

Metal and Nonmetal Mine Rescue Contest Rules



2016

PREFACE

This booklet was prepared for mining industry instructors, MSHA instructors and inspectors to train mine rescue teams, judges, and contest personnel in procedures for a mine rescue contest.

Reference to specific brands, equipment, or trade names in this document is made to facilitate understanding and does not imply endorsement.

MISSION STATEMENT

The Metal and Nonmetal National and Regional Contests serve as training tools to improve the skills required to respond to a mine emergency. These competitions serve to strengthen cooperation between mining companies, equipment manufacturers, Federal and State agencies to enhance mine rescue preparedness. This Contest Rule Book establishes procedures and rules that serve to guide the rescue teams in actual situations.

ACKNOWLEDGMENTS

A special thanks to the Metal and Nonmetal Rules Committee for their valuable assistance in preparing this booklet. The aforementioned Rules Committee is comprised of representatives from the following organizations:

Central Kentucky Mine Rescue Association
Central Mine Rescue Unit
Georgia Mine Rescue Association
Kansas Mine Rescue Association
Mine Safety and Health Administration
Missouri Mine Rescue Association
Nevada Mine Rescue Association
Northern Mine Rescue Association
Rocky Mountain Mine Rescue Association
Stillwater Mine Rescue Association
Southern Mine Rescue Association
Southwestern Regional Mine Rescue Association
Southwestern Wyoming Mutual Aid Association

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PREVIOUS NATIONAL CHAMPIONS

Mine Rescue Field Contest

- 2014 - The Doe Run Company - Maroon Team, The Doe Run Company, Viburnum, Missouri
- 2013 - Newmont Mining - Carlin Team, Newmont Mining, Elko, Nevada
- 2010 - The Doe Run Company - Maroon Team, The Doe Run Company, Viburnum, Missouri
- 2008 - FMC Alkali Chemical - Red Team, FMC Corporation, Green River, Wyoming
- 2006 - FMC Westvaco Mine - White Team, FMC Corporation, Green River, Wyoming
- 2004 - OCI - White Team, OCI of Wyoming, L.P., Green River, Wyoming
- 2002 - FMC Westvaco Mine, FMC I, FMC Corporation, Green River, Wyoming
- 2000 - OCI - Blue Team, OCI of Wyoming, L.P., Green River, Wyoming
- 1998 - FMC Mine - Red Team, FMC Corporation, Green River, Wyoming
- 1996 - Big Island Mine - White Team, OCI of Wyoming, Green River, Wyoming
- 1994 - Waste Isolation Pilot Plant - Blue Team, Westinghouse Electric Corp., Carlsbad, New Mexico
- 1992 - Rhone Poulenc - White Team, Rhone Poulenc of Wyoming, Green River, Wyoming
- 1990 - Magmont Mine Team, Cominco American, Bixby, Missouri
- 1988 - Homestake Mine - Gold Team, Homestake Mining Co., Lead, South Dakota
- 1986 - Big Island Mine - White Team, Stauffer Chemical Co., Green River, Wyoming
- 1984 - Texasgulf Mine - Gold Team, Texasgulf Chemicals Co., Granger, Wyoming
- 1982 - Big Island Mine - Blue Team, Stauffer Chemical Co., Green River, Wyoming
- 1980 - Lisbon Mine Team, Rio Algom Corp., Moab, Utah
- 1978 - Jefferson Island Mine Team, Diamond Crystal Salt Co., New Iberia, Louisiana
- 1976 - Magmont Mine Team, Cominco American, Bixby, Missouri (Single-Level Contest)
- 1976 - Magmont Mine Team, Cominco American, Bixby, Missouri (Multi-Level Contest)
- 1975 - Big Island Mine - White Team, Stauffer Chemical Co., Green River, Wyoming
- 1973 - Grand Saline Mine Team, Morton Salt, Division of Morton Norwich Products, Inc., Grand Saline, Texas

PREVIOUS NATIONAL CHAMPIONS

Technician Team Contest

- 2014 - OCI Blue Team, OCI of Wyoming, Green River, Wyoming
- 2013 - Henderson Operations - Henderson Red Team, Climax Molybdenum, Empire, Colorado
- 2010 - FMC Westvaco Mine - White Team, FMC Corporation, Green River, Wyoming

Benchman's Contest

- 2008 - TYLER LOVATO: BG-4, OCI Blue Team, OCI Wyoming, Green River, Wyoming
ROBERT RODRIGUEZ: Bio-Pak, Barrick TRSV Team 2, Barrick, Golconda, Nevada
- 2006 - CURTIS SANDERS: BG-4, WIPP Silver Team, Washington Tru-Solutions, Carlsbad, New Mexico
RICKY MARTIN: BG-174A, The Doe Run Maroon Team, The Doe Run Company, Viburnum, Missouri
TOM SENEAL: Bio-Pak, Newmont Gold Team, Newmont Mining Corporation, Newmont Carlin Mine, Carlin, Nevada
- 2004 - MACLANE BARTON: BG-4, Sugar Creek Mine, Lafarge North America, Sugar Creek, Missouri
GARRY MOORE: BG-174A, Southeast Missouri Mining and Milling Division, The Doe Run Company, Viburnum, Missouri
ROD CHRISTENSEN: Bio-Pak, Barrick Goldstrike Mine, Barrick Goldstrike Mines, Inc., Elko, Nevada
- 2002 - LESLIE WAREHAM: BG-4, General Chemical Mine, General Chemical Corporation, Green River, Wyoming
DENISE RICH: BG-174A, Stillwater Mine, Stillwater Mining Company, Nye, Montana
DAN LUKE: Bio-Pak, Carlin Underground Mine, Newmont Mining Corporation, Carlin, Nevada
- 2000 - JOE BACA: BG-4, Waste Isolation Pilot Plant, Westinghouse Electric Corporation, Carlsbad, New Mexico
RICHARD WEST: BG-174A, Waste Isolation Pilot Plant, Westinghouse Electric Corporation, Carlsbad, New Mexico
ROD CLEMENT: Bio-Pak, #4 Mine and Mill, Zinc Corporation of America, Hailesboro, New York
- 1998 - JOE BACA, Waste Isolation Pilot Plant, Westinghouse Electric Corporation, Carlsbad, New Mexico
- 1996 - MACLANE BARTON, West Fork Mine, Missouri Lead Division, ASARCO, Inc., Bunker, Missouri
- 1994 - FRED MILLER, Waste Isolation Pilot Plant, Westinghouse Electric Corporation, Carlsbad, New Mexico
- 1992 - LESLIE WAREHAM, General Chemical Blue Team, General Chemical Partners, Green River, Wyoming
- 1990 - STAN AMRINE, Parachute Creek Mine, Unocal Mining Division, Parachute, Colorado

**Benchman's Contest
(continued)**

- 1988 - KARL SAUER, Homestake Mine, Homestake Mining Co.,
Lead, South Dakota
- 1986 - ART DAVIS, Henderson Mine, Amax, Inc., Empire, Colorado
- 1984 - STEVE YANCHUNIS, Schwartzwalder Mine, Cotter Corp.,
Golden, Colorado
- 1982 - ART DAVIS, Henderson Mine, Amax, Inc., Empire, Colorado
- 1980 - ALAN HERMEZ (Draeger), Carr Fork Mine, Anaconda
Copper Co., Tooele, Utah
RODNEY PHILBRICK (McCaa), Pine Creek Mine, Union
Carbide Corp., Bishop, California
- 1978 - WILLIE DAVIS (McCaa), Lisbon Mine, Rio Algom Corp.,
Moab, Utah
KEN JOHNSON (Draeger), Climax Mine, Climax Molybdenum
Co., Climax, Colorado
- 1976 - STEVE MURRAY, Bunker Hill Mine, Bunker Hill Co., Kellogg,
Idaho

Multi-Gas Instrument Contest

- 2008 - RICK OWENS, FMC Westvaco Mine - Red Team, FMC
Corporation, Green River, Wyoming
- 2006 - RICK OWENS, FMC Westvaco Mine - Red Team, FMC
Corporation, Green River, Wyoming
- 2004 - RICK OWENS, FMC Westvaco Mine - Red Team, FMC
Corporation, Green River, Wyoming

PREVIOUS NATIONAL CHAMPIONS

First Aid Contest

- 2014 - Newmont, Newmont Carlin Team, Elko, Nevada
- 2013 - Kinross - Kettle River Buckhorn, Kinross, Republic,
Washington
- 2010 - FMC Westvaco Mine – Red Team, FMC Corporation,
Green River, Wyoming
- 2008 - Barrick Goldstrike Gold Team, Barrick Goldstrike Mines,
Inc., Elko, Nevada
- 2006 - Barrick Goldstrike Gold Team, Barrick Goldstrike Mines,
Inc., Elko, Nevada
- 2004 - General Chemical Blue Team, General Chemical Soda
Ash Partners, Green River, Wyoming
- 2002 - Maysville Mine Raiders, Carmeuse Lime, Inc., Maysville,
Kentucky
- 2000 - Maysville Mine Raiders, Dravo Lime, Inc., Maysville,
Kentucky

PREVIOUS NATIONAL CHAMPIONS

COMBINATION CHAMPION

- 2014 - WIPP Red Team, Waste Isolation Pilot Plant, Washington TRU- Solutions, Carlsbad, New Mexico
- 2013 - Newmont Mining - Carlin Team, Newmont Mining, Elko, Nevada
- 2010 - Solvay Chemicals Inc., Solvay Chemicals Mine, Silver Team, Green River, Wyoming
- 2008 - FMC Alkali Chemicals, FMC Red Team, Green River, Wyoming
- 2006 - Barrick Gold Team, Barrick Goldstrike Mines, Inc., Elko, Nevada
- 2004 - WIPP Silver Team, Waste Isolation Pilot Plant, Washington TRU- Solutions, Carlsbad, New Mexico
- 2002 - WIPP Silver Team, Waste Isolation Pilot Plant, Washington TRU-Solutions, Carlsbad, New Mexico

PREVIOUS NATIONAL CHAMPIONS

TEAM TRAINER COMPETITION

- 2014 - Jason Hook, Vulcan Materials Co., Vulcan Blue Team, Bartlett, Illinois
- 2013 - Tom Senecal, Barrick, Barrick Cortez Team, Crescent Valley, Nevada
- 2010 - Kenny Groves, Barrick Gold, Barrick Cortez Team, Crescent Valley, Nevada

**METAL AND NONMETAL
MINE RESCUE HALL OF FAME INDUCTEES**

2014

Maclane (Mac) Barton
Donald (Don) J. Foster
Raymond Nelson
Randal Romero
Rick Terry

2013

Michael T. (Mick) Dennehy
Tom Gleaton
Gary R. Gomez
Gary Kessler
John Sykes
John Teague

2010

Joe Baca
Henry Charpentier
Harold Leblanc
Felix Quintana

2008

Keith Mullins
Tim Musbach
Art Davis
Rogers (Rod) Etie
Rayward Segura
Lee Graham
Brian Liscomb

2006

John Angwin
Lonny Badeaux
Bob McPhail
Walter Mortimer
Clayton Pellerin
Harold Riffle

2004

Walt Bryant
William (Bill) Frankom
Stoney Hotard
Mike Padilla
John Pennington

2002

Wayne D. Kanack
Robert A. Koenig
Gerald Myers
Arlon B. Parmer

2000

M.R. "Whitey" Jacobson
R.J. Rucker
Richard Skelton
Harlan "Buddy" Webb

1998

Harry Hall Anderson
Leo M. Bradshaw
James Chailland
Harold David James
"Buster" Mosele
Thomas Overy, Jr.
J.D. Pitts
Jack L. Squires

**GENERAL RULES
FOR CONDUCTING THE CONTEST**

1. The National Contest will be comprised of four individual events, including a Mine Rescue Field Competition (two days for each participating team), a Technician Team Competition, a First Aid Competition, and a Team Trainer Competition. Each event will include a written examination. Note: Regional Contests will include the same four individual events; however, the field competition will be limited to a one day event.
2. Contest officials will be comprised of the Contest Director, Contest Coordinator, Chief Judge, Appeals Committee, field competition judges (including: field judges, mine managers, and mine attendants), isolation officials, written exam judges, technician team contest judges, and first aid contest judges.
3. There will be no limitations as to the number of teams admitted from any county, state, district, company, or organization.
4. All teams must actively provide bona fide mine rescue services for the metal and nonmetal mining industry and meet all of the requirements set forth in 30 CFR Part 49. Collegiate mine rescue teams may compete with approval of the Contest Director.
5. Mine rescue teams may register up to eight team members and one trainer. For the purpose of technician team and first aid contests, a team member may not participate in more than one event and each team will only be permitted to compete in each event once. The technician teams must compete with the same type of breathing apparatus and multi-gas instrument that their teams will be using for the mine rescue field contest. For the purposes of identification, participants of the Mine Rescue Field, Technician Team, and First Aid Contests must be dressed uniformly, complete with team logo. This includes the testing process. Once registered, no changes will be permitted without the permission of the Contest Director.

6. A schedule of Regional Contests and the National Contest, as well as the respective hosting organizations, will be posted on MSHA's homepage under the "Mine Rescue" heading at www.msha.gov. The specific contest entry forms may be obtained through the hosting organization.

The entry forms will require information regarding the type of equipment (breathing apparatus) each team will be wearing, the type and model of all gas testing equipment the team will use during the field competition, and the type of communication system to be used. Any needed equipment changes require submission of a modified list to the Contest Director for consideration of approval. (Note: Each judge will be given a list of your equipment prior to working of the problem to assist them in determining if the equipment was utilized properly and was functional.)

7. On the day before the contest begins, team equipment shall be secured in isolation and team registration will be conducted at a designated location. Afterward, all of the written tests (outlined in this booklet) will be administered in isolation. For planning purposes, the hosting organization will prepare a contest agenda to include: a specified time period for equipment drop-off; a specified time period and location for team registration; and a listing of scheduled events for the rest of the week. The agenda will be provided in advance to all participating teams and contest officials. At the time of the contest, the agenda will be posted in various locations as a reminder for all.
8. On the day before the contest begins, all written tests will be administered in isolation. The team members (Nos. 1 – 7) and team trainers will be directed to sit at separate tables. Persons from the same company or organization will also be required to sit apart from each other at the designated tables. A separate area will be designated for additional team alternates (No. 8) who wish to take the test(s). Their tests will not count toward their cumulative team scores.

Note: No wireless communication or electronic device will be permitted in isolation or during the written testing.

The field competition, first aid, technician team, and team trainer tests will be included at this same time. A description of each test with the corresponding references is listed in the respective section of this booklet. A total of 60 minutes will be allowed to complete all required testing. At the end of the allotted time, tests will be collected regardless of whether or not the contestants have answered all of the required questions.

9. For the National Contest, the team drawing will be conducted as each teams drop off their equipment in the isolation area. As each team arrives, the number selected by the team captain will determine their running order for the first day's field competition and the third day's first aid and technician team competitions. On the second day of the field competition, the teams will run in reverse draw order.

For Regional Contests, a similar team drawing will be conducted. However, the number selected by each team captain will determine their running order for the one-day field competition. Then, the teams will run in reverse draw order for the first aid and technician team competitions.

In both cases, position changes necessary for management of the respective contest will be permitted if the Contest Director approves the change.

10. On every day of the competitions, all teams shall be in isolation by 7:00 a.m. (local time). No wireless communication or electronic device will be permitted in isolation.

11. All judges will be persons trained in mine rescue procedures; trained in the assembly, use, and care of the different types of breathing apparatus; and trained in the assembly, use, and care of the different types of multi-gas instruments. The judges will not be connected with any of the teams, teams' employers, or companies who manufacture apparatus or gas detecting devices. Exceptions to personnel assigned for judging any phase of the contest requires the approval of the Contest Director.
12. ...WARNING... Any team whose member(s) intentionally disturb or destroy any component on a competition field will immediately be assessed a 100 point discount. Repeated offense may result in team disqualification at the discretion of the Contest Director.
13. For Regional and the National Mine Rescue Contests, the hosting organization will supply one person per field during the mine rescue field and first aid competitions. These persons will act under the direction of the field coordinators and will be used as survivors or patients, respectively.

When a breathing apparatus is required to be used on a patient, the team must demonstrate proper donning procedures and unit activation. After acknowledgement by the judge, the breathing hoses can be disconnected and the unit turned off. The breathing apparatus must be kept in close proximity (as if it were used) to the patient during transport out of the mine.

14. A trophy will be awarded for the Overall Mine Rescue Contest Champion based on the best cumulative team scores (least amount of discounts), including the combined discounts for the mine rescue field, first aid, and technician team competitions. In the event of a tie, the team with the best mine rescue team standing in the mine rescue field competition will be the tie breaker.
15. The results from all elements of the National Contest will be mailed to each team. For Regional Contests, the results will be distributed to the teams at the conclusion of the awards ceremony.

TEAM TRAINER COMPETITION

GENERAL RULES

1. On the day before the contest begins, all written tests will be administered in isolation. The team trainer tests will be included at this same time. The written test will consist of thirty (30) multiple choice and true/false questions, including:
 - Material contained in MSHA Publication 3027 – Instructor’s Manual for Mine Rescue Training (formerly MSHA Publication “IG 6”). The training modules in Publication 3027 are as follows: Module 1 – Surface organization; Module 2 – Mine Gases; Module 3 – Ventilation; Module 4 – Exploration; Module 5 – Fire, Firefighting, and Explosions; Module 6 – Rescue of Survivors and Recovery of Bodies; and Module 7 – Mine Recovery.
 - Ninth Edition of Brady “Emergency Medical Responder – First on the Scene”, Chapters: 3, 4, 5, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, and 26.
 - Title 30 Code of Federal Regulations Part 49 Mine Rescue Teams, Subpart A – Mine Rescue Teams for Underground Metal and Nonmetal Mines.
 - Current MSHA National Metal and Nonmetal Mine Rescue Contest Rules.
 - Generic questions covering the use and care of self-contained breathing apparatus and multi-gas instruments.

Contestants will be assessed one (1) discount point for each incorrect or unanswered question. Any alterations to the test questions or answers will be determined to be incorrect by the test judge and discounts assessed.

2. Scoring of the test will be completed by at least two qualified judges.
3. In special circumstances, individual team members may be given an oral test by one or more judges in lieu of a written test. Requests for consideration shall be presented to the Contest Director at the time of registration. All other team members will take the test at the same time. In any case, the judges will not explain the meaning of questions, but may explain a word or words in the questions.
4. One trophy will be awarded for the Team Trainer Competition. The team trainer with the least amount of discounts on the written test will be the winner. In the event of a tie, the team trainer with Overall Mine Rescue Contest Champion Team will determine the winner. The second tie breaker would be the team trainer with the best mine rescue team standing in the mine rescue field competition.

MINE RESCUE FIELD COMPETITION

GENERAL RULES

1. The Contest Director will establish a reasonable amount of time for each team to complete the problem(s). All teams will be notified of the established time prior to beginning to work the problem(s). Any teams working beyond the established time period will be notified by the #1 Judge that they must leave the field. All teams will be scored based on their discounts, including: appropriate discounts for items missed in areas left unexplored or abandoned by the team; and appropriate discounts for necessary actions not taken by the team to complete the mission.
2. Discounts will not be added to the team's field score once the judges have signed their discount sheets. This does not preclude changes due to administrative errors or a misapplication of a rule.
3. ... WARNING ... Any team whose member(s) intentionally disturb or destroy any component on a competition field will immediately be assessed a 100 point discount. Repeated offense may result in team disqualification at the discretion of the contest director.
4. Upon completion of the problem, a 5-minute review will be conducted. At that time, the team will be informed of any infractions regarding their working of the problem. The team will be permitted to verbally appeal any infractions either with the field judge or the chief judge. If not resolved, the chief judge will make the final decision until an appeal can be filed by the team. Note: During this process mutual respect for the judges and team members is paramount and civility must be demonstrated by all involved or the review will be stopped before the allotted time.

5. After the scorecards are checked by the scorecard examiners, they will be taken to a designated location. The team captain, trainer, and one other team member may examine their team's scoring cards for a time not to exceed 20 minutes. No protest of the discounts assessed may be given to the person in charge of the review, however, the team captain and/or trainer may protest in writing any discount within 30 minutes after reviewing them. Written appeals are not to exceed one page for any discount assessed and will be submitted to the Appeals Committee.

Documentation (contest rules and other documents used in the contest) supporting the appeal will be accepted. Any protest(s) will be considered by the Appeals Committee. A discount summary sheet will be used to list the discounts. All discounts except time will be listed and totaled. Both the captain and the review judge will sign the team discount summary sheet to certify they have reviewed the discounts and verified the totals (See page 54).

6. The Appeals Committee shall rule in matters concerning any interpretations, procedures, or any matter involving proper conduct of the Contest. Any complaints filed with the committee shall be in writing and shall set forth incidents, times, names, source of information, and the act complained against. Where a written test question or rule application was found to be wrong, all teams will receive the appropriate correction. A decision by a majority of the committee shall be binding.

7. A predetermined amount of trophies will be awarded for the Mine Rescue Competition based on the best cumulative team scores (least amount of discounts). For the National Mine Rescue Contest, this would include each team's combined discounts for both day's field problems plus their written test discounts. For the Regional Contests, this would include each team's discounts for the field problem (one-day event) plus their written test scores.

In the event of mine rescue field competition ties, the underground discount sheet will be the first tie breaker, the surface discount sheet will be the second tie breaker, mine maps will be the third tie breaker, the written test will be the fourth tie breaker, and time will be the fifth tie breaker.

GUIDELINES AND PROCEDURES

Team Members

Each team shall be composed of five members, one fresh air base attendant and one assistant (optional). Each member shall wear a number on the arm at or near the shoulders with number one (1) being assigned to the captain, the number six (6) to the fresh air base attendant and seven (7) to the assistant. Switching of numbers by team members will not be permitted after arriving at the portal or fresh air base. Any means of affixing legible numbers on the sleeve of the uniform will be acceptable.

Additional persons, who had been isolated with the team, may assist the team placing equipment prior to starting the clock. Only the fresh air base attendant and the assistant will be allowed to assist the team after the clock has started. The fresh air base attendant and assistant will be isolated from visual contact with the field while the teams are in the mine. The fresh airbase attendant will maintain voice communications with the team utilizing a portable communication system. The team may use either one of the following options to accomplish this task.

1. Teams will be equipped with and use a portable, hard wire, 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. The assistant may listen in with a separate headset and advise the fresh air base attendant and interact with the team only when they are at the fresh air base. If during the working of the problem any team member is unable to continue (due to physical condition or by problem design), the assistant (No. 7 member) may be used as a substitute. The team can rearrange member positions to complete the problem.

2. Teams may use a wireless communication system (radios), provided they are designed and used in such a manner that the integrity of the Contest is not jeopardized, as determined by the Contest Director. A lifeline will still be required for working of the problem. This can be achieved through the use of a wire or cable which has sufficient tensile strength to be used as a manual communication system. The assistant may listen to the radio transmissions and advise the fresh air base attendant and interact with the team only when they are at the fresh air base. If during the working of the problem any team member is unable to continue (due to physical condition or by problem design), the assistant (No. 7 member) may be used as a substitute. The team can rearrange member positions to complete the problem.

Note: For teams using a wireless communication system (radios), the specific requirements for use are outlined in the “Equipment” section.

In either case, teams wishing to communicate with the fresh air base attendant shall use their portable communication system, or they must return to the fresh air base.

Medical Requirements

Per 30 CFR Part 49, all mine rescue team members must have completed physical examinations in the past 12 months preceding the contest and are capable of performing strenuous work under oxygen.

Equipment

Breathing apparatus approved for at least **four hours** shall be used in the Mine Rescue Contest problems. Each team member must have his/her own approved breathing apparatus. Teams cannot expect recharging materials, apparatus parts, and accessories for all types of apparatus at the contest site.

Team members must wear an approved protective hat, identification tag, safety shoes, permissible cap lamps, self-rescuer, and be clean shaven to the extent that a good face-to-face-piece seal is achieved.

Each team must have approved gas instruments, or testers for rescue and recovery work.

Teams are required to bring with them a sufficient supply of materials. Brattice or other materials necessary for constructing bulkheads or stoppings will be furnished by the field committee. Teams will be responsible for collecting the material from the source of supply.

When teams report to the fresh air base to begin the problem and are given information indicating that explosive gas(es) is/are or may be present in the mine, they must have non-sparking tools while they are working the problem so as not to endanger themselves. If teams do not have non-sparking tools, they must ask the official in charge at the fresh air base to provide them with such tools before they go underground.

If the mine is not classified as gassy and the teams go underground to work the problem and encounter an explosive gas and they do not have non-sparking tools, they must return to the fresh air base immediately and ask the official in charge to provide them with such tools.

For teams who opt to use a wireless communication system (radios) during the mine rescue field competition, the following procedures shall be strictly followed.

- All radios are to be MSHA-approved and intrinsically safe.
- Upon completing the contest entry form, the team shall properly identify that they will be using radios in lieu of a hard-wired system during the field competition.
- On the day before the contest as the team drops off their mine rescue equipment, they must provide all of their radios to the official-in-charge with a list of the programmed channels and frequencies. The radios must be properly labeled as team property so that they can be stored exclusively for the respective team's use. The associated charger(s) must be supplied.

- Teams using wireless communication must have radios charged and properly programmed to the MSHA FCC licensed radio frequencies prior to turning them over to contest officials.

UHF radios must support at least 16 channels (see Table 1).
VHF radios must support at least 3 channels (see Table 2).

Table 1 – UHF Frequencies

Channel	Frequency	Channel	Frequency
1	451.8125	9	464.5000
2	456.8000	10	464.5500
3	456.8125	11	464.5625
4	461.0375	12	466.0375
5	461.0875	13	466.0875
6	461.1375	14	466.1125
7	462.7625	15	466.1375
8	462.7875	16	469.5500

All Frequencies will have a PL code set for transmit and receive of 94.8 Hz

All Frequencies will be set to "Low Power" and "Narrow Band"

Table 2 - VHF Frequencies

Channel	Frequency
1	151.5050
2	151.6250
3	154.5275

- MSHA licensed radio frequencies and settings such as PL codes, low power, and narrow banding protect MSHA and teams from FCC violations and prevent crosstalk between competing teams.

- When selecting a channel for team competition, the team's radios will be set by a designated contest official on a channel that is different from any other radios in use.
- The mine manager or other designated contest official will check and monitor conversations on the channel selected. In the event of failure of the radio provided to the mine manager or other contest official, corrective actions will be immediately taken by the team.
- Teams may take up to three radios in by the fresh air base and must provide at least two for the fresh air base to be used by the team's attendant and the mine manager or other designated contest official. Teams may leave additional radios at the fresh air base for use in case of malfunctions. **A minimum of three radios shall remain operational during the working of the problem.** This consists of: one radio each for the team underground, the team's fresh air base attendant and the mine manager or other designated contest official. This complement of radios is necessary for the team to be considered as using wireless communication.

Team Preparation (Apparatus)

Team members must make necessary checks of all apparatus for proper working condition and airtightness prior to going underground. Cylinder pressures must be within specifications of approval. Apparatus tests must comply with prescribed tests for that particular type of apparatus.

An approved 4-hour oxygen breathing apparatus and/or an approved one-hour oxygen-generating unit must be used as an emergency spare for a mine rescue team member or for use on the survivor(s) or other rescued personnel when respiratory protection is needed.

Note: If a survivor is found and is wearing an approved one-hour oxygen-generating self-contained self-rescue (SCSR) device, the team will not be required to replace it with one of the above mentioned units unless the SCSR has been depleted. In addition, if any of the above persons are unconscious, one of the above units equipped with a full face-piece must be used.

Written Test

On the day before the contest begins, all written tests will be administered in isolation. The mine rescue field test will be included at this same time. Team member Nos. 1 through 7 will take the written test. The six best test scores (least amount of discounts) will be counted as the team's cumulative written test discounts. If the team does not have a No. 7 alternate, then the aggregate sum of scores for team member Nos. 1 through 6 will count as the team's cumulative written test discounts.

The questions for the written test will be taken from material contained in MSHA Publication 3027 – Instructor's Manual for Mine Rescue Training (formerly MSHA Publication "IG 6"). The training modules in Publication 3027 are as follows: Module 1 – Surface organization; Module 2 – Mine Gases; Module 3 – Ventilation; Module 4 – Exploration; Module 5 – Fire, Firefighting, and Explosions; Module 6 – Rescue of Survivors and Recovery of Bodies; and Module 7 – Mine Recovery.

MSHA Publication 3027 is available on the MSHA homepage at <http://www.msha.gov/MineRescue/Training/TeamTraining.asp> or at the following address:

U.S. Department of Labor
National Mine Health and Safety Academy
ATTENTION: Printing and Training Materials Distribution
1301 Airport Road
Beaver, WV 25813-9426
Telephone: (304) 256-3257
Fax: (304) 256-3368
E-mail: MSHADistributionCenter@dol.gov

The written test of thirty (30) questions will include at least ten (10) questions on mine gases from MSHA Publication 3027 (Module 2 – Mine Gases) for each team member. The questions shall consist of true/false and multiple choice questions.

The total written test discounts (as determined above) will be included as part of the team cumulative discounts for the mine rescue field competition (i.e., National Contest – two-day total or Regional Contest – one-day total).

Judges

All judges will be persons trained in mine rescue procedures and knowledgeable in the rules, interpretations, and the procedures for working the respective problems. The judges will attend training sessions prior to the contest concerning the problems to be worked and the guidelines for working such problems. Judges will be trained in all aspects of the problems to allow for consistent and accurate judging.

Competing teams deserve the full attention of the judges and only those personnel judging the specific teams are allowed on the field. While the team is in the mine, judges must not ask questions, answer questions, or interfere with the team. Only personnel approved by the Contest Director will be permitted on the field. Media access and videos for future training aids will be allowed with the Contest Director's approval.

During preparation, judges are to observe the captain and other team members as to their knowledge and proper operation of the self-contained breathing apparatus, gas detecting devices, other respiratory protection equipment to be used, and firefighting equipment, etc.

The mine manager will be stationed and must remain at the fresh air base when the teams are working the problem. He/she will provide answers, as necessary, to questions posed by the team, the fresh airbase attendant, or the assistant.

A minimum of two (2) persons will judge the team during the entire working of the field problem. Only the Contest Director, Chief Judge, or their designee may discuss discrepancies or discounts on the field. If discussions are held on the field, interrupting the working of the problem, the time will be stopped and restarted after the discussion is over. A Mine Safety and Health Administration employee will be the #1 Judge. All judges must have current Mine Rescue Judge's Training and have been briefed on the particular problem and possible solutions.

The judges will mark and explain on their scorecards the discounts for work performed by each team member. In the event that more than one discount applies, the highest discount will be assessed for a violation. There will be no stacking of discounts. Judges must sign their scorecard after the discounts have been recorded. Scorecards will be marked promptly and delivered to scorecard examiners as soon as possible after completion of the problem.

Security

Each team 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. Any team receiving information concerning a contest problem will be disqualified. No person except guards and contest officials authorized to do so, will be allowed to communicate with any team or teams under guard. Teams that have performed will not be permitted to communicate with any teams awaiting their turn to perform.

Only judges, contest officials, escorted photographers, and news media approved by the contest director will be permitted on the competition fields. A separate area will be provided for spectators to observe the teams during competition.

Competition Problem

The problem may involve a multi-level mine; however, the team will be limited to working on one level. It may include hoists or shafts. Skip pockets and sumps (either above or below) will be considered part of the working level. Raises or boreholes may be in the problem; however, climbing will not be required.

Teams may have to change existing ventilation, pump water, or move falls to rescue persons and/or explore if it can be done safely. Changing ventilation shall not be done until the official in charge has been informed. Ventilation changes will be considered as starting, stopping, altering, or redirecting the air current. If existing check curtains are to be used to direct ventilation, the check curtain must first be converted into a temporary stopping. Regulating airflow to control a fire is not considered a ventilation change.

All areas that have been cleared of smoke and toxic or dangerous gases that the teams elect to travel through must be rechecked prior to the team's reentering. Upon re-entry into these areas where the ventilation has been changed, whether advancing or retreating through these areas, separate gas tests will be conducted by the team along the route they travel across each entry (rib-to-rib) within 25 feet of each opening to the place turned off the entry.

When smoke or gas is encountered in an opening, it will be considered to extend to a placard indicating the smoke or gas is cleared, or to a separation intended, or indicated to be air tight.

If water is being pumped, ventilation changed, falls moved, loose rock barred down, etc.; teams must wait until placards have been changed by the ground committee. If placards have not been changed after 15 seconds, teams must assume that their actions were not successful.

Inaccessible areas only need to be explored when there are miners unaccounted for or if an explosive air/gas mixture will be moved through the unexplored areas. Teams may be required to pump water or set timbers to explore inaccessible areas. If this is necessary, appropriate materials will be provided in the problem.

Only judges, contest officials, escorted photographers, and news media approved by the Contest Director or Chief Judge will be permitted in the working areas.

Insofar as possible, materials rather than placards will be used in the mine. Bodies with identification may be designated by the use of dummies. When placards indicating conditions are used, they will be placed face up, and the letters shall not be less than one (1) inch in height, and easily visible.

Additionally, when these placards are used to identify mining machinery or equipment, a description of the current condition of the equipment and/or a photocopy of a picture of such machinery or equipment may be on the placard, when possible, to aid teams in identifying it.

Terms used in the problem will be terms which appear in the Glossary of this Rule Book, the MSHA Mine Rescue Training Modules, or 30 CFR - Part 49 and Part 57.

When raises, winzes or boreholes are in the problem, the card identifying them will indicate whether they go up and/or down from the level being worked.

TEAM PREPARATION AND PROCEDURES

Apparatus and Material Checks

Before reporting to the contest field, each team member must check his/her own apparatus to see if it is charged properly and in good working condition. These checks must be within the manufacturer's specified limits and the regenerator fully charged with chemicals.

Other materials such as roof testing devices, stretchers, hammers, blankets, fire extinguishers, and gas detectors must be checked to see that they are in good operating condition. If horns are to be used for signaling between team members, they should be checked. A portable communication system, utilizing insulated wire strong enough to give and receive manual signals, must be used by all teams. Wheeled stretchers will be allowed.

Briefing

When all members of the team have their apparatus fully assembled and ready to wear, the captain should assemble the team and report to the Briefing Station Official when directed by the guard. The team will be briefed on field conditions either by a video or a briefing paper. Team members will return any handouts at the conclusion of the briefing. The briefing should contain all pertinent information, including the following conditions: classification of the mine; frequency of explosive gas being found; accuracy of the mine map; possibility of the mine being cut into another mine; condition of the fan; have guards been posted; electric power cut off from the mine or affected parts of the mine; recovery work that has been accomplished; notification of the local, state, and federal agencies; reserve rescue teams, equipment, and materials that are available.

Any final adjustments to the equipment and necessary talks between team members can be completed prior to reporting to the field judge.

Reporting to Field

On reporting to the field, communication cable can be strung out prior to starting the clock. Afterward, the captain should have the team line up at the place indicated by the person in charge. The captain introduces his team and remarks "We are here to offer our help. I have a fully equipped, properly trained, and physically fit mine rescue team and we are ready to do anything that you may require in the rescue and recovery work at your mine." The official in charge will reply that they do require the service of mine rescue teams, and that if they are ready, they can be of immediate service.

Start of Problem

When the necessary introductions have been made, the team captain will indicate that they are ready for the problem and map. No work will be done until the clock is started. The captain will start the timing device and date the board (month, day, year, and team position number) before receiving the problem and the map. After the clock is started, only the five working team members, fresh air base attendant, and assistant will be permitted to do the work at the fresh air base. MSHA's field attendants will feed out and reel in the communication wire.

The fresh air base attendant will receive the problem and map at the same time. From this point on, the team members should discuss the conditions presented by the problem and the map. On the map, solid lines will denote actual workings. Although locations may not be totally accurate within the six (6) foot map requirement, solid lines will represent known conditions. Dotted lines will denote projections and may or may not be accurate. These conditions should be studied carefully so that proper procedures may be decided in advance.

Equipment Checks and Procedures

No testing of equipment is required at the fresh air base. Testing of equipment used by the team will be performed while the team is in isolation before reporting to the field. This testing will not be judged, however, if any defects occur while working the problem, discounts will be assessed. Random checks of equipment to insure reliability may be made upon completion of the problem.

Standard Communications and Signals

A portable communication system, utilizing hard wire, will be used to inform the fresh air base of all conditions encountered. External speakers will not be permitted at the fresh air base while working the problem. In the event of a communication failure, the team will be required to return to the fresh air base to repair or replace the system.

The following standard horn blasts or other audible signals between team members will be used:

- 1 blast on the horn will mean for the team to “stop” if in motion
- 2 blasts on the horn will mean “advance”
- 3 blasts on the horn will mean “retreat”
- 4 blasts on the horn will mean “distress”

Hoist Signals

The following signals will be used for the Mine Rescue Field Competition. The conveyance shall not be moved without a command signal: when persons are to be hoisted or lowered, they must enter the conveyance and close the door; then give the signal for the desired level followed by either "Hoist Persons" (3-1 bells) or "Lower Persons" (3-2 bells).

9 Bells: Emergency - then ring mine level signal where emergency exists.

MINE LEVEL SIGNALS

Surface Shaft Collar - 1-2 Bells

500 Feet First Level - 2-1 Bells

HOIST SIGNAL

1 Bell - STOP

2 Bells - Lower Conveyance

3 Bells - Raise Conveyance

3-1 Bells - Hoist Persons

3-2 Bells - Lower Persons

3-3-1 Bells - Hoist Slowly with Caution

3-3-2 Bells - Lower Slowly with Caution

1-2-1 Bells - Hoist Muck or Materials Only

2-1-2 Bells - Release Conveyance

Team Safety

Team members must follow established procedures, per this booklet for the type of equipment used, when getting under oxygen.

The team captain must now check each member's apparatus. A team member must make the same checks on the captain's apparatus. The judges will observe the operation and adjustment of the apparatuses.

The captain should see that the team line is properly stretched out and that the team members are holding or are attached to the team line.

If a team encounters smoke, an apparatus check or personnel check is required before entering smoke. In smoke, all team members must have hold of, or be fastened to, a lifeline.

The captain must now have the team count off either orally or visually by the raising of hands.

The captain must give the signal to advance. The stretcher bearers should pick up the stretchers, and the rear captain shall relay the signal to the fresh air base. When the signal is returned, the team may now advance into the mine.

Entrances to all mine openings shall be examined while under oxygen. In air clear of smoke, these checks may be made without a lifeline, provided the entire team does not go into the entrance. This examination should not cover more than twenty-five (25) feet.

For Contest purposes, a placard denoting "clear air" will mean that the atmosphere is free of smoke and all dangerous and/or harmful concentrations of flammable, combustible, noxious, and or toxic contaminants.

Teams shall never travel through water over knee deep.

Checking for loose ground (loose roof or rib) is done visually by the team captain as the team advances. The captain must verbally indicate that he is checking for loose ground at every location required. The team captain must orally warn the team each time loose ground conditions are encountered. A similar warning must be given upon retreat.

First Team Stop

After advancing into the mine, not more than fifty (50) feet from the cage or portal, the captain shall give a signal for the team to stop. The co-captain may take no more than two steps forward after the signal before stopping. The captain now checks the members and their apparatus to see if they are in good condition and a team member checks the captain and his/her apparatus. (This check must not be made on the cage.) The procedure shall be followed at not more than twenty (20) minute intervals while the team is working the problem. Additionally, apparatus removed in order to enter a confined area or apparatus that has sustained possible damage from impact must be checked before continuing.

If all the apparatus are operating properly and the members are in good condition, the team can now continue into the mine.

The cage door must be closed and the signal to release conveyance to a standby mode must be sent after the cage has been unloaded.

Advancing

When stops are made at the openings of crosscuts, intersections, or drifts turned off the drift that is being traveled, separate gas tests must be made across each entry (rib-to-rib) within 25 feet of each opening to the place turned off the entry. No place, which intersects entry direction, should be passed without first checking the condition of that place. Examination of any intersection or entry shall not exceed 25 feet from the rear captain. This means the captain can extend out into openings and take gas readings within the limits of the team line.

In case of entries turned from the entry being traveled, it is a matter of choice which entry is to be followed and many things must be taken into consideration in making the choice. However, the openings of all places must be checked before that place is passed. A team will be considered to have passed an opening or intersection when the number 5 member is past the opening.

While advancing, if a team encounters an impassable fall or other condition that prevents the members from following the normal course of travel into an area, they may break a stopping and enter that area. If it becomes necessary to break a stopping, the team shall erect a temporary stopping or stoppings that would have the same effect on the area that the original stopping would have provided.

Doors shall not be opened without prior knowledge of the effects of the mine ventilation system, unless a temporary stopping has been erected. However, in any case, if the conditions behind the stopping or door are unknown and there is a potential that missing miners are located in the enclosed area, these ventilation controls should be treated like a "barricade" and the same precautions must be taken as prescribed in the section below.

Regulators shall not be opened without prior knowledge of the effects of the mine ventilation system, unless a temporary regulator has been erected.

Where crosscuts are blocked, no team member may advance more than three (3) feet beyond the second (2nd) intersection before tying across and/or behind into all unexplored areas that intersect. The second intersection will be determined by two crosscuts on either side of the entry being traveled. The first intersection will be the blocked intersection. However, a team will be permitted to tie across to adjacent drifts to tie in behind.

Barricades

If a barricade is found, the team will take action to protect the barricaded persons as indicated by the conditions found outside the barricade. For the purposes of contest work, no barricade will be breached without ventilating in front of the barricade if: Oxygen (O₂) is below 17.0%; or Carbon Monoxide (CO) exceeds 1200 ppm (0.12%); or Hydrogen Sulfide (H₂S) exceeds 100 ppm (0.01%); or Nitrogen Dioxide (NO₂) exceeds 20 ppm (0.002%); or Sulfur Dioxide (SO₂) exceeds 100 ppm (0.01%); or Carbon Dioxide (CO₂) exceeds 4.0%. In the event that gases other than these are encountered or indicated by the problem, the team must ask for stain tubes or testing devices for these gases if they don't have them.

If conditions behind the barricade are unknown, the barricade cannot be breached unless the team erects a reasonably airtight temporary stopping. The space between the barricade and the temporary stopping should be as little as feasible; however, it should be large enough for the team to enter. When entering the barricaded area, the opening in the barricade should be kept to a minimum, the roof in the area shall be tested, and gas tests made.

If survivors are found and conditions warrant (i.e., unconscious survivor and/or survivor will travel through toxic contaminants), they shall be given proper respiratory protection which can include an approved one-hour oxygen generating unit.

Note: If a survivor is found and is wearing an approved one-hour oxygen-generating self-contained self-rescue (SCSR) device, the team will not be required to replace it with either a four-hour or a one-hour oxygen generating self-contained self-rescue unit unless the SCSR has been depleted. In addition, if any of the above persons are found or become unconscious, one of these units equipped with a full face-piece must be used.

If more than one (1) survivor is behind the barricade and proper protection cannot be provided for all of them, the team in retreating should keep the openings in the barricade and temporary stopping to a minimum so that as little irrespirable air will get into the barricaded area as possible. If the area beyond the last survivor can be explored without advancing the survivor, this should be done before retreating with the survivor. When all the survivors have been removed from the barricaded area, the enclosure may be opened (or breached) as wide as necessary for easy exit. Survivors must be secured to the stretcher and covered with a blanket unless first aid procedures indicate other treatment is proper. If a person is found behind a barricade or in a refuge chamber and the area is not entered, the team may advance beyond the chamber for exploration. However, if survivor(s) can be safely evacuated without changing conditions, they shall be evacuated before any further exploration is done.

Dates and Initials

The date and the captain's initials must be marked at the point of farthest advance of the team in any direction such as at stoppings, faces of rooms and drifts, water over knee deep, impassable falls, barricades, fires out of control, and at the location of any survivors or bodies. The captain must verbally indicate to the judges each time initials and date are simulated.

Maps and Timing Device

The map person and fresh air base attendant must use the standardized map legend provided in this rule booklet. If a symbol is not available on the legend, the team must write out the exact information contained on the placards on both maps. Teams will be expected to accurately map all required items on the maps maintained by the team and the fresh air base attendant.

An additional map will be provided to the team for use by the team alternate, if they so choose. However, deficiencies found on this map will not be counted toward the team's cumulative score.

After the team has completed its 50 foot check, they will not be allowed to physically compare the team map with the fresh air base map. That is, no side by side comparison will be allowed and no changes (edits) can be made to either map while the team is at the fresh air base or out of the mine. When the team has explored all accessible areas, accounted for all miners and completed all required work, they should return to the fresh air base and count off. At that time, no other changes can be made to either map and the captain should present all three maps to the person in charge of the mine and stop the timing device.

The marked maps must show: the condition of all faces, stoppings and doors; the location of all placards or materials; the location of fires and barricades; and the location of dead bodies and survivors (including identification). Temporary stoppings that are erected shall also be shown as well as the location of any gas found or indicated by placards. The maps must show all locations dated and initialed by the team captain. If a team fails to explore the entire mine, the furthest point of advance shall be indicated on the maps by a line drawn across the entry with the appropriate mine map legend symbol.

Ventilation

Under no circumstances should mine ventilation be altered without knowing the full effects of those changes and without notification of the changes to the mine manager.

A contaminant or explosive gas, when indicated on a placard and regardless of the mass, is considered moved throughout the established ventilation course until exhausted from the mine.

Unless otherwise documented by placards indicating air movement, the mine is not considered to have natural ventilation or airflow. All airflow is provided by the existence of mine fans or other mechanical ventilation. However, before the team can breach, open, or alter an existing ventilation control (bulkhead, door, stopping, or regulator) without the knowledge of the effects on the existing mine ventilation system, the team must follow the necessary precautions outlined in the "Advancing" section of these rules.

Ventilation changes will be considered as starting, stopping, altering, and/or redirecting the air current. The direction of airflow depends upon where the team constructs ventilation controls. A standard brattice frame and curtain are 10 feet. Therefore, if the team elects to build a ventilation control at a distance greater than 10 feet, such as diagonally across an intersection, they must utilize a second brattice frame and curtain.

If existing check curtains are to be used to direct ventilation, the check curtain must first be converted into a temporary stopping.

Regulating airflow to control a fire is not considered a ventilation change.

If there is no clear air separation, indicated by placards, stoppings, caved air tight, the entire area is considered contaminated. Once the team has established an airflow course, areas that contain contaminants that are not directly in the established air course, and have two or more openings, could potentially be drawn from those areas unless isolation and/or ventilation controls are established to prevent movement. An example is in an uncontrollable fire area where regulators were constructed. Until all but one regulator is closed, airflow will draw from those regulators into the established air course.

Blankets or other porous materials cannot be used as curtains to direct airflow. All brattice material, including wing curtains, will be provided for each problem so that adequate ventilation can be established to work the problem correctly. Teams need not carry additional brattice materials on their stretcher.

All problems will be designed with at least one clear and systematic ventilation solution. When the team alters and/or constructs ventilation controls, and the effects of those changes do not clear the air and the placards do not change, the team has missed a critical adjustment to the ventilation solution.

Mine Fires

When a mine rescue team encounters a noncombatible fire, indicated by “intense heat” or “fire out of control,” the team shall, without undue delay, seal the fire or regulate the fire, so as to restrict the air flow to the fire and prevent its further advance. Regulating airflow to control a fire is not considered a ventilation change. The team must then, without undue delay, find all other approaches to the fire and seal or regulate them. This does not preclude systematic exploration of the area. Whether to use regulators to control the fire or to entirely seal the fire must be decided by the team. The team must inform the official in charge prior to making any ventilation changes. This decision will take into consideration the safety of the team and any survivor(s), the classification of the mine (gassy/nongassy), the presence of any explosive gases, the possible effects of any ventilation change(s), and other pertinent data. A regulated fire, left unsealed, has the potential to emit contaminants into the mine atmosphere.

Roof or Ground Control

The following illustration (Figure 1) shows the proper method of setting roof supports through an unsafe area using the safe ribs as support.

- 5-foot maximum spacing between temporary roof supports.
- The first support is set a maximum of 1-foot from the area designated as unsafe.
- The rib can be used as support unless designated as unsafe.
- Once a post has been set to correct and support an unsafe roof condition, it cannot be removed.

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.

The team must simulate setting support and then place placard on the floor in the proper location.

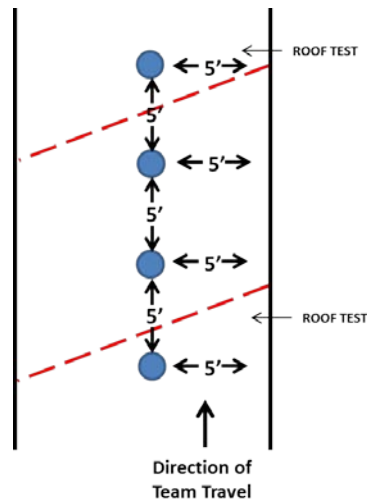


Figure 1

The following illustration (Figure 2) shows the proper method of setting roof supports through an unsafe area with designated unsafe ribs.

- 5-foot maximum spacing between temporary roof supports.
- The first support is set a maximum of 1-foot from the area designated as unsafe.
- The rib can be used as support unless designated as unsafe.
- Once a post has been set to correct and support an unsafe roof condition, it cannot be removed.

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.

Team must simulate setting support and then place placard on the floor in the proper location.

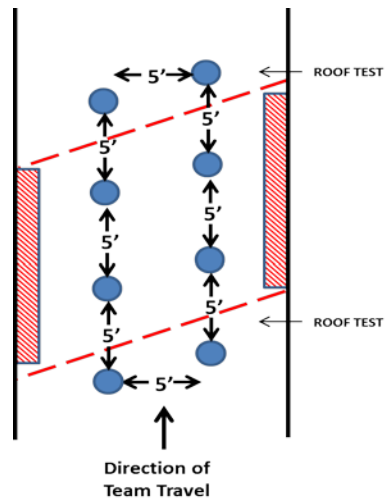


Figure 2

The following illustration (Figure 3) shows the proper method of setting roof supports through an unsafe intersection.

- 5-foot maximum spacing between temporary roof supports.
- The first support is set a maximum of 1-foot from the area designated as unsafe.
- Once a post has been set to correct and support an unsafe roof condition, it cannot be removed.

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.

Team must simulate setting support and then place placard on the floor in the proper location.

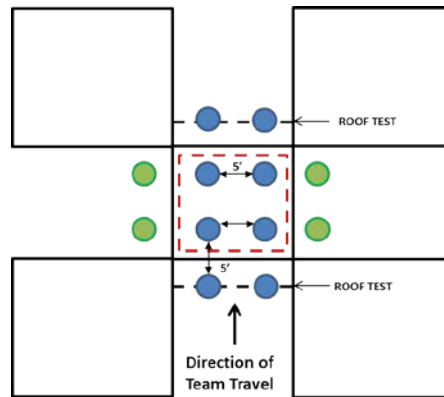


Figure 3

Note: If the team decides to travel through the intersection to the east or the west, additional supports will need to be installed (as shown in green on the illustration).

The following illustrations (Figures 4 and 5) show the proper method of setting roof supports to recover a patient located under an area of unsafe roof or back.

- 5-foot maximum spacing between temporary roof supports.
- The first support is set a maximum of 1-foot from the area designated as unsafe.
- Once a post has been set to correct and support an unsafe roof condition, it cannot be removed.

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.

In each situation, the team must simulate setting supports and then place placards on the floor in the proper location.

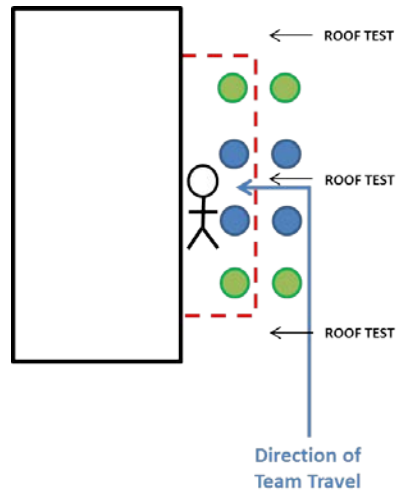


Figure 4

Note: If the miner is alive and requires first aid, additional supports will need to be installed (as shown in green on the illustration) so that additional team members can safely access the area and provide necessary treatment.

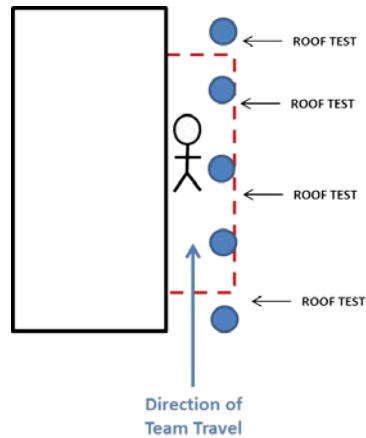


Figure 5

Gas Field Testing

Gas testing proficiency will be conducted during the working of the mine rescue field competition. At the fresh Air Base, the team will find a gas box (gas cylinder and tubing) containing an “unknown” mixture of gases. Each mine rescue team will need to provide their own calibration cups for their multi-gas instruments and will be expected to report all required concentrations within acceptable limits: O₂, CH₄, CO, and NO₂.

This segment of the contest will be scored by the judging officials as follows: at each gas box, there will be fifteen (15) discount points deducted per gas if the team does not report the respective gas concentration within the acceptable limits below:

- a. Oxygen readings are considered to be correct if within plus or minus 0.5% by volume;
- b. Methane readings are considered to be correct if within plus or minus 0.2% by volume (LEL readings are not acceptable) with an instrument equipped with a catalytic sensor. Note: For those instruments equipped with an infrared sensor, the readings would be rounded to the nearest whole number. Therefore, a team must use an instrument equipped with a catalytic sensor in order to be within the required tolerance;
- c. Carbon Monoxide readings are considered to be correct if within plus or minus 10% of the actual value present; and
- d. Nitrogen Dioxide readings are considered to be correct if within plus or minus 3 ppm of the actual value present.

MINE RESCUE DISCOUNTS AND INTERPRETATIONS
Surface Discount Sheet
Judge #1

Time: Hours: ___ Minutes: ___ Seconds: ___ Discounts

- | | |
|---|----------------|
| 1. Apparatus improperly assembled, each apparatus | 10 x ___ = ___ |
| 2. Apparatus improperly adjusted to the wearer, each infraction | 1 x ___ = ___ |
| 3. Apparatus part or parts worn or deteriorated so as to be dangerous to wearer, each person | 8 x ___ = ___ |
| 4. Failure to follow prescribed procedures for going under oxygen, each person | 3 x ___ = ___ |
| 5. Failure of team member to be clean shaven in the area that affects a good face-to-facepiece seal, each infraction | 10 x ___ = ___ |
| 6. Failure of captain to examine each apparatus and have captain's examined before entering the mine, each apparatus each infraction | 2 x ___ = ___ |
| 7. Team member not wearing identification, protective clothing, including safety shoes, hard hat, permissible cap lamp, self-rescuer, each infraction | 2 x ___ = ___ |
| 8. Failure of team captain to mark date and team position number on the check board at mine portal or fresh air base, or start timing device, each omission | 4 x ___ = ___ |
| 9. No work will be done prior to starting the clock | 4 (total) ___ |
| 10. Failure of team to "count off" before entering or leaving the mine | 2 x ___ = ___ |

_____ **Total Discounts** _____

Judge's Signature

MINE RESCUE DISCOUNTS AND INTERPRETATIONS
Surface Interpretation
Judge #1

1. Apparatus not meeting manufacturer's life critical specifications during use. This discount will be applied if the team captain or team member does not correct it before the team goes underground. Once the team has entered the course, no further penalty can be assessed by the judge.
2. Shoulder straps, chest straps, etc., that are twisted or not fastened.
(Separate discount for each strap.) This discount will be applied if the team captain or team member does not correct it when the team goes under oxygen. Once the team has entered the course, no further penalty can be assessed by the judge.
3. Holes in the breathing tubes or straps worn to the extent that they break during working of the problem while still at the fresh air base; should not be discounted if they are replaced prior to starting work in the mine.
4. This will depend on type of apparatus used; the proper procedure will be outlined in the apparatus section. Once the team has entered the course, no further penalty can be assessed by the judge.
5. Self-explanatory.
6. The captain must examine the apparatus of team members and have a team member examine the captain's apparatus before entering the mine. The person making the check must obtain assurance from person being checked that he/she is all right (asking if person is okay will suffice).
7. Self explanatory.
8. Captain must mark date and team position number on check board after clock is started, and the captain must stop the clock after the maps are turned in.
9. Self-explanatory.
10. This can be done at any time after the clock is started, but must be done prior to team entering the mine for the first time. It does not have to be done prior to checking portals. Hand or audible counting off is acceptable. It is not necessary to count off upon reentry or leaving mine; however, the team is also required to count off when completing problem.

MINE RESCUE DISCOUNTS AND INTERPRETATIONS
Underground Discount Sheet

Judge #1	Discounts
1. Breathing external air while working problem, each team member, each infraction	10 x ____ = ____
2. Team not following proper procedure in case of apparatus failure, each infraction	10 x ____ = ____
3. Failure of team to stop within 50 feet of the fresh air base or at the shaft station to perform personnel and apparatus checks, upon their first entry into the mine	4 (total) ____
4. Team member(s) not making apparatus check after removing apparatus to traverse restricted clearance or after apparatus has sustained possible damage from impact (each person, each incident)	4 x ____ = ____
5. Apparatus examination exceeding 20-minute intervals.	5 x ____ = ____
6. Failure to use posted hoisting signals, each infraction	1 x ____ = ____
7. Failure to close shaft station gate	5 x ____ = ____
8. a. Failure of the captain to indicate to the team he/she has recognized bad ground.	
b. Failure of the captain to verbally indicate he/she is checking the back or roof;	
1. at intersections, shaft stations, rooms, faces, and mine openings;	
2. at all points of farthest advance;	
3. before building or erecting any structure;	
4. upon passing through any barricade, stopping, bulkhead, air lock; door; check curtain, or similar barrier;	

Discounts

5. at the location of fire or intense heat.
- c. Any team member performing work or moving into any part of an area during a team stop before the captain has visually checked the ground conditions in that part, each infraction 5 x ___ = ___
9. Failure of the captain to mark the date and his/her initials at the point of farthest advance of the team in any direction such as at stoppings, faces of rooms and drifts, water over knee deep, impassable falls, barricades, fires out of control, and at the location of any live persons or bodies, each omission (maximum 10 discounts) 2 x ___ = ___
(10 max.)
10. Captain or other team member doing anything to endanger himself/herself or other team members, 15 points each team member so endangered, each infraction, each occurrence 15 x ___ = ___
11. Failure of team to explore or examine workings systematically and thoroughly, each omission 4 x ___ = ___
12. Teams must be checked immediately before entering smoke 5 x ___ = ___
13. Failure to locate, seal, or extinguish fire, if possible, without undue delay 50 x ___ = ___
14. Failure to notify the fresh air base when an air/gas mixture has reached its explosive range. 10 x ___ = ___
15. Failure to bring live person to surface or fresh air base by the end of the problem, each omission 50 x ___ = ___
16. Failure to locate bodies and/or live persons, each omission 50 x ___ = ___

Discounts

17. Transporting survivor in unexplored territory, leaving survivor unattended, and moving survivor in any direction except toward the fresh air base, each infraction

6 x ____ = ____

18. The team performing an act that may result in the death or injury of survivor(s). Some examples of this would be:

- a. Breaching a barricade with toxic gases outside.
- b. Directing toxic gases over survivor(s) through a change in ventilation
- c. In the case of multiple survivors, leaving the higher priority patient and taking a less injured patient out, each infraction
- d. Improperly protecting survivor(s) from toxic gases

50 x ____ = ____

Judge's Signature

Total Discounts _____

MINE RESCUE DISCOUNTS AND INTERPRETATIONS

Underground Interpretation

Judge #1

1. Working all or part of problem without a facepiece or working with inhalation hose disconnected.
2. Proper procedure would depend on type of apparatus; however, team must proceed to fresh air base immediately.
3. This check must be made: at the first stop, with all team members past the portal or off the cage (this does not apply to checking mine entrances prior to working the problem); before the captain exceeds 50 feet from portal or shaft; and before the team leaves the shaft station.
4. This apparatus check must be made as soon as all team members have passed through the restricted area and before any other work is done. Additionally, this apparatus check must be made immediately after any apparatus has sustained a blow which might cause damage to it.
5. Self-explanatory.
6. Hoist shaft signals will be posted at shaft stations and will be used to notify the hoistman of intended movement and cage release.
7. Self-explanatory.
8. a. Must so indicate before any other team member passes the placard. This applies each time such a placard is reached; when retreating, the rear captain must do this.
 - b. 1. Must be so indicated before physically entering the area.
 2. Includes checking in front of any physical barrier to advancement.
 3. Including erecting or breaching stoppings, barricades, curtains, etc.
 4. Must be so indicated before physically passing through.
 5. Must be so indicated immediately upon reaching the placard indicating fire or intense heat.

- c. This means the captain's physical presence is necessary before any part of an area can be considered as having been examined.
9. Such places only need be marked once and also must be indicated on both maps. Date means month, day, and year.
10. Examples of endangerment include, but are not limited to:
- a. 15 points will be assessed for each team member who:
 - 1. travels under bad roof or ground;
 - 2. travels into water over knee deep or into a sump containing water;
 - 3. travels over or under an open ore pass or ore pocket into which they could fall or be injured by falling objects;
 - 4. advances past a sign indicating intense heat or fire out of control;
 - 5. fails to take body substance isolation (BSI) precautions before physically contacting a patient; and
 - 6. fails to wear apparatus while examining the entrances to mine openings.
 - b. The entire team will be considered endangered and 75 points assessed for:
 - 1. failure to check a shaft for possible damage, or the presence of fire or flooding, prior to traveling through it. For contest purposes, this check may be done by placing combustible materials on the cage and having the cage lowered to the level to be explored, then raising it to the collar.
 - 2. not having non-sparking tools in a gassy mine or when explosive gases are found in a non-gassy mine.
 - 3. changing conditions of the mine ventilation system in such a manner that an explosive mixture is moved over an ignition source. Changing conditions of the mine ventilation system in such a manner that an explosive mixture is moved over an unexplored area. If a

team explores all sides of an overcast or an undercast, both ends of a ventilation shaft, or the top and bottom of shafts when the shaft cannot be traveled, the in-between areas are considered explored for ventilation purposes.

4. continuing exploration after conditions are found to indicate an imminent explosion is possible by the presence of an explosive mixture and the evidence of fire (smoke or carbon monoxide) and the location of the fire is unknown. A team must continue to explore if it knows there is a continuous nonexplosive separation between the explosive mixture and the evidence of fire.
 5. utilizing electric or battery-powered equipment in explosive air/gas atmosphere. Ignition sources would include any communication device, unless designated as sound-powered or intrinsically safe.
 6. failure to take a functioning wire communication system into the mine or committing an act that causes the communications system to break or fail while underground.
 7. removing a post that has been set to correct and support an unsafe roof condition.
11. This will be assessed for not exploring all areas of the mine that can be explored without endangering team, if problem requires entire mine to be explored. All accessible areas must be tied across and behind before advancing. Where crosscuts are blocked, no team member may advance more than three (3) feet beyond the second intersection before tying across and/or behind into all unexplored areas that intersect. This may require building an air lock or returning to the fresh air base and exploring into other drifts at the discretion of the team and according to conditions of the mine. Shafts must be checked for possible damage, water, or fire, and must be traveled to be considered explored. All shafts must be traveled, if possible, before proceeding more than three (3) feet beyond the second intersection.

12. Personnel checks, not necessarily an apparatus check. The person making the check must obtain assurance from person being checked that he/she is all right (asking if person is okay will suffice).
13. Sealing or fighting a fire does not relieve the team of the responsibility of systematic exploration.
14. Failure to notify the fresh air base when an air/gas mixture, which reached its explosive range, has been encountered.
15. Self-explanatory.
16. Self-explanatory.
17. If a person is found behind a barricade or in a refuge chamber in a contaminated area, and the barricade or refuge chamber is not breached, the team may advance.
18. An act which does not endanger the team, but may injure or result in the death of a survivor.

MINE RESCUE DISCOUNTS AND INTERPRETATIONS
Surface Discount Sheet
Judge #2

	Discounts
1. Failure to take necessary permissible equipment and gas detecting devices to work the problem, each omission	4 x ____ = ____
2. Gas detectors, testers, and/or indicators failing to function properly and not corrected before entering the mine, each infraction	4 x ____ = ____
3. Testers or detectors improperly assembled or defective parts used	8 (total) ____
4. Failure to secure extra apparatus to stretcher, each omission	4 x ____ = ____
5. Physically comparing team map with fresh air base map, once the team has entered the mine.	25 (total) ____
6. Failure of the team to complete the problem within the established time limit.	25 (total) ____
7. Any team whose member(s) intentionally disturb or destroy any component on a competition field will immediately be assessed this discount. Repeated offense may result in team disqualification at the discretion of the contest director.	100 (total) ____

Total Discounts _____

_____ Judge's Signature

MINE RESCUE DISCOUNTS AND INTERPRETATIONS

Surface Interpretation

Judge #2

1. Failure to take necessary permissible equipment or testing devices underground, discount should be assessed even if teams return to fresh air base to pick up necessary equipment.
2. Faulty or inadequate equipment must be repaired or replaced. (This includes instruments used beyond their designed limits or range.)
3. If any questions exist, the equipment should be checked by the judges after the completion of the problem in the presence of the team captain.
4. Extra apparatus must be secured to stretcher to prevent it from falling off.
5. Teams may place reference or other information on both maps before proceeding into the mine. After the team has completed its 50 foot check, no side by side comparison of the maps or changes (edits) will be allowed on either map while the team is at the fresh air base.
6. Teams are required to complete the problem in the established time limit: explore all accessible areas of the mine; extinguish or seal all fires; locate all missing miners; and bring all survivors to the surface.
7. Self-explanatory.

MINE RESCUE DISCOUNTS AND INTERPRETATIONS
Underground Discount Sheet

Judge #2	Discounts
1. Failure to make necessary gas tests where required, each gas, each omission	1 x ____ = ____
2. Improper procedure when testing with gas detectors, each gas, each infraction	1 x ____ = ____
3. Intentional causing of a test instrument to inflate faster than tests indicate that it should, each infraction	1 x ____ = ____
4. At the fresh air base, the team must stop at the gas box, take a measurement, and report the respective gas concentrations within the acceptable limits below:	
a. Oxygen (O ₂) readings are considered to be correct if within plus or minus 0.5% by volume;	15 x ____ = ____
b. Methane (CH ₄) readings are considered to be correct if within plus or minus 0.2% by volume with an instrument equipped with a catalytic sensor. Note: For those instruments equipped with an infrared sensor, the readings would be rounded to the nearest whole number. Therefore, a team must use an instrument equipped with a catalytic sensor in order to be within the required tolerance;	15 x ____ = ____
c. Carbon Monoxide (CO) readings are considered to be correct if within plus or minus 10% of the actual value present; and	15 x ____ = ____
d. Nitrogen Dioxide (NO ₂) readings are considered to be correct if within plus or minus 3 ppm of the actual value present.	15 x ____ = ____
5. Less than 5 members entering, working or completing problem, each person	8 x ____ = ____
6. Traveling at more than a normal walking speed	8 (total) ____

Discounts

7. Team member talking to an unauthorized person without permission of the judges or contest officials, each infraction 5 x ____ = ____
8. Intentionally detaching/severing lifeline 5 (total) ____
9. All team members must be connected or have hold of the lifeline when the team is traveling or when in smoke. When stopped, in clear air, at least one person must have hold of the life line. If tag lines are used between team members and the team line, they shall be no longer than 3 feet in length. 2 x ____ = ____
10. Failure to erect temporary barricade, stopping or regulator when necessary, each infraction 10 x ____ = ____
11. Failure to erect temporary barricade, seal, or stopping reasonably airtight, each infraction 2 x ____ = ____
12. Failure to make necessary ventilation changes or changing ventilation or electric power before the effects of such changes are known, each infraction 15 x ____ = ____
13. Failure to properly secure survivor to stretcher; failure to cover survivor with blanket (unless first aid procedures indicate otherwise); or placing survivor on stretcher in such a way as to foul proper operation of apparatus, each omission 4 x ____ = ____
14. Survivor care:
- a. Failure to adequately examine and assess each person found in the mine for possible injury or illness, each infraction 4 x ____ = ____

Discounts

- b. Failure to properly treat any injury or illness which is, or should have been, revealed by the examination, each infraction 4 x ____ = ____
- 15. Failure to follow proper procedure when putting apparatus on survivor, each infraction 5 x ____ = ____
- 16. Assistance given by supposedly unconscious person, each infraction 5 x ____ = ____

_____ **Total Discounts** _____
Judge's Signature

MINE RESCUE DISCOUNTS AND INTERPRETATIONS

Underground Interpretation

Judge #2

1. Tests for gases must be made at face areas, stoppings, doors, regulators, barricades and other areas where conditions are unknown. When stops are made at the openings of crosscuts, intersections, or drifts turned off the drift that is being traveled, separate gas tests must be made across each entry within 25 feet of the rear captain's position. No place shall be passed without first checking the condition of that place. That is, if a room is turned from the entry, that room shall be checked before examining the entry beyond the opening. This does not necessarily hold true in cases of entries. In cases of entries turned from the entry being traveled, it is a matter of choice which entry is to be followed and many things must be taken into consideration in making the choice. However, all places must be checked before that place is passed. A team will be considered to have passed an opening or intersection when the No. 5 member is past the opening. All areas that have been cleared of smoke and toxic or dangerous gases that the teams elect to travel through must be rechecked prior to the team's reentering. Upon re-entry into these areas where the ventilation has been changed, teams shall make gas tests (rib-to-rib) at all openings along the route they travel.
2. This will depend on type of instrument used. Improper procedure when testing includes the location of the instrument when testing or using a gas detection device beyond its limits or range. For example, a methane detector must be held overhead when testing because methane (CH₄) is light and will be found in high places near the back or roof. Nitrogen dioxide (NO₂) is relatively heavy and will be found in greater concentrations along the floor and in low places. Therefore, this test must be made with the tester below the waist. Carbon monoxide (CO) is slightly lighter than air so this test must be made at chest height.

3. Self-explanatory.
4. Self-explanatory.
5. This does not apply to checking mine entrances prior to working the problem.
6. Teams traveling obviously faster than a normal walk (both judges must concur on this) shall be discounted.
7. Do not hesitate to assess this discount; however, explain and name unauthorized person on discount card and state instructions given, if known.
8. Self-explanatory.
9. The No. 5 member may move from side to side to give captain more area when team is connected by lifeline in smoke or by communication line as long as he/she does not pull or give line. All team members must hold or be attached to the lifeline at all times while traveling. If taglines are used between team members and the team line, they shall be no longer than 3 feet in length.
10. Stoppings, doors, regulators, and barricades require construction of temporary stoppings by a team before a team may make openings in the pre-existing stoppings, doors, etc. Doors shall not be opened without prior knowledge of the effects of the mine ventilation system, unless a temporary stopping has been erected. Regulators shall not be opened without prior knowledge of the effects of the mine ventilation system, unless a temporary regulator has been erected. This does not apply to existing check curtains used to direct the air current. When retreating out of a barricade or coming back through a stopping where an air lock has been erected, it will not be necessary to air lock on the way out, if this will not change any existing ventilation.
11. During a ventilation change, a curtain that directs airflow is required to be upgraded to a temporary barricade, seal, or stopping and must be fastened at top and sides.
12. Teams must inform the official in charge before changing the ventilation or electric power, and such things as explosive gases and the safety of trapped miners and rescue personnel must be considered. Teams do not have to exit the mine to change

power or ventilation. Teams can inform the fresh air base attendant by approved communication devices available, and the fresh air base attendant must inform the official in charge before changing ventilation or electric power. Informing the official in charge of the fresh air base does not relieve the team of the responsibility of their decision.

13. Survivor must be secured to stretcher by at least two bandages or straps, one around trunk of body and one around legs, covered with blanket, and placed so as not to crimp air hoses. (Hands of unconscious person must be secured.)
14. a. This will be based on the Ninth Edition of Brady "Emergency Medical Responder – First on the Scene", Chapters: 3, 4, 5, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, and 26, and MSHA Publication 3027 (IG 6) - Module 6, Rescue of Survivors and Recovery of Bodies. (This book may be ordered from the National Mine Health and Safety Academy. See page 16.)
b. A team must deal with a victim(s), if there is either visual or verbal contact or if the rescue can be done without violating procedures. Visual contact requires the captain's presence in the area. Verbal contact is any voice communication from the victim that can reasonably be expected to be heard by the team.
15. To properly protect a survivor, a team must provide an approved 4-hour oxygen breathing apparatus and/or an approved one-hour oxygen-generating unit. However, if a survivor is found and is wearing an approved one-hour oxygen-generating self-contained self-rescue (SCSR) device, the team will not be required to replace it with one of the above mentioned units unless the SCSR has been depleted. In addition, if the survivor is unconscious, one of the above units equipped with a full face-piece must be used.
16. Applies to person sitting up unassisted or moving arms so as to help in putting on apparatus. (Only applies if person is member of the team and not an MSHA employee.)

**MINE RESCUE FIELD COMPETITION
Team Discount Summary Sheet**

Team No.: _____

Company Name: _____

Team Name: _____

Judge #1 Surface: _____

 Underground: _____

Judge #2 Surface: _____

 Underground: _____

Written Test: _____

Map: _____

Working Time: Hours: ____ Minutes: ____ Seconds: ____

Total Discounts
Excluding average time: _____

Time Review Completed: _____

I certify that I have read and reviewed all discounts listed above.

Team Captain

Review Judge

MINE RESCUE FIELD COMPETITION
Written Examination Discount Summary Sheet

Company Name: _____

Team Name: _____

Draw Number: _____

Discounts

For each incorrect answer for each person
(1 discount)

No. 1 person	1 x _____ = _____
No. 2 person	1 x _____ = _____
No. 3 person	1 x _____ = _____
No. 4 person	1 x _____ = _____
No. 5 person	1 x _____ = _____
No. 6 person	1 x _____ = _____
No. 7 person (alternate)	1 x _____ = _____

Note:

Total Discounts is the aggregate sum of the six best test scores (tests with least amount of discounts). For teams with only six members, Total Discounts will include the aggregate sum of all six test scores.

_____ **Total Discounts** _____

Judge's Signature

MINE RESCUE FIELD COMPETITION
Map Discount Summary Sheet

Company Name: _____

Team Name: _____

Draw Number: _____

Team Map:

1. Failure to record information on map 1 x ____ = ____

2. Not recording information accurately on map (within 6 feet of actual location measured from the center point of the object), each infraction 1 x ____ = ____

Fresh Air Base Map:

1. Failure to record information on map 1 x ____ = ____

2. Not recording information accurately on map (within 6 feet of actual location measured from the center point of the object), each infraction 1 x ____ = ____

_____ Total Discounts _____
Map Examiner's Signature

**MINE RESCUE FIELD COMPETITION
Time Discount Summary Sheet**

Company Name: _____

Team Name: _____

Draw Number: _____

Total Time

Total time will be rounded off to the next highest minute. (Total average time will also be rounded off to the next highest minute.) _____

Discounts

For each minute over average time. $\frac{1}{2} \times \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$

Total Discounts _____

Timekeeper's Signature

TECHNICIAN TEAM COMPETITION

GENERAL RULES

1. The Technician Team Competition will be held in a simulated mine rescue station and may consist of benching one self-contained breathing apparatus (which will be assembled) and at least one multi-gas instrument to ensure the field readiness of the team. Thus, with this practical approach at the conclusion of the competition, the technician team's mine rescue team will be prepared to go underground and conduct a successful mine rescue mission.
2. The technician team will consist of two members of the 8-person mine rescue team. Persons competing in the Technician Team Competition cannot be members of the first aid team.
3. Registration will be made with the team registration.
4. The Technician Team competition will be held at designated location in conjunction with the first aid competition. Contestants will remain in isolation until they finish the Technician Team Competition or they will be disqualified.
5. For the purposes of identification, participants of the Technician Team Competition must be dressed uniformly, complete with team logo and team member number.
6. After the team verifies that they are ready, the clock will be started. The technician team may work together or separately to complete the required tasks.
7. At the simulated mine rescue station, the technician team will be provided with one breathing apparatus (designated by each team at the time of registration) and at least one multi-gas instrument, equipment, tools, and supplies, as necessary to complete the problem. Only those tools, equipment, and supplies provided will be used by contestants to work the problem. It is imperative that each team provide the type and model of breathing apparatus that the team will be using during the field competition because the same type and model of breathing apparatus will be made available to the Technician Team at the "simulated mine rescue station" during the Technician Team competition.

8. Thirty (30) minutes will be allowed to complete the competition. There will be a five (5) minute warning given by the judge when the time is about to expire. If the technician team has not completed the competition when time expires, the judges will stop their activities. They will be scored based on their discounts to that point, including: appropriate discounts for items missed; and appropriate discounts for necessary actions not taken by the technician team to complete the assigned task.
9. All defects in testing and preparation will result in the appropriate discounts.
10. ... WARNING ... Any team whose member(s) intentionally disturb or destroy any component on a competition field will immediately be assessed a 100 point discount. Repeated offense may result in team disqualification at the discretion of the contest director.
11. When the 30-minute time limit expires, the judges will conduct a five-minute review of all discounts. After the review, both the judges and the technician team will sign the appropriate judge's scorecard in the spaces provided.
12. Only judges, contest officials, escorted photographers, and news media approved by the contest director will be permitted in the technician team simulated mine rescue station. A separate area will be provided for spectators to observe the teams during competition.

13. A predetermined amount of trophies will be awarded for the Technician Team Competition. These will include separate trophies for the teams using Draeger BG-4 apparatuses and those teams using Biomarine BioPak 240R/S apparatuses.

The combined total discounts of the written tests and the individual segments of the competition will determine the winners. In the event of a tie, the written test scores will determine the winner. The total time will be the second tie-breaker. The winning teams will be announced during the banquet.

WRITTEN TEST

1. On the day before the contest begins, all written tests will be administered in isolation. The technician team tests will be included at this same time. The written test will consist of thirty (30) multiple choice and true/false questions, including:
 - a. Ten (10) questions from MSHA Publication 3027 (formerly "IG 6 – Instructor's Manual for Mine Rescue Training"): Module 2 – Mine Gases and Module 3 – Ventilation.
 - b. Ten (10) questions concerning the breathing apparatus used by the Technician Team's mine rescue team, as declared on the contest registration form.

For those team's using Draeger BG-4 apparatuses, test questions will be taken from Draeger Safety, Inc.'s "PSS BG 4 Service Manual" – P/N 4057781, Revision O, Serial No. ERXE-F001.

For those team's using Biomarine BioPak 240S apparatuses, test questions will be taken from: the BioPak 240S User Instruction Manual, Document A46D029, Revision F; the Benchman Instruction Manual, Document A46D030, Revision L; and applicable BioPak 240 Benchman/User Quizzes.

For those team's using Biomarine BioPak 240R apparatuses, test questions will be taken from: the BioPak 240R User Instructions, Document A47D134, Revision K; the Benchman Manual, Document A47D135, Revision M; and the current BioPak 240R User (Document A47D264, Revision C) and Benchman (Document A47265, Revision D) Quizzes.

- c. Ten (10) questions concerning the MX6 iBrid multi-gas instrument used by the Technician Team's mine rescue team. Questions will be taken from the Industrial Scientific Corporation's "MX6 iBrid Multigas Monitor Operation Guide" – Revision 9, dated April 24, 2014.
2. Contestants will be assessed one (1) discount point for each incorrect or unanswered question. Any alterations to the test questions or answers will be determined to be incorrect by the test judge and discounts assessed.
3. Scoring of the test will be completed by at least two qualified judges.
4. In special circumstances, individual team members may be given an oral test by one or more judges in lieu of a written test. Requests for consideration shall be presented to the Contest Director at the time of registration. All other team members will take the test at the same time. In any case, the judges will not explain the meaning of questions, but may explain a word or words in the questions.

JUDGES

1. All judges will be trained as prescribed by the Contest Director.
2. Judges must stand clear of team members.
3. Prior to the competition, judges will ensure that the team's breathing apparatus(es), multi-gas instrument(s), and communications system contains only the deficiencies as per the planned problem.
4. When unplanned deficiencies are encountered, judges will stop the clock, instruct the technician team to turn their backs to their respective area, at which time the judge will correct the unplanned deficiencies. Judges shall instruct the technician team that upon turning back to their area, the clock will restart. If the deficiencies are caused by either team member, the clock will not be stopped.

APPEALS

1. After the five-minute review, the technician team will be notified to report to the area designated for 20-minute looks. The team will have 20 minutes for reviewing the judges' scorecards and written test scores. A discount summary sheet will be used to list the discounts. All discounts will be listed and totaled. Both the technician team and the review judges will sign the discount sheet to certify they have reviewed the discounts and verified the totals (see page 91). After the completion of the review, the technician team will have an additional 30 minutes to prepare and submit any appeals. All appeals must be in writing and must clearly state the team's comments to the discount in question.
2. All appeals will be considered by the Technician Team Appeals Committee and their decision will be binding and final.

DISCOUNTS

1. Discounts will not be added to the technician team score once the judges have signed their discount sheets following a review with team members. This does not preclude changes due to administrative errors or a misapplication of a rule.
2. Technician Teams will not be discounted more than once for any one mistake in the same segment of the competition where such mistake may qualify under more than one discount. Judges will confer and assess the highest single discount.

**TECHNICIAN TEAM COMPETITION
TEAM EQUIPMENT CHECKS/PREPARATION**

GENERAL RULES

1. The technician team must make necessary checks of multi-gas instruments (see Multi-Gas Instrument Checks/Problem Diagnosis) and self-contained breathing apparatuses (see Apparatus Checks/Problem Diagnosis) for proper working condition. These checks must be within the manufacturer's specified limits. The extra breathing apparatus must also be tested accordingly.
2. Faulty equipment must be repaired or replaced. If replacements or replacement parts are not available, these items can be requested from the respective judges.
3. The equipment provided during the competition (i.e., breathing apparatus and multi-gas instruments must be MSHA-approved and bear an MSHA Approval sticker where applicable.

**TECHNICIAN TEAM COMPETITION
TEAM EQUIPMENT CHECKS/PREPARATION
Judges' Scorecard**

Discounts

1. Failure to provide necessary equipment or supplies for the team to work the problem, each omission 5 x ____ = ____
2. Failure to repair or replace defective equipment, each infraction 5 x ____ = ____
3. Any team whose member(s) intentionally disturb or destroy any component on a competition field will immediately be assessed this discount. Repeated offense may result in team disqualification at the discretion of the contest director. 100 (total) ____

Total Discounts _____

Judge's Signature

**TECHNICIAN TEAM DISCOUNTS
AND INTERPETATIONS
TEAM EQUIPMENT CHECKS/PREPARATION**

1. At the conclusion of the competition, the technician team's mine rescue team must be prepared to go underground and conduct a successful mine rescue mission. The Technician Team must check the available apparatus and multi-gas instruments to ensure that they are adequate to meet the requirements of the problem and that they are in functional condition and ready for use.
2. All faulty equipment must be repaired or replaced. If replacements or replacement parts are not available, these items can be requested from the respective judges.
3. Self-explanatory.

**TECHNICIAN TEAM COMPETITION
MULTI-GAS INSTRUMENT CHECKS/PROBLEM DIAGNOSIS**

GENERAL RULES

1. The technician team must be familiar with the respective multi-gas instrument manufacturer's operations manual, handbook, and/or instructional videos. (Note: these videos may be found on the individual manufacturers' websites).
2. For Contest purposes, multi-gas instruments used by the teams during the field and technician team competitions must include at least one instrument that meets the requirements of 30 CFR 49.16(a)(6).
3. The multi-gas instrument given to the technician team may have multiple bugs or problems consisting of any of the following:
 - a. Missing and/or needed sensors
 - b. Failed sensors
 - c. Mis-calibrated sensors
 - d. Dead or incorrect batteries
 - e. Incorrect alarm and calibration points
 - f. Missing parts
 - g. Defective parts
4. The technician team will be expected to evaluate the instrument(s), repair all of the deficiencies, properly calibrate or functional (bump) test the instrument(s), and check for proper action level alarm set points. During this process, the technician team may need to reconfigure the instrument(s) to complete these tasks.
5. The technician team may return to correct any uncorrected deficiencies at any time within the time limit.

6. Five (5) discount points per alarm point will be assessed for any incorrectly set alarms.
7. Five (5) discount points will be assessed for each instance of incorrect procedure or equipment use during calibration.
8. No discounts will be assessed for replacing non-deficient sensors, as long as the resulting calibration(s) and alarm points are correct.
9. For completion, the instrument(s) must be fully assembled, operating, and properly configured within the allowed time. If the team technician does not leave the instrument(s) in this "ready-for-use" condition, a five (5) point discount will be assessed.

Note: "Ready for Use" means that the instrument is left "on" with the peaks cleared.

**TECHNICIAN TEAM COMPETITION
MULTI-GAS INSTRUMENT CHECKS/PROBLEM DIAGNOSIS
Judges' Scorecard**

Technician Team: _____
 Company Name: _____
 Team Name: _____
 Draw Number: _____
 Instrument Model _____ Serial # _____

Bench Problem

Sensor	Alarm Points		Set	Comments	Discounts
		Reqd.			
O ₂	Low	19.5	_____	_____	_____
	High	23.5	_____	_____	_____
	Procedure		_____	_____	_____
CH ₄	Low	1.0	_____	_____	_____
	High	1.5	_____	_____	_____
	Procedure		_____	_____	_____
CO	Low	50	_____	_____	_____
	High	100	_____	_____	_____
	Procedure		_____	_____	_____
NO ₂	Low	3.0	_____	_____	_____
	High	5.0	_____	_____	_____
	Procedure		_____	_____	_____
Toxic:	Low	_____	_____	_____	_____
	High	_____	_____	_____	_____
	Procedure		_____	_____	_____
Additional Discounts:					
Functional (Bump) Test Not Performed, if required -					
5 discounts, each infraction					_____
Multi-gas Instrument(s) not "ready for use"					
5 discounts (total)					_____
_____					_____
_____					_____
_____					_____
_____					_____

Judge _____ **Total discounts:** _____

Judge _____

**TECHNICIAN TEAM COMPETITION
APPARATUS CHECKS/PROBLEM DIAGNOSIS**

GENERAL RULES

1. The technician team must be familiar with the respective self-contained breathing apparatus manufacturer's service manual.
2. The technician team will be provided with at least one fully assembled self-contained breathing apparatus, an apparatus tester, defogging solution, leak detector fluid, and all parts necessary to complete the problem. Only tools, apparatus, and testing equipment provided by the judge will be used by the technician team to work the problem. Bugs used in the competition will be consistent with all models of breathing apparatuses.
3. Checks must be performed in order as prescribed by the manufacturer and recorded. If and when deficiencies are encountered, the technician team must call out to the judge and properly correct and record any and all deficiencies. Visuals can be performed at any time.
4. The technician team may return to correct any uncorrected deficiencies within the thirty (30) minute time limit.
5. If the technician team performs checks out of order, there will be a one-time discount of five (5) points assessed.
6. The technician team will be allowed to move forward, in order, in the event a deficiency is detected but not located. Once deficiency is corrected, the technician team must return to the point of deficiency and repeat all test steps in proper order.
7. If checks are performed incorrectly, checks will be discounted as not performed.
8. Fifteen (15) discounts will be assessed for each deficiency not found.
9. Five (5) discounts will be assessed for each deficiency not corrected.
10. Five (5) discounts will be assessed for each monthly check not performed.

11. Sucking or blowing on valves with one's mouth while making checks is prohibited. There will be a ten (10) point discount assessed for each infraction.
12. For completion, the self-contained breathing apparatus must be assembled with hoses connected to the face piece and attached to the apparatus. If the team technician does not leave the apparatus in this "ready-for-use" condition, a five (5) point discount will be assessed. This rule addressing "ready for use" criteria is self-explanatory and specific. Contestants must ensure that all apparatuses found at the "simulated mine rescue stations" are left in this condition before the thirty (30) minute time limit expires. Any deviation or omission will result in a five (5) point discount.

**TECHNICIAN TEAM COMPETITION
DRAEGER BG-4 BREATHING APPARATUS**



**TECHNICIAN TEAM COMPETITION
DRAEGER BG-4 BREATHING APPARATUS
CHECKS/PROBLEM DIAGNOSIS
Judges' Scorecard**

Apparatus Serial #	
Test Date	
Visual Inspection	
Low Pressure Alarm (Negative Pressure Warning)	
Inhalation Valve	
Exhalation Valve	
Drain Valve	
Positive Pressure Leak	
Relief Valve	
Constant Metering (Dosage)	
Minimum Valve	
Bypass Valve	
Residual Warning	
Battery Check	
Test OK (initials)	
Replacement Parts	
Ready for Use	

Team No. _____
 Technician(s) _____
 Company _____

Corrected

Bug _____
 Bug _____
 Bug _____
 Bug _____
 Bug _____
 Bug _____

Summary of Discounts

Required check not performed:
 5 discounts x _____ = _____

Checks out of order:
 5 discounts (total) _____

Deficiency (bug) not found:
 15 discounts x _____ = _____

Deficiency (bug) not corrected:
 5 discounts x _____ = _____

Sucking/Blowing Valves:
 10 discounts x _____ = _____

Apparatuses not "Ready for Use":
 5 discounts (total) _____

Total Discounts _____

Judge _____

Judge _____

**TECHNICIAN TEAM COMPETITION
BENCHMAN'S CONTEST - DRAEGER BG-4
CHECKS/PROBLEM DIAGNOSIS
Technician Team's Blank Testing Card**

Team No. _____

Technician(s) _____

Company _____

Problems Found
Corrected

Bug _____

Bug _____

Bug _____

Bug _____

Bug _____

Bug _____

**TESTING PROCEDURE
DRAEGER BG-4 BREATHING APPARATUS**

<u>STEP</u>	<u>TESTER SETTING</u>	<u>PROCEDURE HINTS</u>
1. Visual Inspection	-----	Check for good condition.
2. Insert O ₂ Cylinder	-----	Fully Charged.
3. Insert Canister	-----	Factory Sealed or Reusable.
4. Facepiece and Hoses	-----	Check for good condition.
5. Low Pressure Warning	Pos. Pres. Pumping	Watch pressure gauge, activation should sound at 1.25 and/or 1.4 mbar.
6. Inhalation Valve	Pos. Pres. Pumping	Pinch exhalation hose - 10 mbar indicated on gauge.
7. Exhalation Valve	Neg. Pres. Pumping	Pinch inhalation hose - 10 mbar indicated on gauge.
8. Drain Valve	Pos. Pres. Pumping	Pump until 10 mbar is indicated on gauge. Fit sealing cap over tappet of relief valve as bag inflated. Drain valve must not open at 10 mbar.
9. Leak Test	Leak Test	Reduce Pres. to 7 mbar pressure should not change by more than 1 mbar in 1 minute.
10. Relief Valve	Pos. Pres. Pumping	Pump until relief valve opens. Opening pressure should lie between 2 & 5 mbar.

(Alternate Relief Valve Test, can be performed after Step 13.)

<u>STEP</u>	<u>TESTER SETTING</u>	<u>PROCEDURE HINTS</u>
11. Constant Metering	Pos. Pres. Pumping Dosage .05 - 2 L/min	Open O ₂ cylinder. Inflate breathing bag. Fit sealing cap over tappet of relief valve. Constant metering dosage should lie between 1.5 and 1.9 L/min.
12. Minimum Valve	Neg. Pres. Pumping	Pump slowly until minimum valve is opening. Minimum Valve should open between 0.1 and 2.5 mbar.
13. Bypass Valve <i>(Alternate Relief Valve Test)</i>	Leak Test	Press red button. Breathing bag inflates. Observe reading on Rz, relief valve should open between 2 and 5 mbar.
14.	Low Pressure Warning	Close cylinder valve. Warning sounds at 700 psi.
15.	Battery Check	If Failing: Alarm sounds 5 times. Red indicator flashes for 30 sec. Bat is displayed.

(Note – Battery check is performed when shutting off the sentinel by observing the indicator. Black battery is sufficient, battery indicator with “1” indicates four (4) hours left on battery, and “2” means change battery immediately.)

PROCEDURES FOR “HIGH PRESSURE LEAK TEST”

For the Draeger BG-4 with Monitron (CCr/OCr Test):

- a. The oxygen cylinder must be full, i.e. the charging pressure must be greater than 2600 psi/165 bar.
- b. Open the oxygen cylinder valve. **CCr (Close Cylinder)** will appear on the display unit approximately 3 seconds after opening the cylinder valve and successful completion of the battery test.
- c. As soon as the display disappears: close the cylinder valve.
- d. After approximately 35 seconds if the apparatus is O.K.:
 - i. Alarm sounds once
 - ii. Green indicator flashes
 - iii. **OCr (Open Cylinder)** is displayed, i.e. open cylinder valve.
- e. The high-pressure leak test has been completed successfully.
 - i. Keep cylinder valve closed
The “automatic battery test” is performed, before switching off.
- f. Afterward, attach the face piece to the hoses and the unit is now in a “ready to use” condition.

For the Draeger BG-4 with Sentinel:

- a. The oxygen cylinder must be charged to at least 2600 psi, otherwise the Sentinel will not carry out the test.
- b. Open the oxygen cylinder valve. The icon “Close cylinder valve” appears on the display, the backlight is on, and a double alarm beep sounds when the pressure is greater than 2600 psi/165 bar.
- c. Close the cylinder valve.
- d. After 15 seconds when the BG-4 is O.K.:
The icon “Open cylinder valve” appears on the display, the backlight is on, and the countdown process of the bar graph continues. The high pressure leak test has been passed successfully.

- e. Keep the cylinder valve closed.
Remove the sealing cap. Wait until the Sentinel shows 0 psi/0bar pressure.
- f. Replace the sealing cap on the plug-in coupling.
- g. Switching off the Sentinel
 - i. Simultaneously press the right and the left hand button until a sharp audible “bleep” sounds.
 - ii. Release buttons.
 - iii. For 3 seconds the Sentinel shows the battery status.
 - iv. Sentinel switches off.
- h. Afterward, attach the face piece to the hoses and the unit is now in a “ready to use” condition.

**PROCEDURES FOR GETTING UNDER OXYGEN
DRAEGER BG-4 BREATHING APPARATUS**

Procedures for getting under oxygen:

1. Prior to donning the apparatus, make sure a filled cylinder, a fresh soda lime pack, and an ice block for the breathing air cooler are installed. Don the apparatus and adjust the harness and belt.
2. Don the facepiece by spreading the head harness with hands; put chin into chin support and pull harness over the head. Tighten the chin straps first, then the temple straps, and then the top head strap. The facepiece must be sufficiently tight on the face to prevent leakage of the breathing air which could shorten the duration of the apparatus.
3. Open cylinder valve fully.
4. Check the digital pressure gauge to see that a sufficient oxygen supply remains. The green LED light should be displayed. Press the by-pass valve to check the by-pass valve operation.
5. Check the facepiece tightness by tightly closing both breathing hoses and inhaling. The facepiece should collapse against the face, indicating there are no leaks.
6. Each team member and apparatus should be rechecked by the team captain. The team captain and apparatus should be rechecked by a team member.

Items to be checked prior to going underground and at 20 minute intervals:

1. Visually check apparatus.
2. Check pressure gauge.
3. Question member as to member's ability to continue.

**TECHNICIAN TEAM COMPETITION
BIOMARINE BIOPAK 240R/240S
BREATHING APPARATUS**



**TECHNICIAN TEAM COMPETITION
BIOMARINE CHECKS/PROBLEM DIAGNOSIS
BIOPAK 240R
Judges' Scorecard**

Apparatus Serial #	
Test Date	
Visual Inspection	
Constant Flow Test 1.6 – 2.4	
Low Pressure Leak Test	
RMS Guage & TRIM System Check	
Plumbing High Pressure Leak Test	
Ready for Use	

Team No. _____
 Technician(s) _____
 Company _____

Corrected

Bug _____
 Bug _____
 Bug _____
 Bug _____
 Bug _____
 Bug _____

Summary of Discounts

Required check not performed:
 5 discounts x _____ = _____

Check out of order:
 5 discounts (total) _____

Deficiency (bug) not found:
 15 discounts x _____ = _____

Deficiency (bug) not corrected:
 5 discounts x _____ = _____

Sucking/Blowing Valves:
 10 discounts x _____ = _____

Apparatuses not "Ready for Use":
 5 discounts (total) _____

Total Discounts _____

Judge _____

Judge _____

**TECHNICIAN TEAM COMPETITION
BIOMARINE CHECKS/PROBLEM DIAGNOSIS
BIOPAK 240S
Judges' Scorecard**

Apparatus Serial #	
Test Date	
Visual Inspection	
Plumbing Leak Test	
Constant Flow Test 1.6 – 2.4	
Breathing System Leak Test	
Ready for Use	

Team No. _____

Technician(s) _____

Company _____

Corrected

Bug _____

Bug _____

Bug _____

Bug _____

Bug _____

Bug _____

Summary of Discounts

Required check not performed:

5 discounts x _____ = _____

Check out of order:

5 discounts (total) _____

Deficiency (bug) not found:

15 discounts x _____ = _____

Deficiency (bug) not corrected:

5 discounts x _____ = _____

Sucking/Blowing Valves:

10 discounts x _____ = _____

Apparatuses not "Ready for Use":

5 discounts (total) _____

Total Discounts _____

Judge _____

Judge _____

**TECHNICIAN TEAM COMPETITION
 BIOMARINE CHECKS/PROBLEM DIAGNOSIS
 BIOPAK 240R/240S
 Technician Team's Blank Testing Card**

TEST PROCEDURES	

Team No. _____

Technician(s) _____

Company _____

Problems Found

Corrected

Bug _____

Bug _____

Bug _____

Bug _____

Bug _____

Bug _____

**TESTING PROCEDURE
BIOMARINE BIOPAK 240R
BREATHING APPARATUS**

<u>STEP</u>	<u>EQUIPMENT</u>	<u>PROCEDURE HINTS</u>
1. Visual Inspection	-----	Visually inspect the entire BioPak 240R for worn, loose or missing parts, and parts that could fail under use.
2. Constant Flow Test	Flow Meter	Attach the flow meter on to the constant flow line. Open O ₂ cylinder valve. Flow should be 1.6 – 2.4 LPM. (+10% at elevations above 2000 ft)
3. Low Pressure Leak Test	Leak Test Kit/Gauge Two Test Keys	Connect leak test kit/gauge to hoses Insert two pressure test keys into the holes in the back of the unit and turn ¼ turn to lock in place. Open O ₂ cylinder valve, depress by-pass to inflate chamber. Close cylinder valve. Depress by-pass to vent internal pressure. Vent pressure at test fixture until leak test kit/gauge reaches 6" - 8" water column. Time for one minute, maximum .2" drop.
4. RMS Gauge & TRIM System Check	Gauge/TRIM RMS	Open oxygen cylinder and observe gauge and TRIM. Listen for alarm horn, observe light sequence (Red, Green, Blue) and verify flashing Green.
5. Plumbing High Pressure Leak Test	Leak Tec	Install fully charged oxygen cylinder. Open O ₂ cylinder valve. Check each plumbing joint with Leak Tec.

**TESTING PROCEDURE
BIOMARINE BIOPAK 240S
BREATHING APPARATUS**

<u>STEP</u>	<u>EQUIPMENT</u>	<u>PROCEDURE HINTS</u>
1. Visual Inspection	-----	Visually inspect the entire BioPak 240S for worn, loose or missing parts, and parts that could fail under use.
2. Plumbing High Pressure Leak Test	Tongue Depressor Leak Tec	Install fully charged cylinder (minimum 2,700 psi). Remove breathing chamber lid and CO ₂ scrubber. Hold diaphragm away from demand valve with tongue depressor. Open O ₂ cylinder valve. Check each plumbing joint with Leak Tec.
3. Constant Flow Test	Tongue Depressor Flow Meter	Slip the flowmeter over the flow restrictor. Hold diaphragm away from demand valve with tongue depressor. Open O ₂ cylinder valve. Flow should be 1.6 – 2.4 LPM. (+10% at elevations above 2,000 feet)
4. Breathing System Leak Test	Leak Test Fixture Pressure Test Knob	Connect leak test fixture to hoses. Insert pressure test key into the hole in the back of the unit and turn ¼ turn to lock in place. Open O ₂ cylinder valve, depress by-pass to inflate balloon. Close cylinder valve, depress by-pass to vent internal pressure.

Vent pressure at test fixture
until balloon reaches
approximately 45 degree.
Time for two minutes
looking for significant
drop in balloon pressure.

PROCEDURES FOR “HIGH PRESSURE LEAK TEST”

For the BioPak 240 R:

- a. Hold the pneumatic gauge in one hand and turn the unit by opening the oxygen cylinder. Verify that the pressure gauge reads between 2700 and 3000 psi.
- b. Observe gauge and TRIM light sequence, listen for Horn. When the 240 R RMS finishes its battery test and horn test and then flashes green, the contestant may then turn off the oxygen cylinder and bleed the unit by depressing the bypass. This takes approximately 50-60 seconds to do this test due to the gauge line flow restrictor.
- c. A successful test is one in which: 1) Oxygen does not leak out of the regulator; 2) Gauge goes to flow; 3) Proper RMS light sequence which ends up with a green light; and 4) Horn goes on and off.
- d. Bleed the unit properly by depressing the bypass.
- e. Afterward, attach the face piece to the hoses and the unit is now in a “ready to use” condition.

For the BioPak 240S:

- a. Hold the pressure gauge in one hand and turn on the unit by opening the oxygen cylinder. Verify that the pressure gauge reads between 2700 and 3000 psi.
- b. Observe gauge and listen for whistle. When the gauge reaches full (it takes a BioPak 240S gauge to reach full in 50-60 seconds due to the gauge in flow restrictor) and the contestant hears the whistle, he/she is then OK to turn off the oxygen cylinder and bleed the unit by properly depressing the bypass.
- c. A successful test is one in which: 1) Oxygen does not leak out of the regulator when the cylinder is opened; 2) Gauge goes to full; and 3) Whistle goes on and off.
- d. Bleed the unit properly by depressing the bypass.
- e. Afterward, attach the face piece to the hoses and the unit is now in a “ready to use” condition.

**PROCEDURES FOR GETTING UNDER OXYGEN
BIOMARINE BIOPAK 240R BREATHING
APPARATUS**

Procedures for getting under oxygen:

Pre-Use Inspection

1. If apparatus is stored in a ready to use condition, Turn-Around Maintenance Tag attached to harness (date less than one year old). Before donning the apparatus install frozen Ice Canisters, wet sponges, secure lid.
2. If apparatus is not stored in a ready to use condition, prior to donning the apparatus, complete the Turn Around maintenance procedures as outline in the BioPak 240R Benchman Instruction Manual, Revision I, wet sponges and install the CO₂ absorbent cartridges (Cartridges dated within three years). Install a frozen Coolant Canister, secure lid.

Donning, Getting under Oxygen

1. Don the apparatus, tighten shoulder straps, buckle and adjust waist strap, connect and adjust chest strap.
2. Attach facemask to hose adapter and lock in place.
3. Place facemask harness over head, center chin in chin cup, hold facemask to face and snug bottom (chin) straps first, then the upper (temple) straps, and then the top (head) strap (if supplied). A poor facemask seal will cause a significant decrease in duration.
4. Perform negative pressure check by collapsing the inhalation hose and inhaling. If the mask collapses in on your face mask fit is good and exhalation valve is OK.
5. Perform positive pressure check by collapsing the exhalation hose and exhaling. If the mask pushes away from face, mask fit is good and inhalation valve is OK.
6. Completely open the oxygen cylinder all the way.
7. Inspect Chest gauge minimum 3000 psi and TRIM flashing Green.

8. The team captain should recheck each team member and apparatus. A team member should recheck the team captain and apparatus.

Items to be checked before going underground and at 20-minute intervals.

1. Visually check apparatus.
2. Check chest mounted pressure gauge.
3. Question member as to member's ability to continue.

**PROCEDURES FOR GETTING UNDER OXYGEN
BIOMARINE BIOPAK 240S BREATHING
APPARATUS**

Procedures for getting under oxygen:

Pre-Use Inspection

1. If apparatus is stored in a ready to use condition, Turn-Around Maintenance Tag attached to oxygen cylinder valve (date less than one year old). Before donning the apparatus install frozen Gel Tube Insert into cooling canister, secure lid.
2. If apparatus is not stored in a ready to use condition, prior to donning the apparatus, complete the periodic long term maintenance procedures as outline in the BioPak 240S Benchman Instruction Manual, Revision K. Fill and install the CO₂ absorbent canister (LimePak dated within one year). Install a frozen Gel Tube Insert into cooling canister, secure lid.

Donning, Getting under Oxygen

1. Don the apparatus, tighten shoulder straps, buckle and adjust waist strap, connect and adjust chest strap.
2. Place facemask harness over head, center chin in chin cup, hold facemask to face and snug bottom (chin) straps first, then the upper (temple) straps, and then the top (head) strap. A poor facemask seal will cause a significant decrease in duration.
3. Perform negative pressure check by blocking the inhalation port with hand and inhaling. If the mask collapses in on your face, mask fit is good and exhalation valve is OK.
4. Perform positive pressure check by covering the exhalation port with hand and exhaling. If mask pushes away from face; mask fit is good and inhalation valve is OK.
5. Remove hose coupler; connect inhalation hose and then exhalation hose to mask. Open oxygen cylinder valve fully counterclockwise and back ½ turn. Note whistle chirp.

Option: If hoses are connected to the facepiece prior to donning.

- a. Don facemask as outlined above (item 2).
 - b. Open cylinder valve fully counterclockwise and back 1/4 turn. Note whistle chirp.
 - c. Perform negative pressure check by pinching off the inhalation hose and inhaling. If the mask collapses in on your face, mask fit is good and exhalation valve is OK.
 - d. Perform positive pressure check pinching off the exhalation hose and exhaling. If mask pushes away from face, mask fit is good and inhalation valve is OK.
6. Check chest-mounted pressure gauge, 2700 – 3000 psi within one minute.
 7. The team captain should recheck each team member and apparatus. A team member should recheck the team captain and apparatus.

Items to be checked before going underground and at 20-minute intervals.

1. Visually check apparatus.
2. Check chest mounted pressure gauge.
3. Question member as to member's ability to continue.

**TECHNICIAN TEAM COMPETITION
Discount Summary Sheet**

Team No.: _____

Company Name: _____

Technician Team: _____

Team Equipment Checks/Preparation
Discounts: _____

Multi-Gas Instrument Checks/Problem Diagnosis
Discounts: _____

Apparatus Checks/Problem Diagnosis
Discounts: _____

Written Test Discounts: _____

Total Discounts: _____

Time to Complete Problem: _____

Time Review Completed: _____

I certify that I have read and reviewed all discounts listed above.

Technician

Review Judge

Technician

Review Judge

FIRST AID COMPETITION

GENERAL RULES

1. The Contest Director will establish a reasonable amount of time for each team to complete the problem(s). All teams will be notified of the established time prior to beginning to work the problem(s). Any teams working beyond the established time period will be notified by the Judge that they must leave the station.
2. The First Aid team must furnish the basic first aid supplies needed to complete the problem unless specified by the contest coordinator that the supplies will be available at a specific station.
3. All material used to solve the first aid problem will be picked up by the team prior to moving on to their next prospective station.
4. Cardiopulmonary Resuscitation (CPR) with an AED and rescue breathing will only be performed on a manikin.
5. Any team found committing an act that will endanger the patient will receive fifty (50) discounts for each infraction.
6. Team members must wear an approved protective hat, identification tag, safety shoes, permissible cap lamps, self-rescuer, and safety glasses.
7. ... WARNING ... Any team whose member(s) intentionally disturb or destroy any component on a competition field will immediately be assessed a 100 point discount. Repeated offense may result in team disqualification at the discretion of the contest director.

GUIDELINES AND PROCEDURES

1. The First Aid Contest will consist of first aid problems and a written examination.
2. One first aid team will be allowed to compete for each mine rescue team entered in the Mine Rescue Contest.
3. The first aid team will consist of three members of the mine rescue team.
4. All first aid team members will remain in isolation until their team is called. Teams will receive a briefing on the problem scenario when they arrive at the first aid station.
5. If participating teams need additional help, such as transporting or moving a patient, help will be provided by contest officials.

6. There will be a minimum of two (2) judges at each of the first aid stations.
7. Judges will be assigned specific tasks to be scored prior to the judging and will record their findings on a specific scoring card issued prior to the contest.
8. Judges must be trained in first aid methods and knowledgeable in the station they will be judging.
9. There will be two (2) separate first aid stations (not necessarily in any order).
 - a. Cardiopulmonary Resuscitation (CPR) with an AED and Artificial Respiration.
 - b. Patient assessment, control of bleeding, physical shock, wounds, burns, scalds, musculoskeletal injuries, and transportation.
10. When the team receives the first aid scenario the clock will be started.
11. Judges must keep an accurate time and record it on scoring sheets for tie breaker purposes.
12. Judges will not discuss any first aid problem with contestant teams unless there are technical problems.
13. Only judges, contest officials, escorted photographers, and news media approved by the contest director will be permitted in the first aid stations. A separate area will be provided for spectators to observe the teams during competition.
14. On the day prior to the contest, a meeting will be held to discuss officials' and judges' assignments and training. All personnel who will be officiating during the contest shall attend this meeting.
15. The Ninth Edition of Brady "Emergency Medical Responder – First on the Scene" (Chapters: 3, 4, 5, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, and 26), the current American Heart Association Heartsaver CPR guidelines, the published rules, and the interpretations of the discount sheets are authorized for reference and guidance.

16. The team will not be permitted to use first aid manuals for reference purposes during the problem solving or between working stations.
17. If oxygen is required in the treatment of a patient, it may be simulated with the use of a mask. No oxygen tank will be required.
18. Liquids applied for the purposes of washing eyes, moistening dressings, and rinsing contaminated skin may be simulated. All dressings and splints must be placed properly.
19. Team members are not allowed to leave the working area to obtain materials for the problem.
20. Rough treatment of patient is not allowed.
21. If a tourniquet is required in First Aid problem, do not secure tightly. Upon proper application of the tourniquet, bleeding will be considered controlled and acknowledged by the judge.
22. Assistance in treatment from a supposedly unconscious patient is not allowed.
23. Teams failing to complete problems at station 2 in the specified time will be discounted.
24. A predetermined amount of trophies will be awarded for the First Aid Competition based on the best cumulative team scores (least amount of discounts). In the event of a tie, the first tie breaker will be field scores on all stations, the second tie breaker will be scores on written test, and the third tie breaker will be total time on field scores. The winning teams will be announced during the banquet.

WRITTEN TEST

1. On the day before the contest begins, all written tests will be administered in isolation. The first aid test will be included at this same time. The written test will consist of thirty (30) true/false and multiple choice questions. The questions will be taken from the Ninth Edition of Brady "Emergency Medical Responder – First on the Scene" (Chapters: 3, 4, 5, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, and 26), the current American Heart Association Heartsaver CPR guidelines, the published rules, and the interpretations of the discount sheets. The contestants will be assessed one (1) discount point for each incorrect or unanswered question. Any alterations to the test questions or answers will be determined to be incorrect by the test judge and discounts assessed.
2. Scoring of the test will be completed by at least two qualified judges.
3. In special circumstances, individual team members may be given an oral exam by one or more judges in lieu of a written exam. Requests for consideration shall be presented to the Contest Director at the time of registration. All other team members will take the test at the same time. In any case, the judges will not explain the meaning of questions, but may explain a word or words in the questions.

APPEALS

1. Upon completion of the examination of the patient by the judges at each station, the team will be informed of any infractions regarding treatment while at the station. The team will be permitted to verbally appeal any infractions either with the field judge or the chief judge. If not resolved, the chief judge will make the final decision until an appeal can be filed by the team.
2. During the verbal appeal process, all questionable splints/dressings must remain intact until any verbal appeal is resolved. If any questionable splints/dressings are removed or altered by the team prior to being resolved, the appeal will not be allowed.
3. At the conclusion of the competition, the team members will be instructed to report to the area designated for 20-minute looks. At that time, the team may examine their team's scorecards and written tests for a time not to exceed 20 minutes. A discount summary sheet will be used to list the discounts. All discounts will be listed and totaled. Both the first aid team captain and the review judge will sign the discount sheet to certify they have reviewed the discounts and verified the totals (see page 107). No protest of the discounts assessed may be given to the person in charge of the review, however, the team may protest in writing any discount within 30 minutes after reviewing them. Written appeals are not to exceed one page for any discount assessed and will be submitted to the First Aid Appeals Committee. All appeals will be considered by the committee and their decision will be binding and final.

DISCOUNTS

1. Discounts will not be added to the team score once the judges have signed their discount sheets following a review with team members. This does not preclude changes due to administrative errors or a misapplication of a rule.
2. Teams will not be discounted more than once for any one mistake in the same problem where such mistake may qualify under more than one discount. Judges will confer and assess the highest single discount.

3. Teams will be additionally discounted for repetition of the same mistakes in the same problem. For example; improper bandaging on two separate wounds (2 times the appropriate discount), three granny knots (3 times the appropriate discount), etc.
4. Teams will not be discounted for doing more than the problem calls for, unless it is detrimental to the patient or improper care.
5. 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, judges will not improvise a discount to cover the suspected violation.

**FIRST AID COMPETITION
Judges' Discount Card**

**Station No. 1
Cardiopulmonary Resuscitation (CPR) with AED
Rescue Breathing**

Team Name: _____ Team Number: _____
Team Members: Captain _____

Date: _____

A. CPR with AED (Two Person) Discounts
(In accordance with the current American Heart Association CPR Guidelines as referenced in 9th Edition Brady's "EMR – First on Scene")

1. Not checking accident scene to assure personal safety, prior to entering the scene 5 x ____ = ____
2. Not taking body substance isolation (BSI) precautions (glasses, gloves, and CPR barrier), prior to patient contact 15 x ____ = ____
3. Not determining unresponsiveness 1 x ____ = ____
4. Not checking for normal breathing for between 5 and 10 seconds 1 x ____ = ____
5. Not activating 911 1 x ____ = ____
6. Not checking for a pulse (for at least 5 seconds, but no more than 10 seconds) 2 x ____ = ____
7. Not requesting an Automatic External Defibrillator (if available) 2 x ____ = ____
8. Not exposing patient's chest 1 x ____ = ____
9. Improper hand placement (heel of hand on the center of patient's chest between the nipples) 1 x ____ = ____
10. Not providing 30 compressions initially 1 x ____ = ____
11. Not delivering chest compressions hard and fast at a rate of 100 per minute (18 seconds or less / 30 compressions) 1 x ____ = ____

	Discounts
12. Not releasing pressure completely to allow the heart to refill (in at least 23 of 30 compressions)	1 x ____ = ____
13. Not opening the airway after the initial 30 compressions	1 x ____ = ____
14. Using the head tilt / chin lift maneuver when a spinal injury is suspected	1 x ____ = ____
15. Not giving two breaths between compressions	1 x ____ = ____
16. Not providing two slow breaths (to allow chest to fall between breaths)	1 x ____ = ____
17. Not watching the chest rise and fall with each breath	1 x ____ = ____
18. Interrupting CPR for more than 10 seconds (each)	1 x ____ = ____
19. Not performing CPR for two minutes prior to defibrillation	2 x ____ = ____
20. Not continuing CPR as AED is prepared	5 x ____ = ____
21. 2 nd Rescuer not turning on AED	1 x ____ = ____
22. 2 nd Rescuer not attaching AED pads	5 x ____ = ____
23. Touching patient while AED analyzes	1 x ____ = ____
24. Not switching rescuers	1 x ____ = ____
25. Not administering shock when advised	5 x ____ = ____
26. Not resuming CPR following delivery of shock (2 nd rescuer delivering compressions)	5 x ____ = ____
27. First rescuer not providing breaths with either bag or CPR mask	1 x ____ = ____
CPR with AED	Subtotal _____

B. Rescue Breathing (One Person)	Discounts
1. Not checking accident scene to assure personal safety, prior to entering the scene	5 x ____ = ____
2. Not taking body substance isolation (BSI) precautions (glasses, gloves, and CPR barrier) prior to patient contact	15 x ____ = ____
3. Not determining responsiveness	1 x ____ = ____
4. Not calling for help	1 x ____ = ____
5. Not opening airway	2 x ____ = ____
6. Using head-tilt/chin lift maneuver when modified jaw thrust should be used	2 x ____ = ____
7. Not assessing breathlessness	1 x ____ = ____
8. Not checking for carotid pulse for 5 to 10 seconds	1 x ____ = ____
9. Not providing rescue breathing when pulse is found	4 x ____ = ____
10. Not repositioning the head if initial breaths do not go in	1 x ____ = ____
11. Not giving one breath every 5 to 6 seconds	2 x ____ = ____
12. Not giving 10 to 12 breaths per minute	2 x ____ = ____
13. Not reassessing pulse after 2 minutes	2 x ____ = ____
14. Not performing CPR in accordance with EMR and AHA guidelines	10 x ____ = ____

Rescue Breathing **Subtotal** _____

Station #1 **Total Discounts** _____

Judge

Judge

Scorecard Examiner

**FIRST AID COMPETITION
JUDGES' DISCOUNT CARD**

Station No. 2

Patient Assessment
Control of Bleeding
Physical Shock
Soft-Tissue Injuries and Burns
Musculoskeletal Injuries
Transportation

Team Name: _____ Team Number: _____
Team Members: Captain _____

Date: _____ Time to Complete Problem: _____

A. Patient Assessment

Primary Assessment	Discounts
1. Not checking accident scene to ensure personal safety	5 x ____ = ____
2. Not taking body substance isolation (BSI) precautions (glasses, gloves and CPR barrier)	15 x ____ = ____
3. Not administering patient assessment	25 x ____ = ____
4. Not assessing responsiveness / mental status	1 x ____ = ____
5. Not assessing breathing – look, listen, feel	10 x ____ = ____
6. Not managing injuries compromising breathing / ventilation	1 x ____ = ____
7. Not stabilizing head if spinal injury is suspected	2 x ____ = ____
8. Not assuring adequate ventilation	1 x ____ = ____
9. Not checking carotid pulse	10 x ____ = ____
10. Improperly checking for a pulse	2 x ____ = ____
11. Not visibly checking for profuse bleeding – state to judge that you are looking for bleeding	10 x ____ = ____

Discounts

- 12. Not managing injuries compromising circulation 2 x ____ = ____
- 13. Not doing primary assessment in proper sequence 15 x ____ = ____

Secondary Assessment

- 14. Not examining head (scalp, blood in hair, ears, etc.) 1 x ____ = ____
- 15. Not assessing facial area 1 x ____ = ____
- 16. Not assessing eyes 1 x ____ = ____
- 17. Not inspecting nose 1 x ____ = ____
- 18. Not inspecting mouth 1 x ____ = ____
- 19. Not examining neck 1 x ____ = ____
- 20. Not checking position of trachea 1 x ____ = ____
- 21. Not inspecting jugular veins for distention 1 x ____ = ____
- 22. Raising head if suspected spinal injury exists 6 x ____ = ____
- 23. Not checking chest (placing hand on chest) 2 x ____ = ____
- 24. Not gently feeling abdominal area 2 x ____ = ____
- 25. Not checking pelvic area for injury 2 x ____ = ____
- 26. Not checking genital area for obvious injury 2 x ____ = ____
- 27. Not gently feeling under patient (lower back) for injury 2 x ____ = ____
- 28. Not checking lower extremities for injury 2 x ____ = ____
- 29. Not checking lower extremities for paralysis 2 x ____ = ____
- 30. Not checking upper extremities for injury 2 x ____ = ____
- 31. Not checking upper extremities for paralysis 2 x ____ = ____
- 32. Not inspecting back 2 x ____ = ____
- 33. Checking out of order (Rules 14 – 32 above) 15 x ____ = ____
- 34. Not checking medic alert bracelets/necklace 2 x ____ = ____

	Discounts
35. Work other than taking support or controlling bleeding during secondary survey	4 x ____ = ____
36. Not obtaining vital signs (BP, pulse, respirations)	4 x ____ = ____
Patient Assessment	Subtotal _____

	Discounts
B. Control of Bleeding	
1. Not controlling arterial bleeding immediately	20 x ____ = ____
2. Not applying direct pressure to control arterial bleeding	20 x ____ = ____
3. Failure to elevate extremity to control bleeding (if no fx suspected)	4 x ____ = ____
4. Releasing direct or elevation before bleeding is controlled	4 x ____ = ____
5. Elevating an extremity with fx present	4 x ____ = ____
6. Not applying a tourniquet when direct pressure and elevation do not control bleeding	10 x ____ = ____
7. Tourniquet – Ineffective application, improperly applied or loosened during problem	4 x ____ = ____
8. Applying tourniquets when not required	4 x ____ = ____
9. Not giving any treatment for internal bleeding	4 x ____ = ____
10. Bandages improperly applied (not entirely covered, wrong location, method, or position of knot, etc.)	2 x ____ = ____
11. Failure to reassess distal circulation after bandaging extremities	4 x ____ = ____
12. Removing or attempting to replace a dressing that is applied directly to the wound	2 x ____ = ____
Control of Bleeding	Subtotal _____

C. Physical Shock**Discounts**

- | | |
|---|-----------------|
| 1. Not administering oxygen per local protocols | 2 x ____ = ____ |
| 2. Not keeping patient in supine position | 1 x ____ = ____ |
| 3. Not calming and reassuring the patient | 2 x ____ = ____ |
| 4. Not maintaining a normal body temperature | 1 x ____ = ____ |
| 5. Providing fluids or food to the patient | 4 x ____ = ____ |
| 6. Not monitoring ABC's and vital signs | 4 x ____ = ____ |

Physical Shock**Subtotal** _____**D. Soft-Tissue Injuries and Burns****Discounts**

- | | |
|--|------------------|
| 1. Not applying dressing for wound or burn (each) | 8 x ____ = ____ |
| 2. Not applying cover dressing | 4 x ____ = ____ |
| 3. Not using sterile gauze or sterile dressing | 1 x ____ = ____ |
| 4. Bandages improperly applied (not entirely covered, wrong location, method, or position of knot, etc.) | 2 x ____ = ____ |
| 5. Failure to place gauze between fingers, toes, or back of ear (when required) | 2 x ____ = ____ |
| 6. Not properly treating an impaled object | 2 x ____ = ____ |
| 7. Not removing or indicating removal of clothing from affected area | 2 x ____ = ____ |
| 8. Not properly treating an evisceration | 6 x ____ = ____ |
| 9. Not simulating or indicating that gauze is moist (when required) | 2 x ____ = ____ |
| 10. Failure to properly treat sucking chest wound | 10 x ____ = ____ |
| 11. Not treating injuries in their proper order (according to fundamentals) | 4 x ____ = ____ |

	Discounts
12. Not properly treating eye injuries	1 x ____ = ____

Soft-Tissue Injuries and Burns	Subtotal _____
---------------------------------------	-----------------------

E. Musculoskeletal Injuries	Discounts
1. Not rendering any treatment for a strain or sprain (each infraction)	4 x ____ = ____
2. Not treating suspected spinal injury, fracture of pelvis or thigh (each) (this includes not using a properly sized cervical collar)	12 x ____ = ____
3. Not treating fractures other than (#4) (each)	10 x ____ = ____
4. Failure to properly treat suspected skull fracture	2 x ____ = ____
5. Failure to support fractures / dislocations until properly splinted	6 x ____ = ____
6. Not properly treating dislocations (each)	8 x ____ = ____
7. Failure to properly splint	2 x ____ = ____
8. Failure to properly apply padding where needed	1 x ____ = ____
9. Failure to check distal circulation and sensation before and after splinting	2 x ____ = ____
10. Improperly lifting or rolling of patient (lifting to knee when patient has dislocated or fractured hip or spinal injury)	2 x ____ = ____
11. Failure to apply cold applications to reduce pain and swelling	2 x ____ = ____
12. Improperly applied bandages	2 x ____ = ____
13. Improperly applied slings when required (each)	1 x ____ = ____
Musculoskeletal Injuries	Subtotal _____

F. Preparation for Transportation	Discounts
1. Improper "log roll"	2 x ____ = ____
2. Patient not placed on a spine board when required	2 x ____ = ____
3. Improperly secured to a spine board or stretcher	1 x ____ = ____

Preparation for Transportation **Subtotal** _____

1. Failure to locate and treat any condition (each infraction)	10 x ____ = ____
2. Not completing problem in specified time 25 (total)	25 (total) _____
3. Any team found committing an act that will endanger the patient, each infraction.	50 x ____ = ____
4. Any team whose member(s) intentionally disturb or destroy any component on a competition field will immediately be assessed this discount. Repeated offense may result in team disqualification at the discretion of the contest director.	100 (total) _____

Station #2 **Total Discounts** _____

Judge

Judge

Scorecard Examiner

**FIRST AID COMPETITION
Discount Summary Sheet**

Team No.: _____

Company Name: _____

First Aid Team: _____

Station No. 1
Discounts: _____

Station No. 2
Discounts: _____

Time to Complete Problem: _____

Written Test
Discounts: _____

Total Discounts: _____

Time Review Completed: _____

I certify that I have read and reviewed all discounts listed above.

First Aid Team Captain

Review Judge

GLOSSARY OF TERMS

ACCESSIBLE - Able to be traveled into; not impassable.

ADIT - A nearly horizontal passage from the surface by which a mine is entered.

AIR LOCK - An area in the mine closed at both ends by two doors or two bulkheads. An air lock is used to prevent mixing of different atmospheres while still permitting miners to enter and exit.

AIR SHAFT - Shaft used exclusively for conducting air.

AIR SPLIT - The division of an air current into two or more parts.

AIR TRACK DRILL - A heavy drill mounted on crawler tracks.

AIRWAY - Any passage through which air is flowing.

ALTERNATE - Person qualifying to participate as a mine rescue team member. Can replace any team member who cannot continue or who is removed from the problem.

ASSISTANT - Optional seventh person who may assist the fresh air base attendant but is not eligible to substitute for another team member including the fresh air base attendant.

ATMOSPHERIC PRESSURE -Force exerted by air. Atmospheric pressure is measured on a barometer.

AUXILIARY FAN - A small, portable fan used to supplement the ventilation of an individual working place.

AUXILIARY VENTILATION - Portion of main ventilating current directed to face of dead-end entry by means of an auxiliary fan and tubing.

BACK FILL - The rough material used to refill a place from which the earth has been removed.

BACK/ROOF - That part of an opening which is nearest the surface in relation to any portion of the workings of the mine, the roof. Overhead surface of an underground opening.

BACKUP TEAM - The rescue team stationed at the fresh air base as a "backup" for the working team beyond the fresh air base.

BAFFLE - A device used to deflect, check or regulate the flow of air.

BARRICADE - Enclosed part of mine to prevent inflow of noxious gases from a mine fire or explosion. This may be done by doors or by building one or more airtight walls using any available materials such as rock, wood, brattice cloth, mud, clothing, etc., so as to enclose a maximum quantity of good air. If contact is not made with person behind the barricade, conditions inside the barricade will be unknown.

BARRICADING - Enclosing part of mine to prevent inflow of noxious gases from a mine fire or an explosion.

BATTERY LOCOMOTIVE - Battery powered machine used for moving cars within the mine.

BATTERY CHARGING STATION - Area set aside for charging and storing batteries.

BATTERY OPERATED EQUIPMENT – Any equipment powered by batteries.

BELT FEEDER - The dump end of a belt system. To disperse ore on the belt.

BLASTING BOX - The unit used for firing of one or more charges electrically.

BLASTING CAPS - A detonator containing a charge of detonating compound, which is ignited by electrical current or the spark of a fuse used for detonating explosives.

BOREHOLE - Any deep or long drill hole. It may be a source of air, supplies and communications in an emergency.

BORER - A device for making large holes.

BRATTICE CLOTH - Fire-resistant fabric or plastic used in a mine passage to control ventilation.

BRIEFING -Session held before a team goes underground to inform team members of conditions underground and give them their work assignment.

BULKHEAD (same as STOPPING) - A temporary wall or partition constructed across a passageway to direct the ventilating air. Can be modified or removed if needed.

BUMP TEST – A functional test, defined as a brief exposure of the monitor to a concentration of gas(es) in excess of the lowest alarm set-point for each sensor for the purpose of verifying sensor and alarm operation and is not intended to be a measure of the accuracy of the instrument.

CAGE - A shaft conveyance used in hoisting personnel and materials.

CAVED - Ground which has fallen.

CAVED IMPASSABLE - For the duration of the problem, a cave which is incapable of being passed, traveled, crossed, or surmounted, but allows some ventilation flow.

CAVED TIGHT - Ground caved in to prevent access and allows no ventilation flow.

CHOCKS - Wedge shaped blocks to put under vehicle wheels to prevent movement.

CHUTE/ORE PASS - Vertical or inclined passageway for downward movement of ore.

CLEAR AIR - An atmosphere which is free of smoke and all dangerous and/or harmful concentrations of flammable, combustible, noxious, and or toxic contaminants.

CONTINUOUS MINER - A mining machine designed to remove ore from the face and load it into cars or conveyors.

CRIB BLOCKS - Blocks used for support.

CROSSCUT - A horizontal opening driven across the direction of the main workings; a connection between the two drifts or tunnels.

CURTAIN - Brattice cloth, canvas or plastic curtain used to deflect or direct air into a working place. Constructed in a manner to allow the passage of miners and machinery.

CUTTING MACHINE - A power (electric) driven machine used to undercut ore.

DEBRIEFING - Session held when teams return to the surface after completing an assignment to review what they saw and did.

DETONATING FUSE - A round, flexible cord containing a center core of high explosives (Primacord).

DETONATOR - A device used for detonating explosives.

DISTRIBUTION BOX - An enclosure through which electric power is carried to one or more cables from a single incoming feed line.

DOWNCAST - An opening though which fresh ventilating air is drawn or forced into the mine; the intake.

DRIFT/ENTRY - A passage underground

EXHAUST - The air course along which the air of the mine is returned or conducted to the surface.

FACE/RIB - Vertical surface of an underground opening.

FEEDER - Small cracks in rock strata from which gas escapes.

FILL - Any material that is put back in place of the extracted ore.

FLOOR - That part of any underground opening upon which one walks.

FOOTWALL - Lower side of a dipping ore body.

FRESH AIR BASE - Base of operations from which the rescue and recovery teams can advance into irrespirable atmospheres.

FRONT-END LOADER - Self-propelled machine used for moving or loading muck.

HANGING WALL - Upper side of a dipping ore body.

HOLE CHARGED - A drilled hole that is charged with explosives ready to be blasted.

IMPASSABLE - Incapable of being passed, traveled, crossed, or surmounted.

INACCESSIBLE AREAS - All areas of the mine where team travel is blocked by one of the following conditions: seals, unsafe roof (rib-to-rib) that cannot be supported or scaled, inextinguishable fires, water over knee deep, caved impassable falls, or the top of an overcast.

INCLINE/SLOPE - A non-vertical shaft, usually on the dip of a vein.

INTAKE - The passage through which fresh air is drawn or forced into a mine.

INTENSE HEAT - Air heated to the extent that it cannot be entered.

INTERSECTION - For contest work, any area driven 3 feet or more off a drift.

LAGGING - Materials used for flooring or shoring.

LEAD WIRE - Wire used to fire electric detonators.

LIFELINE - Rope, line, or cable that links the team to the fresh air base.

LINE BRATTICE - Fire-resistant fabric or plastic partition used in a mine passage to direct the air into the working place. Also termed "Line Canvas or Line Curtain."

LOADING MACHINE - A machine to load broken ore or rock.

LONG HOLE DRILL - A drill using sectional steel to drill holes to greater depths.

LOOSE BACK - Unstable overhead surface which must be controlled before entry.

LOOSE RIB - Unsupported loose ground on the side of the drift.

MAGAZINE - A storage place for explosives or for detonators.

MANDOOR - Door installed in a permanent stopping (bulkhead) to allow persons to travel from one drift to another.

MANHOLE - A refuge hole constructed in the side of a drift.

MANTRIP - A trip on which personnel are transported to and from a work area.

MINE DOOR - A large, hinged door used to close off a mine entry.

MISFIRE - The complete or partial failure of a blasting charge to explode as planned.

MOTOR - Machine usually on a track used for tramming ore or supplies.

MULTI-GAS INSTRUMENT - Gas detector capable of continuously and simultaneously measuring atmospheric concentrations of oxygen (O₂), methane (CH₄), carbon monoxide (CO) and at least one other toxic gas (e.g. nitrogen dioxide -NO₂).

ORE PASS - A vertical or inclined passage for the downward transfer of ore.

OVERCAST - Enclosed airway built at an intersection of mine passages that permits one air current to pass over another air current without mixing.

PERMANENT STOPPING (same as PERMANENT BULKHEAD) – For the duration of the problem, a ventilation control which cannot be removed or modified.

PERMISSIBLE - A machine, material, apparatus or device which has been investigated, tested and approved by MSHA for use in gassy mines.

PILLAR - A column of ore or rock left in place.

POST - A mine timber.

RAISE - A vertical or inclined opening driven upward.

RAISE CLIMBER - Equipment used in an opening (raise) that is mined upward.

REFUGE CHAMBER - An airtight, fire-resistant room in a mine used as a method of refuge in emergencies by miners unable to reach the surface.

REGULATOR - An adjustable door or opening in a stopping, used to control and adjust the quantity of airflow.

RETURN AIR - The air that has passed through the working areas of the mine.

RIB - The wall of a mine opening.

ROOF BOLTER - A machine designed to drill holes in the roof and install bolts.

ROOF BOLTS/ROCK BOLTS - A long bolt inserted and anchored in holes drilled in the rock.

ROOF JACKS - A roof support designed for immediate temporary use.

SCALING BAR - Tool with a flat point and a heel used to pry in a crack of the rock.

SEAL - A stopping built of greater thickness and more substantial construction used to isolate abandoned areas of the mine from the active workings or to isolate a fire.

SHAFT - A vertical opening of limited area compared with its depth, made for finding or mining ore, raising ore, rock or water, hoisting and lowering workers and materials, or ventilating underground workings.

SKIP - A hoisting bucket, which slides between guides in a shaft.

SLUSHER/SCRAPER - A machine for transferring or loading rock by pulling an open bottomed scoop back and forth from the face to the loading point by means of a drum hoist, cables and sheaves.

SPLIT - To divide the air current in two or more separate currents.

STOPE - An excavation in a mine, other than development workings, made for the purpose of extracting ore.

STOPER - A pneumatic hammer drill used for drilling upward.

STOPPING (same as BULKHEAD) - A temporary wall or partition constructed across a passageway to direct the ventilating air. Can be modified or removed if needed.

STULL/PROP - Column of wood or steel used for support of underground openings.

SUMP - An excavation in the shaft or mine made below the mining level to collect mine water.

SUPPLY PLATFORM - Area set aside for storage of materials.

SURVIVOR - Person found alive in the mine.

SWITCH - An electrical switch.

TAGLINE - Short line no longer than 3 feet hooked from a team member to the team line.

TEAM LINE - Line that links team members together (extension of lifeline).

TIMBER SET - Tunnel support consisting of a roof beam or arch and two posts.

TYING ACROSS AND BEHIND - Systematic exploration of all intersecting and adjacent passageways so that the team is never forward (toward the working face) of an accessible, unexplored area.

UNDERCAST - An enclosed airway built at an intersection of mine passages that permits one air current to pass under another air current without mixing.

UPCAST - The opening through which the return air is removed from the mine. The opposite of downcast or intake.








VENT BAG - An enclosed airway to direct airflow to a given area or location.

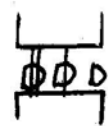
WINZE - An opening, like a small shaft, sunk from an interior point in a mine.

WORKING PLACE - Any place in or about a mine where work is being performed.

MINE MAP LEGEND

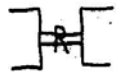
This legend must be used by all teams participating in the Mine Rescue Field Competition.

	Gas Test	For each gas test conducted.
	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 is noted beside the symbol.
	Permanent Stopping Intact	Stopping is intact, airtight. (No indication of opening or leakage.)
	Permanent Stopping Not Intact	Stopping may be destroyed, partially destroyed, or have openings. Is not airtight. Condition noted on placard is to be shown on map beside symbol.
	Temporary Stopping Intact	Stopping is intact and airtight. This symbol is used for all structures built by the team, such as airlocks, etc.
	Temporary Stopping Not Intact	Stopping may be destroyed, partially destroyed, or have openings. Is not airtight. Condition noted on placard is to be shown on map beside symbol.
	Barricade	Any information on placard, such as leaking, damaged, destroyed, etc. shall be noted on mine map beside symbol.



Door

The "D" symbol can be shown by itself, in permanent or temporary stopping. Type, size, and open or not if indicated on placard, must be indicated on map beside symbol. The curve of the "D" indicates direction of door opening.



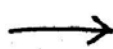
Regulator

If the regulator is damaged, leaking, or destroyed, condition must be shown on map. Also, indicate whether open (how much), or closed.



Fire

Write out any information given on placard about fire, on map beside symbol.



Air Movement

Show arrow in direction of movement as indicated on placard, and how any quantity, if given, or other information, such as flow velocity. Put on map beside symbol.



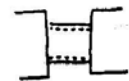
Water

Indicate depth or any other information as shown on placard. Put on map beside symbol.



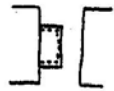
Caved

Caved areas are not considered airtight unless so stated on placard. Write out any information on placard beside symbol on map.



Unsafe Roof Across Entry Rib-to-Rib

Symbol used for any indication of questionable roof conditions. May or may not be scalable. Write out any other information on placard on map beside symbol.



Unsafe Roof Partially Across Entry

Symbol used for any indication of questionable roof conditions. May or may not be scalable. Write out any other information on placard on map beside symbol.



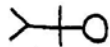
Unsafe Rib or Overhanging Brow

Symbol used for any indication of questionable rib conditions. May or may not be scalable. Project over rib line area on map. Write out any other information on placard on map beside symbol.



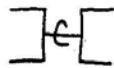
Body

Indicate position of head and feet as body is found. If word "body" is on placard, show symbol. Indicate any additional information on placard on map beside symbol.



Live Person

Indicate position of head and feet as found. Write out condition, such as conscious, walking, etc. Indicate any injuries as given on placard. Write out information on map beside symbol.



Check Curtain

Condition of check, if noted on placard, must be shown on mine map beside symbol. Ex. "Partially down"



Line Brattice or Line Curtain


The full extent of curtain shall be shown. If the curtain is partially or completely down, it must be noted on the map beside the symbol.



Overcast

If it is damaged, leaking, or destroyed, that particular condition is to be noted on the map beside the symbol.

	Undercast	If it is damaged, leaking, or destroyed, that particular condition is to be noted on the map beside the symbol.
	Fan	Write out the conditions of the fan, and any other information indicated on placard, on the map beside the symbol.
	Fan with Tubing	Write out the conditions of the fan, tubing, vent bag or placard on the map by symbol.
	Brattice Frames	Indicate any information on placard on mine map beside symbol.
	Brattice Cloth or Brattice Material	Indicate any information on placard on mine map beside symbol.
	Gas Mixture	Use for any placard indicating a gas or a mix of gases in the mine atmosphere. Write out the gas name or symbol and indicate PPM or percent (%) if shown on placard.
	Smoke	Write out light, heavy, dense, or any other information indicated on placard, on map beside the symbol.
	Elongated Object	For use in indicating pipelines, cables, and other objects usually found that are of any length. Do not use for cable coiled, etc. Write out any other information about object on map beside symbol.
	Track	Write out any information noted on placard on map beside symbol.

	Mobile Equipment	Use for all mobile face equipment. Write out any other information given on placard on map beside symbol on map.
50	50 Foot or First Team Check Inby Fresh Air Base	Used for 50 foot check of team members
20	20 Minute Apparatus Check	Used for every 20-minute apparatus check of team members.
FPA	Farthest Point of Advance	Should be used only where areas inby will not be explored for whatever reason. Not to be used where other conditions block travel.
DI	Captain's Date and Initial	Use for all locations where the team captain dated and wrote his initials.
PC	Power Center	Self explanatory -Write out any information noted on placard.
X	Other Objects, Conditions, or Equipment	Write the name of the object, condition, or equipment and other information indicated by placard on map beside the symbol. This would include a "face" if marked by a placard.

