barricades, stoppings, ventilation doors, seals, walls of overcast and undercast check curtains converted to stoppings, at the location of bodies and live persons and at points where objects/conditions prohibit further travel in that direction, not to exceed 12 points___2

Dates and initials are not required if the live person or body cannot be reached due to the conditions of the mine.

The captain must mark the date and his/her initials at or on team built stoppings after the building process has begun but before the clock is stopped.

Such places only need to be marked once. Date and initials are not required at ventilation controls completely destroyed.

Date means correct month, day, and year.

28. Failure of teams to stop within 50 feet of the fresh-air base to check team members and apparatus___4

The first examination must be made when the team is stopped within the first 50 feet, and with all team members underground or inby the fresh-air base to check apparatus.

This examination must be made at the first stop when entire team is inby fresh-air base or portal even though the 50 foot limit has not been reached. This examination is also required on the affected apparatus upon initial re-entry inby the fresh-air base after such apparatus has been repaired or changed.

The team captain shall not exceed 50 feet; however, all team members must be underground or inby the fresh-air base.

29. Any team member traveling more than 25 feet from the captain or No. 5 team member's original stopping point, each infraction___2

During initial exploration, when a team advances into an intersection and makes a team stop, exploration into the openings will be limited to 25 feet from the captain or No. 5 team member's stopping point or to the imaginary line of the next intersection, whichever is the lesser distance. (The Captain's stopping point cannot be inby the imaginary line of the next intersection.) See Figure 5.

When crosscuts are staggered and the inby rib of one crosscut is even with the outby rib of the opposite crosscut, the two intersections shall be treated as one continuous intersection for the purpose of team stops only. Rule 24B, gas testing, and Rule 44A, systematic exploration, are still applicable. See Figure 6.

The 25 foot limit shall also apply when the team is attached to the lifeline.

30. Captain or other team member who acts to endanger self or patient, 5 points each team member or patient, each infraction (three or more persons involved will be considered as entire team endangered) maximum 15 points each occurrence___5

Each team member that endangers self will be assessed points for each endangerment (when less than three members are involved as described below):

- A. Travel under unsafe roof, unsafe rib, or overhanging brow. See Figure 2.

Teams supporting unsafe roof:

1. If both ends of the unsafe roof have been previously tested by sound and vibration method, timbers must be set in sequence as follows:
 - a. set first timber outby unsafe roof
 - b. set additional timbers in unsafe roof at no more than five foot intervals
 - c. set last timber inby unsafe roof before any other work is done or team members pass through the area
2. If neither end of the unsafe roof has been examined by the sound and vibration method, roof testing and timbers must be set in sequence as follows:
 - a. test roof on outby end of unsafe roof (Rule 23)
 - b. set first timber outby unsafe roof
 - c. set additional timbers in unsafe roof at no more than five foot intervals
 - d. set last timber inby unsafe roof
 - e. test roof on inby end of unsafe roof before any other work is done or team members pass through the area (Rule 23)

Outby/inby verbiage is interchangeable depending on the direction the unsafe roof is approached.

- B. Travel into or through water over knee deep. When water is encountered, the extent of the water will be denoted by placards.
- C. Passing a fire in the same opening or intersection the team is traveling without first extinguishing the fire.
- D. Not immediately retreating to the fresh-air base when the manufacturer's warning device of the apparatus is activated. If visual contact has been made with a patient, the patient may be removed simultaneously with the team. (No additional work such as setting/retrieving timbers or the completion of building any structure can be done to rescue the patient.) The team may perform gas test, roof and rib test and D&I's at such location, but may not advance in by the captain's location at the time of the activation or simulation.

The activation of the warning whistle will require the team to return to the fresh-air base and change out the apparatus or bottle. If the activation of the warning whistle is a simulated event, the team may simulate replacement (may verbally state changing bottle). Upon re-entry, the 50-foot apparatus check must be made.

- E. Removing any roof support that is set, whether found or installed by the team.
- F. Ventilating an unexplored area with irrespirable air when the location of a potentially live person is unknown. Any unaccounted for miner is considered to be a potentially live person. If a team explores all sides of overcasts or undercasts, all ends of ventilation tubes and the bottom of shafts, the in-between areas are considered explored.

When a body is located in an area of elongated unsafe roof and the team finds and maps the body, the location of the body will be considered known. This will apply even if there are conditions that prevent the captain from physically examining the body.

Irrespirable air that extends into an unexplored area does not relieve the team from having to explore.

- 31. Any act by a team which may result in an explosion of an explosive air/gas mixture___30
 - A. Changing conditions of the mine ventilation system in such a manner that an explosive mixture is moved over an ignition source.

- B. Continuing exploration after conditions are found to indicate an imminent explosion is possible by the presence of an explosive mixture and evidence of fire (visual acknowledgment of a fire, smoke or carbon monoxide above 10 ppm), or continuing exploration when energized electrical equipment, energized circuits (including all batteries except cap light batteries) or energized cables are found in an explosive mixture.

When a withdraw situation exists at an intersection, the team can go to any location they have already explored at that stop, prior to exiting the mine.

A team must continue to explore if it knows there is a continuous nonexplosive separation between the explosive mixture and the evidence of fire, or energized electrical equipment, energized circuits (including all batteries, except cap lamp batteries) and energized cables.

- C. Changing conditions of the mine ventilation in such a manner that an explosive mixture is moved over an unexplored area. If a team explores all sides of overcasts or undercasts, all ends of ventilation tubes and the bottom of shafts, the in-between areas are considered explored.
- D. Changing conditions of the mine ventilation in such a manner that an explosive mixture is moved over energized electrical equipment, energized electrical circuits (including all batteries except cap lamp batteries) or energized cables. Energizing electrical equipment, electrical circuits, or cables in an explosive mixture, or moving any of the above ignition sources into an explosive mixture.

An explosive mixture will be present when the methane is between five and fifteen percent inclusively and the oxygen is 12.1 percent or greater. Both methane and oxygen concentrations must be shown on the placards.

- 32. Failure to locate missing persons, each omission___10

The team must stop and the captain examine, by touching with his or her hand, all missing persons (live persons or body) prior to any team member passing the location of the missing person. This will not be considered a team stop by the rules for the purpose of gas testing.

If the Captain cannot physically examine a missing person located under elongated unsafe roof due to a lack of roof support, a team stop will not be required.

Bodies located under elongated unsafe roof must be examined before the clock is stopped if roof support is provided. See Figure 3.

33. Failure to bring live person to the fresh-air base, each omission___20

Self-explanatory.

34. Failure to properly protect potentially live person(s), each omission___10

Proper protection must be used on persons taken into or found in irrespirable atmospheres. Atmospheres containing less than 19.5 percent oxygen, concentrations of carbon monoxide in excess of 50 PPM or smoke are irrespirable atmospheres. In an irrespirable atmosphere, unconscious patients must be protected by approved apparatus with full face pieces. On a conscious person, if conditions permit, an approved self-rescuer may be used. Training models may be used if sterilized and properly assembled. Simulation of proper donning of approved respiratory apparatus shall not be permitted. If an irrespirable atmosphere is encountered immediately outby a barricade, the team must remove the irrespirable atmosphere before breaching the barricade. If an irrespirable atmosphere is encountered immediately outby an airtight ventilation structure and verbal contact is made with patient, the team must remove the irrespirable atmosphere before breaching the structure.

35. The atmosphere for the briefing officer shall remain respirable. This cannot be achieved by the use of an apparatus.___10

The briefing officer cannot be relocated at the fresh-air base to allow irrespirable air to flow across his designated location.

36. Traveling at more than a walking speed, total___4

Teams running shall be discounted.

37. Team member talking to or receiving information from an unauthorized person without permission of the judges, each infraction___5

Unauthorized information given to the team by the patient would be prohibited.

38. Failure to follow proper procedure when putting apparatus on patient, each infraction___2

Mask tightness test is not required for an unconscious patient.

39. Assistance lent by supposedly unconscious patient, each infraction___2

Would cover patient sitting up unassisted or moving arms so as to help in putting on apparatus, or unconscious patient communicating with team.

40. Teams leaving patient unattended, each infraction___6

A team member must be within 10 feet of the patient to be considered attended.

41. Failure to remove patient(s) promptly to the fresh-air base, each infraction___6

A. When a team finds a patient(s), either by visual or verbal contact, every effort must be made to remove them safely and promptly to the fresh-air base. Visual contact will require the captain's presence in the area. Verbal contact is any voice communication from the patient(s) that can reasonably be expected to be heard by the team.

B. When a team reaches a patient(s) (visual contact), every effort must be made to remove them safely and promptly to the fresh-air base. Exploring ahead of the location will be limited to 25 feet in any direction. The 25 foot limit will be determined from the stopping point at or outby the patient(s).

The team may perform any function during this team stop. The team may not continue to explore while retreating with the patient, unless required by the problem design.

C. If the team is in verbal or visual contact with a patient, and the team is unable to immediately reach the patient due to the conditions of the mine, the team may continue to explore if necessary for its own or the patient's safety. During this exploration process, the team may perform any function during team stops. However, every effort shall be made to safely and promptly remove the patient from the mine.

If a team finds a patient(s) under or inby an area of unsafe roof and subsequently finds the necessary roof support to recover the patient(s), the team must stop (prior to the No. 5 team member passing the roof support), retrieve the roof support and return to

recover the patient(s). The team may perform any function during this team stop.

If multiple patients have been found at different locations and additional work is required before the patients can be removed, the sequence of removal will be at the team's discretion.

42. Failure to erect temporary stopping (airlock) when necessary, each infraction___6

Before breaching stoppings, doors, seals, barricades, closed regulators, or removing water roofed, an airlock must be formed if conditions on the other side are unknown. This does not apply to existing check or drop curtains used to direct the air current. When retreating out of a barricade or coming back through a stopping where an airlock has been erected, it will not be necessary to airlock on the way out if this will not change any existing ventilation.

If a person behind the barricade, stopping, etc. relays information to the team sufficient to insure that the team has knowledge of the conditions in the area to be entered, an airlock is not required.

A person behind a barricade, stopping, etc. may relay information by reading aloud a statement furnished by the judges. No other information on conditions behind the barricade is permitted to be relayed to the team. (Rule 37)

An airlock is formed by erecting a temporary stopping at a location(s) that will provide the equivalent airtight separation as the airtight structure or condition breached by the team.

43. Failure to erect temporary stopping, reasonably airtight, each infraction___2

Curtains used to erect temporary stoppings shall be fastened at the top and sides, and at the bottom when a bottom board is provided. Top and bottom boards shall not be nailed to the uprights by the teams when stoppings are erected.

If a structure is moved from one location to another, it must be completely dismantled prior to moving (includes curtains installed on frames).

44. Failure of team to explore or examine workings systematically and thoroughly, each omission___4

Definitions:

Inaccessible: All areas of the mine where team travel is blocked by one or more of the following conditions: seals; unsafe roof rib to rib; inextinguishable fires; water over knee deep and caved areas.

Opening: Any entry or mining that was performed off an entry, room, or crosscut that may or may not connect to another entry, room, or crosscut.

Crosscut: An opening that connects two entries.

Contaminant: Any one or more of the following: smoke; carbon monoxide above 10 PPM; methane above one percent; or less than 19.5 percent oxygen. An entry or crosscut will be considered contaminated until the team finds the end of the contaminant.

- A. This should be assessed for not exploring all areas of mine that can be explored without endangering team if problem requires entire mine to be explored or leaving accessible areas unexplored outby where team is working and for passing accessible openings.
- B. Unless blocked, teams must advance in the contaminated entry or in entries adjacent to the contaminated entry. When a contaminated entry and adjacent entries are blocked, teams may explore/advance in other nearest accessible entries. However, the team will be discounted if it fails to return to the contaminated or adjacent entry at the first accessible opening, and if not blocked, make all further explorations in the contaminated or adjacent entries before advancing into other areas of the mine.
- C. Passing or failing to explore an accessible opening to a crosscut.

Team would be required to travel into this opening and tie across and behind before advancing into other areas of the mine. If a contaminant is found in an accessible crosscut, teams would be required to tie across in this crosscut before traveling into other accessible crosscuts.

- D. Where crosscuts are blocked, the No. 5 team member may not advance beyond the inby corner of the second crosscut before the team ties across and/or behind into all accessible areas outby that crosscut. Where crosscuts are staggered, the second crosscut will be determined by two crosscuts on the same side, either left or right, in the entry being traveled. After the accessible areas outby are completely explored to the side where the two crosscuts were determined, the team will be permitted to explore the original entry until it encounters the second crosscut to the other side. This may require building an airlock or ventilation controls such as a stopping, door, etc., or returning to the fresh-air base, and exploring into other entries at the discretion of the team and according to the conditions of the mine.

This rule requires team to make all accessible areas outby the second crosscut limit (this would include all sides of areas that are inaccessible such as caved, etc.).

- E. Inaccessible areas need not be explored unless the team has explored all accessible areas and there are unaccounted for miners or an explosive mixture to be moved through the inaccessible (unexplored) areas.

Teams will be required to pump water or set timbers to explore the inaccessible areas in these cases, if the necessary materials are provided in the problem.

- F. Exploration behind seals is not necessary, unless required by the problem and then only after all accessible areas of the mine are explored.

45. Only the ventilation material provided will be permitted to be used during the working of the problem. Stoppings located on the course shall be completely disassembled when moved to other locations.____10

46. Less than five team members completing problem, each person____8

Self-explanatory.

47. Failure to examine lunch pails, each infraction____2
Lunch pails may contain important information and therefore shall be examined. Any team member may examine the lunch pail provided he/she does not exceed the 25 foot limit of the captain or No. 5 team member at a team stop. Lunch pails under unsafe roof need not be examined unless teams enter the area.

48. Any act by a team member that violates the intent of the problem design layout, each location___10

This would include traveling into or passing materials through areas indicated to be impassible by placards or intended to be impassible by the physical condition indicated.

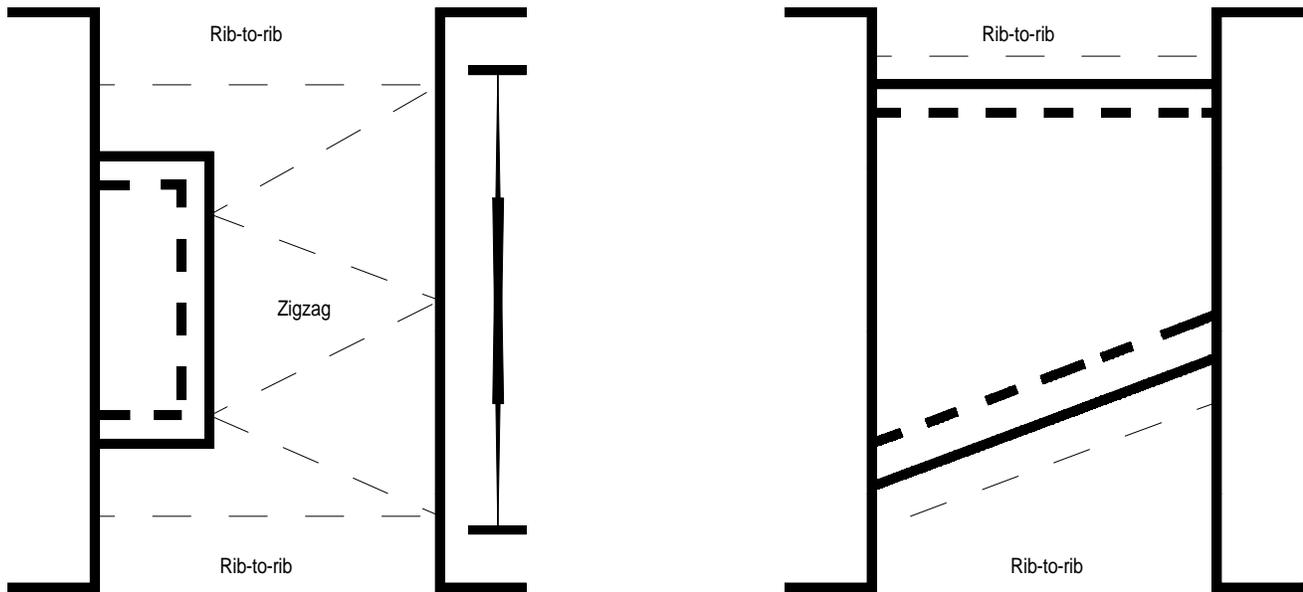
Examples of such areas would include, but not be limited to, caved areas, ribs, faces, water roofed, etc.

Isolating equipment, or other energized electrical components with structures other than those depicted in the legend will not be acceptable.

49. Failure to comply with other written adopted National Rules not covered in Discount Sheets, each infraction___2
50. Failure of team to follow written instructions provided to the team for working of the Contest problem___15

Figure 1(a)

PROPER METHOD OF ROOF TESTING



This sketch is applicable to either a 3 or 4-way intersection.

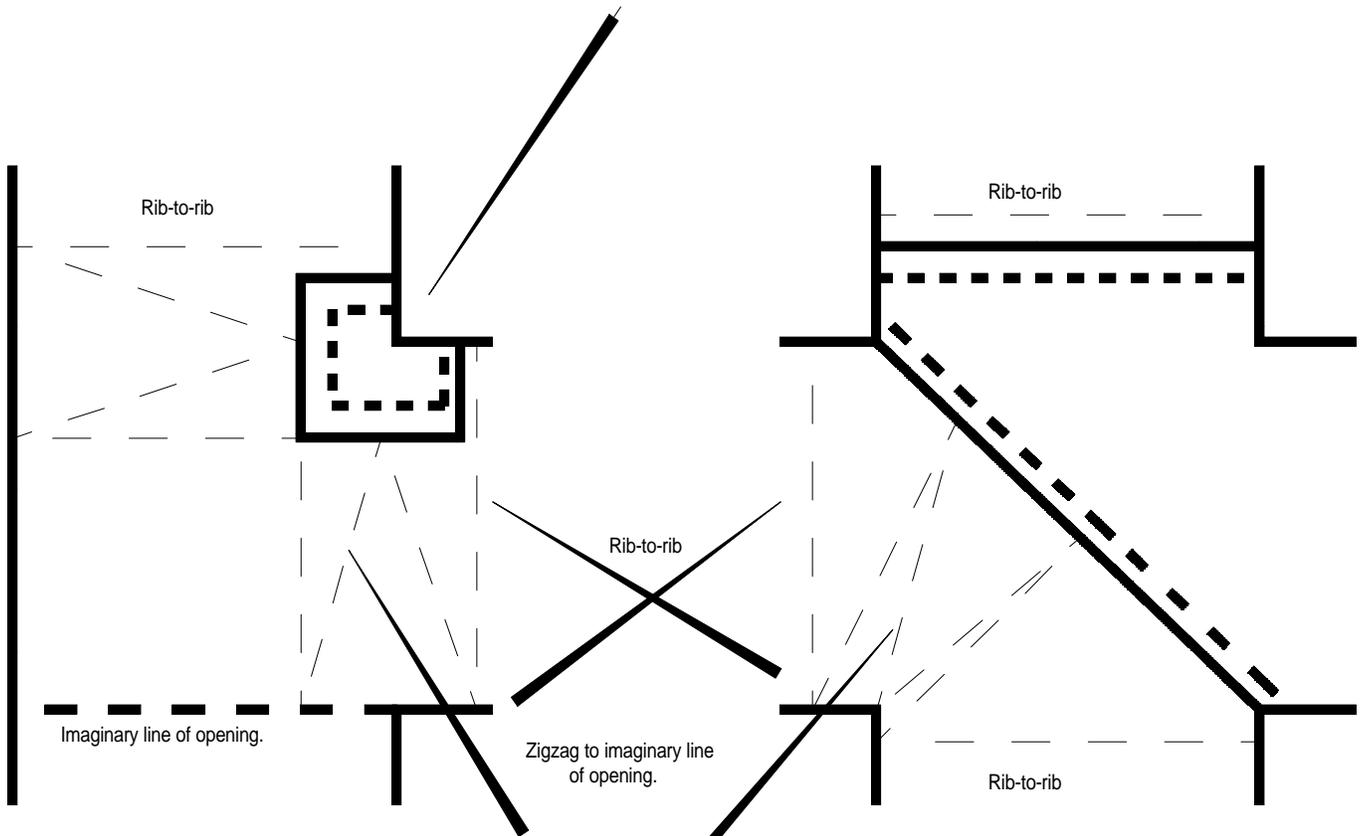
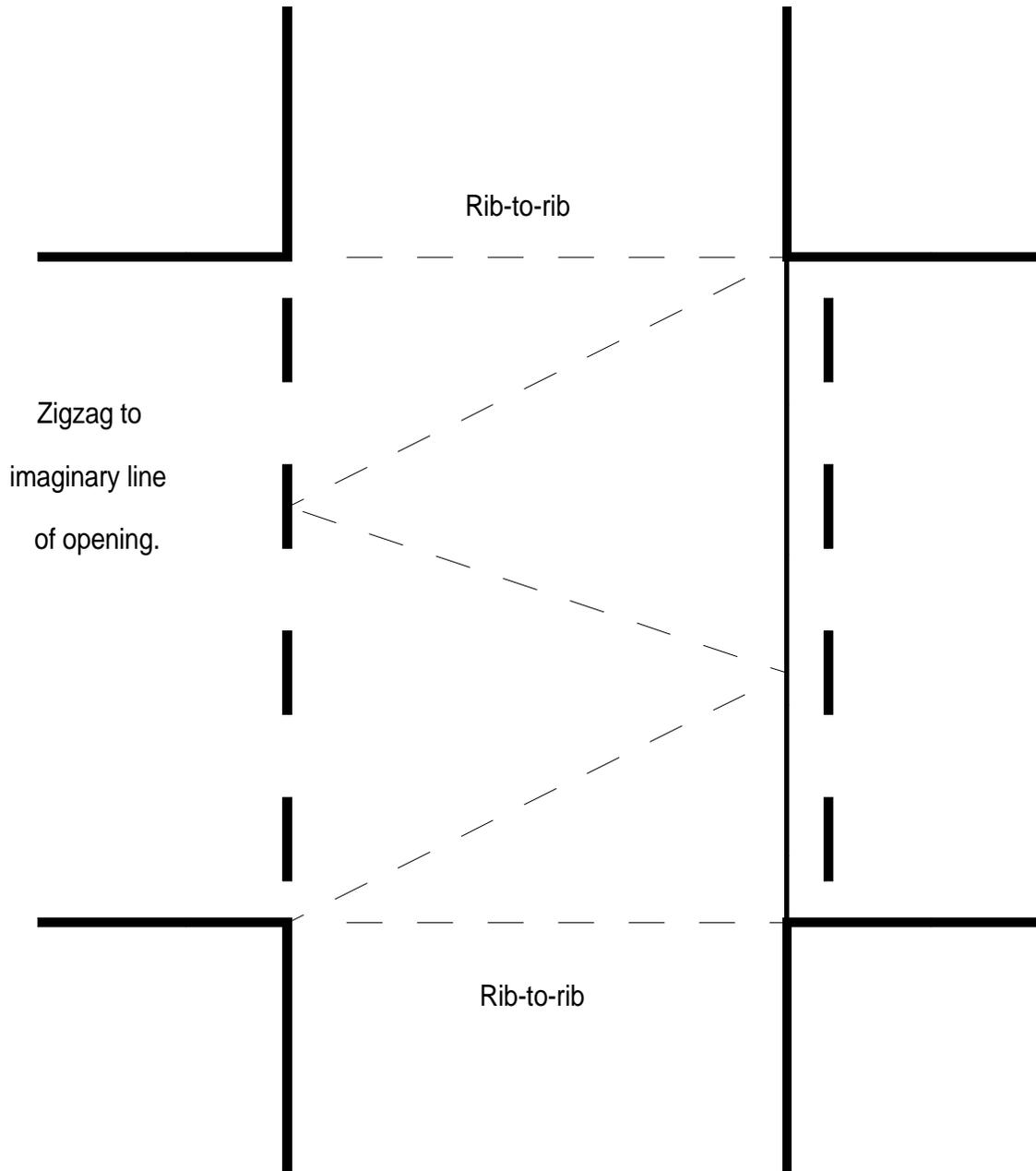


Figure 1(b)

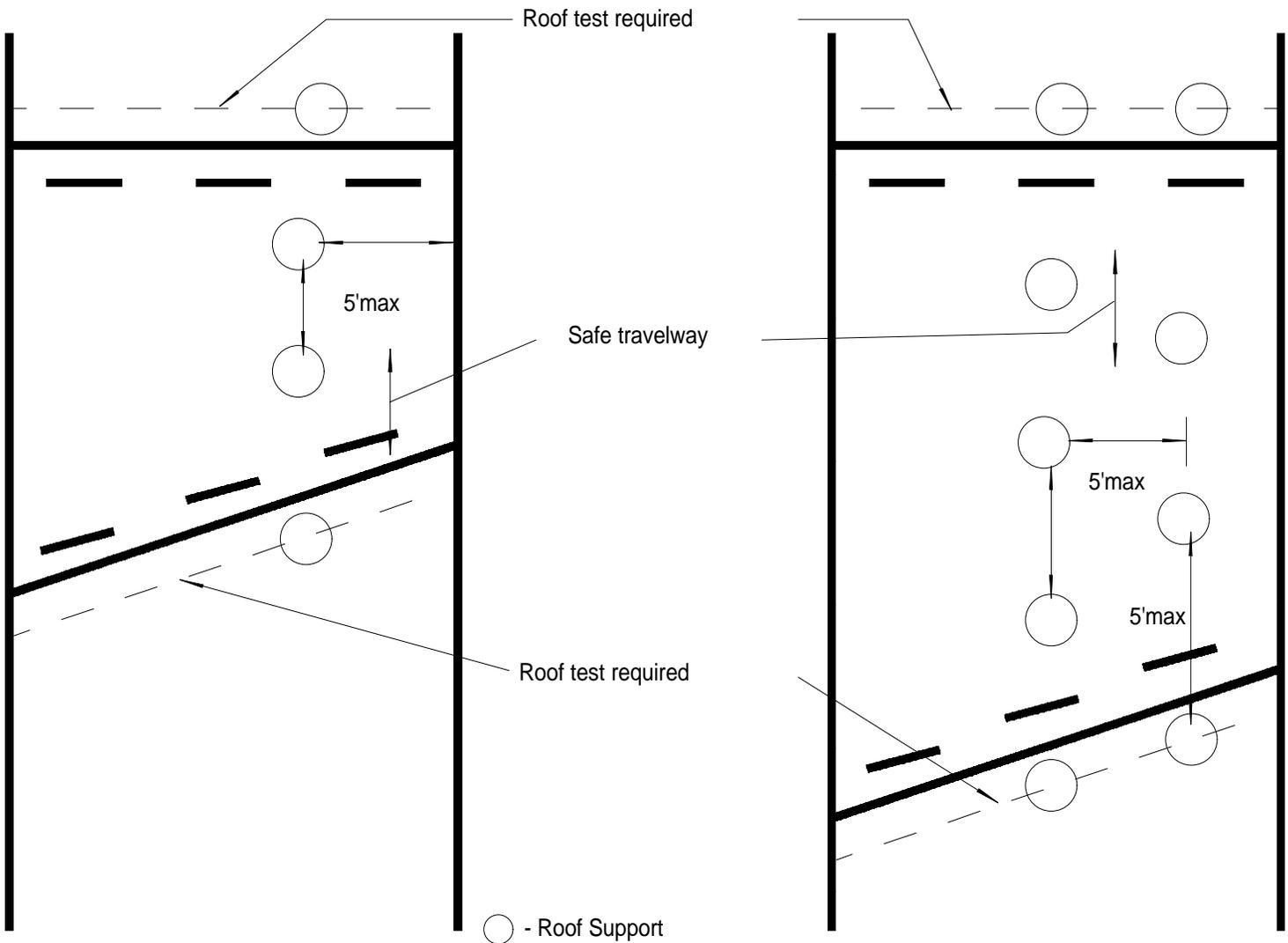
PROPER METHOD OF ROOF TESTING (cont.)



This sketch is applicable to either a 3-way or 4-way intersection.

Figure 2

EXAMPLES OF PROPER METHODS OF SETTING ROOF SUPPORTS



5' maximum width travel way may be established between one row of supports and a safe rib or between two rows of supports.

No roof test required IN area of unsafe roof.

Simulate setting support by standing in proper location and then placing on floor.

If the unsafe roof is less than 5 feet in length, a minimum of three supports must be set; one on each end and one under the unsafe roof.

Figure 3

PROPER INSTALLATION OF ROOF SUPPORT TO RECOVER A PATIENT LOCATED UNDER AN AREA OF ELONGATED UNSAFE ROOF

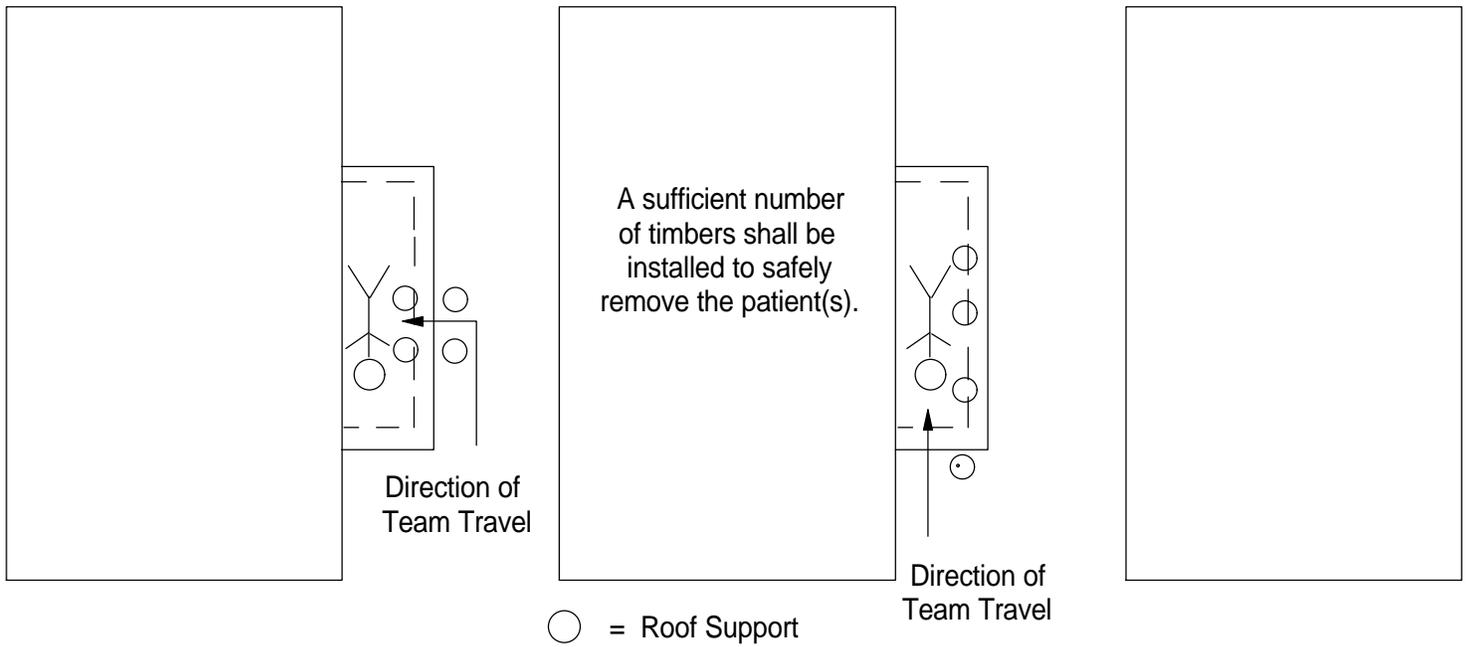
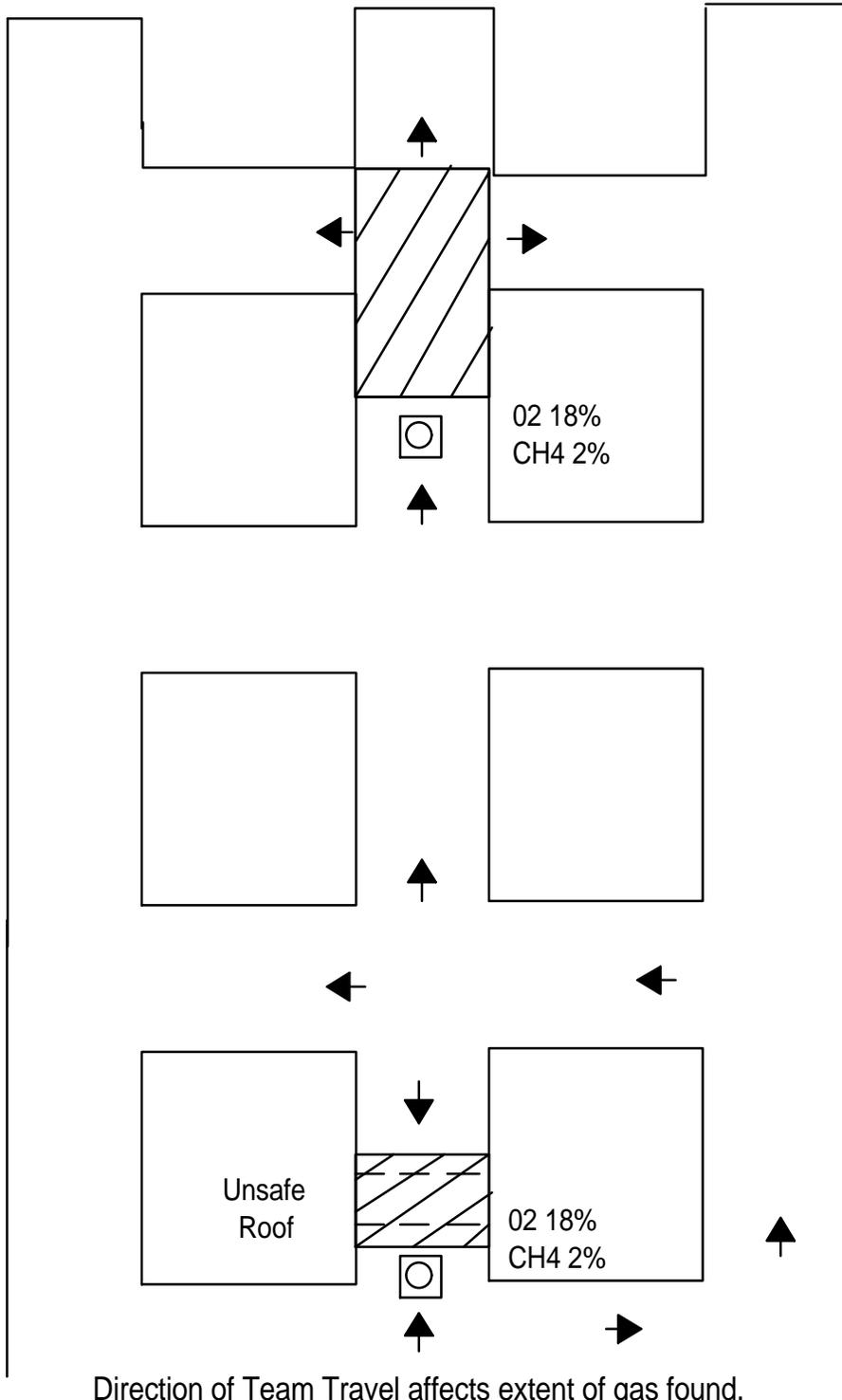


Figure 4

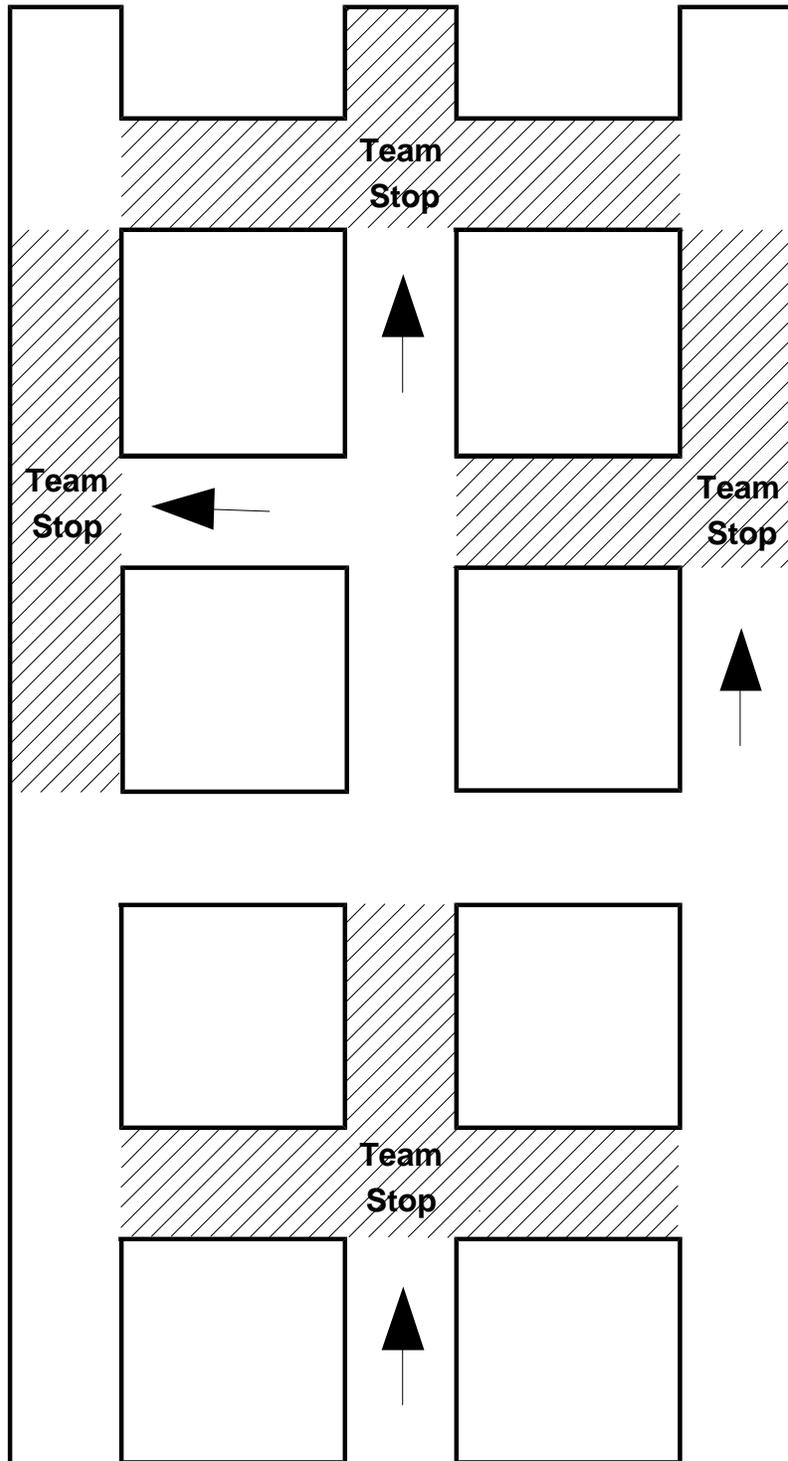
EXTENT OF GAS SKETCH



Direction of Team Travel affects extent of gas found.
Arrows indicate team travel after gas is found.
Diagonal lines indicate extent of gas.

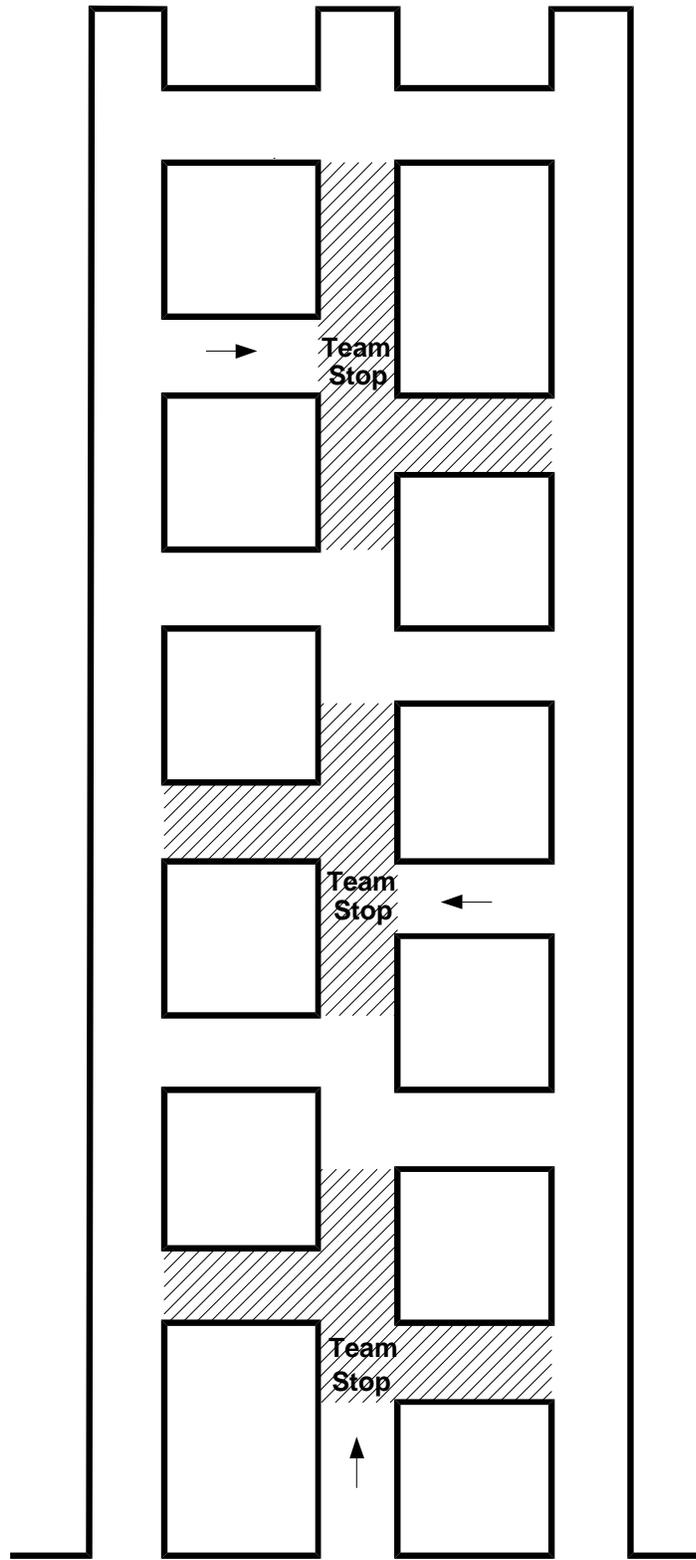
Figure 5

Example of Initial Exploration Under Rule 29



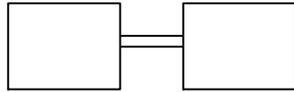
- ▶ Direction of Team Travel
- ▨ Maximum Extent of Exploration

Figure 6
Staggered Crosscuts - Rule 29

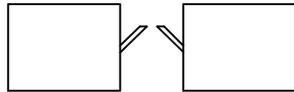


→ Direction of Team Travel
▨ Maximum Extent of Exploration

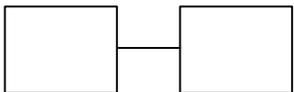
MINE MAP LEGEND



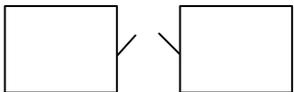
PERMANENT STOPPING
Stopping intact, airtight (No indication of opening(s) or leakage).



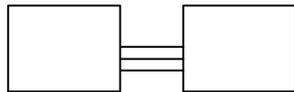
PERMANENT STOPPING NOT INTACT, NOT AIRTIGHT
Condition noted on placard must be shown on the map.



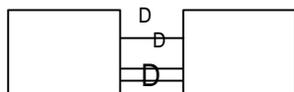
TEMPORARY STOPPING
Stopping intact and airtight, this symbol must be used for all newly erected, intact and airtight, structures built by the team.



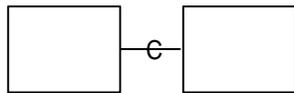
TEMPORARY STOPPING NOT INTACT, NOT AIRTIGHT
Condition noted on placard must be shown on the map.



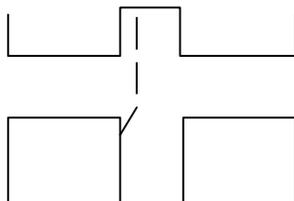
SEAL
If the seal is equipped with devices such as sampling tubes or water traps, or is damaged, leaking, or destroyed, that particular device or condition must be noted beside the symbol.



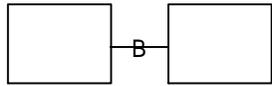
DOOR
Can be shown by itself or in permanent or temporary stopping; however, the type and size (if indicated by placard) and "open" or "closed" must be written out.



CHECK CURTAIN
Condition noted on placard must be shown on the mine map.

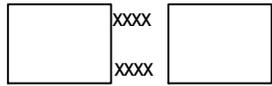


LINE CURTAIN
The full extent of the line curtain shall be shown. If the line curtain is partially or completely down, it must be noted beside the symbol. Can not be folded or rolled up.



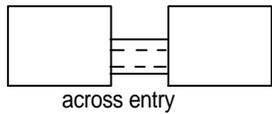
BARRICADE

If the placard indicates that the barricade is damaged, leaking, or destroyed, that particular condition must be noted beside the symbol.



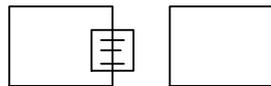
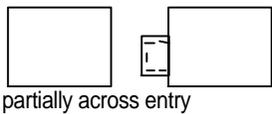
CAVED

Caved areas are not considered airtight unless the placard states "airtight", and it will have to be written out on the map ("airtight") beside the symbol.



UNSAFE ROOF

Placard must state "unsafe roof". Any other condition designated must be noted beside the symbol. Outline size if indicated by placard or markings.



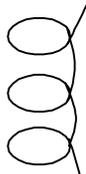
UNSAFE RIB OR OVERHANGING BROW

Project over ribline and area on map.



WATER

Write out depth as shown on placard.



SMOKE

Write out "light" or "dense" if indicated on placard; draw in entire extent of smoke.



BODY

Indicate position of head and feet as body is found. If the word "body" is on the placard, show symbol for body and denote the additional information that is shown on the placard.



LIVE PERSON

Write out condition indicated on the placard, such as conscious unconscious, walking, etc., indicate position if lying down.



BRATTICE FRAMES



BRATTICE CLOTH



PLACARD INDICATING GAS MIXTURE

Write out gas name or symbol and state percent or PPM if shown on the placard.



AIR MOVEMENT

Write out quantity if shown on placard



FIRE

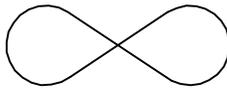
Write out "smoldering", "raging", etc., if shown on placard.

The fire symbol must be placed over the object on fire



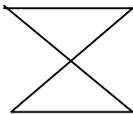
FARTHEST POINT OF ADVANCE IN ENTRY, ROOM, OR CROSSCUT

This symbol should only be used where areas in by the farthest point of advance will not be explored.



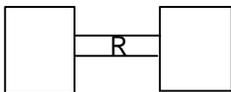
FAN

Write out conditions of fan as indicated by placard.



OVERCAST OR UNDERCAST

If the overcast or undercast is damaged, leaking, or destroyed that particular condition must be noted beside the symbol



REGULATOR

If the regulator is damaged, leaking, or destroyed, that particular condition must be noted beside the symbol.

The letter "R" can overlap the parallel lines

LOCATION OF ANY OTHER OBJECTS, CONDITIONS, OR EQUIPMENT



Write the name of the object, condition or equipment by the symbol. This also includes faces if indicated by a placard.



ANY ROOF SUPPORT INSTALLED BY THE TEAM

NOTE: Two maps will be provided to each team. The scale on the maps will be 1 inch is equal to 10 feet.

(for Contest work only)

SELF-CONTAINED BREATHING APPARATUS

**Draeger 174, BG174, or 174A, Two, Three, or Four-Hour
Self-Contained Breathing Apparatus**

- A. Procedures for getting under oxygen:
1. Bring mask close to face and open cylinder valve fully; then close one-half turn. Face mask straps may be placed over the head and the mask allowed to hang loosely prior to opening cylinder valve. This will suffice for bringing the mask close to the face.
 2. Put on facepiece properly and tighten straps; observe gauge.
 3. Block off both breathing tubes. It should be impossible to draw in any air when inhaling and hard to expel air to the outside when exhaling.
 4. Check gauge and operation, straps, etc., prior to leaving fresh-air base.

BIOPAK 60P Self-Contained Breathing Apparatus

- A. Procedures for getting under oxygen:
1. Put on facepiece and adjust.
 2. Open the bottle valve.
 3. Block off both breathing tubes. It should be impossible to draw in any air when inhaling and hard to expel air to the outside when exhaling.
 4. Check pressure gauge and operation straps, etc., of each team member prior to leaving fresh-air base.

Biomarine, Biopak 240 Donning Procedures

- A. Don facepiece
1. Tighten lower straps simultaneously

2. Tighten temple straps simultaneously
 3. Tighten forehead strap (if face piece has this strap)
- B. Simulate the inhalation valve check by verbally stating:
- “I am using my hand to block the inhalation port of the face piece and inhaling. There are no leaks present. I am removing the hose cap and reconnecting the inhalation hose to the face piece”. (This can be stated by the captain.)
- C. Perform exhalation valve test
1. Grasp exhalation hose and exhale
- D. Open oxygen bottle valve full counter clockwise and then turn back 1/4 turn

Draeger BG-4 Self Contained Breathing Apparatus

1. Procedures for getting under oxygen:
 - A. Put on facepiece properly and tighten straps. Open cylinder valve fully, then close one-half turn.
 - B. Observe the Monitron Pressure Gauge and Warning Module:
 - (a) Green indicator light - Apparatus O.K.
 - (b) Red Indicator light - Apparatus faulty
 - (c) PSI Reading
 - C. Tightly squeeze both breathing hoses and breathe in until a vacuum is produced. Hold your breath for an instant; the vacuum must be maintained, otherwise the straps on the mask must be tightened.
 - D. Check gauge and operation, straps, etc., prior to leaving fresh-air base.

(for Contest work only)

DETECTING INSTRUMENTS

CMX 270 Continuous Carbon Monoxide, Methane, and Oxygen Monitor

A. Checking instrument:

1. Turn unit on by backing off knurled knob and inverting calibration cover. Tighten knurled knob. (Do this prior to starting the clock for the working of the Contest problem.) Visually inspect the digital display.
2. In the battery failure mode, the liquid crystal display (LCD) becomes blank except for the numeral "1" and the word "LOBAT", and the audible alarm sounds a continuous tone. Approximately one-half hour before this condition, the audible alarm begins to beep periodically.
3. If the instrument's methane sensor should malfunction, the monitor will go into a failure mode similar to the low battery failure mode. The word "FAULT" will appear in the lower left corner of this display, and the audible alarm will sound a continuous tone.

B. Tests for carbon monoxide/methane/oxygen:

1. When activated, the CMX 270 detects and measures concentrations of carbon monoxide, methane, and oxygen in ambient air continuously and simultaneously. Also, when activated, the instrument will automatically reveal the oxygen content on the digital LCD. Since the Contest rules require the oxygen deficiency tests to be made last, the instrument should be put into a different readout mode before tests at the gas box are made.
2. All gas measurements are revealed in the digital LCD. The type of readout desired is selected by activating one of three touch type switches on the front of the case.
3. Carbon monoxide is measured and displayed in parts per million (ppm), methane is percent by volume, and oxygen is percent by volume.

MSA Passport Personal Alarm

A. Checking instrument:

1. Turn the instrument on by pressing the On/Off button on the control face panel. (Battery pack should be secured to instrument prior to starting the clock for working of the contest problem.) Visually inspect the digital display after it stabilizes.
2. Check the battery condition by pressing the page button. Battery condition and voltage will be displayed. BATT appears in the exposure display, alarm lights flash, and alarm sounds. After initial LOW warning, (instrument will function for only approximately 30 minutes more). The alarm sounds every five minutes until power is turned off or the battery condition is at VERY LOW level. Very low battery is no longer able to operate the instrument and unit shuts down automatically.
3. Visually check instrument for damage.

B. Testing for carbon monoxide/methane/oxygen:

1. When activated, MSA Passport detects and measures concentration of carbon monoxide, methane and oxygen in the ambient air continuously and simultaneously.
2. All gas measurements are revealed in the digital liquid crystal display (LCD) and all are displayed simultaneously.
3. Carbon monoxide is measured and displayed in parts per million (ppm), methane and oxygen are displayed in percent by volume.

LTX 310 Multi-Gas Monitor

A. Checking instrument:

1. Turn the instrument on by pressing the On/Off button on the control face panel. The HOLD screen appears and the instrument sounds a beep approximately once a second. Continue holding the On/Off key until the RELEASE screen appears.
2. The following start-up screens will be displayed.

DISPLAY TEST - All segments of the display are activated to verify proper operation.

BATTERY TEST - The battery charge condition is displayed as either

NORMAL (at least eight hours of operation) or LOW (there may not be sufficient charge to operate the instrument for eight hours).

SENSOR CONFIGURATION - Displays the types of installed sensors.

3. Visually check instrument for damage. Visually inspect the digital display after it stabilizes.

B. Testing for carbon monoxide/methane/oxygen:

1. When activated, LTX 310 detects and measures concentrations of carbon monoxide, methane and oxygen in the ambient air continuously and simultaneously.
2. All gas measurements are revealed in the digital liquid crystal display (LCD) and all are displayed simultaneously.
3. Carbon monoxide is measured and displayed in parts per million (ppm), methane and oxygen are displayed in percent by volume.

TMX 410/412 Multi-Gas Monitor

A. Checking instrument:

1. Turn the instrument on by loosening the finger nut at the base and rotate the calibration cover. Rock On/Off switch to the left. The four LED's will flash once and the instrument will emit a short beep.
2. The following start-up screens will be displayed.

DISPLAY TEST - All segments of the display are activated to verify proper operation.

BATTERY TEST - If the battery is not fully charged, the voltage reading will blink. When there is insufficient charge for the instrument to function properly, the display will read BATTERY FAIL (Instrument cannot be used).

SENSOR CONFIGURATION - Displays the types of installed sensors.

CODE - Normal startup continues without any operator response.

3. Visually check instrument for damage. Visually inspect the digital display after it stabilizes.

B. Testing for carbon monoxide/methane/oxygen:

1. When activated, TMX 410/412 detects and measures concentrations of carbon monoxide, methane and oxygen in the ambient air continuously and simultaneously.
2. All gas measurements are revealed in the digital LCD and all are displayed simultaneously.
3. Carbon monoxide is measured and displayed in parts per million (ppm), methane and oxygen are displayed in percent by volume.

STATEMENTS OF FACT MINE RESCUE

1. Three elements must be present for an explosion to occur: fuel, oxygen, and heat (ignition). (Directorate MSHA 2105, p. 51)
2. Permanent seals should be well hitched in the roof, floor, and ribs to make them as airtight as possible. (MSHA 2105, p. 46)
3. Electrical fires are best extinguished by nonconducting agents such as carbon dioxide and certain dry chemicals. (MSHA 2105, pp. 8 & 21)
4. Under no circumstances should ventilation be altered without orders to do so from the command center. (MSHA 2103, p. 5)
5. "Class A" fires are best extinguished by cooling with water or by blanketing with certain dry chemicals. (MSHA 2105, p. 21)
6. The first priority of rescue and recovery operations is team safety. (MSHA 2104, p. 18)
7. The second priority of rescue and recovery operations is the rescue of survivors.(MSHA 2104, p. 18)
8. The third priority of rescue and recovery operations is the recovery of the mine.(MSHA 2104, p. 18)
9. A fresh-air base is established at the point where conditions no longer permit barefaced exploration. (MSHA 2104, p. 7)
10. Hydrogen can be liberated when water or steam comes in contact with hot carbon materials. (MSHA 2105, p. 31)
11. All conductive objects such as cables, track, trolley wire, water lines, belt structures, etc., extending into the explosion area should be severed or removed at or outby the fresh-air base before explorations are started. (MSHA 2104, p.10 and MSHA 2105, pp. 45 & 47)
12. Explosions in coal mines are most often caused by ignitions of methane, coal dust, or a combination of the two. (MSHA 2105, p. 52)
13. An indication of an explosion may be a jump in the pressure recording chart for the main fan. (MSHA 2104, p. 54)

14. Gas readings must be taken in the returns near the fire area to determine if the mine atmosphere is potentially explosive. (MSHA 2105, p. 25)
15. Seals in high volatile coalbeds are often placed 1,000 feet or more from the fire area. (MSHA 2105, p. 37)
16. When sealing a mine fire, you should be careful to ensure that there are no abrupt changes in the ventilation over the fire area. (MSHA 2105, p. 42)
17. Copper tubes or pipes are inserted in temporary and permanent seals for the purpose of collecting air samples from the sealed area. (MSHA 2105, pp. 42 & 47)
18. Before going underground to explore for a fire or to fight a fire, the team should know about any possible ignition sources that may exist in the affected area. (MSHA 2105, p. 23)
19. The team should make sure the main fan is running, a guard is monitoring the operation of the fan, and that tests are being made at the main return for any gases that may be present in the mine, before they go underground. (MSHA 2105, p. 22)
20. Before a fresh-air base is advanced, gas tests should be made in all dead ends and high places between the old and new fresh-air base. (MSHA 2104, p. 15)
21. Your captain may order the team to return immediately to the fresh-air base if a team member's apparatus malfunctions. (MSHA 2104, p. 52)
22. In potentially explosive atmospheres, nonsparking tools, nails, and spads should be used. (MSHA 2104, p. 22)
23. When you have located a barricade, you should try to determine whether the miners inside are still alive and conscious. (MSHA 2106, p. 5)
24. Carbon monoxide is a product of incomplete combustion of any carbon material. (MSHA 2102, p. 35)
25. Opening of seals prematurely can cause a re-ignition of a fire or an explosion. (MSHA 2107, p. 5)
26. Specific gravity is the weight of a gas compared to an equal volume of normal air under the same temperature and pressure. (MSHA 2102, p. 13)
27. The explosive range of methane in air is 5 to 15 volume percent. (MSHA 2102, p. 31)
28. The lower explosive limit of hydrogen is 4.0 percent. (MSHA 2102, p. 67)

29. Acetylene is formed when methane is burned or heated in air having a low oxygen content. (MSHA 2102, p. 45)
30. Continual exposure to hydrogen sulfide may dull the sense of smell. (MSHA 2102, p. 41)
31. The specific gravity of methane is 0.5545. (MSHA 2102, p. 31)
32. The specific gravity of carbon dioxide is 1.5291. (MSHA 2102, p. 29)
33. The specific gravity of carbon monoxide is 0.9672. (MSHA 2102, p. 34)
34. Blackdamp is a mixture of carbon dioxide, nitrogen and air which is oxygen deficient. (MSHA 2102, p. 47)
35. Smoke usually contains carbon monoxide and other toxic or asphyxiating gases produced by fires. (MSHA 2102, p. 48)
36. Breathing air containing 10 percent carbon dioxide causes violent panting and can lead to death. (MSHA 2102, p. 29)
37. The first symptom of carbon monoxide poisoning is a slight tightening across the forehead and possibly a headache. (MSHA 2102, p. 35)
38. High temperatures (or heat) cause gases to expand so they diffuse more quickly. (MSHA 2102, p. 12)
39. It is much easier to remove a concentration of a light gas like methane by ventilation than it is to remove the same concentration of a heavier gas like carbon dioxide. (MSHA 2102, p. 14)
40. Small hydrogen explosions, known as hydrogen "pops" are fairly common in firefighting. (MSHA 2105, p. 31)
41. Explosions, fires, and other disasters frequently result in weakened roof and rib conditions. (MSHA 2107, p. 23)
42. Before a rescue team goes underground, it will attend a briefing session. (MSHA 2104, p. 23)
43. It is the responsibility of rescue team members to have all the information needed to do the work. (MSHA 2104, p. 23)
44. Regulators are used in mine ventilation to regulate airflow to meet the individual needs of each air split. (MSHA 2103, p. 20)

45. Overcasts are used to permit two air currents to cross without the intake air short circuiting to the return. (MSHA 2103, p. 18)
46. When reporting anything to the fresh-air base, be sure you are clearly and correctly identifying locations. (MSHA 2104, p. 48)
47. The lower explosive limit of carbon monoxide is 12.5 percent. (MSHA 2102, p.67)
48. The basic principle of mine ventilation is that air always moves from high to low pressure regions. (MSHA 2103, p. 7)
49. The most positive indicator of the origin of an explosion is the direction in which blocks have moved in or from stoppings across entries near intersections. (MSHA 2103, p. 26)
50. Coking or coke streamers, if encountered, should be reported in location and size. (MSHA 2104, p. 47)

SECTION II

FIRST AID

2001 FIRST AID CONTEST RULES

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Section II

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RULES GOVERNING 2001 FIRST AID CONTESTS

1. Members of First Aid Teams must be bona fide employees of the mining industry.
2. A team shall consist of three working members, one of which will be the patient during Trauma Assessment/Injury Management. If the problem requires a bystander, one will be provided by Contest Officials. The bystander shall be limited to assisting the team only in the area of taking support of fractures, dislocations, or spinal injuries (including maintaining an open airway in the event of a spinal injury). The bystander must be shown the correct method of support and maintaining the open airway by a team member or members after the clock is started but before taking support. If a bystander is available, it will be stated in the problem.
3. The First Aid Contest will consist of two separate stations, one for Trauma Assessment/Injury Management and the other, AV/CPR, in that order. Each team will be required to perform one problem at each station. Teams will be allowed ten minutes after the completion of their first station to re-assemble their equipment and prepare for the next station. AV/CPR will not be performed in the trauma part of the Contest.
4. Each team entering the contest will draw a number to determine the order of performance at the time of registration. Teams sharing equipment must notify the registrar upon registration.
5. Each participating team must be under guard before the start of the contest. If any team or team member receives unauthorized information concerning a contest problem, the team shall be disqualified by the Chief Judge and Final Appeals Committee.
6. No practicing will be allowed on the field before the beginning of the Contest. No First Aid books, training material or timing devices will be permitted in the working area during the working or reading of the problems.
7. All problems will be worked in a designated area (20' X 23') which shall contain only the judges and the teams. Prior to working the problem, team members must perform scene assessment.
8. Only designated officials will be allowed to communicate with teams while teams are working.
9. All Procedures shall be performed as described in the 1998 revised First Aid Manual or in first aid contest skill sheets.

10. Injuries/conditions requiring treatment will be identified by cards taped to the patient at the location of the injury, on the outside of the clothing, or identified by simulated wounds, etc.
11. During the course of the problem, teams may be given a card stating various conditions. Upon completion of treatment of these conditions, resume patient assessment at the point where team left off.
12. Upon entering the Contest field, the team will introduce themselves to the judges.

MATERIALS LIST

The suggested minimum materials for First Aid Teams are as follows:

- Compliment of triangular bandages (sufficient to treat injuries as outlined in First Aid Book)
- Compliment of compress bandages
- Adhesive compresses (Band-Aid)
- Assortment of gauze
- Roller gauze (used only when first-aid book specifies roller gauze)
- 2 Tourniquets
- 4 Blankets
- Scissors
- 8 Pair latex gloves
- 2 Mask/face shields or masks and goggles
- 1 Hot pack
- 1 Cold pack
- 2 Cups
- Pen and paper
- 3 Plastic bags - one gallon size
- Elevating device
- Recording manikin
- 2 Pocket masks with one-way valve
- White bag
- Compliment of splints (appropriate for fractures/dislocations listed in the first-aid book)
- Backboard splint (appropriate for tying fractures/dislocations as outlined in the first-aid book, including 15 ties for spinal injury)
- Air splints and pre-padded splints may be used
- Additional explanation (Backboards may be preassembled, L-shaped splints will be assembled on the field after start of clock.)

Dress

1. All team members shall be dressed alike. Shoes need not be identical.

Timing

1. Judges will require the team to provide a sample CPR tape immediately prior to the start of the AV/CPR problem. (Deep and shallow breaths, deep and shallow compressions, and wrong hand position.)
2. At the Trauma Injury Management Station, the timekeeper shall explain the timing device used.
3. Problems will be kept in unsealed envelopes, retained by the judges, and given to the team when they are ready for the problem. The patient shall be available to the judges for identification of injury locations prior to the working members entering the designated area. The judges will place the patient in the proper position prior to the working members being given the problem.
 - a. The team's material may not be assembled in the designated area until after the clock is started. The manikin may be placed in the designated station prior to performing AV/CPR.
 - b. The working time at the Trauma Injury Management Station will begin when the team starts the timing device and receives the problem.
 - c. Team members must don protective equipment after starting the clock.
 - d. A team member may stop the clock when they have finished working the problem, and the work area has been cleaned of all material and infectious waste, which must be placed in a white trash bag (provided by the team). The judges will consult with the First Aid team upon completion of the problem to verify the working time.
4. After stopping the clock, the team will inform the judges that the patient is ready for inspection. Team members will remain with the patient until released by the judges.

Ties

1. In the event of ties in the contest, Scorecard A (Trauma station) discounts will be the first tie breaker, Scorecard B (AV/CPR) discounts will be the second tie breaker, and the third tie breaker will be the Team's actual working time.

Appeals

1. Upon completion of the examination of the patient by the judges, the team shall be informed of any infractions regarding treatment while still at the trauma station. The team will be permitted to verbally appeal any infractions either with the field judges or the supervising judge. If not resolved, the chief judge will make the final decision.
2. During the verbal appeal process, all questionable splints/dressings shall remain intact until the appeal is resolved. If any questionable splints/dressings are removed or altered by the team prior to being resolved, the appeal shall not be allowed.
3. Teams will have one hour, after being notified to report to Final Appeals. Once notified, the team shall have 20 minutes for reviewing the Scorecards and to prepare any protest. All protests shall be in writing and shall clearly state the team's comments to the discount in question. All protests will be considered by the Final Appeals Committee, and a decision will be binding and final.

Discounts

1. No materials other than those stated on the Minimum Materials List can be used during the working of the contest. __5
2. When the team encounters profuse bleeding, no work other than controlling bleeding and dressing the wound shall be done until bleeding is controlled. Bleeding is controlled when the dressing for that wound is secure unless otherwise stated by the Judge. If treatment has been started and one team member can complete that treatment, the other team member may continue work. __10 for each infraction
3. If patient is conscious, he/she can talk but cannot direct or assist unless stated in the problem. __ 5 for each infraction
4. Handling of a patient by a team or team member in such a manner that could compromise condition of the patient. __5 for each infraction

5. Failure to treat a condition. __10 for each infraction
6. Pre assembly of material, except for broken back board splint. __5
7. Failure to complete the problem in the calculated time, for each three minutes overtime, or fraction thereof (not to exceed 10 points)__1

The calculated time will be determined by averaging the working time of all teams participating in the Contest.

8. Failure to perform a PROCEDURE as identified on the skill sheets.__5 for each infraction
9. Failure to perform a CRITICAL SKILL as identified on the skill sheets.__1 for each infraction
10. Failure to don protective equipment prior to patient contact (gloves, masks and eye protection-eyeglasses are acceptable). Bystanders, if used, will not be required to wear protective equipment.__5 for each infraction.
11. Gloves must be changed if there would be provider contamination because of a glove tear or due to other contamination.__2 for each infraction
12. During the AV/CPR, a barrier device must be used when ventilating the manikin. The face masks/shields may be removed when giving artificial ventilation, inflating splints, etc.__10 for each infraction
13. Violations of or failure to follow general rules. __2

PATIENT ASSESSMENT TRAUMA

PROCEDURE	CRITICAL SKILL
1. SCENE SAFETY	A. OBSERVE AREA TO ENSURE SAFETY _____
2. MECHANISM OF INJURY	A. DETERMINE CAUSES OF INJURY, IF POSSIBLE _____ B. ASK PATIENT WHAT HAPPENED _____ C. HAVE SOMEONE CALL FOR ASSISTANCE _____ D. CONSIDER STABILIZATION OF SPINE _____
3. INITIAL ASSESSMENT	A. VERBALIZE GENERAL IMPRESSION OF THE PATIENT _____ B. DETERMINE RESPONSIVENESS/LEVEL OF CONSCIOUSNESS _____ C. DETERMINE CHIEF COMPLAINT/APARENT LIFE THREATS _____
4. ASSESSES AIRWAY AND BREATHING	A. CORRECTLY EXECUTE HEAD-TILT/CHIN-LIFT OR JAW THRUST MANEUVER DEPENDING ON THE PRESENCE OF C-SPINE INJURIES _____ B. LOOK, LISTEN AND FEEL _____ C. DETERMINE PRESENCE OF BREATHING IN 3-5 SECONDS _____
5. ASSESSES CIRCULATION	A. CHECK CAROTID PULSE _____ B. IF ABSENT, BEGIN CPR _____ C. IF PRESENT, CONTROL BLEEDING _____
6. DETERMINE PRIORITY OF PATIENT	A. VERBALLY RELAY TO JUDGE "WILL TRANSPORT AS SOON AS POSSIBLE" _____
7. DETAILED PHYSICAL EXAMINATION ASSESS: (a) HEAD	A. INSPECT AND TOUCH THE SCALP AND EARS _____ B. ASSESS THE EYES _____ C. ASSESS THE FACIAL AREAS INCLUDING ORAL AND NASAL AREAS _____

(b) NECK	A. INSPECT AND TOUCH THE NECK _____ B. EXAMINE FOR SPINAL FRACTURE _____ C. INSPECT FOR MEDICAL ID _____
(c) CHEST	A. INSPECT FOR INJURY BY TOUCH _____
(d) ABDOMEN	A. INSPECT FOR INJURY BY TOUCH _____
(e) PELVIS	A. INSPECT FOR INJURY BY TOUCH _____
(f) ARMS AND LEGS	A. INSPECT FOR INJURY BY TOUCH _____ B. CHECK FOR PARALYSIS _____ C. CHECK FOR MEDICAL ID BRACELET _____
(g) BACK SURFACES	A. INSPECT FOR INJURY BY TOUCH _____

MOUTH TO MASK RESUSCITATION

PROCEDURE	CRITICAL SKILL
1. ESTABLISH UNRESPONSIVENESS	A. TAP OR GENTLY SHAKE SHOULDERS _____ B. SHOUT, "ARE YOU OKAY?" _____ C. DETERMINE UNCONSCIOUSNESS WITHOUT COMPROMISING C-SPINE INJURY _____ D. SAY ALOUD, "CALL 911" _____
2. ESTABLISH AIRWAY	A. CORRECTLY EXECUTE HEAD-TILT/CHIN-LIFT OR JAW THRUST MANEUVER DEPENDING ON THE PRESENCE OF C-SPINE INJURIES _____
3. MONITOR PATIENT FOR BREATHING	A. LOOK, LISTEN, AND FEEL FOR BREATHING _____ B. DETERMINE THE ABSENCE OF BREATHING IN 3-5 SECONDS _____
4. VENTILATE PATIENT	A. PLACE BARRIER DEVICE (POCKET MASK WITH ONE-WAY VALVE) ON MANIKIN _____ B. VENTILATE PATIENT 2 TIMES AT 1.5-2 SECONDS INTERVALS EACH – MINIMUM OF .8 TO A MAXIMUM OF 2 LITERS PER BREATH _____
5. CHECK FOR CAROTID PULSE	A. CORRECTLY LOCATE THE CAROTID PULSE (ON THE SIDE OF THE RESCUER). _____ B. CHECK FOR PRESENCE OF CAROTID PULSE FOR 5 TO 10 SECONDS _____ C. VERBALIZE PRESENCE OF PULSE _____
6. VENTILATE PATIENT	A. PLACE BARRIER DEVICE (POCKET MASK WITH ONE WAY VALVE) ON MANIKIN. _____ B. VENTILATE PATIENT AT LEAST 12 TIMES A MINUTE. EACH VENTILATION WILL BE PROVIDED AT A MINIMUM OF .8 TO A MAXIMUM OF 2 LITERS PER BREATH. _____
7. CHECK FOR RETURN OF BREATHING AND PULSE	A. AFTER PROVIDING THE REQUIRED NUMBER OF BREATHS (OUTLINED IN PROBLEM), CHECK FOR RETURN OF BREATHING AND CAROTID PULSE FOR 3 TO 5 SECONDS. _____ B. STATE "PATIENT IS BREATHING AND HAS A PULSE" _____

CONTROL OF PROFUSE BLEEDING

PROCEDURE	CRITICAL SKILL
1. DIRECT PRESSURE & ELEVATION	A. APPLY STERILE DRESSING TO WOUND _____ B. APPLY DIRECT PRESSURE WITH HAND _____ C. IF WOUND IS ON EXTREMITY, ELEVATE IF THERE IS NO FRACTURE, DISLOCATION, IMPALED OBJECTS OR POSSIBLE SPINAL INJURIES _____ D. TIE PRESSURE BANDAGE IN PLACE _____ NOTE: If notified by Judge that bleeding is not controlled, go to Procedure 2
2. PRESSURE POINTS	A. APPLY PRESSURE TO APPROPRIATE PRESSURE POINT AND NOTIFY JUDGE VERBALLY THAT BLEEDING IS CONTROLLED. _____
3. DRESSING	A. APPLY COVER BANDAGE _____

**AIRWAY OBSTRUCTION (UNCONSCIOUS VICTIM - UNWITNESSED)
(MANIKIN ONLY)**

PROCEDURE	CRITICAL SKILL
1. ESTABLISH UNRESPONSIVENESS	A. TAP OR GENTLY SHAKE SHOULDERS _____ B. SHOUT, "ARE YOU OK?" _____ C. DETERMINE UNCONSCIOUSNESS _____ D. SAY ALOUD, "CALL 911" _____
2. ESTABLISH AIRWAY	A. CORRECTLY EXECUTE HEAD-TILT/ CHIN-LIFT OR JAW THRUST MANEUVER _____
3. MONITOR PATIENT FOR BREATHING	A. LOOK, LISTEN, FEEL FOR AIR _____ B. DETERMINE THE ABSENCE OF BREATHING IN 3-5 SECONDS _____
4. ATTEMPT VENTILATION	A. PLACE BARRIER DEVICE ON MANIKIN _____ B. ATTEMPT TO GIVE SLOW FULL BREATH _____ C. IDENTIFY THERE IS AN OBSTRUCTION _____
5. CHECK POSITIONING	A. REESTABLISH AIRWAY USING CORRECT METHOD AND PROCEDURE _____ B. IDENTIFY CONTINUED PRESENCE OF THE OBSTRUCTION BY RE-ATTEMPTING TO VENTILATE _____
6. DELIVER ABDOMINAL THRUST	A. STRADDLE THE VICTIM'S THIGHS _____ B. PLACE HEEL OF ONE HAND AGAINST THE VICTIM'S ABDOMEN, MIDLINE SLIGHTLY ABOVE THE NAVEL AND WELL BELOW XIPHOID _____ C. PLACE SECOND HAND ON TOP OF FIRST _____ D. DELIVER QUICK UPWARD THRUST _____ E. EACH THRUST ADMINISTERED WITH INTENTION OF RELIEVING OBSTRUCTION _____ F. DELIVER 5 THRUSTS _____ G. FOLLOW WITH OPENING MOUTH AND FINGER SWEEP _____ H. ATTEMPT ARTIFICIAL VENTILATION _____ I. REPEAT THE PROCEDURES UNTIL OBSTRUCTION IS CLEARED _____

BANDAGING OPEN WOUNDS

PROCEDURE	CRITICAL SKILL
1. GENERAL CARE FOR OPEN WOUNDS	A. VERBALIZE EXPOSING AND CLEARING WOUND SURFACE. _____ B. VERBALIZE PREVENTING FURTHER CONTAMINATION. _____
2. APPLY DRESSING/BANDAGE AS OUTLINED IN THE 1998 MSHA FIRST AID BOOK FOR SELECTED INJURY	THIS SECTION OF THE CRITICAL SKILLS WILL OUTLINE THE BANDAGING PROCEDURES FOR THE WOUNDS SELECTED FOR THE CONTEST FROM THE REVISED 1998 MSHA FIRST AID BOOK.
3. BANDAGING PRINCIPLES	A. COVER ENTIRE WOUND _____ B. DO NOT BANDAGE TOO TIGHTLY _____ C. DO NOT BANDAGE TOO LOOSELY _____ D. DO NOT LEAVE LOOSE ENDS _____ E. COVER ALL EDGES OF DRESSING _____ F. DO NOT COVER THE TIPS OF FINGERS AND TOES WHEN APPROPRIATE _____

**ONE RESCUER CPR
(MANIKIN ONLY)
AMERICAN HEART ASSOCIATION GUIDELINES**

PROCEDURE

CRITICAL SKILL

<p>1. ESTABLISH UNRESPONSIVENESS</p>	<p>A. TAP OR GENTLY SHAKE SHOULDERS _____</p> <p>B. SHOUT, "ARE YOU OK?" _____</p> <p>C. DETERMINE UNCONSCIOUSNESS WITHOUT COMPROMISING C-SPINE INJURY _____</p> <p>D. SAY ALOUD, "CALL 911" _____</p>
<p>2. ESTABLISH AIRWAY</p>	<p>A. CORRECTLY EXECUTE HEAD-TILT/ CHIN-LIFT OR JAW THRUST MANEUVER DEPENDING ON THE PRESENCE OF C-SPINE INJURIES _____</p>
<p>3. MONITOR PATIENT FOR BREATHING</p>	<p>A. LOOK, LISTEN, FEEL FOR AIR _____</p> <p>B. DETERMINE THE ABSENCE OF BREATHING IN 3-5 SECONDS _____</p>
<p>4. VENTILATE PATIENT</p>	<p>A. PLACE BARRIER DEVICE (POCKET MASK WITH ONE-WAY VALVE) ON MANIKIN _____</p> <p>B. VENTILATE PATIENT 2 TIMES AT 1.5-2 SECOND INTERVALS EACH - MINIMUM OF .8 TO A MAXIMUM OF 2 LITERS PER BREATH _____</p>
<p>5. CHECK FOR CAROTID PULSE</p>	<p>A. CORRECTLY LOCATE THE CAROTID PULSE (ON THE SIDE OF THE RESCUER). _____</p> <p>B. CHECK FOR PRESENCE OF CAROTID PULSE FOR 5 TO 10 SECONDS. _____</p> <p>C. VERBALIZE ABSENCE OF PULSE. _____</p>
<p>6. POSITION FOR COMPRESSIONS</p>	<p>A. KNEEL BY VICTIM'S SHOULDERS _____</p> <p>B. VISUALIZE MID POINT "IN THE CENTER OF THE CHEST, RIGHT BETWEEN THE NIPPLES" AND PLACE HANDS IN PROPER POSITION FOR COMPRESSIONS. _____</p> <p>C. DO NOT ALLOW FINGERS TO REST ON THE CHEST. _____</p>

<p>7. DELIVER CARDIAC COMPRESSIONS</p>	<p>RECORDING TAPE WILL BE USED TO JUDGE THE FOLLOWING CRITICAL SKILLS.</p> <p>A. DOWNSTROKE OF COMPRESSION MUST BE ON OR BETWEEN COMPRESSION LINES. _____</p> <p>B. NUMBER OF COMPRESSIONS _____</p> <p>C. RETURN TO BASELINE ON UPSTROKE OF COMPRESSION _____</p>
<p>8. VENTILATIONS BETWEEN COMPRESSIONS</p>	<p>RECORDING TAPE WILL BE USED TO JUDGE THE FOLLOWING CRITICAL SKILLS</p> <p>A. VENTILATE PATIENT 2 TIMES AT 1.5-2 SECOND INTERVALS EACH - A MINIMUM OF .8 LITERS PER BREATH TO A MAXIMUM OF 2 LITERS PER BREATH. _____</p> <p>B. COMPLETE BREATHS AND RETURN TO COMPRESSIONS IN 4-7 SECONDS (THIS WILL BE MEASURED FROM THE PEAK OF LAST DOWNSTROKE TO PEAK OF FIRST DOWNSTROKE OF THE NEXT CYCLE). _____</p>
<p>9. CONTINUE CPR FOR TIME STATED IN PROBLEM</p>	<p>A. WHEN MULTIPLE SETS OF CPR ARE REQUIRED, RECHECK FOR RETURN OF PULSE (3-5 SECONDS) WILL BE REQUIRED AFTER FIRST SET, AND AFTER EVERY THIRD SET THEREAFTER. A FINAL PULSE CHECK (3-5 SECONDS) WILL BE REQUIRED AT THE END OF THE LAST SET OF CPR AS REQUIRED BY THE PROBLEM. _____</p> <p>B. 7-12 SECONDS WILL BE ALLOWED TO COMPLETE VENTILATIONS AND REQUIRED PULSE CHECKS BETWEEN SETS (THIS WILL BE MEASURED FROM THE PEAK OF THE LAST DOWNSTROKE OF ENDING SET TO THE PEAK OF THE DOWNSTROKE OF THE BEGINNING SET). _____</p>

TWO-PERSON LOG ROLL

PROCEDURE	CRITICAL SKILL
1. STABILIZE HEAD	A. STABILIZE THE HEAD AND NECK _____
2. PREPARING THE VICTIM	A. PLACE BOARD PARALLEL TO THE PATIENT _____ B. KNEEL AT THE LEVEL OF THE VICTIM'S SHOULDERS OPPOSITE THE BOARD LEAVING ROOM TO ROLL THE PATIENT TOWARD KNEES _____ C. RAISE THE VICTIM'S ARM, IF NOT INJURED (THE ONE CLOSER TO THE RESCUER) ABOVE THE VICTIM'S HEAD _____
3. PREPARING THE RESCUER	A. GRASP THE VICTIM AT THE SHOULDER AND PELVIS AREA _____ B. GIVE INSTRUCTIONS TO BYSTANDER, IF USED TO SUPPORT _____
4. ROLLING THE VICTIM	A. WHILE STABILIZING THE HEAD, THE VICTIM IS ROLLED TOWARD THE RESCUER BY PULLING STEADILY AND EVENLY AT THE SHOULDER AND PELVIS AREAS _____ B. THE HEAD AND NECK SHOULD REMAIN ON THE SAME PLANE AS THE TORSO _____ C. MAINTAIN STABILITY BY HOLDING PATIENT WITH ONE HAND AND PLACING BOARD WITH OTHER _____ D. ROLL THE BODY AS A UNIT ONTO THE BOARD (BOARD MAY BE SLANTED OR FLAT) _____ E. PLACE THE ARM ALONGSIDE THE BODY _____
5. SECURING PATIENT TO BOARD	A. SECURE THE PATIENT'S BODY, TORSO, LEGS, AND HEAD TO THE ALREADY PREPARED BOARD WHILE HEAD SUPPORT IS MAINTAINED _____ B. SECURE THE PATIENT'S HEAD TO THE BOARD _____ C. TIE THE WRISTS TOGETHER UNLESS INJURY PREVENTS _____

CARE OF FRACTURES/DISLOCATIONS

PROCEDURE	CRITICAL SKILL
<p>1. GENERAL PRINCIPLES</p>	<p>A. TAKE SUPPORT IMMEDIATELY (IF REQUIRED) UPON DISCOVERY OF FRACTURE/DISLOCATION. _____</p> <p>B. CLOTHING REMOVED TO EXPOSE INJURY. _____</p> <p>C. DO NOT ATTEMPT TO PUSH BONES BACK THROUGH OPEN WOUND. _____</p> <p>D. DO NOT ATTEMPT TO STRAIGHTEN FRACTURE/DISLOCATION. _____</p> <p>E. ALL WOUNDS ON THE EXTREMITY SHALL BE DRESSED AND BANDAGED BEFORE WORK ON SPLINTING IS BEGUN. _____</p>
<p>2. APPLY SPLINT AS OUTLINED IN 1998 MSHA FIRST AID MANUAL FOR SELECTED INJURY</p>	<p>THIS SECTION OF THE CRITICAL SKILLS WILL OUTLINE THE CARE OF FRACTURES/DISLOCATIONS OF INJURIES SELECTED FOR THE CONTEST FROM THE REVISED 1998 MSHA FIRST AID BOOK</p>

SECTION III

BENCH

2001 BENCH CONTEST RULES

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Section III

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RULES GOVERNING 2001 BENCH CONTESTS AND INTERPRETATIONS OF DISCOUNT CARDS

1. Each participant must be under guard before the start of the Contest in a location assigned by the Chief Judge and must remain continuously under guard until time to work the problem. Participants under guard must be in a location where they will be unable to obtain any information concerning the problem to be worked. Any participant receiving information concerning a Contest problem prior to starting to work the problem will be disqualified by the Chief Judge and the Assistant Chief Judge. No person, except guards and Contest officials assigned to give the written examination, will be allowed to communicate with any participant under guard. Those who have performed will not be permitted to communicate with any participant awaiting their turn to perform.
2. Any indication of receiving unauthorized information during the working of the problem may result in disqualification as determined by the Chief Judge and the Assistant Chief Judge. No one except judges, Contest officials, and working participants will be permitted in the work area, unless special approval is given by the Chief Judge. Communication with bench participants, except for the judges, is prohibited. News media and photographers who wish to be in the working area must receive permission from the Co-Directors and be accompanied by a Contest official.
3. Any bench participant not in place and ready at the time specified will be disqualified from the Contest.
4. The bench participant will be provided with two BG-174A apparatus (one disassembled, one assembled), an RZ-25 tester, a stopwatch, defogging solution, and leak detector fluid. The work at the bench will consist of (1) a visual examination of a disassembled BG-174A and the proper assembly and preparation for use in rescue work. This will include correcting any predetermined problem(s) so that the apparatus is in proper working order. Simulating defogging of the facepiece lens will be done as part of the visual examination. This visual examination, correcting predetermined problem(s), and proper assembly can be done at any time allowed for working of the problem. (2) Test the assembled BG-174A apparatus with a RZ-25 tester, and correct the predetermined problem(s) so that the apparatus is in proper working condition. Except for removing the test cap from the breathing hoses at the double socket connection, the assembled BG-174A apparatus cannot be disassembled to look for problems, until the hoses are attached to the RZ-25 tester. When testing is completed on the assembled BG-174A apparatus, the hoses shall be removed from the tester, connected to the facepiece, and the back cover installed. This shall be done before the clock is stopped.

5. Spare parts to correct the predetermined problem(s) will be provided once the bench participant has specifically identified the problem. This will require the participant to point out the exact location of the deficiency. (Example: Positive pressure leak in the breathing bag. Participant will identify the location of the hole.)
6. When an unplanned deficiency is encountered with the apparatus, the participant will be notified by the judges that the deficiency is not part of the problem. The judge will stop the clock, and any time used to correct the deficiency will not be charged to the working time. However, the process of verbal elimination shall not be used by the bench participant to find the predetermined problem(s). If it becomes obvious to the judges that this is occurring, the first offense will result in a warning, the second offense a discount, and the third offense could result in disqualification as determined by the Chief Judge. (Example: Participant verbally identifies a deficiency with every part of the facepiece when only one predetermined problem exists.)
7. The bench participant will not be allowed to bring any materials, written information, or records to the work site. The participant will not have to create a test record; however, he or she may write the test from memory on paper that will be provided for that purpose after the official working time has started.
8. Tests will be performed in sequence on the assembled BG-174A apparatus using the standard test procedures with the RZ-25 tester as outlined in the Draeger BG-174A Test, Maintenance and Troubleshooting Manual (July 1996, edition).
9. A maximum of 30 minutes will be allowed to complete the problem. The bench judge will inform the participant when he has one minute remaining to work the problem. At the completion of the problem, the judge(s) and the participant will note the working time of the problem with the official timekeeper. Work done after the clock is stopped will not be recognized.
10. Manually abusing or intentionally over or under pressurizing the RZ-25 tester substantially will be considered abusing the equipment. If the participant is observed abusing the RZ-25 tester, the first offense will result in a warning, the second offense will result in a discount, and the third offense could result in disqualification as determined by the Chief Judge.

A. Written Examination of Bench Participant

1. The written examination shall consist of 30 questions. Twenty questions for the written examination will be taken verbatim from the Statements of Fact which will be fill in the blank and each blank shall represent a key word with no more than three blanks per statement. Ten questions will be taken verbatim from identification of parts. Thirty minutes will be allowed for the written examination.
2. In special circumstances, individual bench participants may be given oral instead of written examinations by at least two judges. Requests for consideration shall be presented to the Co-Directors of the Contest at the time of registration.
3. Bench participants will be separated to the extent possible, and every effort will be made to prohibit discussion of questions and answers among the bench participants.

B. Miscellaneous

1. In the event of ties in the Bench Contest, the number of discounts at bench will be the first tie breaker; the number of discounts on written examination will be the second tie breaker; and the official working time at bench in minutes and seconds will be the third tie breaker.
2. The bench participant and trainer will report to a designated location to review and prepare protests within one hour of notification. Twenty minutes will be given to review and prepare written protests. All protests will be considered by the Chief Judge and his/her Assistant and their decision will be binding.
3. Bench participants must be bonafide employees of the mining industry or members of mine rescue teams designated to fulfill the requirements of 30 CFR Part 49. This does not exclude bench participants whose team is not participating at the National Contest.
4. Disputes with regard to the Bench Contest (except discounts), shall be immediately filed with the Co-Directors. Disputes filed shall be in writing and set forth incidents, times, names source of information and act complained against. Complainant shall remain accessible to the Co-Directors until the complaint is resolved. A decision by the Co-Directors shall be final.

Interpretations of Discount Sheet

A. Written Examination

1. For each incorrect answer _____ 1

B. Time

The time will be recorded in minutes and seconds.

C. Competition at Bench

1. Failure to verbally identify each test being conducted _____ 2

Verbally identify each test being performed.

2. Failure to verbally identify each problem _____ 5

Failure to verbally identify is also interpreted as failure to find the problem.

3. Failure to correct each problem _____ 5

The bench participant shall properly correct the problem and continue with the proper tests. Once a bench participant finds a predetermined problem and does not correct it before continuing with the remaining tests, he/she shall receive a five point discount for continuing without correcting the problem and a pending five point discount for failing to correct the problem. If all of the remaining tests are properly conducted and passed and the participant returns to the uncorrected problem and corrects it, the pending five point discount will not be assessed. Should the participant continue on from this point and properly conduct all of the remaining tests again, he/she would also have the original five point discount for continuing tests removed.

4. Failure to conduct any visual examination or test on the BG-174A, each test _____ 5

5. Failure to tighten connections properly during assembly or testing, each connection _____ 1

All connections must be tightened on the apparatus and verbally identified as hand tight or wrench tight at the time the connection is tightened. Failure to verbally identify at the time the connection is being tightened will result in a one point discount for each. Zero adjustments shall be made on RZ tester prior to connecting the breathing hoses to the RZ-25 tester.

This includes:

- .Hose adapter on the RZ-25 - hand tight
- .Screw ring cover on lung demand valve assembly - hand tight
- .Absorbing cartridge connections - hand tight
- .Plug on training canister (if applicable) - wrench tight
- .Breathing bag - hand tight
- .Supplementary oxygen line connection at lung demand valve - hand tight
- .Pre-flush/dosage line connection - hand tight
- .Cylinder connections - hand tight
- .Locking screw on saliva trap - wrench tight
- .Breathing hoses (once testing has begun or during the visual examination on the disassembled apparatus) - hand tight

Once the zero adjustment on the tester has been made, do not readjust setting for balance of tests.

6. Failure to comply with rules not covered in discount sheet, each infraction_____2

If the discount is not listed on the discount sheet, and if it is not covered under one of the approved rules of the Contest, do not improvise a discount to cover the suspected violation.

D. Visuals

1. Failure to conduct a proper visual examination of the frame/harness_____1

The visual examination will include an examination of the harness assembly, frame, back cover, visible sealing rings, external gage, O₂ regulator, and warning whistle. Failure to examine and verbally identify the examination will result in one discount for each. (Maximum 4 points)

2. Failure to conduct a proper visual examination of the breathing bag_____1

The participant will verbally identify that the breathing bag is being examined for pliability and signs of deterioration. Stretching or manipulating the breathing bag with a massaging action will be part of this examination. The participant will verbally identify that the o-ring and sealing rings are being examined for signs of deterioration. Failure to

examine and verbally identify the examination will result in one discount for each. (Maximum 2 points)

3. Failure to conduct a proper visual examination of the O₂ cylinder_____1

A proper cylinder examination includes a visual inspection of the cylinder. The participant will verbally identify the cylinder pressure on the gage, the pressure rating on cylinder, the hydrostatic test date, and identify if the cylinder is plus rated. Participant will inform the judge if the cylinder pressure is less than 1,400 PSI. Failure to examine and verbally identify the examination will result in one discount for each. (Maximum 4 points)

4. Failure to conduct a proper visual examination of the regenerative canister_____1

A proper examination includes a visual inspection for dents and defects. If a factory packed canister is used, verbally identify that the seal(s) is/are in place, and identify the expiration date with month and year. If a training canister is used, only the visual inspection for dents and defects is required. Failure to examine and verbally identify the examination will result in one discount for each. (Maximum 3 points)

5. Failure to conduct a proper visual examination of the facepiece_____1

The visual examination will include an examination of the head strap assembly, mask body (including sealing edges), the lens, speaking diaphragm, wiper, and neck strap. Failure to examine and verbally identify the examination will result in one discount for each. (Maximum 4 points)

6. Failure to conduct a proper visual examination of the hoses_____1

The participant will verbally identify that the hoses are being inspected for pliability and signs of deterioration. Stretching or manipulating the hoses with a massaging action will be part of this examination. The participant will verbally identify that the o-rings and sealing rings, including the sealing ring on the saliva trap, are being examined for signs of deterioration. Failure to examine and verbally identify the examination will result in one discount for each. (Maximum 2 points)

E. RZ-25 Tester

1. Failure to conduct the proper exhalation valve test_____2

Cap off exhalation hose and connect inhalation hose to exhalation valve connection on apparatus. Set RZ-25 tester on negative pressure pumping, gently activate bellows, and watch breathing bag. If valve is operating properly, bag should not begin to deflate after five seconds.

2. Failure to conduct a proper inhalation valve test_____2

Remove hose from exhalation valve and connect to inhalation valve. Set RZ-25 tester on positive pressure pumping, gently activate bellows and watch breathing bag. If valve is operating properly, bag should not begin to inflate after five seconds.

3. Failure to conduct a proper relief valve test_____2

Remove cap from exhalation hose and connect to apparatus. The RZ-25 tester is set on positive pressure pumping. Activate bellows and listen for opening of relief valve once breathing bag is full. Valve should open between +10 mm H₂O (+1 mbar) and +40 mm H₂O (+4 mbar). Participant will verbally identify reading of opening of valve. This indication can also be felt by wetting skin between index and middle finger and holding in front of hole in relief valve cover.

NOTE: A more precise test of opening pressure for relief valve can be made by opening cylinder valve (with tester set on negative pressure pumping) and setting tester on leak test. Flow of oxygen from constant dosage will cause relief valve to open with opening pressure indicated on tester gage. If this alternative test is used, it must be done after the completion of the preflush/pressure gage equalization test.

4. Failure to conduct a proper positive pressure leak test_____2

Set RZ-25 tester on positive pressure pumping. Plug opening in pressure relief valve cover and warning whistle. Activate bellows until needle on tester reads +100 mm H₂O or +10 mbar. Switch to leak test. Bleed needle down to +70 mm H₂O or +7 mbar and start stopwatch. Needle should not drop more than 10 mm or 1 mbar in 60 seconds. (Other work can be done during this time.)

5. Failure to conduct a proper negative pressure leak test_____2

Remove plug from relief valve cover. Set tester on negative pressure pumping and activate bellows until needle on tester reads -100 mm H₂O or -10 mbar. Switch to leak test. Bleed needle up to -70 mm H₂O or -7 mbar and start stopwatch. Needle should not rise more than 10 mm H₂O or 1 mbar in 60 seconds. Remove whistle cover after test. (Other work can be done during this time.) Participant may use his/her hand to assist in deflating the bag.

6. Failure to conduct a proper pre-flush/pressure gage equalization test_____2

Remove whistle cover from warning whistle. Set tester on negative pressure pumping. Open cylinder valve and watch breathing bag. Bag should completely inflate and there should be a short chirp of the whistle. Cylinder gage and external pressure gage should equalize to within +10 percent of each other. The participant will verbally identify the reading of the cylinder gage and the external pressure gage.

7. Failure to conduct a proper breathing bag volume test_____2

Set RZ-25 tester on negative pressure pumping. With breathing bag full, activate bellows and listen for lung demand valve opening. Valve should not open before tenth stroke of bellows.

8. Failure to conduct a proper lung demand valve test_____2

Set RZ-25 tester on negative pressure pumping and open cylinder valve. Activate bellows and listen for lung demand valve opening. Valve should open between -10 mm H₂O (-1 mbar) and -40 mm H₂O (-4 mbar). Participant will verbally identify reading of opening of valve.

9. Failure to conduct a proper constant dosage/bypass test_____2

Deflate breathing bag. Set RZ-25 tester to red dosage and plug pressure relief valve cover. Activate bypass valve and listen for flow of oxygen into the circuit as bag inflates. Release bypass button when needle has reached 1.7 LPM on the outside red scale. Remove plug from relief valve after test. Participant will verbally identify final reading.

10. Failure to conduct a proper whistle activation test_____2

Close cylinder valve and watch external pressure gage. Whistle should activate at approximately 700 PSI for a four hour apparatus. Participant will verbally identify reading when whistle was activated. (The participant may use the manual bypass valve to bleed down the gage, but must release the valve before the whistle is activated.)

11. Failure to conduct a proper whistle duration manual cut-off test_____2

Lift manual cut-off lever on the oxygen distributor, open cylinder valve (with RZ-25 tester set on negative pressure pumping) and start stopwatch. Stopwatch will be stopped when 60 seconds pass. Participant will verbally identify duration of whistle and reading on external gage. Return manual cut-off lever to original position and place the pressure gage back into the protective cover. (No other work can be done during this test.)

12. Failure to conduct a proper high and medium pressure leak test_____2

Before turning off the cylinder valve, coat the high and medium pressure lines (connections) with a leak detector solution and observe for leaks (formation of bubbles). This test can be simulated, however, the bench participant shall physically touch each connection with the bottle tip of the leak detector solution (closed). Tests can be conducted anytime while the apparatus is pressurized. Shut off cylinder valve after test.

STATEMENTS OF FACT BENCH CONTEST

1. The positive pressure leak test is to insure that no oxygen escapes to the outside atmosphere during operation of apparatus.
2. A leaking diaphragm will create a low opening pressure.
3. An old diaphragm which has lost its flexibility due to age will create a high opening pressure.
4. The pressure relief valve is designed to open when the pressure within the breathing circuit is between +10 and +40 millimeters (+1 mbar and +4 mbar) of pressure measured on the water gage.
5. Once zero adjustment has been made on RZ-25 tester, do not readjust setting for balance of tests.
6. All connections must be tightened on apparatus and zero adjustment made on RZ-25 tester prior to connecting breathing hoses to apparatus.
7. The exhalation valve should allow the breathing air to pass in only one direction toward the regenerative canister.
8. During the exhalation valve test, if valve is operating properly, breathing bag should not deflate.
9. The inhalation valve should only allow the breathing air to pass in one direction toward the face mask.
10. During testing of the inhalation valve, if valve is operating properly, the breathing bag should not inflate.
11. During the positive pressure leak test, the needle on the RZ-25 tester should not drop more than 10 mm H₂O or 1 mbar in 60 seconds.
12. The screw ring cover on the lung demand valve assembly and connections on the breathing bag are hand tight connections.
13. The negative pressure leak test is to insure that no toxic gases enter the breathing circuit during operation of the apparatus.
14. During the negative pressure leak test, the needle of the RZ-25 tester should not rise more than 10 mm H₂O or 1 mbar in 60 seconds.

15. The BG-174A is equipped with a pre-flushing device which automatically purges the nitrogen rich ambient air, initially found in the breathing circuit, with pure oxygen.
16. Once the oxygen cylinder valve is opened and the unit is charged with oxygen, the pressure gage on the oxygen cylinder and the chest gage on the flexible line must equalize to within 10 percent of one another.
17. All BG-174A oxygen cylinders that show zero pressure on the gage must be purged and vacuumed to remove any contaminant or moisture that may have entered due to lack of pressure in the cylinder.
18. The lung demand valve automatically goes into action if more than the allotted dosage of 1.4 - 1.7 LPM of oxygen is consumed by the wearer.
19. During the lung demand valve test, the valve should open between -10 mm H₂O (-1 mbar) and -40 mm H₂O (-4 mbar).
20. The breathing bag volume test is done to insure that the breathing bag has correct volume, which should be at least five liters.
21. Each complete stroke of bellows on the RZ-25 tester is equal to 0.5 liter.
22. During the bypass test, a failure of the bypass valve to instantly provide oxygen into and fill the breathing bag at a rate of approximately 50 LPM in less than 10 seconds is an indication of an internal failure in the oxygen distributor.
23. Constant dosage in the BG-174A is preset at approximately 1.5 liters/minute.
24. Three factors affecting constant dosage are: diameter of dosage orifice, constant pressure, and elevation and atmospheric pressure.
25. The dosage orifice within the oxygen distributor has an opening of approximately 0.17 mm.
26. Oxygen under a constant pressure of 57 PSI is forced through the orifice at an approximate rate of 1.5 liters/minute.
27. The constant pressure of 57 PSI is maintained by the reciprocating action in the oxygen distributor.
28. During the constant dosage test, the breathing bag is deflated, the RZ-25 tester is set to red dosage, and the pressure relief valve cover is plugged.

29. During the constant dosage test, the needle of the RZ-25 tester should automatically settle between 1.4 and 1.7 LPM.
30. Although the RZ-25 tester measures dosage, it is not a flowmeter.
31. The RZ-25 tester is operated by over pressurizing the breathing circuit.
32. The pre-flush/dosage line connection is tightened by hand.
33. The plug on the training canister is tightened by wrench.
34. When it is assured that all hand tight and wrench tight connections are securely fastened, low dosage can usually be attributed to a damaged o-ring or washer.
35. Any leak in the breathing circuit will prevent the apparatus from over pressurizing, thus indicating a low dosage.
36. The oxygen cylinder connection is tightened by hand.
37. The locking screw on the saliva trap is tightened by wrench.
38. The hose adapter on the RZ-25 tester is tightened by hand.
39. The breathing hoses are tightened by hand.
40. During the constant dosage test, a reading of less than 1.4 LPM is low dosage.
41. A high dosage indication can almost always be attributed to a leak at the valve head inside the lung demand valve.
42. An internal leak at the valve head inside the lung demand valve may not be detectable with the positive and negative pressure leak tests.
43. The warning whistle is designed to activate when the pressure in the oxygen cylinder has dropped to approximately 20 percent of the original cylinder pressure.
44. During the whistle activation test, the warning whistle should activate at approximately 700 PSI for a four hour apparatus.
45. If during testing the warning whistle fails to activate at the prescribed setting, the warning whistle should be removed from the apparatus and returned to the manufacturer or their agent for adjustment.
46. If while wearing the apparatus the warning whistle should sound with each inhalation or with each activation of manual bypass valve, this is another

indication of clogged sieves in the oxygen distributor rather than a defective whistle.

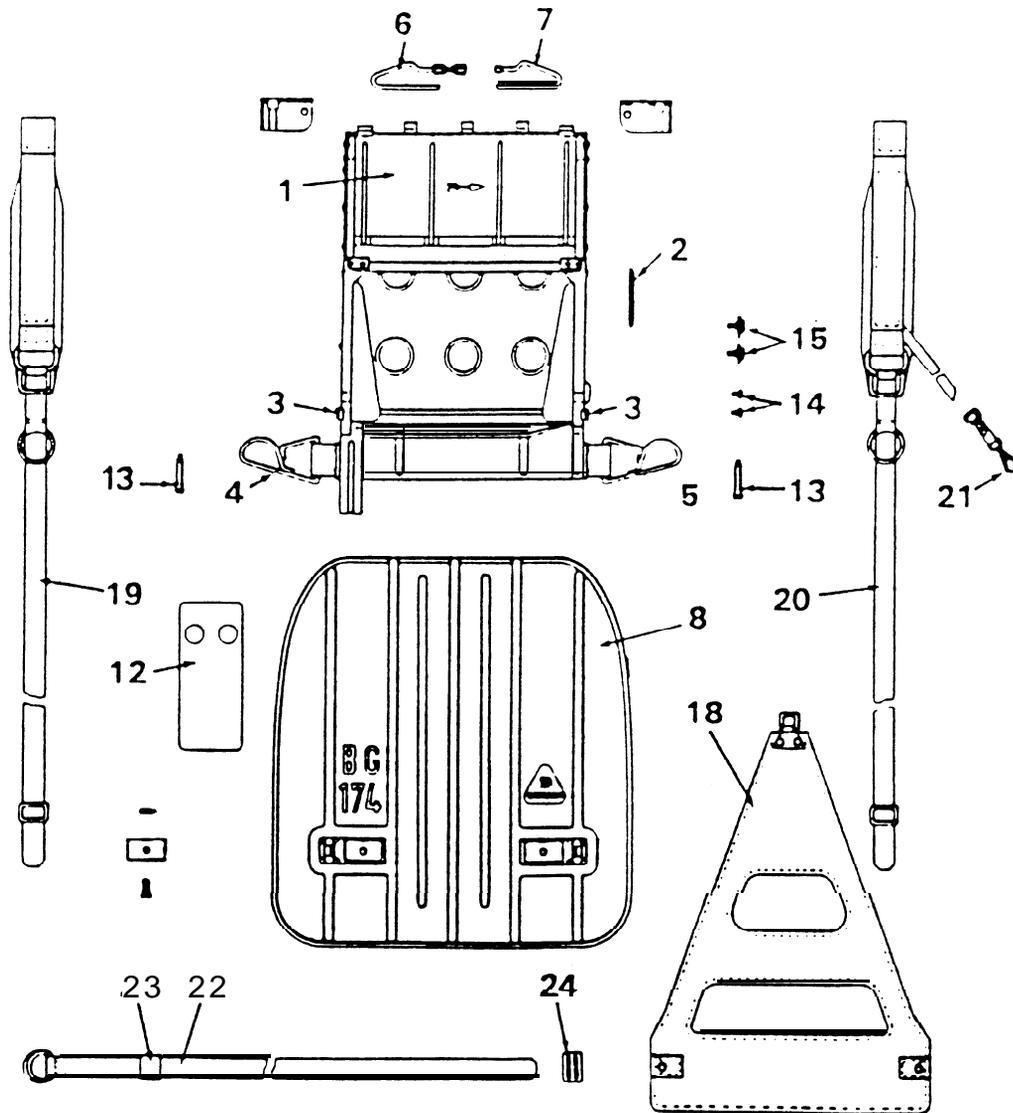
47. During the whistle duration/manual cut-off test, the warning whistle should sound for 20 to 60 seconds before automatically sealing itself.
48. If during the whistle duration/manual cut-off test, the warning whistle sounds less than 20 seconds, it may not be giving the user an adequate warning.
49. If during the whistle duration/manual cut-off test, the warning whistle sounds longer than 60 seconds, it is wasting valuable oxygen.
50. The manual cut-off lever is located on the oxygen distributor.
51. The manual cut-off lever is designed to isolate the chest gage in the event the gage or the flexible line develops a leak during operation.
52. The valve screw should be positioned so that the chest gage and flexible line are isolated when the manual cut-off lever arm is lifted to a 30 to 45 degree angle from the horizontal.
53. Prior to testing whistle duration and the manual cut-off valve, turn oxygen cylinder valve off, lift the manual cut-off lever, open oxygen cylinder valve (with the RZ-25 tester set on negative pressure pumping), and start the stopwatch.
54. When the system is pressurized, the high pressure and medium pressure lines can be tested for leaks by coating the connections with a soap lather or leak detection solution.
55. The BG-I74A should be stored to protect against: dust, sunlight, heat, extreme cold, excessive moisture, damaging chemicals, and mechanical damage.
56. All parts exposed to the circulatory system of the BG-I74A must be thoroughly washed in a good detergent/disinfectant, thoroughly rinsed, and dried after each wearing.
57. The face mask, breathing hose assembly, breathing bag, and lung demand valve assembly are parts exposed to the circulatory system that must be thoroughly washed after each wearing.
58. Before washing the lung demand valve assembly, it is absolutely necessary to isolate the lung demand valve.
59. An improper disinfectant or one that is not diluted properly could cause the rubber or neoprene parts to deteriorate prematurely.

60. Alcohol is not to be used to clean or disinfect any parts of the BG-I74A.
61. If alcohol is used to disinfect or clean, it will break down the rubber in the face mask, hoses, and breathing bag.
62. The temperature of the air used to dry parts should not go above 140 degrees F (60 degrees C).
63. Storing the rubber or neoprene parts in areas with fluorescent lighting will have the same effect as direct sunlight.
64. Replace the o-ring at the oxygen cylinder connection at least once every six months.
65. All rubber or neoprene sealing rings should be replaced at least once every two years.
66. A new inhalation valve should be inserted into the lung demand valve assembly at least once every two years.
67. The lung demand diaphragm should be replaced after at least three years usage.
68. The o-ring under the speaking diaphragm should be replaced at least once every three years.
69. The oxygen distributor should be returned to the manufacturer or their agent for complete overhaul after at least five years usage.
70. The oxygen cylinder must be retested by a certified testing facility every five years.
71. The test date in month and year is stamped on top of all oxygen cylinders.
72. The lung demand valve assembly should be replaced at least every six years.
73. The warning whistle should be returned to the manufacturer or their agent for overhaul after at least six years usage.
74. When copper gaskets are removed from the BG-I74A for any reason, they should not be reused.
75. Only USP medical oxygen is to be used to fill the BG-I74A oxygen cylinders.

76. Before filling any oxygen cylinder, check the service rating and hydrostatic test date stamped on the cylinder.
77. If the oxygen cylinder is rated at 2600 PSI or 2850 PSI, it can be filled up to these pressures only.
78. Only oxygen cylinders rated at 2850+ can be filled to 3135 PSI.
79. The temperature in the areas for filling and storage of oxygen cylinders should be maintained at approximately 70 degrees F.
80. During the filling cycle, the temperature in the oxygen cylinder will rise in proportion to how fast the cylinder is filled.
81. A prerequisite for the safe use of an oxygen breathing apparatus is a proper maintenance program.
82. It is very important that an accurate record be kept of each test performed on the BG-I74A with the RZ-25 tester.
83. When using a factory packed regenerative canister, insure that the string seal is in place and the expiration date has not been reached prior to removing the end caps and inserting the canister into the apparatus.
84. The expiration date is stamped on the white label attached to each factory packed regenerative canister.
85. The expiration date on each factory packed regenerative canister appears as a Roman numeral and year.
86. The BG-I74A apparatus will not offer protection against poisonous gases absorbed through your skin.
87. The wearing harness consists of two adjustable shoulder straps with double slide buckles and a waist belt.
88. On the top of the oxygen cylinder is a safety device known as the pressure burst cap.
89. The pressure gages are marked in increments of 200 PSI and are luminous, so you can see them in the dark or in other conditions that limit visibility.
90. The special chemicals inside the regenerative canister absorb the carbon dioxide from the air that is exhaled by the wearer.

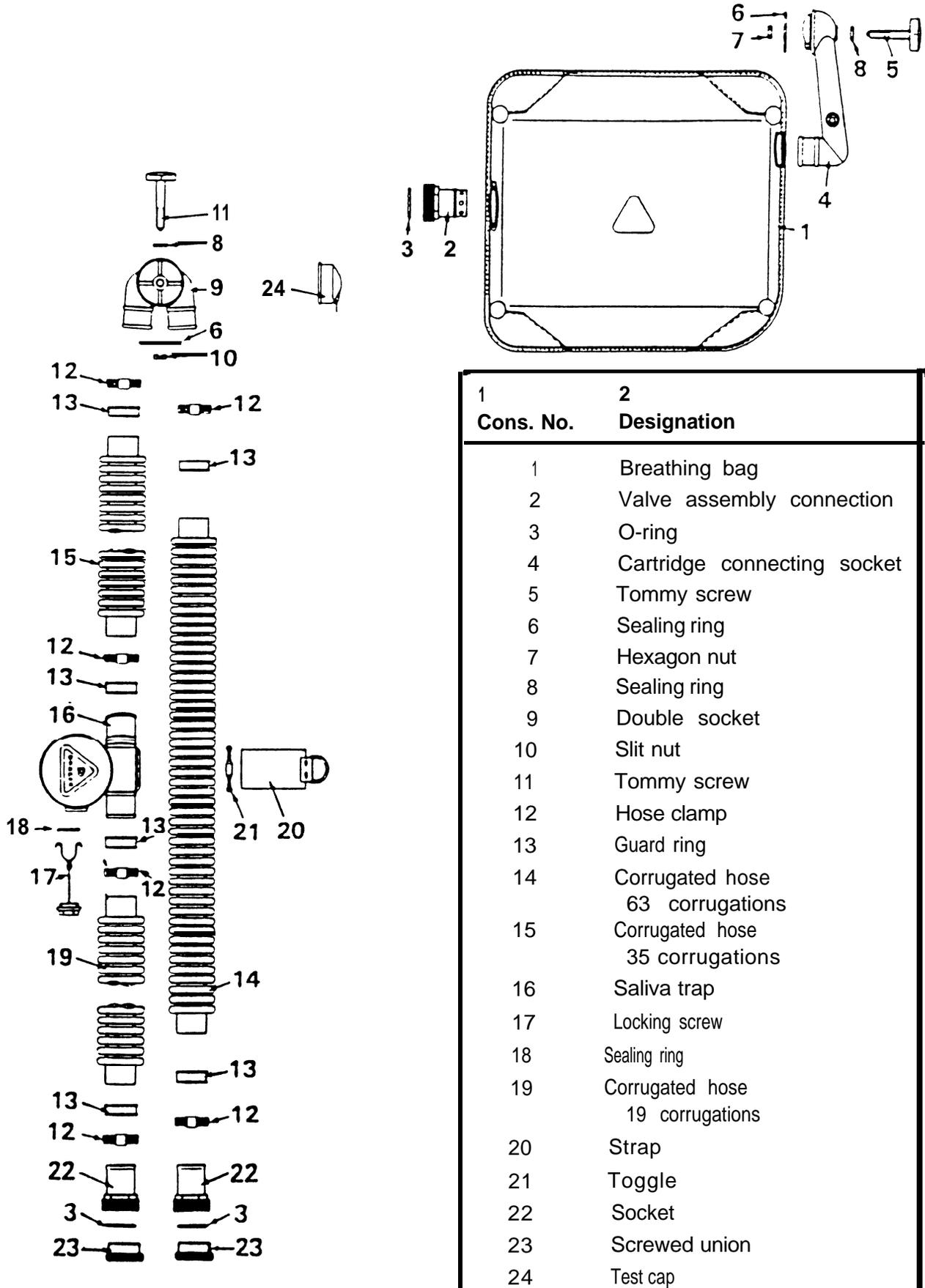
91. There are two types of canisters you can use with the Draeger BG-I74A apparatus, refillable training canister and factory packed disposable canister.
92. The refillable training canister is made of stainless steel and can be used over and over again as long as the absorbent chemicals are freshly packed for each use.
93. Inside the refillable training canister is a set of baffles designed to expose more surface area of the chemicals to the exhaled air.
94. If the factory packed disposable rescue canister has expired, yet is still factory sealed, it can be used for training provided that the chemicals can be heard rattling around when the canister is shaken and the canister has not gained 10 or more grams in weight.
95. The lung demand valve assembly contains the diaphragm, pressure relief valve, lung demand valve, and inhalation and exhalation valves.
96. The pressure relief valve is the part of the lung demand valve assembly that keeps oxygen from building up in the breathing bag if you use less than the unit provides.
97. The saliva trap is on the inhalation hose because it must be located on the lowest part of the apparatus when it is worn so that the moisture will settle there.
98. Heat buildup within the unit's system is produced when your exhaled air flows through the regenerative canister.
99. The area where oxygen cylinders are filled and stored must have adequate ventilation to prevent a buildup of oxygen and reduce the potential for fire.
100. If you're using a high pressure oxygen pump to fill an oxygen cylinder, the pump itself should have a filter dryer installed on the gas inlet side of the pump to prevent moisture and dust from getting into the oxygen.

Carrying Frame Assembly with Protective Shell



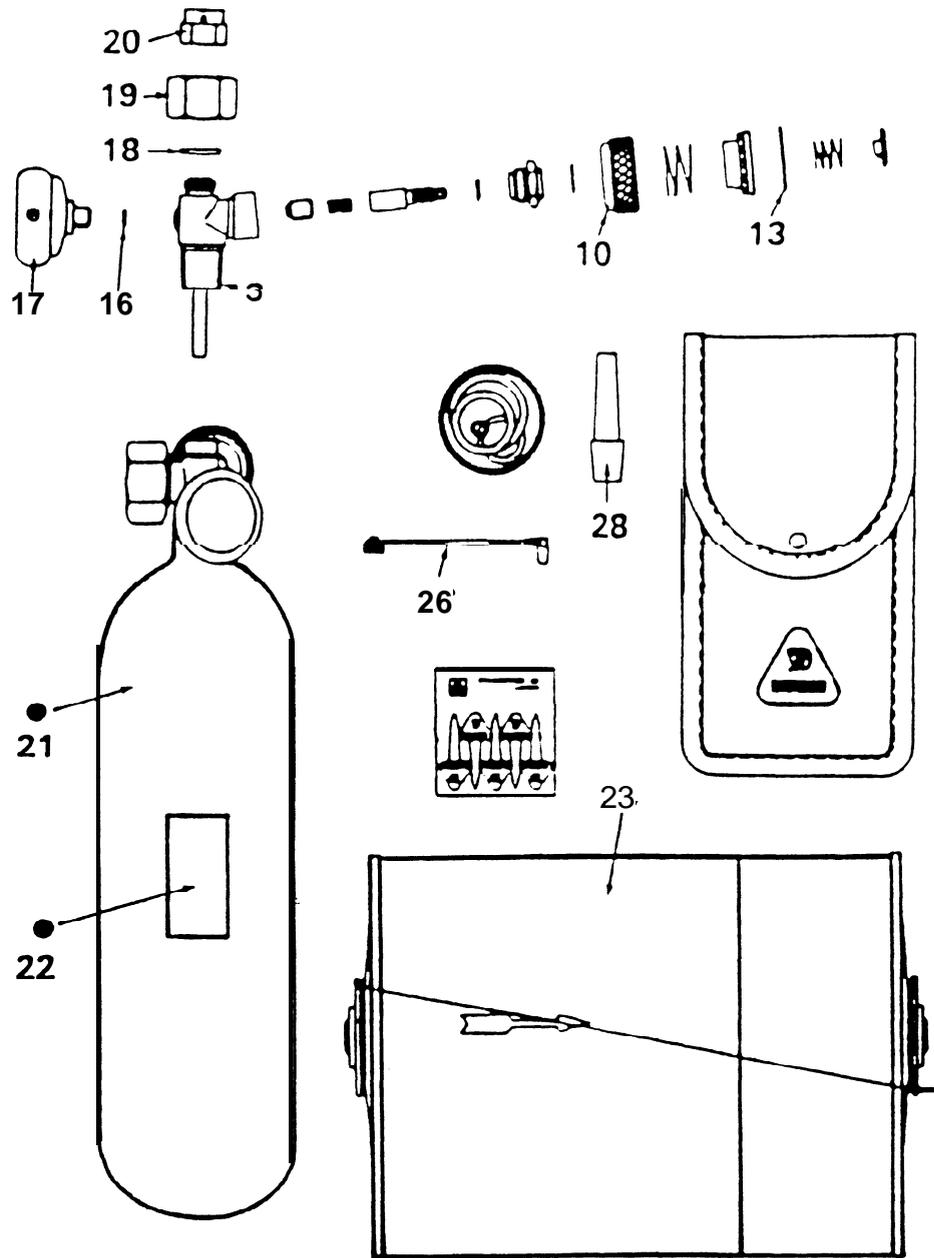
1	2	1	2
Cons. No.	Designation	Cons. No.	Designation
1	Carrying support	13	Screw
2	Protection ring	14	Screw
3	Snap	15	Screw
4	Belt bearing block, left	18	Back spanning
5	Belt bearing block, right	19	Carrying strap, left
6	Carrying loop, left	20	Carrying strap, right
7	Carrying loop, right	21	Buckle
8	Protective casing	22	Waist-belt
12	Approval label BG 174 A(4 h)	23	Slide
		24	Slide

Breathing Bag and Hoses Assemblies



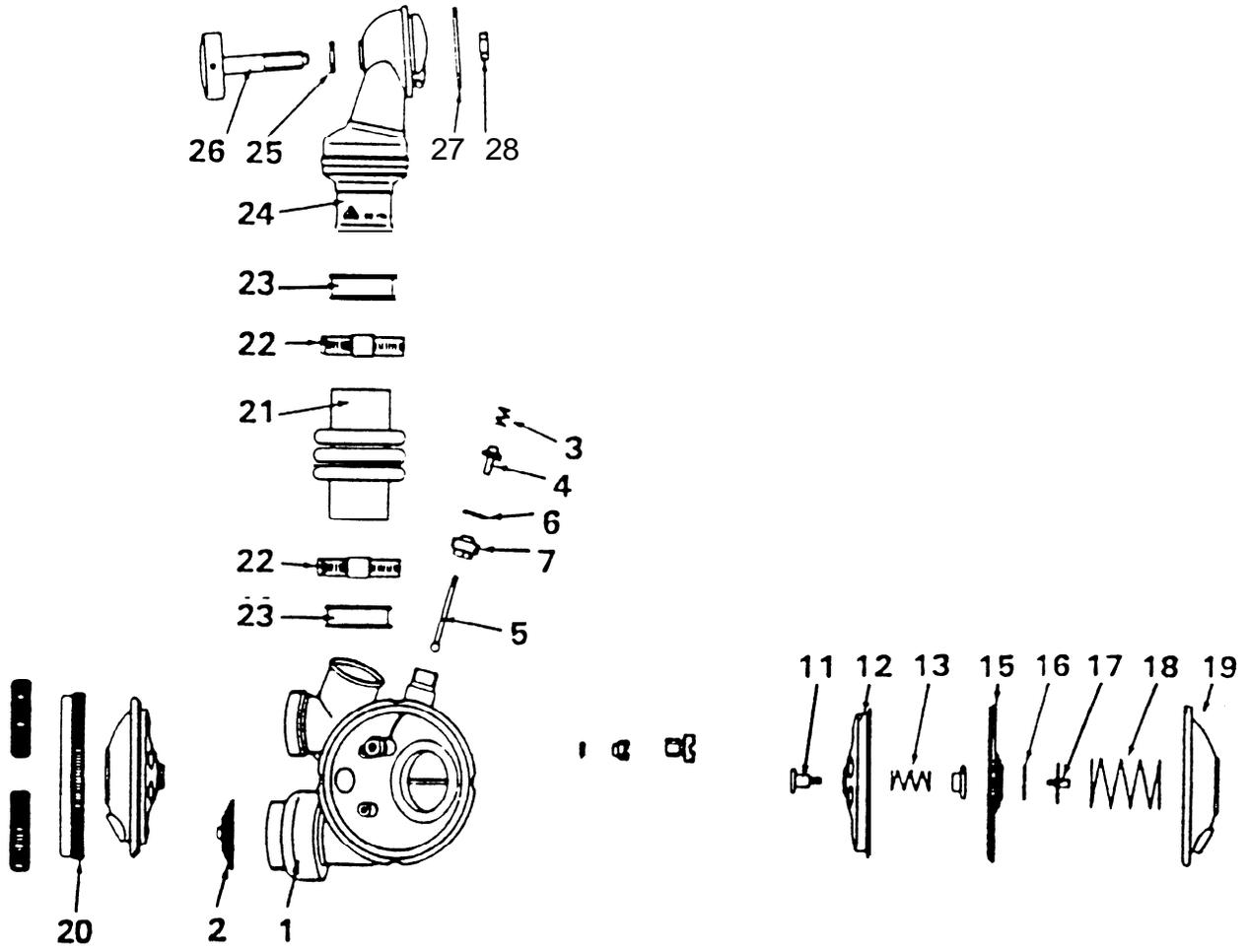
1	2
Cons. No.	Designation
1	Breathing bag
2	Valve assembly connection
3	O-ring
4	Cartridge connecting socket
5	Tommy screw
6	Sealing ring
7	Hexagon nut
8	Sealing ring
9	Double socket
10	Slit nut
11	Tommy screw
12	Hose clamp
13	Guard ring
14	Corrugated hose 63 corrugations
15	Corrugated hose 35 corrugations
16	Saliva trap
17	Locking screw
18	Sealing ring
19	Corrugated hose 19 corrugations
20	Strap
21	Toggle
22	Socket
23	Screwed union
24	Test cap

O₂ Cylinder, Cylinder Valve, Alkali Cartridge, Tool Kit



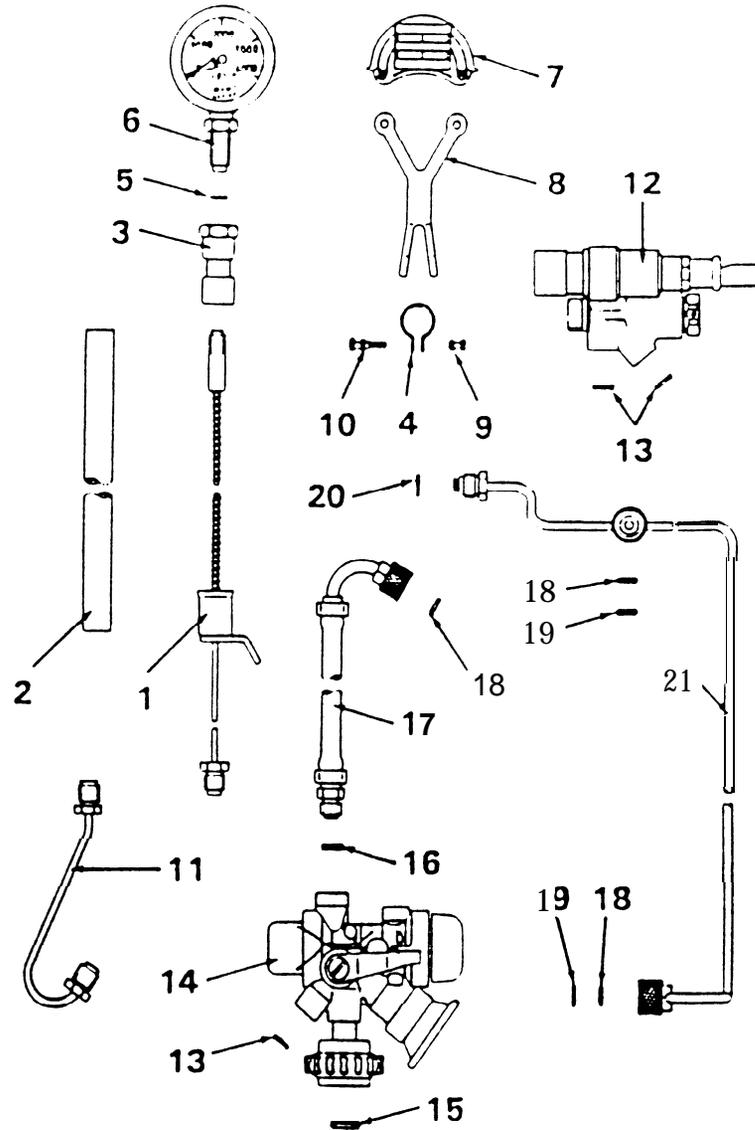
1 Cons. No.	2 Designation	1 Cons. No.	2 Designation
3	Valve housing	20	Bursting disc
10	Hand-wheel	21	Oxygen cylinder (4h)
13	Safety ring	22	Label (4h)
16	Sealing ring	23	Alkali cartridge
17	Manometer	26	Double washer
18	Lock washer	28	Test plug
19	Lock nut		

Lung Demand Valve Assembly



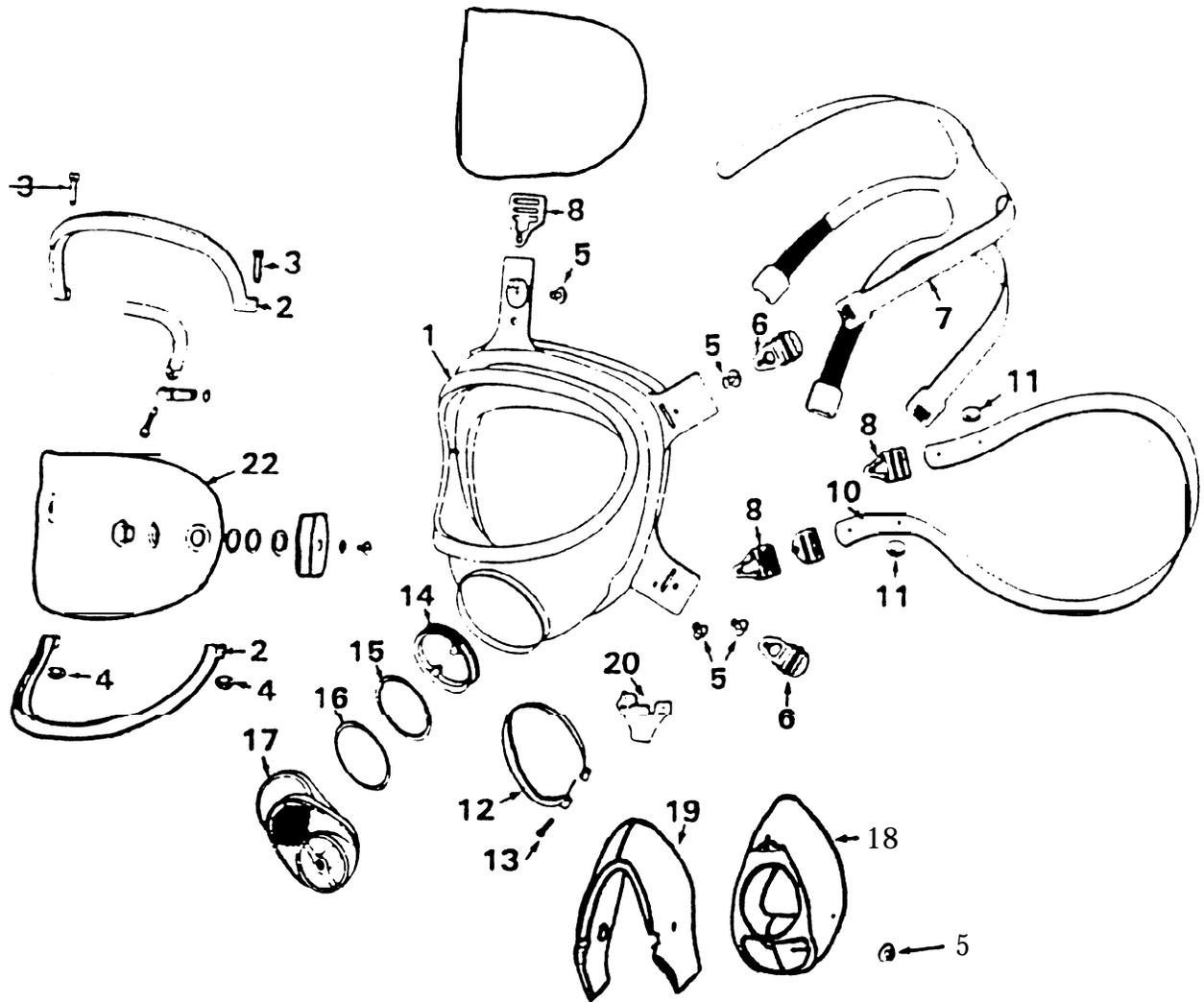
1	2	1	2
Cons. No.	Designation	Cons. No.	Designation
1	Valve box frame	17	Valve disc
2	Valve disc	18	Spring
3	Spring	19	Housing cover
4	Valve disc	20	Screw ring
5	Lever	21	Corrugated hose
6	Sealing ring	22	Hose clamp
7	Valve seat	23	Guard ring
11	Thrust bolt	24	Valve socket
12	Protective cage	25	Sealing ring
13	Spring	26	Tommy screw
15	Diaphragm	27	Sealing ring
16	Lock washer	28	Hexagonal nut

O₂ Regulator, Warning Whistle, Oxygen Lines



1	2	1	2
Cons. No.	Designation	Cons. No.	Designation
1	High pressure line	12	Rest pressure warning
2	Protective hose	13	Sealing ring
3	Threaded sleeve	14	Oxygen distributor
4	Clamp	15	O-ring
5	Sealing ring	16	Sieve insert
6	Pressure gauge	17	Pre-flushing line
7	Protective cap	18	O-ring
8	Tightening strap	19	O-ring
9	Bushing	20	Sealing ring
10	Screw	21	O ₂ -line
11	High pressure line		

Panorama Z/ZS Mask



1	2	1	2
Cons. No.	Designation	Cons. No.	Designation
1	Mask body	12	Tightening strap
2	Frame	13	Screw
3	Screw	14	Screw ring
4	Nut	15	Speech diaphragm
5	Stud	16	O ring
6	Roller buckle	17	Connecting piece
7	Headstrap	18	Inner mask
8	Slide with eye	19	Filling piece
10	Strap	20	Support plate
11	Stud	22	Face plate