2020 INTERNATIONAL MINES RESCUE COMPETITION RULES

SEPTEMBER 12---18, 2020

NATIONAL MINE HEALTH & SAFETY ACADEMY

BEAVER, WV



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SECTION 1

Introduction

Mission Statement

The International Mines Rescue Competition (IMRC) is a biennial event. The purpose of the IMRC is to present as realistic as possible simulations that will allow organizers to:

- 1. Evaluate skills required to perform rescue operations in a mining environment.
- 2. Judge participants in an open and transparent manner.
- 3. Provide feedback to all participants.

4. Promote Mine Rescue through improved communication, co-operation and knowledge transfer between responders, mine operators, suppliers, regulators and educators.

Notice of Rules Revisions

The 2020 International Mine Rescue Competition Organizing Committee may be required to revise or update the rules found in this or other pre-competition documents. Registered competing teams will be given notice of any revisions or updates to this or other rules documents. The current, standing rules documents will remain posted on the www.IMRC 2020.com website prior to the competition. All scheduled future publications will be listed within this document and on the www.IMRC 2020.com website.

Roles and Responsibilities

Chief Judge

The Chief Judge is responsible for the drafting, preparation and execution of all aspects of the IMRC. All Simulation Lead Judges, volunteers and support personnel are under the direction of the Chief Judge or his designated alternate. All scoring sheets are to be submitted by the Simulation Lead Judge to the Chief Judge for final review and scorekeeping. Any scoring disagreements that cannot be resolved amongst the Simulation Judges in their area of responsibility shall be presented to the Chief Judge for final decision. For the 2020 International Mine Rescue Competition (IMRC 2020), the role and responsibilities of Chief Judge shall be carried out by the Deputy Superintendent of MSHA's National Mine Academy

Simulation Lead Judge

Reporting to the Chief Judge, the Simulation Lead Judge is responsible for coordinating all Simulation Judges in their area of responsibility, and assisting in the interpretation of the Rules Governing the IMRC 2020. The Simulation Lead Judge will guide each competing team through their area of responsibility and ensure understanding of the given scenario by the team and/or Technical Translator. The Simulation Lead Judge is also responsible for ensuring that the field layout of their area of responsibility is reset after each team has competed, so that it is identical for each team.

For IMRC 2020, the role and responsibilities of Simulation Lead Judge shall be carried out by the individuals appointed by the Chief Judge prior to the event.

Simulation Judge

Reporting to the Simulation Lead Judge for each competition task, the Simulation Judges will be responsible for observing the actions of competing teams and scoring each team according to pre-determined requirements. Simulation Judges must attend the official judges meeting prior to the competition, where they will be provided with information on their duties and scoring areas of the competition.

Simulation Judges will be selected and assigned by the Chief Judge from the list of qualified individuals that submit an Online Judge Application via the IMRC 2020 website before the listed deadline.

Scorekeepers

Scorekeepers will be responsible for collecting and compiling the official scoring documents completed by Simulation Judges for each competing team at each competition event or task. The Scorekeepers will be stationed in an area of seclusion and will be in contact with the Simulation Lead Judges and Chief Judge only. For the IMRC 2020, the role and responsibilities of Scorekeepers shall be carried out by the individual(s) appointed by the Chief Judge.

Scribe

The Scribe will follow each competing team through each competition task and shall be responsible for transcribing time specific actions of each competing team in English. Annotation of team actions will be made from the beginning of each scenario until the Simulation Lead Judge calls the problem "complete". The notes compiled by the Scribe shall be used by Simulation Lead Judges as well as the Chief Judge to confirm the validity of competition scoring and eliminate judging errors.

For IMRC 2020, the role and responsibilities of Scribe shall be carried out by the individual appointed by the Chief Judge.

Incident Commander (Briefing Officer) and Assistant

The team Incident Commander (Briefing Officer) is ultimately responsible for oversight of teams while they work through simulated underground emergency tasks.

The actions of the team Incident Commander (Briefing Officer) and Assistant as it relates to team competition events shall be judged and scored in conjunction with the team score.

Captain

The team Captain shall take charge of, and be responsible for, the discipline, general safety and work performed by his/her team; and should take orders only from the Briefing Officer. The actions of the Captain as it relates to team competition events shall be judged and scored in conjunction with the team score.

Team Member

Each Team Member shall operate under the direction of the Captain at all times during all competition tasks.

The actions of the Team Members as it relates to team competition events shall be judged and scored in conjunction with the team score.

Technician

Competing Technicians will be responsible for diagnosing and repairing multiple pieces of emergency equipment during a separate Technician competition. The Technician will not participate in any team task, exercise or event and will not contribute towards team scoring in any manner.

Technical Translator

For IMRC 2020, the role of the Technical Translator shall be carried out by an individual appointed in advance of arrival by the competing team. The Technical Translator will be responsible for following the team and converting both spoken language and written competition materials into the working language of the competing team. The goal of the Technical Translator role is to have the team hear the interpretation as if it were the original. Therefore, the Technical Translator must be an individual proficient in technical mining and emergency response terminology.

Honesty, Transparency and Integrity Isolation

In the spirit of fairness and equality, teams taking part in the competition must not seek or share information in advance of participation pertaining to simulation events, exercises, tasks or test.

Before the start of the contest all teams scheduled to participate in competition tasks on that day will be placed in isolation.

All members of the team including technical translators and other accompanying persons will also be isolated.

No other personnel will be allowed into the isolation area other than those approved by the Chief Judge.

The time and location of the isolation area will be announced prior to the competition date.

Teams in isolation will not be allowed to communicate with personnel outside of competition organizers by any means: visually, by means of phones, cells, radio, electronic devices, and social media. Posting news or information to social media or other online information sites (e.g. Facebook, Twitter) prior to the completion of all competition field events is prohibited. In case of violation or intention to violate these rules, the team will be assigned negative (penalty points) and may be subject to disqualification.

Personnel who leave the isolation area will not be allowed to re-enter.

Teams that have completed competition field events are not permitted to communicate with any teams that have not yet completed the event.

Team members may take reference material into the isolation area. The team member may not use any of this reference material during competition tasks or while completing the theory exam.

Contestants will not carry personal notebooks into the contest area.

Simulation Lead Judges, Simulation Judges and other competition officials are not allowed to be in contact with any competing team members, in particular to discuss issues related to the competition.

Competition Task Areas

A separate area will be provided for spectators to observe the teams during the competition. Only officially escorted spectators, photographers or news media will be permitted closer to the field exercise as approved by the Chief Judge.

All photographs of competition events and tasks will be taken by the designated event photographers. Photographs will be distributed to teams upon completion of the IMRC. Team photographers are permitted, however must stay within the assigned spectator's area.

All judges and officials shall be provided with a visible means of identification. No person except designated officials will be permitted to communicate with the teams performing or waiting their turn to do so.

Simulation Lead Judges, Simulation Judges or competition officials may not communicate with the competing team members or interfere with tasks unless a health & safety risk is identified.

Only Simulation Lead Judges, Simulation Judges or competition officials assigned to each particular competition task are allowed on the competition field for each specific event.

Following the field exercise, a brief Simulation Judges meeting will be held to ensure consistency between all of the Simulation Judges of that specific competition task or event.

Simulation Judges will complete their respective scorecards.

Simulation Judges will judge in their assigned area only.

Simulation Judges must attend the official judges meeting prior to the competition. Following the official judges meeting, Simulation Judges are prohibited from communicating with members or affiliates of the competing teams.

Competition Review/Debrief

Debrief information sessions will be offered on the day following the awards ceremony. Debrief information sessions are for summary purposes only, not for the discussion of scoring or interpretation of actions. Following scoring of team actions by Simulation Judges there will be no appeal process.

Team Requirements

Fitness/Medical Suitability

All team members must have a medical assessment completed no more than 12 months prior to the competition. This assessment is to confirm a team member is physically fit, and capable of performing work while using

breathing apparatus during Mine Rescue activities. This assessment is to be conducted and authorized by a medical professional.

Before the competition begins, medical professionals will confirm the fitness of each team member. No one will be permitted to participate in the team events without having been found physically fit by a medical professional. Personnel with severe colds or other ailments affecting normal breathing are not permitted to wear breathing apparatus upon direction of the medical professional.

All individuals participating in the competition must be self-insured in the event of an accident or illness. Each participant will take part in the competition at their own risk and responsibility.

Certificate of Qualifications

Each member of the team must be certified/qualified in Mine Rescue and recovery activities within their jurisdiction of work. In addition, team members must demonstrate the necessary physical and mental abilities to perform Mine Rescue work.

In jurisdictions where there is a certifying organization to regulate training, team members must present a certificate of training.

In jurisdictions where there is no certifying organization to regulate training, the Mine General Manager (MGM) or equivalent authority will provide a letter of qualification for the participating team members to confirm their proficiency.

Personal Protective Equipment

Competing teams must be properly dressed for emergency response simulation exercises with personal protective equipment including protective headwear, chin straps, protective eyewear, high visibility apparel, protective footwear and hand protection.

Competing teams must have personal protective equipment (PPE) that meets the requirements specified as follows.

Protective Headwear

Hard hats must have a fixture for a cap lamp and a chin strap. Reflective material for hard hats will be silver. Retro-reflective striping must be applied to the front, back and sides.

All hard hats must meet at least one of the following standards:

a) Canadian Standards Association standard CAN/CSA – Z94.1-05, Industrial Protective Headwear – Performance, Selection, Care and Use.

b) American National Standards Institute, standard ANSI – Z89.1-2003 Safety Requirement for Industrial Head Protection.

c) ANSI/ISEA (International Safety Equipment Association) - Z89.1-2009

Please note, all hard hats should be affixed with an attachment point for a cap lamp (miner's lamp). Any team unable to obtain such an attachment should notify IMRC 2020 organizers to discuss alternatives.

Protective Eyewear

Protective eyewear must be safety spectacles and have permanently affixed side shields. Protective eyewear must fit properly and manufacturer's recommendations for use must be followed. All eye protection must meet one of the following standards:

(A) American National Standards Institute, standard ANSI –Z87.1-03 and/or Z87.1-10.

(B) Canadian Standards Association, standard CAN/CSA –Z94.3-07 Eye and Face Protectors.

High Visibility Safety Apparel

Safety apparel must be Class 3, Level 2 coveralls or pants and long sleeve shirt with the following features: a) Be made of fluorescent background material

b) The apparel must have retro-reflective striping that measures 50 millimeters in width

c) The striping must entirely circle each arm and each leg (at or just below the knee) as well as the waist

d) The striping must be arranged in two vertical lines on the front extending over the shoulders and down to the waist and be arranged in an X on the back portion covering the upper body.

e) Team members must have their team number attached. to the left arm at the shoulder (starting with #1 for team captain, #6 for the vice-captain, #7 for the spare and finishing with #8 for the briefing officer).

f) The apparel must be flame resistant and suitable for exposure to flash fires or short duration flame exposure. All safety apparel must meet the following standards:

a) NFPA Standard 1851

b) Ontario Regulations 854 Sections 262 (2), 263 (2) and 263 (3)

c) Canadian Standards Association standard CAN/CSA - Z96-09

Hand Protection

Gloves should provide protection from friction, cuts and punctures. Gloves must be suitable for a variety of tasks that may include rope work, firefighting and the use of a variety of hand tools in underground and surface environments. Different types of gloves may be used in each simulation.

Protective Footwear

Protective footwear must be rubber, leather or ballistic nylon. Rubber boots must have metatarsal protection, puncture resistant soles, and meet CSA Grade 1 impact requirements. Leather or ballistic nylon boots must be omega rated, have puncture resistant and electric shock resistant soles, integral or external metatarsal protection, and meet CSA Grade 1 impact requirements as shown below.

All safety footwear must meet one of the following standards:

- a) ASTM International Standard F2413
- b) Canadian Standards Association standard CAN/CSA Z195-09 Protective Footwear

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The following items will be supplied during IMRC 2020 field tasks or events:

a) Cap Lamps

- b) Mine Rescue travel restraint belt
- c) Link line

d) Medical examination gloves

Team Supplied:

a) PPE as per above

IMRC 2020 Supplied:

- a) Miners' belts
- b) Link lines

c) Cap lamps

- d) Medical examination gloves
- e) All rescue equipment required for simulations

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Official Language

The official language for all of the events and communications will be English. Every effort will be made during competition task planning to minimize any disadvantage to competing teams due to a lack of proficiency in English or the use of a Technical Translator.

Team Demographics

Team Member Requirements – each candidate must be:

- a) A minimum age of 18 years old
- b) In good health and physically fit
- c) Clean shaven, with no facial hair to interfere with the facemask seal
- d) Calm and self-controlled in an emergency or a dangerous event
- e) Known to be of good judgment and initiative
- f) Capable of performing long, arduous and physical labor
- g) Familiar with underground mining conditions and practice
- h) Certified in first aid training
- i) An employee of a mining company/government agency

Section 2

General Rules for the 2020 International Mines Rescue Contest

There will be a predetermined allotment of time, prior to the day of scheduled competition events, for each team to review the equipment that may be used in the competition(s). This equipment review period will be assigned by competition organizers to coincide with the IMRC 2020 schedule of events.

The IMRC 2020 Overall Team Competition will consist of six available scored events. Each team <u>must</u> participate in <u>five of the six available team events to be entered in the Overall Team Competition rankings.</u> Five team events are mandatory with the fifth team event being a choice between one of two optional events. All of the team events will have a weighted scoring value contributing to the Overall Team Competition scoring as follows:

- a) Team Underground Mine Rescue Simulation (Mandatory) 30%
- b) Team Firefighting (Mandatory) 20%
- c) Team Theory Exam (Mandatory) 10%
- d) Team First Aid---- (Mandatory)--20%
- e) Final Scoring Task 20%
- 1. (**Option 1**) Mine Rescue Skills
- 2. (Option 2) Team High Angle Rope Rescue

Teams are encouraged to participate in all six events. Their sixth event will not count in the Overall Team Competition score, but will qualify for the awards associated with the individual event.

Teams electing not to participate in the Overall Team Competition are still eligible for the awards associated with the individual events in which they participate.

WARNING...Any team whose member(s) intentionally disturb or destroy any component on a competition field will immediately be assessed a 100 point discount

Each team shall be composed of a minimum of eight (8) persons (six working team members, an Incident Commander (Briefing Officer) and Assistant and optional Command Center Attendant and shall be limited to a maximum of ten persons.

Each competing team will be comprised of eight (8) team members:

- One Incident Commander (Briefing Officer)
- One Assistant Incident Commander Assistant
 - One Captain
 - One Vice (Rear) Captain and
 - Four Team members
- One Optional Command Center Attendant

Upon registration and prior to the commencement of competition tasks, teams must clearly designate the roles of the individuals selected to compete and those individuals in a non-competing spare or reserve role. Teams must also include a Technician to compete in the individual Technician Competition. All other people

travelling with the team will be considered spectators and will be restricted from the competition. All other people task area. All spectators will be guided to the competition task viewing area. The auditorium at the National Mine Academy will be the viewing area for the Mine Rescue Segment.

Technical Translators, for the purpose of assisting teams during competition tasks, will not be provided by the IMRC 2020 organizing committee. Technical Translators are in addition to the seven competing team members outlined above. Technical Translator duties are to provide translation only. They may not assist with competition tasks or discuss team actions with competing team members.

Technical Translators will have equivalent access to the designated task areas as the competing team members.

Team Member Substitution

If a medical professional determines that a team member is medically unfit to participate in the event, a substitution will be allowed. The unfit team member will be allowed to switch positions with their spare team member. All substitutions must be approved by the Chief Judge prior to the team leaving isolation.

Penalties

Prior to commencement of each competition problem, a check based on direct observations shall be made to determine whether any of the team members are unfit to participate in the competition task. Where there are reasonable grounds to believe any physical or mental factor renders a team member unfit to compete, the Chief Judge will investigate. If the Chief Judge agrees, the team member will be disqualified and the team may face further penalty up to and including disqualification.

The Chief Judge will investigate when there are reasonable grounds to believe that a person has attempted to assist/influence a team by providing information related to any part of the competition, prior to or during a competition problem. If the Chief Judge deems that such a transgression has occurred, the team may face penalties up to and including disqualification.

The Chief Judge will investigate when there are reasonable grounds to believe a team or member received information concerning a competition problem. If the Chief Judge deems that such a transgression has occurred, the team may face penalties up to and including disqualification.

WARNING...Any team whose member(s) intentionally disturb or destroy any component on a competition field will immediately be assessed a 100 point discount

The Chief Judge will investigate if any team, team member or team representative is found to have posted competition information to digital channels or social media prior to such a time. If the Chief Judge deems that such a transgression has occurred, the team may face penalties up to and including disqualification. Information or pictures about the competition cannot be posted to digital communication channels or social media outlets until the awards ceremonies are complete. If any member or team representative is found to have

posted competition information to digital channels or social media prior to such a time. If the Chief Judge deems that such a transgression has occurred, the team may face penalties up to and including disqualification.

The Chief Judge will investigate if any team, team member or team representative causes disruption during the competition. If the Chief Judge deems that such a transgression has occurred, the team may face penalties up to and including disqualification.

Any penalty applied will be decided by the Chief Judge. Teams will not be allowed to appeal the decision or penalties assessed. All decisions will be final.

Scoring

Examples of performance checklists (scoresheets) with merit/penalty values (scoring points) will be provided to registered teams in advance of IMRC 2020 for training purposes.

Interpretation and scoring in each competition event will be pre-determined by IMRC 2020 organizers and agreed upon by Simulation Lead Judges and Simulation Judges in advance of the event and at the judge's pre-competition meeting.

The Simulation Lead Judge and Simulation Judges for each competition event will discuss each competing team's performance and must reach consensus on the scoring of each task.

In the event of a tie for any scenario the team's working time for that scenario will be used as the tie breaker.

In the event of a scored tie in all Scenarios the team with the faster completion time (working time) for that scenario will break a tie. In the event of a score tie for the overall standings the total working time of the affected teams will break a tie.

The Chief Judge will have final oversight on the interpretation and scoring of the actions of the teams. The decision of the Chief Judge may supersede the evaluation of the Simulation Lead Judge and Simulation Judge for that competition task and will be recognized as the final ruling in the event of a disagreement regarding the scoring.

Competing teams will not be permitted to appeal the scoring or decisions of the Simulation Judges, Simulation Lead Judges or Chief Judge.

The Chief Judge and Simulation Lead Judges shall be the only people in contact with the Scorekeepers.

Debriefing/Information Sessions

Competing teams and technicians will be provided with an opportunity for a debriefing information session on the day following completion of the competition awards ceremony.

The purpose of the debriefing information session is to provide feedback to all competing teams.

At the debriefing information session, competing teams will be provided with the following:

a) A scoresheet summarizing the scoring of all competing teams in all tasks

b) A copy of their own scoresheets including Simulation Judge written comments and Scribe notesc) An opportunity to discuss their actions in the context of the intended competition task requirements

General

Format Notes

All emergency simulations will use live infrastructure including compressed air, water, ventilation, radio communication and ground support.

All people (and/or manikins (dummies) are to be considered as live and unconscious persons) encountered in underground workings are to be treated as part of the emergency scenario unless visually identified as a Judge.

Order of Competing Teams: Will be drawn by lottery prior to the date of the competition (date to be determined). Teams travelling from the same jurisdiction or country will be drawn together and complete each task following one another to prevent any potential for information sharing.

The Chief Judge and Simulation Lead Judge with the assistance of a committee will develop and set up the simulation.

Once developed, the simulation will be sent for an external (Non-MSHA 3rd Party) technical expert review to ensure procedures are realistic.

Where possible any simulations underground that are present will be simulated by an actual means, such as smoke, gas readings, heat etc. When this is not possible, these will be indicated by a visual or symbolic means.

Simulation victims will be made-up using casualty simulation visual effects to show any injuries.

Illness / Injury

Any Mine Rescue Team member (Competitor) that experiences unexpected illness or injury of any form during the competition scenario must immediately notify the nearest Simulation Judge who will then inform the Lead Simulation Judge.

Simulation or assignment task "measured time" will be paused during the evaluation of any injuries or illnesses in fairness to the competing team.

The Simulation Lead Judge will determine whether it is safe for the team member (competitor) to continue with the task, and therefore, will also determine whether the Mine Rescue Team may proceed with the remainder of the task. It is the goal of both the IMRC Judges and competing teams to help every team achieve the goal of completing each task; however, this will not be done at the expense of health or safety.

Equipment Orientation Location: National Mine Health & Safety Academy (Various Locations) 1301 Airport Road, Beaver, WV 25813

All teams will be allocated a 3-hour Equipment Orientation Session on either Sunday, September 13 or Monday, September 14.

All teams requiring an English translator must bring their Technical Mining Translator to the equipment orientation

Where possible, teams will be grouped with other teams speaking the same native language to help utilize translators more effectively.

Orientation sessions will demonstrate all equipment that may be used during the competition. Some equipment demonstrated may not be used; it is the responsibility of teams during each emergency to determine what is required.

Demonstrations will include:

- Inspection of equipment
- Hazards of operating equipment
- Proper operating procedure
- Proper shutdown procedure
- Competitors (Mine Rescue Team) hands-on time
- Questions that team members may have

Locations of the individual orientation sites will be posted on the 2020 IMRC Website in advance of the Contest.

SECTION 3:

Underground Mine Rescue Scenario/Simulation:

Format:

General:

The Underground Mine Rescue Scenario is mandatory for all teams participating in the 2020 IMRC Overall Team Competition.

Task will be carried out in the Mine Simulation Lab at the National Mine Health and Safety Academy. Both levels of the Mine Simulation Lab may be used for the competition.

Location: Mine Simulation Lab (Coordinates: N 37⁰ 46.7176', W 081⁰ 07.2980) Mine Maps / Plans / video are available to teams for reference on the Competition Page of www.IMRC2020.com

MINE SIMULATION LAB and MINE EMERGENCY OPERATIONS BUILDING

Mine Simulation Lab

48,000 sq. ft.

Mine Simulation Lab photos / video will be provided for simple visual familiarization purposes no later than 1 month prior to the competition.

Field Setup

In the workings of the Mine Simulation Lab it is important for teams to prepare for a very different experience than previous International Mines Rescue Competitions. Placards and judges will **NOT** be used to convey information about the condition of any of the below where possible. It is the intention of IMRC 2020 to allow teams to interact with the mine environment as they would in an underground emergency:

Casualties / Victims: Any information pertaining to these individuals must be obtained either through inquiry by the Incident Commander (Briefing Officer) and Assistant and Command Center Attendant, if used prior to or during the emergency, or through active first aid engagement by the Mine Rescue Team. On both live casualties/victims (actors) and simulated casualties/victims (manikins/dummies) injuries will be displayed visually by makeup/moulage, or through verbal or physical communication. Any manikins (dummies) encountered during the scenario/simulation are to be considered as live and unconscious persons) and shall to be treated as part of the emergency.

Numbered paper tags (spads) will be hanging from the roof of the Simulated Mine and will be marked on the maps provided to the team and Incident Commander (Briefing Officer) and Assistant and Command Center Attendant, if used, for team location and mapping purposes.

Machines, objects and their state: Equipment and objects are to be interpreted as found. For example, if the scenario calls for the Mine Rescue Team to come upon a piece of energized mobile equipment, the equipment will actually be present and energized in the mine. In this example, Mine Rescue Teams are to approach such equipment with caution, turn off or remove power to the unit and remove any other hazards before passing or working around the equipment.

Conditions in headings and crosscuts and the state of ground (rock) support: All travelways used during the competition will be assumed to be safe unless otherwise indicated by a photograph, poster or actual or simulated item. Teams may be required to crawl during the Underground Mine Rescue Scenario/Simulation. Knee Pads will be provided by the 2020 IMRC.

- Physical hazards: Common hazards such as debris, flooded areas, waste rock, garbage or confined workings will appear in the mine where required. Teams are to interpret whether these areas can be safely navigated, whether work is required to remediate the area for safe work, or whether the hazard is unsafe to pass. For example, a depression in the mine drift resulting in a 1ft deep pool of water can be safely navigated on foot; however a sump area containing 15 ft. of water would be deemed impassable unless a means to evacuate the water was present.
- Gas concentrations and/or smoke: Please note, gas concentrations will not be given to Mine Rescue Teams by Judges or via placards. Rather, artificial gas readings will be live transmitted to gas monitoring devices carried by Mine Rescue Teams. It is the responsibility of the Mine Rescue Team to check the device for gas concentrations where necessary and react appropriately to any alarms that

occur. In the event of a failure of the gas monitoring devices, gas concentrations WILL be given to the team via placards.

Where it is not possible or fair to expect teams to interpret the environment without assistance, Mine Rescue Teams will be instructed during Equipment Orientation to look for large symbols or signs in the mine to indicate a specific condition.

Fresh Air Base

Will be situated in an assured supply of fresh air near the place of emergency. May be located on either surface or underground depending on the nature and location of the emergency.

At the Fresh Air Base there will be 1 member of the team, Incident Commander (Briefing Officer), who will perform the following duties:

- Interacting with specialists and leadership of the mine (Control Group);
- Communicating with the Mine Rescue Team;
- Annotating a map of the emergency area including all Mine Rescue Team findings;
- Keeping a log-book of emergency operation;
- Analyzing conditions in the place of emergency in order to prevent complications and ensure safety of team members;
- Interacting with reserve teams (if necessary);
- Incident Commander (Briefing Officer) and Assistant and Command Center Attendant, if used at the Fresh Air Base will not have visual contact with the Mine Rescue Team on the field.
- In the case of a performing Mine Rescue Team returning to the Fresh Air Base, the Incident Commander (Briefing Officer) and Assistant and Command Center Attendant, if used may either assist the Mine Rescue Team or stay at their communication station. When the team leaves the Fresh Air base the Incident Commander (Briefing Officer) and Assistant and Command Center Attendant, if used must return to their communication.
- Incident Commanders (Briefing Officers) and Assistant and Command Center Attendant, if used stationed at the Fresh Air Base do not need to be equipped with their own respirators.
- The Incident Commander (Briefing Officer) and Assistant and Command Center Attendant, if used may **NOT** substitute with a Mine Rescue Team member once the team has begun the assignment. Accommodations may be made in the event of injury or illness as previously specified, though this is not guaranteed and remains at the discretion of the Chief Judge.

Equipment:

General:

- Underground rescue teams will be supplied with identical rescue equipment, including radios, lifelines and Visio Computer if team elects to use Visio mapping.
- Field test and procedures will be provided in advance.

Minimum Equipment provided by organizers:

- Self-contained closed circuit breathing apparatus (Drager BG4).
- Teams are not required to be proficient in the use of the BG4. If teams have concerns regarding the breathing apparatus, they should contact IMRC 2020 organizers as soon as possible.
- Electronic Gas monitoring system (Industrial Scientific MX6, or "Lights On" Gas Training System.
- Fully equipped First Aid Kit (Medical bag), rescue basket and spine board
- Team member reserve (backup) breathing apparatus
- Casualty (victim / injured person) rescue breathing apparatus (Portable Resuscitator). CAREvent DRA or other.
- Mine maps/plans
- Communication devices (eg. Wireless radio)
- Firefighting equipment (eg. extinguishers, hose & nozzle, AFFF, etc.)
- Cap lamps (miner's lamp). Please note, all hard hats should be capable of attaching such a lamp as specified in the PPE Requirements
- Knee Pads
- Team linking device for low-visibility
- Life line on a reel to enable a team to travel thru areas of low visibility

Minimum Equipment required by Teams

• Personal protective equipment outlined in PPE section of the "Rules Governing IMRC 2020" is the responsibility of each team member

Additional / Supplementary Rescue Equipment

- The Fresh Air Base may be furnished with supplementary rescue equipment (pneumatic lifting bags, hydraulic and pneumatic jacks, scissor expander, rescue rope, pyrometer, thermal imaging (IR) camera, pickaxe, axe, hand saw, etc.) as well as a standby breathing apparatus that can be substituted if one of breathing apparatuses operated by the team has failed.
- The requirement for use of this supplementary equipment will be dictated by the scenario and decision of the Mine Rescue Team. Any equipment likely to be required will be presented to teams during the Equipment Orientation meeting to provide an equal understanding of when the equipment would be required.

Failures:

• When a breathing apparatus operated by a Mine Rescue Team fails for reasons out of the Team's control (unrelated to misuse or incorrect operation), the time count stops and the defective breathing apparatus is substituted with a functioning unit.

First Aid Equipment for Mine Rescue Simulation:

• 2020 IMRC will provide the following First Aid Equipment for the Mine Rescue Simulation

12	Triangular Bandages
6	Adhesive compresses
12	Sterile gauze, (4"x4") and/or 4" Compresses
6	Roller Bandages
2	Blankets
1	Disposable Blanket
1	Scissors, EMT Utility
6	Pairs of Examination Gloves
	Mask/face shields or masks and goggles combination meeting
2	blood borne pathogen requirements (mine rescue apparatus face
	mask suffices)
1	Compliment of splints (may be pre-padded but not assembled)
1	Long back board with straps (Aluminum, Wood, etc.)(Cravat
	bandages or straps cannot be preassembled on the back board)
1	Burn Sheet, Sterile (40" x 80" minimum)
1	Rigid Extrication Collar
2	Trauma Dressings (minimum of 10" x 30")
2	Tourniquets
2	Occlusive Dressing
1	Care- Vent
1	Packet sugar/tube of instant glucose (for diabetic purposes)

Technical Standards:

General:

• No applicable technical standards are required to be studied at this time.

Team Procedures, Roles, Responsibilities: General:

- Each participating team shall be made up of **six rescuers** who will be wearing breathing apparatus underground, as well as one Incident Commander (Briefing Officer) and Assistant and Command Center Attendant, if used who will be stationed on surface or underground at the Fresh Air Base. Team may elect to use a Command Center Attendant that will use Visio Electronic Mapping. Visio Electronic Mapping will be explained and instructions will be in Appendix 17- Visio Mapping Guidelines. The Command Center Attendant will be stationed with the Incident Commander/Briefing Officer and Assistant but CANNOT visually compare maps with the Incident Commander/Briefing Officer and Assistant.
- The team members participating must be registered before leaving isolation.

- Teams must explore underground workings without the assistance of any Judges.
- The scope of tasks that must be completed during the simulation include:
- Team preparation and donning of the breathing apparatuses
- Team preparation of standard and auxiliary equipment to be taken underground
- Establish the teams assignment, which may include but are not limited to the four main priorities of mine rescue and recovery work, both fire and non-fire:

Exploration Procedures to be utilized by ALL teams for exploring the Simulated Mine:

- Mine Rescue exercise will be conducted using a simulated mine layout with entries and crosscuts similar to a traditional mine rescue field. Teams will be required to advance in the mine using the 2+2+2 procedure for exploring the mine. Teams must follow the procedures outlined in rules when advancing in the mine.
- When working in 2, 2 and 2 person groups any member can perform the duties of the Captain or other members, including the 20 minute apparatus check.

Two, Two and Two Exploration Procedures:

- Each group must have the following equipment: handheld radio, gas detector, and chalk.
- Anytime stretchers are transported through water they must be elevated to above the level of water.
- Each group must have at least 1 radio for communications, and communications must be maintained between the groups and the Incident Commander (Briefing Officer) and Assistant.
- The radios that are used for communications by the team must be visually checked by the team before going underground for safe operating condition and level of battery charge.
- 1. Teams must explore the areas of the mine that are smoke free in 2, 2 and 2 person groups.
- 2. The team Captain will decide which members are paired up in the 2, 2 and 2 person groups.
- 3. Each member of each group can perform the duties of any team member including the Captain's duties.
- 4. The groups will not be required to maintain a map. The Incident Commander(Briefing Officer) and Assistant as well as Command Center Attendant will maintain a map which will be scored according to 2020 International Mines Rescue Contest Rules and must be turned in upon the stopping of the clock. Each group will be given a blank map for recording information and must turn the maps in upon stopping the clock. These maps will not be scored but must be turned in upon competition of the simulation.
- 5. The 2+2+2 person groups must stay within one crosscut of an adjacent group when exploring.
- 6. An outside group will notify the center group that they have stopped or ready to advance. The center group will notify the Incident Commander/Briefing Officer that the groups have stopped or are advancing. All other communications can be between the 3 groups and the Incident Commander (Briefing Officer) and Assistant.
- 7. When encountered, the following conditions or situations will require the 2+2+2 person groups come together and function as a 6 person team.

- A. Locating a Person requiring any type of action or treatment, including providing First Aid Treatment
- B. Entering a Refuge Chamber or Barricade (Must follow 2020 International Mines Rescue Rules)
- C. Fire Fighting (Must follow 2020 International Mines Mine Rescue Rules)
- D. Ventilating the Mine (Must follow 2020 International Mines Mine Rescue Rules)
- E. Pumping Water (Must follow 2020 International Mines Mine Rescue Rules)
- F. Setting Timbers(Must follow 2020 International Mines Mine Rescue Rules)
- G. Traveling into or through any SMOKE (Must follow the rules listed below)
- Immediately upon competition of any of the tasks above, the team must return to the 2+2+2 person groups and continue exploration.
- 8. If a 2+2+2 person group is blocked in the entry they are exploring, they can retreat and advance up the adjacent entry to tie back into the entry they were exploring at the first accessible crosscut.

If a group encounters smoke, the following procedures must be followed:

- Teams must carry sufficient rope, wire or cable to be used as a lifeline when smoke is encountered. The lifeline must be attached on the outby end of the smoke and left in place until the team travels back through the smoke. (Will be provided by 2020 IMRC)
- Teams shall secure their lifeline in a location that is clear of smoke and continue with that lifeline traveling into or through the smoke to air clear of smoke, and retreat through the smoke using the reverse procedure.

Where:

- Last person in line does not travel into smoke. Captain and other team members may travel into smoke. All members must hold or be firmly attached to lifeline and/or link line. Captain's travel limited by rules covering exploration (e.g. 25' limit.)
- Team intends to ventilate smoke over the team; all members must hold or be firmly attached to lifeline and/or link line.
- **9.** One of the groups must take the stretcher inby the Fresh Air Base and keep it with them as the groups explore the mine.
- **10.** The groups can either go under oxygen at the Fresh Air Base before traveling inby the Fresh Air Base and must be examined (described below) and the gauge reading of the team member's apparatus with the lowest p.s.i must be reported to the Incident Commander/Briefing Officer by the Captain before traveling inby the Fresh Air Base or the groups can explore until any group encounters an Immediately Dangerous to Life or Health (IDLH) atmosphere (described below). The team has the choice of either of the 2 options. Upon encountering an irrespirable atmosphere by a group or groups all team members inby the Fresh Air Base must go under oxygen and remain under oxygen until stopping the clock. The groups must examine each other's apparatus (described below) and must report the low gauge reading to

the Incident Commander (Briefing Officer) at this time. The groups must examine their apparatus and report the low gauge reading to the Incident Commander (Briefing Officer) every 20 minutes and/or after the apparatus has been removed in order to enter a confined area or apparatus that has sustained possible damage from impact until stopping the clock.

Immediately Dangerous to Life or Health (IDLH) atmosphere is defined as:

The atmosphere contains, when tested: Oxygen (O2) is below 17.0%; Carbon Monoxide (CO) exceeds 1200 ppm (0.12%); Hydrogen Sulfide (H2 S) exceeds 100 ppm (0.01%); Nitrogen Dioxide (NO2) exceeds 20 ppm (0.002%) Methane (CH 4) exceeds 5% and ANY smoke. ALL Immediately Dangerous to Life or Health (IDLH) atmosphere encountered by any

ALL Immediately Dangerous to Life or Health (IDLH) atmosphere encountered by any group or by the team must be reported to the Incident Commander (Briefing Officer) and the Assistant.

Proper Apparatus Check: A proper apparatus examination will include a visual examination of the gauge, facepiece, hoses, and determine by sight or feel, that the protective cover is secure.

11. <u>Entering a Rescue Chamber</u>: When a team finds a rescue chamber, the team must enter the rescue chamber at the same team stop by the following method:</u>

Whether the atmosphere outside is respirable or irrespirable, the captain must open the outer door and take a gas test in the airlock prior to any other team member entering the airlock. The team (2 members, the Captain and another team member) may enter into the airlock, close the outer door. If the air inside the airlock is respirable, the team may open the inner door and the captain must take another gas test prior to any other team member entering the area.

If the atmosphere inside the airlock is irrespirable, the team will use the purge valve (placard) for 5 seconds to clear the airlock. The captain will then take a gas test to determine that the irrespirable atmosphere is cleared. The captain will then open the inner door and take a gas test prior to any other team member entering the area.

If the atmosphere outside the rescue chamber is irrespirable, the patient must be protected with an approved breathing apparatus before being removed from the refuge alternative.

Team members entering the airlock may drop their life line at the rescue chamber door (even in smoke) so an airtight airlock is maintained and allow them to move around in the refuge chamber. If smoke is present outside the rescue chamber, once the patient is removed (placed on stretcher if unconscious), team members must immediately reattach themselves to the lifeline.

Objects other than the person or bodies inside the rescue chamber will not need to be mapped. Orientation of person or bodies will not need to be mapped as they are found because of limited space of

the enclosed rescue chamber. If the live person is unconscious, they may be moved outside the rescue chamber before being placed on a stretcher.

- **12.** Roof /Ground Testing: Checking for loose ground (loose roof or rib) is done visually by the team member as the team advances. The team member must verbally indicate that he/she is checking for loose ground at every location required.
- **13.** Gas Testing: Each Group will be supplied with an electronic "gas instrument" that is capable of receiving updated gas readings throughout the problem. The gas levels can and will change throughout the problem and the each group is responsible for reporting the changes to the Incident Commander/Briefing Officer. The Incident Commander/Briefing Officer must place the gas readings on his/her map. The following gases tested for: Methane (CH4), Carbon Monoxide (CO), Oxygen (O₂) and Nitrogen Dioxide (NO₂). The results of the gas readings shall be placed on the Incident Commander/Briefing Officer's map as follows:

Priorities during an Emergency:

- 1. Ensure the safety of all Mine Rescue Team members at all times in all situations.
- 2. Ensure the safety and safe evacuation of known Casualties (victim / injured persons).
- 3. Fight and eliminate all known fire and combustion related hazards in the underground mine.
- 4. Examine the underground mine for concentrations of gas contaminants that prevent the safe operation of the mine and restore proper ventilation when possible.

Casualties (Victims / Injured Persons):

- Location found must be noted on Incident Commander (Briefing Officer) and Assistant map
- All casualties (victim / injured persons) not located in permanent refuge chambers safe from the emergency must be evacuated/transported to the surface Fresh Air Base.
- Casualties / victims / injured persons found in contaminated atmospheres must be immediately protected with a rescue breathing apparatus if available for transportation. If no rescue breathing apparatus or self rescue apparatus is available, thought must be given to the nearest source of fresh air to temporarily station the individual.
- Casualties / victims / injured persons must be evacuated/transported to the surface Fresh Air Base utilizing the shortest route of travel to the surface.

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Mine Map / Plans:

- One annotated Mine Map/Plans is to be created during the simulation by the Incident Commander (Briefing Officer) and will be scored according to the map legend created for the 2020 IMRC.
- Only information related to the emergency must be noted on the mine map / plans. The following information must be marked on the map or specified on the Captain's notes.
- Location of gas and temperature measurements
- Location of missing persons (victims / casualties)
- Location of hazards
- All Reported "Low Gauge Readings"
- All Immediately Dangerous to Life or Health (IDLH) atmosphere encountered by any group of team must be marked on the Incident Commander (Briefing Officer) or the Assistant's map.
- Incident Commander (Briefing Officer) or Assistant and Command Center Attendant, if used do not need to mark on maps / plans the location of stops and physical condition of rescuers; however, the time that these checks occurred must be noted on either the map or Incident Commander (Briefing Officer's) or Assistant and Command Center Attendant, if used notes.
- Any infrastructure, including but not limited to compressed air, water, radio, ground support and ventilation that is functioning normally does not need to be specially noted on mine map / plans.
- Any infrastructure, including but not limited to compressed air, water, radio, ground support and ventilation that has been altered, disrupted or destroyed due to the emergency must be noted on the mine map / plans
- The scenario may include working on more than 1 level and it may include boreholes, shafts, raises and slopes that could influence the ventilation system changes. Teams may be required to explore more than 1 level of the mine.
- Team may elect to use a Command Center Attendant that will use Visio Electronic Mapping. Visio Electronic Mapping will be explained and instructions will be in Appendix 17- Visio Mapping Guidelines. The Command Center Attendant will be stationed with the Incident Commander (Briefing Officer) and Assistant but CANNOT visually compare maps with the Incident Commander (Briefing Officer) and Assistant.

Map Symbols that must be used by Incident Commander (Briefing Officer and Assistant:

PERMANENT STOPPING

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

PERMANENT STOPPING NOT INTACT, NOT AIRTIGHT

TEMPORARY STOPPING

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

SEAL

If the seal is equipped with devices such as sampling tubes or water traps, or is damaged, leaking, or destroyed, that particular device or condition must be noted beside the symbol, including gas test results from sampling tube. No gas box symbol would be required for sampling tube test results.

DOOR

Can be shown by itself or in ventilation controls. However, the type and size and "open" or "closed" must be written out. Letters to indicate doors or barricades can be parallel or perpendicular to or on the stopping, or adjacent to the structure as shown.

LINE CURTAIN

Designated curtain provided for removing contaminated or explosive gases. and held by the team and is considered airtight.

CAVED

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

"Unsafe Roof" will be visually determined and illustrated by "simulated" unsafe roof conditions. Any other condition designated must be noted beside the symbol. Outline size if indicated by markings

XXXX

хххх

partially across entry

WATER

depth(s) as encountered in the Simulation.

SMOKE

Write out "light" or "dense" as encountered; draw in entire extent of smoke.

FIRE

Write out "smoldering", "raging", etc., as encountered. The fire symbol must be placed over the object on fire.

BODY

Indicate position of head and feet as body is found.

LIVE PERSON

Write out condition encountered, such as conscious, unconscious, walking, etc., indicate position if lying down.

AIR MOVEMENT

Write out quantity if determined by the team.

FARTHEST POINT OF ADVANCE IN ENTRY, ROOM, OR CROSSCUT

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

PLACARD INDICATING GAS MIXTURE

ANY ROOF SUPPORT INSTALLED BY THE TEAM

FAN

Write out conditions of fan as encountered by the team.

. OVERCAST OR UNDERCAST

This symbol is to be used for placards indicating "overcast/undercast" or "overcast wall". If the overcast or undercast is damaged, leaking, or destroyed, that particular condition must be noted beside the symbol.

LOCATION OF ANY OTHER OBJECTS, CONDITIONS, OR EQUIPMENT

Write the name of the object, condition, or equipment by the symbol.

RESCUE CHAMBER

RC A rescue chamber is considered to be an undamaged and airtight unit Equipped with an airlock.

For contest work a rescue chamber will be the prefabricated type and will not block ventilation through an entry where the component is located or prohibit exploration around the component.

The symbol "RC" may be located outside of the RC; the symbol is to remain upright with door oriented as found. The only items required to be mapped inside the Rescue Chamber are live persons and bodies (orientation does not apply).

Hazards:

- Any hazard to the safety of the Mine Rescue Team that is encountered in the underground mine must be eliminated or reported to the Incident Commander (Briefing Officer) or Assistant and Command Center Attendant, if used prior to proceeding past the hazard. Preventing exposure of the Mine Rescue Team to a life threatening hazard takes first priority over any other tasks. Hazards include, but are not limited to:
- Unsupported ground/rock
 IF THE TEAM OR INCIDENT COMMANDER (BRIEFING OFFICER or ASSISTANT) DEEMS and
 COMMAND CENTER ATTENDANT, if used. IT NECESSARY TO SUPPORT UNSUPPORT
 GROUND/ROCK THE FOLLOWING METHOD MUST BE USED:
 - a. set first timber outby unsafe roof no more than 5 feet from a safe rib (see figure 2a) or set two timbers outby unsafe roof no more than 5 feet apart staying between the timbers being set if there is no safe rib (see figure 2a).
 - b. set additional timbers in unsafe roof at no more than five foot intervals and no more than 5 feet from a safe rib or set two timbers inby the previously set timbers at no more than 5 feet apart if there is no safe rib staying between the 2 rows of timbers being set.
 - c. set last timber inby unsafe roof not more than 5 feet from the safe rib or set two timbers inby the unsafe roof at no more than 5 feet apart if there is no safe rib staying between the 2 rows of timbers being set before any other work is done (except for recovering patient found in the unsafe roof)-or team passes through the area. If team subsequently travel through the area they must stay between the row of timbers they previously set and the safe rib or the two rows of timbers they previously set.

EXAMPLES OF PROPER METHODS OF SETTING ROOF SUPPORTS

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

No roof test required IN area of unsafe roof.

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

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

If supporting elongated unsafe roof along a safe rib:

- a. the captain can choose to set timbers parallel to a safe rib by setting first timber outby the unsafe roof no more than 5 feet from a safe rib and then setting timbers no more than 5 feet intervals in the unsafe roof staying between the row of timbers and the safe rib (see figure 3 right side of page);
- b. or timber perpendicular to the rib by setting two timbers outby the unsafe roof no more than 5 feet apart staying between the timbers and then set two timbers in the unsafe roof staying between the two rows of timbers. (see figure 3 left side of page). This method must be used if there is no safe rib i.e. unsafe roof that wraps around a corner in an intersection and the team needs to access the area or the corner.

FIGURE 3

PROPER INSTALLATION OF ROOF SUPPORT TO RECOVER A PATIENT LOCATED UNDER

AN AREA OF ELONGATED UNSAFE ROOF

- Explosive concentrations of gas
- Live fire
- Electrical hazard
- Flooding
- Unsafe/Unsecured equipment
- Operating machinery
- Machinery not blocked against movement
- Note: Contaminated ventilation is **not** considered a life threatening hazard to those wearing an oxygen breathing apparatus.

If at any time the Simulation Lead Judge feels that a team member's safety may be compromised, the action will be stopped and re-direct (penalty) points will apply.

Fires

- When a mine rescue team encounters a **non-combatable** fire it should seal the fire without delay and regulate ventilation regime so that to restrict the air flow to the fire and prevent it from further advance.
- Fire-fighting rescue actions are carried out with the aim to salvage endangered persons, mitigation of the fire expansion, extinguishing of the fire with use of active or passive measures.
- Active putting out of fires consists in its direct extinguishing, e.g., by flooding with water or hydraulic filling, use of extinguishing agents (foams, powders), etc. Passive extinguishing consists in sealing of the region where the fire has occurred by erection of sealing walls (dams) and, if possible, supplying of inert gases to the encapsulated area.
- Fire-fighting rescue actions should comprise actions aimed at active extinguishing of fires while keeping the rescuers on the fresh air side when possible.
- Active extinguishing of fires is not allowed under the following conditions:
- When an explosive concentration of gas is present.
- When the atmosphere is too hot to proceed.
- When excessively high temperature prevents from application of active methods for extinguishing of the fire in the areas with no methane hazard. The rescue team should restrict inflow of air to the fire zone by erection of barricades (dams).
- For zones with the methane hazard where active extinguishing of the fire proves infeasible, the rescue team should embark on sealing of the fire zone with use of isolating barricades (dams) of explosion-proof design.
- Rescuers are prohibited to enter fire zones where the temperature exceeds 60°C.

Incident Commander (Briefing Officer) and Assistant and Command Center Attendant, if used

- Prior to (and during) the emergency, an unseen group of mine administrators ("Control Group") will have ultimate authority over the site and emergency response plan. This group has given responsibility for all Mine Rescue Team activity planning to the Incident Commander (Briefing Officer) and Assistant and Command Center Attendant, if used, however, at any time they may direct the Incident Commander (Briefing Officer) and Assistant, and Command Center Attendant, if used to change his/her designated plan to align with the overall site emergency response plan. In this way, the Incident Commander (Briefing Officer) and Assistant and Command Center Attendant, if used reports directly to this group and must obey their instructions when presented. However he/she has the freedom to proceed as they see fit in all other circumstances. During the competition, instructions from this group will be presented to the Incident Commander (Briefing Officer) and Assistant and Commet Attendant, if used to change his/her designated plan to align with the overall site emergency response plan. In this way, the Incident Commander (Briefing Officer) and Assistant and Command Center Attendant, if used reports directly to this group and must obey their instructions when presented. However he/she has the freedom to proceed as they see fit in all other circumstances. During the competition, instructions from this group will be presented to the Incident Commander (Briefing Officer) and Assistant and Command Center Attendant, if used by a Judge or via phone/radio communications.
- The Incident Commander (Briefing Officer) and Assistant and Command Center Attendant, if used Simulation Judges will take the Incident Commander (Briefing Officer) and Assistant and Command Center Attendant, if used into a separate room during the time the pre-use equipment testing by the respective team is being performed. Mine plans and a copy of the emergency narrative (record of events that have taken place up to that point) will be made available to the Incident Commander (Briefing Officer) and Assistant and Command Center Attendant, if used. The Incident Commander (Briefing

Officer) and Assistant and Command Center Attendant, if used may ask any question of the Judge, and any reasonable question will be answered, but a sense of urgency must prevail.

- Care must be taken that the Judge remains available for any questions for exactly the same length of time in each case. Sufficient time will then be allowed for the Incident Commander (Briefing Officer) and Assistant and Command Center Attendant, if used to study the mine plans and the narrative.
- The Incident Commander (Briefing Officer) and Assistant and Command Center Attendant, if used will be responsible for detailing the proposed assignment for the Mine Rescue Team being deployed. This proposed assignment will be evaluated prior to notifying the Mine Rescue Team.
- The Incident Commander (Briefing Officer) and Assistant and Command Center Attendant, if used Simulation Judges will then present detailed (complete or partial) written instructions to the Incident Commander (Briefing Officer) and Assistant and Command Center Attendant, if used outlining the mandatory team assignment. This is done to ensure that each Mine Rescue Team begins the task with the same information so that they may be equally judged from that point forward. The Incident Commander (Briefing Officer) and Assistant and Command Center Attendant, if used and Judges will discuss these instructions to be sure the Incident Commander (Briefing Officer) and Assistant and Command Center Attendant, if used understands them and the reasoning behind them. Any differences between the Incident Commander (Briefing Officer) and Assistant and Command Center Attendant, if used plan and mandatory task plan will result in a penalty being applied to the overall scoring.
- The Technical Mining Translator that attends the competition with each team will be stationed with the Incident Commander (Briefing Officer) and Assistant at all times. The Translator will be responsible for translating all discussion between the Incident Commander (Briefing Officer) and Assistant, Judges and radio communication with the Mine Rescue Team.
- The Incident Commander (Briefing Officer) Assistant and Command Center Attendant, if used can do any of the duties of the Incident Commander (Briefing Officer) including mapping, note taking and communications with the team.

Ventilation

- Ventilation changes are considered to be any combination of stopping, starting or redirecting the airflow/current within the mine.
- Groups or team may only ventilate areas of the mine which they have explored.
- Re-direction of the air current should be made by means of erecting temporary stoppings, breaking existing ventilation installations, regulating air flow.
- Before changes are made to ventilation, Mine Rescue Teams must receive permission from the Control Group (mine management authority) through a request from the Incident Commander (Briefing Officer).
- It is permitted to change ventilation when all accessible areas have been explored;
- To direct airflow, containing irrespirable gases or explosive air-gas mixture through unexplored areas is strictly prohibited;
- When passing ventilation constructions a team should maintain the existing regime of ventilation;
- Before breaching airtight separations such as: stoppings, doors, seals, barricades, or removing water roofed, an airlock must be formed if conditions on the other side are unknown.
- An airlock is formed by erecting a temporary stopping at a location(s) that will provide the equivalent airtight separation as the airtight structure or condition breached by the team. To be considered reasonably airtight, at least 8 of the 9 clips across the top of the temporary stopping and at least 3 of the

4 clips on each side must be attached to the hooks that are in place.

- Regulating airflow to control a fire is considered as a ventilation change ;
- When breaking a brattice (curtain) irrespirable or explosive gas mixture is not to penetrate beyond barricade;
- While controlling the ventilation system a team should exclude the possibility of penetration air current, containing explosive gas mixture to areas where may exist sites of ignition, sparking or smoldering;
- It is permitted to ventilate unexplored areas provided permission is given to the Incident Commander (Briefing Officer) and Assistant and Command Center Attendant, if used by the Control

Group (mine administration officials).

Tasks

- Teams must don their primary breathing apparatus and be under respiratory protection prior to entering any area of known respiratory contamination
- Upon entering an area of known respiratory contamination, a survey of gas concentrations must be taken for the following contaminants:

Carbon Monoxide – CO Methane – CH⁴ Oxygen – O₂ Nitrogen Dioxide-NO₂

- The Gas Instruments that are provided are constant testing for the concentrations of the four gases above. Team Members do NOT have to push any buttons or make any adjustments to the "gas instrument". ALL changes in the concentrations MUST be reported to the Incident Commander (Briefing Officer) and noted on his/her map.
- It should be noted, the mine in which the Underground Simulation is being conducted does not have a history of methane contamination.
- Upon first entering an area of known respiratory contamination, an apparatus check is required.

Specific Locations for air quality (gas concentration) checks and reporting to the Incident Commander (Briefing Officer) include:

- At the shaft (or portal/ramp) entrance
- After crossing a ventilation dam/barricade (in front of and behind the dam) if conditions appear to have changed
- Locations where victim/casualties are found
- First appearance of smoke
- Location of fire and after having it put out
- Entering a Refuge Chamber
- Any area where a ventilation change has occurred.
- Prior to energizing or de-energizing any equipment
- During initial exploration **air quality (gas concentration) checks must be taken at all openings to the area(s) to be explored and in all intersections encountered by the groups or team.**



Where possible during the Underground Simulation heat will be represented by an actual heated environment. If, during the Underground Simulation, the creation of an actual heated environment is not possible, the simulated conditions of "heat" will be indicated by displaying a symbol such as the following:



Upon entering an area of elevated ambient temperatures, a survey of climactic conditions must be taken via the following readings:

- Dry Bulb Temperature
- Wet Bulb Temperature
- Temperature readings are used determine the maximum allowable working time for Mine Rescue Teams according to the following chart which will be provided to each team:

		Dry Bulb Temp.													
p.		24	26	28	30	32	34	36	38	40	42	44	46	48	50
m	23	•	*	*	118	113	108	103	98	93	89	85	81	77	73
-	24	119	114	108	103	99	94	90	85	81	78	74	71	67	64
	25		99	95	90	86	82	78	75	71	68	65	62	59	56
т	26		87	83	79	75	72	68	65	62	59	56	54	51	49
1	27			72	69	66	63	60	57	54	52	49	47	45	43
b	28			63	60	57	55	52	50	47	45	43	41	39	37
1	29				53	50	48	45	43	41	39	38	36	34	32
"	30				46	44	42	40	38	36	34	33	32	30	30
	31					38	36	35	33	32	31	30	29	28	27
B	32					33	32	31	30	29	28	27	26	26	25
	33	200				1.000	29	28	27	27	26	25	24	23	23
t	34	1		1.0.0	1	1	27	26	25	24	23	23	22	22	22
e	35				1	1		24	23	22	22	22	21	20	20
vv	36							22	22	21	20	20	19	19	19
	37								20	19	19	19	19	19	
-1	38								19	19	19	19			
				M	line	Reso	cue l	Heat	Exp	osu	re St	tand	ard		

Cross-referencing the Wet Bulb and Dry Bulb temperatures indicates the maximum time exposure in minutes. Exposure limits include time for entry, exit and rest breaks.

Exposure limits must not be exceeded.

Where possible and appropriate for ventilation conditions, smoke will be represented by a simulated smoke or low-visibility environment. Smoke or low-visibility environments will be created by mechanically generated smoke to ensure consistent quality.









When Mine Rescue Teams are travelling in areas of low or zero visibility, teams must link or connect all members to ensure the safety of all members at all times. Linking or connecting in low visibility must notify all other team members if any team member becomes separated from the team or experiences duress. Teams may link or connect in low visibility in the following ways:

- While carrying the rescue basket, all members are considered linked or connected. If the Captain does not carry the rescue basket, the Captain must be fastened to the rescue basket by some other means.
- Through the use of a linking rope, lanyard, cord, elastic or other device by which all members are connected to one another. Teams may use the rope, lanyard, cord, elastic or other device that is utilized in their home jurisdiction.
- The act of active firefighting is considered a task as defined above.

Team Safety

- When traveling in or working in smoke or low-visibility environment the Captain must check the reserve of oxygen in breathing apparatuses of each rescuer, including his/her own, as well as their physical condition every 20 minutes.
- When traveling or working as three (3) two (2) person groups the groups shall stop and check the reserve of oxygen in breathing apparatuses of each rescuer, report the low gauge reading, and check the physical condition of each team member every 20 minutes.
- If the oxygen reserve in a breathing apparatus of any team member drops below 25% of the initial value, the team must report the situation to the Incident Commander (Briefing Officer) and determine the safest plan of action for returning to the Fresh Air Base.
- Rescuers must demonstrate a sense of urgency at all times, but are not permitted to run while they travel through the mine simulation.

Captain

- When arriving at an assigned worksite or destination, the Captain must provide feedback to the Incident Commander (Briefing Officer) and Assistant and Command Center Attendant, if used regarding findings and measurement results.
- Roof of explored workings should be visually checked in the following cases: at locations of fires prior to commencements of the fire extinguishing and after having it put out, at each crossing of the fire location, at rock falls, prior to erection of a dam (barricade), at the face end and prior to erection of props to strengthen roof support of the working. Locations of rock or ground issues must be marked on the maps. As the simulation is being conducted in a Simulated Underground Mine, where ground support has not been installed, the roof/back or top shall be considered competent by visual inspection unless otherwise shown by picture, illustration or mechanical means. These duties can be carried out by a member of the three (3), two (2) person groups exploring the mine.
- Captain should continuously supervise activities of all members of his team during the rescue jobs. When exploring in the 2 +2 + 2 Person Groups this can be accomplished thru the use of the provided Hand-Held Radios.









- Captain may participate in jobs assigned to the rescue team unless it restricts his abilities to look after safety of all the team members.
- When transportation of injured persons via already explored roads proves infeasible they may be evacuated through unexplored workings.
- When an injured person on a stretcher is hauled through a low passage it is essential to take extreme care of his/her safety.
- Upon completion of the task and arriving back to the rescue fresh air base the team Captain reports to the Incident Commander (Briefing Officer) and Assistant and Command Center Attendant, if used that the team is back and outlines how the task was completed with own comments and remarks.
- Only the team Captain may give the order to remove facemasks and request the team remove oxygen once back at the Fresh Air Base.

Communication:

Voice Communications will be achieved thru the use of Contest Provided Hand Held Radios:

- The rescue team, on its way to the location of assigned rescue jobs, during execution of such jobs, and on their way back, must attempt to remain in continuous voice communication with the Incident Commander (Briefing Officer) and Assistant and Commander Center Attendant, if used. In the event that communication capability is lost while advancing or retreating from the mine, the Mine Rescue Team must return to the last location of functioning voice communication to notify the Incident Commander (Briefing Officer) and Assistant and Command Center Attendant, if used. Mine Rescue Teams may proceed into areas containing no voice communication capability provided the Incident Commander (Briefing Officer) and Assistant and Command Center Attendant, if used are notified and a strict time limit for return to the communication point is established.
- When voice communication is interrupted because of a known issue, Mine Rescue Teams should attempt to repair the system or seek permission to continue without voice communication.

Evaluation Criteria:

Equipment:

- Teams will **not** be evaluated on the pre-use testing (field test) of the primary Mine Rescue Team breathing apparatus (Draeger BG4 or Biomarine 240R). This is to ensure fairness for teams that do not use the BG4 within their home jurisdiction. All BG4 breathing apparatus provided to the team may be considered ready-to-wear, at which point teams may don the apparatus as instructed during orientation. In the interest of fairness, all teams are given the opportunity to begin under oxygen on a level playing field, after which time how they perform in the emergency scenario will determine how they are scored.
- Teams will **not** be evaluated on the post-use service (cleaning & function test) of the primary Mine Rescue breathing apparatus (Draeger BG4 or Biomarine 240R). This is to ensure fairness for teams that do not use the BG4 or Biomarine 240R within their home jurisdiction. All cleaning and service of Draeger BG4 breathing apparatus will be supervised by Draeger personnel.









Tasks:

- Competitors (Mine Rescue Team Members) are encouraged to carry out tasks as safely, efficiently and quickly as they normally would during an actual mine emergency in their home jurisdiction. However, because all tasks are being evaluated for completion or quality, competitors must ensure their activities can be viewed clearly by either an in-person Judge or monitoring camera, or that their work can be inspected once the team has left the task area. As often as possible, verbal communication of tasks between Competitors and Judges will not be required or encouraged to remove any disadvantage to non-English speaking teams.
- Simulation Judges will follow the team's progress on the floor and will be responsible for judging proper team procedures.
- Judges will remain in fresh air where possible and, if not, will be provided with an assured supply of fresh air. Use of thermal imaging cameras for evaluation can be used where conditions allow.
- The underground simulation will be laid out in such a way that teams will be able to navigate through the scenario with little to no assistance from the Judges.
- Unlike previous International Mines Rescue Competitions, where possible the "completion" or tasks will be determined by the Mine Rescue Team rather than a Judge. Teams must balance the efficient and timely completion of a task with the quality required to achieve the goal, as they will be evaluated on both aspects. For example, if an object must be lifted off of a pinned casualty/victim, the Mine Rescue Team may choose to lift only the minimum height required to scrape the person from underneath without supporting or stabilizing the load. This may appear to save time, however the Mine Rescue Team will be evaluated as having done poorly with respect to safety, casualty care and task planning.

Underground Time Limits:

- The underground simulation will have a time limit determined by the Chief Judge and Lead Underground Simulation Judge.
- Teams will be advised of the time limit prior to simulation.
- Teams will be advised to get out of oxygen once the time limit has expired, identifying the end of the problem.
- Once the team is directed to get out of oxygen, the team will not qualify for any potential remaining merit points available in the simulation.
- The pre-determined time limit will be established to allow teams more than sufficient time to complete the entire problem or task, should they fully understand their objectives and work towards achieving them. It is important to note, the time limit is not intended to be utilized as in previous International Competitions to stop teams from completing the task. The time limit is reserved as a last resort by the Simulation Lead Judge to remove a competing team from the field where they have clearly demonstrated a lack of progress towards the task specific goals. This must be done to ensure the continuation of the competition for remaining teams.

Scoring:

The Underground Simulation will be judged using a merit system with "0" being assigned to a task that is not done or skipped. Merits will range between 0-3 depending on the difficulty of the task. Scoring of each task will be done by more than one Simulation Judge independently. Following the team moving to the next task, Simulation Judges will create a consensus score based on their observations.









Where no specific mandatory procedure or guideline for a task is provided in advance of the event, teams are encouraged to use the most safe and effective procedure known to them to complete the challenge. Simulation Judges will reward or penalize teams based on the relative safety and effectiveness of each task. In the event of a scored tie in the Underground Mine Rescue Scenario, the team with the faster completion time (working time) for Underground Mine Rescue Scenario will break a tie.

• Judges Instructions:

- Scoring:
 - 0 = not done
 - 1 = poor attempt
 - 2 = needs improvement
 - 3 = excellent meets all requirements

Every line must be scored.

- A score of 0, 1 or 2 must be explained by the scoring Judges, or the Chief Judge may reinstate the points due to lack of justification.
- When a score of 3 is applied, comments are encouraged.
- If a team runs out of time, a score of 0 will apply to remaining actions.
- In the event of a scored tie in the Underground Mine Rescue Scenario the Team with the faster completion time (working time) for Underground Mine Rescue Scenario will break a tie

See additional scoring rules in" Mine Rescue Exploration Rules Governing IMRC2020".

Completion:

The problem will be considered completed when the Control Group (Judges interacting with Incident Commander (Briefing Officer) and Assistant and Command Center Attendant, if used instruct the Incident Commander (Briefing Officer) and Assistant and Command Center Attendant, if used that the task has been completed. This may occur at any stage of the simulated emergency, regardless of overall completion, as dictated by the conditions and timeline.









Pictures of equipment that may or may not be used during the Underground Mine Rescue Scenario:

SHUTTLE CAR

DIESEL POWERED MANTRIP











ROOF BOLTING MACHINE



BATTERY POWERED SCOOP











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DIESEL POWERED "MINI-TRAC"

"WHEEL CHOCKS" USED TO SECURE MOBILE EQUIPMENT











"WHEEL CHOCKS" USED TO SECURE MOBILE EQUIPMENT



"MINE PHONE" USED FOR UNDERGROUND COMMUNICATIONS



VENTILATION CONTROL WITH MANDOOR











NUMBERED PAPER "SPAD" AS REFERRED TO ON PAGE 33, SECTION 5



MANNEQUIN











"Lights On" Gas Trainer used to transmit gas reading to the Teams during the Mine Rescue Scenario



Masimo RAD-57 Handheld Pulse/Oximeter











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IWT RADIO



DRAGER THERMAL IMAGER











Drager CAREvent DRA



ROOF FALL or IMPASSABLE CAVED AREA











OCENCO EBA 6.5 SELF RESCUER INTACT AND OPENED



CSE SRLD SELF RESCUER











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"USED" CSE SRLD SELF RESCUER



OCENCO M20 SELF RESCUER



"USED" OCENCO M20 SELF RESCUER











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SUPPLEMENTAL ROOF SUPPORT (TIMBER, POST, PROP)





VENTILATION CONTROL (CURTAIN) INTACT













VENTILATION CONTROL (CURTAIN) NOT INTACT

VENTILATION CONTROL (WOODEN DOOR) INTACT













VENTILATION CONTROL (WOODEN DOOR) NOT INTACT

VENTILATION CONTROL (METAL ROLL UP DOOR) INTACT











VENTILATION CONTROL (METAL ROLL UP DOOR) NOT INTACT



TEMPORARY STOPPING TO BE USED TO CONSTRUCT AN AIRLOCK











TEMPORARY STOPPING TO BE USED TO CONSTRUCT AN AIRLOCK WITH ARROWS POINTING TO THE ATTACHMENT CLIPS

ATTACHMENT CLIP





VENTILATION SHAFT WITH EXHAUST FAN AND FAN OPERATING SWITCH













ACCESS SLOPE TO UPPER MINE



SELF RESCUER CACHE











SECTION 4

Firefighting Scenario:

Format:

General:

The Firefighting Scenario is mandatory for all teams participating in the 2020 IMRC Overall team competition. Task will be carried out in at the Burn Pad and Fire Tunnel.

The Firefighting Scenario will involve the extinguishing of a live fire in an enclosed area

Location:

Burn Pad and Fire Tunnel at the National Mine Academy (Coordinates: N 37⁰ 46.7176', W 081⁰ 07.2980) Photographs and video are available to teams for reference on the Competition Page of www.IMRC2020.com Burn Pad and Fire Tunnel photos / video will be provided for simple visual familiarization purposes no later than 1 month prior to the competition.

Team Safety is a priority: Running while at the Burn Pad will not be tolerated. The team will be given a warning by the Judge(s) if they are running. The timing device will remain running while the warning is given.

BURN PAD











BURN TUNNEL



,,

Equipment

General:

Rescue teams will be supplied with identical rescue equipment Any pre-use test checklists (field tests) and procedures will be provided no later than 1 month in advance of the competition

Minimum Equipment Required:

- SCBA (Drager PSS-3000 (IMRC provided)
- Nomex or FR rated coveralls
- Nomex Hood (IMRC provided)
- Firefighting Gloves (IMRC provided)
- Personal protective equipment as outlined in the "Rules Governing IMRC 2020"











DRAGER PSS 3000:

Firefighting Equipment

- Mine Rescue Teams will be supplied with identical firefighting equipment.
- Firefighting equipment will be available for viewing prior to the competition.
- Extinguishing Agents: Use of mine water / in-line foam solutions where applicable
- Fire hoses will be no longer than 50' each
- Gaited Wye's or "fire tap hook ups" will be provided and identified for use where applicable.

Low-Medium Expansion Foam Generator

- TFT New Force PRO/pak
- <u>https://www.tft.com/TaskForceTips/media/Resource-Library/LIU-030_Rev09.pdf</u>











Firefighting Nozzle

- TFT Dual-Force Automatic Nozzle (with grip)
- <u>https://www.tft.com/TaskForceTips/media/Resource-Library/lin-035_rev16.pdf</u>











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Firefighting Hose

- 50 foot with 1-1/2" NH* Couplers Brass/Pyrolite
- NH National Hose Thread (also known as NH and NST), washer seal



Remote Water Monitors

- TFT Blitzfire with Max-Force Adjustable Nozzle
- <u>http://legacy.tft.com/literature/library/files/lix-630_rev09.pdf</u>











Thermal Imaging Camera

• http://www.draeger.com/sites/enus_ca/Pages/Fire-Services/Draeger-UCF-7000-



Technical Standards:

General:

- Any scenario and associated evaluation will derive core principles from the following reference material:
- Mine Rescue Team members (competitors) will not be directly exposed to the proximity hazards of a direct fire attack. The minimum safe distance from the live fire scenarios will be established by preinstalled barriers or signage. As such, Mine Rescue Team members (competitors) will not require personal protective equipment to the standard of structural firefighting and proximity fire fighting.
- NFPA 1851 protective ensembles are not required.
- The minimum standard for personal protective coveralls to be worn by Mine Rescue Team members (competitors) is NFPA 2113: Standard On Selection, Care, Use, and Maintenance of Flame-Resistant Garments for Protection of Industrial Personnel Against Short-Duration Thermal Exposures.

Team Procedures:

General:

- Each participating team shall be made up of six (6) rescuers who will be wearing breathing apparatus while working, as well as one Incident Commander (Briefing Officer) and one Assistant Incident Commander who will be stationed on surface at the Fresh Air Base.
- The team members participating must be registered before leaving isolation.
- Mine Rescue Teams will not be allowed to possess reference material after they leave the isolation area.

The scope of tasks that must be completed during the simulation include:

- Team preparation and donning of the breathing apparatuses.
- Team preparation of auxiliary, rescue and firefighting equipment to be taken to the fire site
- Establish the team's assignment, which may include but are not limited to the four main priorities of mine rescue and recovery work, both fire and non-fire:









Priorities During an Emergency:

- 1. Ensure the safety of all Mine Rescue Team members at all times in all situations.
- 2. Ensure the safety and safe evacuation of known Casualties (victim / injured persons).
- 3. Fight and eliminate all known fire and combustion related hazards in the scenario.

Captain:

During the simulation the team Captain's role is:

- Supervise and direct while maintaining care and control of all Mine Rescue Team members at all times
- Assess each situation, develop a plan of action independently, or where necessary in consultation with the Incident Commander (Briefing Officer)
- Identify and determine the priorities for Mine Rescue Team members
- Provide direction to other team members

Location Reporting:

• Mine Rescue Teams must, at all times, be assigned a target destination/task and time limit by the Incident Commander (Briefing Officer) and Assistant. The next report to the Incident Commander (Briefing Officer) and Assistant must come from the assigned destination or following completion of the assigned task.

Casualties (Victims / Injured Persons):

• There will be no requirement to perform First Aid or casualty care during the Firefighting Scenario.

Maps / Plans:

- Only information related to the emergency must be noted on the maps / plans.
- Any infrastructure, including but not limited to compressed air, water, radio, ground support and ventilation that is functioning normally, does not need to be noted on maps / plans.
- Any infrastructure, including but not limited to compressed air, water, radio, ground support and ventilation that has been damaged, altered, disrupted or destroyed due to the emergency, must be noted on the maps / plans.

Hazards:

- Any hazard to the safety of the Mine Rescue Team that is encountered at the site must be eliminated and reported to the Incident Commander (Briefing Officer) and Assistant prior to proceeding past the hazard. Preventing exposure of the Mine Rescue Team to a life threatening hazard takes first priority over any other tasks. Hazards include, but are not limited to:
- Explosive concentrations of gas
- Live fire
- Electrical hazard
- Flooding









- Unsafe/unsecured equipment
- Operating machinery
- Note: Contaminated ventilation is **not** considered a life threatening hazard to those wearing an oxygen breathing apparatus.

If at any time the Simulation Lead Judge feels that a team member's safety may be compromised, the action will be stopped and re-direct negative (penalty) points will apply.

• Proper firefighting techniques must be used when in proximity to combustion generated heat. At no point in time may a team expose members directly to heat without protection (wide pattern water fog heat barrier, physical obstacle, etc). This rule applies while advancing or retreating from a live fire or heating situation.

Fire Fighting Time Limits

- The firefighting simulation will have a time limit determined by the Chief Judge and Firefighting Lead Simulation Judge.
- Teams will be advised of the time limit prior to simulation.
- Event will be timed from the initial report of fire observation to the final extinguishment task (if multiple tasks take place).
- Teams will be advised to return to surface once the time limit has expired, identifying the end of the problem.
- Once the team is directed to get out of oxygen, the team will not qualify for any potential remaining points available in this simulation.
- The pre-determined time limit will be established to allow teams more than sufficient time to complete the entire problem or task, should they fully understand their objectives and work towards achieving them. It is important to note, the time limit is not intended to be utilized as in previous International Competitions to stop teams from completing the task. The time limit is reserved as a last resort by the Simulation Lead Judge to remove a competing team from the field where they have clearly demonstrated a lack of progress towards the task specific goals. This must be done to ensure the continuation of the competition for remaining teams.

Fire Fighting Skills IMRC 2020

This document is intended to serve as a guideline to prepare participants for the proper use of the advanced fire protection equipment provided, as well as basic firefighting techniques, and not a set of "rules" to govern the firefighting component of the IMRC 2020. The components of the firefighting portion of the IMRC 2020 will be a fire hose and nozzle management course set up on the upper burn pad, and the live fire component which will be carried out in the burn tunnel on the lower fire grounds. Each team will begin on the upper fire pad and finish in the burn tunnel. Time will begin after the team is under air at the designated starting point, at the upper burn pad area, and stop after the fire is extinguished in the burn tunnel. Judges will be evaluating key aspects of firefighting skills. These include: fire hose hook up, fire hose lays, fire hose line management, nozzle management, and remote monitor set-up.









Fire Hose Hook Up Procedures

- Flush each hydrant that is going to be used for firefighting by opening the valve provided on it and allowing water to flow freely.
- For the IMRC 2020, teams will be working off of gaited wyes for hydrants, and a team member will be required to remain at the hydrant until all hoses necessary are established for safety and control.
- Flushing the hydrant reveals that you have water to that point and removes debris and scaling so it doesn't find its way to the equipment being used at the end of the hose lay and become an obstruction.
- For the IMRC 2020, there will be no need for pressure reduction at the hydrant, so no pressure reducing devices will going to be required to be installed.
- Fire hose will be installed directly to the hydrants provided and will be hand tight without use of spanner wrenches.

Hose Lay Establishment

- After the appropriate length of hose lay is established, the entire lay may be flushed at this point. This is best and most efficient. Flushing individual joints as you go is redundant and time consuming.
- Flushing a hose lay is another measure to remove any and all debris and potential obstructions before any equipment is installed at the end of it.
- A team member must secure the open end of the hose during the flushing process to eliminate hazards associated with hose whip.
- A proper length of hose lay is made up of one to multiple joints of fire hose, extending far enough to be effective in completing the firefighting objective.
- It takes roughly 3 to 5 seconds to flush approximately 100 feet of 1 ¹/₂" fire hose, at 100 psi and 100 GPM. These pressures and flows will be maintained to that capacity during the components.
- For the IMRC 2020, 50 foot joints, or sections, of fire hose will be provided.
- When establishing a hose lay, couplings must be hand tightened without the use of spanner wrenches. These wrenches are not necessary and fittings can be over tightened. This is a problem when a nozzle, or other piece of equipment, becomes inoperable due to clogging and one has to break the fittings loose to relieve static pressure to clear the equipment. This is also very dangerous. Never overtighten fittings!

Fire Hose and Nozzle Management

- For the IMRC 2020, two fire hose lays will be used for each component.
- Teams will split up equally on two separate hose lays after nozzles are installed and flushed.









- The Briefing Officer will designate positions on each hose, for a nozzle man, back up man, and trailing man.
- The fire hose teams will maintain an arm's length spacing at all times, and keep the hose level and straight. This will permit the bracing of one another with a free hand if necessary, while maintaining control of the hose with the other hand. Keeping the hose level and straight will equally distribute the force from "push back" due to pressure and closed stream patterns. The more closed the stream pattern, the more "push back" a hose team experiences.
- The nozzle person should never engage in the act of "pulling" during the advancing of a fire hose, which is the duty of each back-up person. The nozzle person dictates the terms of advancement and may verbally prompt the group in preparation by simply calling out, "ready" then "advance".
- The nozzle person shall dictate stream patterns and flows. This is accomplished by regulating flow with the "bail," or shut-off handle, and manipulating the adjustable end of the nozzle. Please refer to the information provided on TFT Automatic Nozzles.
- Always open the flow to the nozzle slowly and deliberately. This is a safety measure for proper control and fire fighter safety, and to protect the equipment from the damage potentially caused by a sudden rush of water creating a fluid hammer effect.
- The upper burn pad component at the IMRC 2020 will require moving an object with water through a designed course. The more closed a stream pattern is, the more force from pressure exerted, with less control in moving the object through the prescribed course. The more open the stream pattern, the less force and pressure exerted, the easier it is to control movement of the object through the prescribed course.
- Dual fire hose attacks in the burn tunnel, and on live fire in general, requires the nozzle persons to be even and in the same stream patterns.

Loss of Water on Fire Hose during Dual Attack on Live Fire

- The burn tunnel component of the IMRC 2020 will require two independent hoses working together to extinguish a propane fueled fire.
- All persons on each fire hose will be required to position themselves on the inside of the hoses. This is a fire fighter safety technique that permits the "closing of ranks," or falling together if the need arises for protection if one of the fire hoses loses water flow and or pressure. It also allows two hoses to function independently by team members "shouldering in" in more confined walkways during nozzle attacks.
- If one fire hose were to lose water flow and/or pressure, the trailing person on that particular hose is to immediately fall back, looking for kinks and contributing causes. They are closest in proximity to the source.
- Immediately, the fire hose that still has pressure and flow shall adjust the nozzle to the "fullfog," or protection pattern. Immediately, members on the hose that has lost water pressure and flow will maintain control of their inactive fire hose. The nozzle person on that hose must shut









off the nozzle in case flow is resumed so as not to lose control, then fall in directly behind each person on the active fire hose.

- After this is accomplished, the entire group will begin retreat to a safe distance.
- This is to protect the group, especially if both fire hoses are operating from the same source and it is a supply issue. Generally, sloppy hose lays provide the potential for "kinks" to occur as fire hose is being advanced.
- It is best to keep all of the "slack", or excess hose neat and orderly. This can be accomplished by creating even loop lengths and keeping all loops "open." Therefore when the hose is advanced and it comes to that point, the hose is not pulling across itself and closing the loop to the point that it may not flop over. Often times with lower pressure and flows, hoses pulling across themselves will "kink," or pinch themselves off, and we either lose all flow, or lessen the flow substantially. This is a danger to fire fighter safety when in close proximity to a live fire.
- If all is well and water flow with adequate pressure is re-established, then the teams may carry on and proceed with their attack of the live fire.

Establishing Remote Water Monitors and Stationary Fire Protection Equipment

- The live fire portion in the burn tunnel at IMRC 2020 will require the proper installation of a remote water monitor at a designated location in proximity to the live fire. Remote water monitors can free up "hands" of fire fighters so they may carry out other tasks, which is a benefit if personnel were limited. They can also be used in more hazardous areas to protect against prolonged exposure associated with fire fighters being committed to "hand held" equipment.
- The remote monitor that will be used during the IMRC 2020 will be properly equipped to accept two separate fire hoses. Please refer to the information provided on the TFT Blitzfire.
- To install a remote water monitor properly, as they are generally used inby and possibly in returns if hazards and threats to the life and safety of team members are minimal, and providing that heat permits us to even be there, it is recommended that two separate attack hoses are utilized.
- The protection, or full-fog pattern is utilized to absorb hot gases in the immediate area, making it safer and more tolerable for team members.
- Once both hose lines are in the protection pattern at the point that the monitor is to be established, we will need to free up hands to do so.
- At the IMRC 2020 live fire component in the burn tunnel, the trailing person on each hose will be required to fall back to gather the Blitzfire and hose clamp, while maintaining hand contact with their respective hose line. Teams will not be tethered, so their respective fire hose will act as their lifeline, due to being in theatrical smoke.







- Once the equipment is then brought to the area of installation, the team member bringing the Blitzfire will commence to placing it appropriately. Please refer to the information provided concerning the TFT Blitzfire.
- As the Blitzfire is being set up, the team member with the hose clamp will prepare to clamp off, or pinch off, one of the hose lines approximately six to eight feet behind the nozzle. Remember, both hose lines will still be flowing in the protection patterns and controlled by the other team members.
- After the Blitzfire and hose clamp are in place, the hose that is to be clamped off will start to slowly shut down their nozzle. By doing this slowly, it will allow for determining that the single hose still flowing in the protection pattern in fact has control of the fire. You cannot just abruptly clamp of one of the hoses and assume that one flowing line will be adequate.
- Once it is determined that the single line flowing has control of the fire, then the other hose line can be clamped. Please, refer to information concerning the use of hose clamps.
- At this point, there will be static pressure between the clamp and the nozzle, so the nozzle must be reopened to relieve that pressure.
- After pressure is relieved, the nozzle person will remove the nozzle and hand the open ended fitting to the team member that set up the Blitzfire. The nozzle person must keep control of the free nozzle and bring it to fresh air to be accounted for after the fire is deemed extinguished.
- The team member that set up the Blitzfire will then commence to hooking up, or installing the clamped off hose to the gaited wye inlet on the monitor. Once it is installed, the Blitzfire can be charged by unclamping, opening the appropriate handle on the wye, and opening the "bail", or flow handle on the monitor.
- Once water is flowing through the Blitzfire, it should then be set to the protection, or fullfog pattern, because team members on the other hose that was being used for protection will now commence to repeating the same process of shutting down slowly, clamping, removing the nozzle, and installing hose to the other port on the wye of the monitor.
- It is important to note that at no time will any team member be permitted to work on any task without being behind the flowing water of the protection pattern.
- Once both lines are installed and flowing to the Blitzfire, it must be adjusted to a firefighting pattern, and the proximity to the live fire will dictate the degree of the open stream pattern established. Judges will be present to determine that the pattern selected is adequate for the safety of all.
- Once the Blitzfire is set to an adequate firefighting pattern, the judges will deem the fire to be extinguished, and all team members must maintain hand contact with the hose and retreat to fresh air. The team members that were on the nozzles must bring them out. The team member who used the hose clamp last will be responsible to bring it out also. There will be a designated area to place this equipment.







• Once all team members are at the designated fresh air area and equipment is accounted for, the clock will stop and the firefighting challenge will be complete.



• Upon entering an area of elevated ambient temperatures, a survey of climactic conditions must be taken via the following readings:

o Dry Bulb Temperature o Wet Bulb Temperature

• Temperature readings are used determine the maximum allowable working time for Mine Rescue Teams according to the following chart which will be provided to each team:

						1	Dry B	ulb T	emp						
		24	26	28	30	32	34	36	38	40	42	44	46	48	50
"	23	•	•	*	118	113	108	103	98	93	89	85	81	77	73
	24	119	114	108	103	99	94	90	85	81	78	74	71	67	64
	25		99	95	90	86	82	78	75	71	68	65	62	59	56
r	26		87	83	79	75	72	68	65	62	59	56	54	51	49
l	27			72	69	66	63	60	57	54	52	49	47	45	43
>	28			63	60	57	55	52	50	47	45	43	41	39	37
1	29				53	50	48	45	43	41	39	38	36	34	32
	30				46	44	42	40	38	36	34	33	32	30	30
	31					38	36	35	33	32	31	30	29	28	27
3	32					33	32	31	30	29	28	27	26	26	25
	33				·	1	29	28	27	27	26	25	24	23	23
:	34					-	27	26	25	24	23	23	22	22	22
1	35							24	23	22	22	22	21	20	20
	36							22	22	21	20	20	19	19	19
	37								20	19	19	19	19	19	
T	38					1			19	19	19	19			
				M	line	Reso	cue l	Heat	Exp	osu	re St	tand	lard		

Cross-referencing the Wet Bulb and Dry Bulb temperatures indicates the maximum time exposure in minutes. Exposure limits include time for entry, exit and rest breaks. Exposure limits must not be exceeded.









- Where possible and appropriate for ventilation conditions, smoke will be represented by an actual smoke or low-visibility environment. Smoke or low-visibility environments will be created by mechanically generated smoke to ensure consistent quality.
- When Mine Rescue Teams are travelling in areas of low or zero visibility, teams must link or connect all members to ensure the safety of all members at all times. Linking or connecting in low visibility must notify all other team members if any team member becomes separated from the team or experiences duress. Teams may link or connect in low visibility in the following ways:
- Through the use of a linking rope, lanyard, cord, elastic or other device by which all members are connected to one another. Teams may use the rope, lanyard, cord, elastic or other device that is utilized in their home jurisdiction.
- Teams are not considered linked or connected while holding a rescue basket that is being transported by a rolling cart or vehicle.
- Teams may disconnect from one another when performing a task (eg. building a ventilation barricade) at a fixed location but must be linked when advancing or returning as a team.
- The act of active firefighting is considered a task as defined above.

Team Safety:

- Every 20 minutes the team should stop and the Captain must check the reserve of oxygen in breathing apparatuses of each rescuer, including his/her own, as well as their physical condition.
- If the oxygen reserve in a breathing apparatus of any team member drops below 25% of the initial value, the Captain must report the situation to the Incident Commander (Briefing Officer) and determine the safest plan of action for returning to the Fresh Air Base
- Captain must assist team members in the check of their face mask seal initially upon donning the breathing apparatus and must re-check after travel through confined spaces or ladderways.
- Rescuers must demonstrate a sense of urgency at all times, but are not permitted to run while they travel through the mine simulation

Evaluation Criteria:

General:

- There will be a minimum of two Simulation Judges per competing team
- Simulation Judges will be competent in the judging of firefighting simulations
- Simulation Judges will keep accurate start and finish times on the score cards
- The Firefighting Simulation Lead Judge will ensure the firefighting simulation is reset in an identical manner for each team
- Judges will remain in fresh air where possible, or alternatively will be provided with an assured supply of fresh air or self-contained breathing apparatus. Use of thermal imaging cameras by Simulation Judges for evaluation will occur in low visibility areas.
- •

Equipment:

• Teams will **not** be evaluated on the pre-use testing (field test) of the primary Mine Rescue Team breathing apparatus (Draeger PSS-3000). This is to ensure fairness for teams that do not use the









(Draeger PSS-3000) within their home jurisdiction. All (Draeger PSS-3000) breathing apparatus provided to the team may be considered ready-to-wear, at which point teams may don the apparatus as instructed during orientation. In the interest of fairness, all teams are given the opportunity to begin under oxygen on a level playing field, after which time how they perform in the emergency scenario will determine how they are scored.

• Teams will **not** be evaluated on the post-use service (cleaning & function test) of the primary Mine Rescue breathing apparatus (Draeger PSS-3000). This is to ensure fairness for teams that do not use the (Draeger PSS-3000) within their home jurisdiction. All cleaning and service of (Draeger PSS-3000) breathing apparatus will be done by WVU personnel.

Tasks:

- Competitors (Mine Rescue Team Members) are encouraged to carry out tasks as safely, efficiently and quickly as they normally would during an actual mine emergency in their home jurisdiction. However, because all tasks are being evaluated for completion or quality, competitors must ensure their activities can be viewed clearly by either an in-person Judge or monitoring camera, or that their work can be inspected once the team has left the task area. As often as possible, verbal communication of tasks between Competitors and Judges will not be required or encouraged to remove any disadvantage to non-English speaking teams.
- Simulation Judges will follow the team's progress on the floor and will be responsible for judging proper team procedures.
- Judges will remain in fresh air where possible and if not will be provided with an assured supply of fresh air. Use of thermal imaging cameras for evaluation can be used where conditions allow.
- The Firefighting Scenario will be laid out in such a way that teams will be able to navigate through the scenario with little to no assistance from the Judges.

Incident Commander (Briefing Officer) and Assistant:

- The Incident Commander (Briefing Officer) and Assistant Simulation Judges will take the Incident Commander (Briefing Officer) and Assistant into a separate room during the time the pre-use equipment testing by the respective team is being performed. Mine plans and a copy of a narrative (record of events that have taken place up to that point) will be made available to the Incident Commander (Briefing Officer) and Assistant. The Incident Commander (Briefing Officer) and Assistant may ask any question of the judge, and any reasonable question will be answered, but a sense of urgency must prevail.
- Care must be taken that the judge remains available for these questions for exactly the same length of time in each case. Sufficient time will then be allowed for the Incident Commander (Briefing Officer) and Assistant to study the mine plans and the narrative.
- The Incident Commander (Briefing Officer) and Assistant will be responsible for detailing the proposed assignment for the Mine Rescue Team being deployed. The proposed assignment will then be evaluated before presentation to the Mine Rescue Team.
- The Incident Commander (Briefing Officer) and Assistant Simulation Judges will then present detailed (complete or partial) written instructions to the Incident Commander (Briefing Officer) and Assistant,








outlining the mandatory team assignment. This is done to ensure that each team begins the task with the same information so that they may be equally judged from that point forward. The Incident Commander (Briefing Officer), and Assistant, and Judges will discuss these instructions to be sure the Incident Commander (Briefing Officer) understands them and the reasoning behind them. Any differences between the Incident Commander (Briefing Officer) and Assistant plan and mandatory task plan will result in a penalty being applied to the overall scoring.

• The Technical Mining Translator that attends the competition with each team will be stationed with the Incident Commander (Briefing Officer) and Assistant at all times. The Translator will be responsible for translating all discussion between the Incident Commander (Briefing Officer) and Assistant, Judges and radio communication.

Scoring:

- The Firefighting Scenario will be judged using a merit point system with teams receiving points for each task that is completed or partially completed
- Scoring of each task will be done by more than one Simulation Judge independently, each from differing Mine Rescue jurisdictions. Following the team moving to the next task, Simulation Judges will create a consensus score based on their observations.
- Where no specific mandatory procedure or guideline for a task is provided in advance of the event teams are encouraged to use the most safe and effective procedure known to them to complete the challenge. Simulation Judges will reward or penalize teams based on the relative safety and effectiveness of each task.
- In the event of a scored tie in the Firefighting Simulation Task the Mine Rescue Team with the faster completion time for all combined related tasks will break a tie
- See additional scoring rules in the "Rules Governing IMRC2020"
- Judges Instructions:
 - Scoring:
 - 0 = not done
 - 1 = poor attempt
 - 2 = needs improvement
 - 3 = excellent meets all requirements

Every line must be scored.

- A score of 0, 1 or 2 must be explained by the scoring Judges or the Chief Judge may reinstate the points due to lack of justification.
- When a score of 3 is applied, comments are encouraged
- If a team runs out of time a score of 0 will apply to remaining actions
- In the event of a scored tie in the Fire Fighting Scenario the Team with the faster completion time (working time) for Fire Fighting Scenario will break a tie









SECTION 5

First Aid Scenario:

Location:

Simulated Surface Mine at the National Mine Academy (Coordinates: N 37^0 46.7176', W 081^0 07.2980)

Photographs and/ video are available to teams for reference on the Competition Page of www.IMRC2020.com

Format:

General:

- Participation in the First Aid Simulation is mandatory.
- The 2020 International Mines Rescue First Aid Competition will be scenario based. The scenario will be a multiple patient/casualty/victim incident. It will take place on the surface at a mine site. The use of self-contained breathing apparatus will not be required.
- Mine Rescue first aid teams will be made up of seven team members. The team members participating must be registered before leaving isolation. A team Captain must be appointed. The team Captain can only verbally assist the team and cannot conduct any physical treatments on any patients.
- The Chief Judge and First Aid Simulation Lead Judge with the assistance of a committee will develop and set-up the simulation. Once developed, the simulation will be sent for medical review to ensure injuries, conditions and treatments are realistic.
- Simulation victims/casualties will be made up using casualty simulation art to show any injuries.
- Mannequins will represent patients with vital signs absent. CPR will be required immediately.
- The first aid simulation will be split into two parts:
 - 1. Providing first aid to people with various types of injuries and
 - 2. CPR with Automatic External Defibrillation and respiratory arrest requiring rescue breathing
- Any of the examples listed below may be incorporated in the simulation scenario:
- Casualty Management Unresponsive/Conscious, Adult Resuscitation, CPR A + AED, 2 Person CPR, Severe Bleeding, Medical Conditions, Wound Care, Burns, Eye Injuries, Chest Injuries, Multiple Casualty Management, Poisoning, Heat and Cold injuries, Rescue Carries, Bone and Joint Injuries. and Head and Spinal Injuries.
- The use of self-contained breathing apparatus will not be required.







Casualty Report may or may not be required to be completed by the Teams





Equipment:

General:

- Mine Rescue first aid teams will be supplied with identical first aid supplies and equipment.
- First aid supplies and equipment will be available for viewing prior to the competition.
- Any pre-use evaluation tests (field tests) and procedures required will be provided no later than 1 month in advance of the competition date.

Minimum Equipment Required:

Fully equipped First Aid Kit, rescue basket and spine board
Casualty (victim / injured person) rescue breathing apparatus
Personal protective equipment outlined in the "Rules Governing IMRC 2020"
is the responsibility of each team member.
BSI protection such as gloves, safety glasses, face shields or masks will be provided by the IMRC 2020.









MATERIALS LIST

Participants will not be required to furnish their own materials. 2020 IMRC will provide the following: Problems will be designed utilizing no more than the minimum material list. For contest purposes, all bandaging materials will be considered sterile. For contests purposes only four by four dressings need not be opened before use for treatment.

- 24 Triangular Bandages
- 6 Adhesive compresses
- 24 Sterile gauze, (4"x4") and/or 4" Compresses
- 6 Roller Bandages
- 3 Blankets
- 1 Scissors, EMT Utility
- 6 Pairs of Examination Gloves
- 2 Mask/face shields or masks and goggles combination meeting bloodborne pathogen

requirements

- 2 Heat Pack Simulated
- 4 Cold packs Simulated
- 2 Oval Eye Pads
- 1 Pen and paper set
- 1 Recording manikin (with device to print results of AV/CPR performed)
- 2 Barrier devices with one-way valve for performing AV/CPR
- 1 White bag (i.e. plastic garbage bag)
- 1 Compliment of splints (may be pre-padded but not assembled)
- 1 Long back board with straps (Aluminum, Wood, etc.)
- 2 Air splints (1 full arm and 1 full leg)
- 1 Adhesive Tape
- 1 Burn Sheet, Sterile (40" x 80" minimum)
- 1 Rigid Extrication Collar
- 4 Trauma Dressings (minimum of 10" X 30")
- 1 Eye Shield/Cup
- 1 Pen Light
- 4 Tourniquets
- 2 Towels
- 1 Pillow
- 4 Occlusive Dressing
- 2 Sticks, Wooden Dowels or equivalent
- 1 Watch/Timing Device
- 1 Headset (long spine board)
- 1 500 ml sterile water (for contest purposes expiration date not applicable)



International Mines Rescue Competition Since 1999





Compliment of Straps for Long Spine Board (buckle straps, spider straps, etc.) **Technical Standards:**

General:

The reference material being used to develop the scoresheets are as follows;

- Emergency Medical Responder (First on Scene) 10th Edition Le Baudour Bergeron
- Workbook for Medical Responder (First on Scene) 10th Edition Le Baudour Bergeron
- Basic Life Support, American Heart Association 2015 Basic Life Support Provider Manual (for copies <u>www.aha.channing-bete.com</u> or <u>www.laerdal.com</u>)
- All participating teams should use this reference material to prepare for the first aid competition.
- The minimum level of first aid training expected will be First Aid Training that is required by the jurisdiction that a Team is from or international equivalent.

Transparency and Fairness:

Teams that are trained by first aid providers other than Emergency Medical Responder (First on Scene) 10th Edition will not be at a disadvantage. With the goal of transparency and fairness Emergency Medical Responder (First on Scene) 10th Edition and American Heart Association Instructors are assisting in the development of the scenario. The treatment of all injuries will be reviewed by a medical professional.

Team Procedures, Roles, Responsibilities:

General:

Seven competing team members will be expected to:

- Conduct a scene assessment.
- Perform primary and secondary assessments.
- Provide ongoing patient care and transportation.

Team members will be expected to perform triage:

- To determine the patient's condition and the urgency of the patient's condition
- To assign a priority to the patient's treatment and prioritize transport to an appropriate receiving facility
- Team members will be expected to manage all injuries or illnesses found. "Load and Go" or equivalent methodology will not apply.

During the simulation the team Captain's role is:

- Assessing the situation and developing a plan of action
- Providing direction to other team members
- Identifying and determining priorities for treatment by team members









Evaluation Criteria:

General:

- There will be a minimum of two judges per patient. Judges will be competent in the judging of first aid application. Judges will keep accurate start and finish times on the score card. Judges will interview patients and examine the treatment patients received to determine their final scores.
- Rough handling, incomplete or poorly done treatment will be scored.
- First Aid Simulation Lead Judge will be responsible to ensure the first aid simulation is set up identically for each team.
- In the event of a tie, the team with the faster overall time to complete the simulation will break a tie. In the event of identical completion times, a determination will be made with respect to the quality of patient care as indicated by the volunteer victim/casualties.

Communication:

• Communication is essential when teams are assessing patients. To minimize language barriers team interpreters should be familiar with first aid terminology. Every effort will be made to evaluate a team's actions rather than spoken word.

Time Limits:

- The first aid simulation will have a time limit determined by the Chief Judge and First Aid Simulation Lead Judge. Teams will be advised of the time limit prior to the simulation. The clock will start when the first aid team receives a call requesting a response to a specific emergency.
- Teams will proceed to the scene as quickly as possible. The clock will stop when the first aid team has completed part 1 and 2 or the time limit has expired. First aid team members must stop when time is called.

Judges Instructions:

Scoring:

- 0 = not done
 - 1 = poor attempt
 - 2 = needs improvement
 - 3 = excellent meets all requirements

Every line must be scored.

- A score of 0, 1 or 2 must be explained by the scoring Judges or the Chief Judge may reinstate the points due to lack of justification.
- When a score of 3 is applied, comments are encouraged
- If a team runs out of time a score of 0 will apply to remaining actions









Rough Handling

- Rough handling negative (penalty) points will be deducted from the total score
- Judges can deduct 1 to 5 points per each patient
- Rough handling negative (penalty) points will have a maximum of 10 points
- Rough handling deductions must be explained by the judges

EQUIPMENT THAT MAY OR MAY NOT BE USED DURING THE FIRST AID SCENARIO



ZOLL MEDICAL AUTO PULSE

ZOLL MEDICAL AED PLUS









SECTION 6

Rope Rescue Scenario:

General:

The rope rescue task will be carried out off site at the Beckley Fire Department Station #3 training tower. This scenario will involve a scenario inside the tower and out of any unforeseen environmental elements.

Location:

Beckley Fire Department Station #3 (Coordinates: N 37° 48'34.7" W 81° 10'44.2")

Training tower, equipment photos and videos will be available for visual familiarization purposes no later than 1 month prior to the competition.

Team safety is a priority. At any point throughout the evolution if there is an unsafe act about to occur, the judges will stop the evolution and correct the unsafe act. The timing device will not be stopped during this time frame. Every team member must utilize fall protection within 10 feet of any edge or hole within the confines of the training tower.

Photographs and/ video are available to teams for reference on the Competition Page of www.IMRC2020.com

Training Tower











Rope Rescue



Equipment

General:

Rescue teams will be supplied with identical rescue equipment. Teams may use their own safety equipment but must be inspected by judges prior to the start of the evolution. Examples would include but are not limited to class III harnesses, rope rescue gloves, eye protection, fall protection, etc.

Minimum Equipment Required:

- Hard hat with suspension and chin strap
- Work gloves
- Eye protection
- Boots with steel toes
- Class III harness

All safety and rope rescue equipment will be provided with the exception of eye protection and boots.











Class III Harness

Rope Rescue Equipment:

- Mine Rescue Teams will be supplied with identical rope rescue equipment.
- Rope Rescue equipment will be available for viewing prior to the competition.
- All ropes will be no longer than 200' and $\frac{1}{2}$ inch diameter.
- Anchors will be available and identified to the team prior starting an evolution.









Locking Carabiners

- Auto Locking
- Two Stage locking
- General use rated



CMC MPD Control Decent Device

- Variable-friction descent control device for rescue systems and rappels
- Incorporates a high efficiency pulley with an integral rope-locking mechanism (ratchet) for a haul system
- Built-in becket allows cleaner rigging and more efficient pulley systems
- Allows main line and belay line rigging to be mirrored or twin-tensioned
- Functions as both a lowering brake and as a ratcheting pulley for raising
- Ideal for confined space operations because it converts rapidly to a retrieval line











Synthetic Fiber Rope 1/2 inch

- Kernmantle type design
- Block and creel construction
- 200 feet in length
- Rated for a two-person load (600 LBS)
- Static











1/2 inch Tubular Nylon Webbing (Varying Lengths)

- Must be looped and doubled at minimum for anchors
- Configured or tied in a manner to achieve over 10,000 LBS breaking Strength
- <u>https://www.cmcpro.com/one-inch-webbing-anchors-minimum-breaking-strength/</u>



Single Prusik Minding Pulley

- General use rated
- Swivel Omni Pulley











Double Prusik Minding Pulley

- General Use Rated
- Swivel Omni Pulley
- Not rated for loading single sheave (must have two ropes loaded to use)



Gibbs Cam Ascender

- Free running
- General use rated











Handled Ascenders

- Technical use rated
- Used for one person load only



Prusik Cords

- Two different lengths (must use tandem if catching or holding a load)
- Must be used in a general use rated configuration
- Pre-sewn and/or double fishermen











Stokes Basket with CMC quick patient tie in system

- Stainless steel
- Tie-in system for easy patient packaging











Tripod

• The Sked-Evac Tripod extends from 6' to 10' high at the anchors. It has three anchors to clip into. Each anchor is mounted high onto the header, all of which are anodized in red to identify them. The anchors, headers and legs are inter-connected to provide maximum strength. The header limits the distance the legs can spread. Each anchor is equally strong. The legs are adjustable in 5" increments. When at full extension this tripod allows you to bring the patient in a stretcher completely out of the hole. It is rated to handle an NFPA rescue load. Height adjustment positions are labeled every 5" from at the highest extension (5,280 lbf. 23.49 kN) to the lowest (9,500 lbf. 42.25 kN) setting. It utilizes a chain through the feet to provide greater strength and stability.











Technical Standards:

General:

• Any scenario and evaluation will derive core principles from the following reference material:

CMC Field Guide Application (Free Download)

Following sections include but are not limited to:

- Rope
- Equipment
- Anchor System
- High Anchor Points
- Belay Systems
- Lowering Systems
- M/A Systems
- Patient Packaging
- Litter Rigging

Team Procedure:

General:

- Each team participating shall be made up of (8) rescuers who will be wearing proper personal protection equipment (as defined in previous section) while inside the training tower. Also available will be one Incident Commander, one assistant Incident commander and two safety officers.
- The team members participating must be registered before leaving isolation.
- Mine Rescue Teams will not be allowed to possess reference material after they leave isolation.

Scope:

- Team preparation and donning of safety equipment and harnesses.
- Team preparation of rope rescue equipment, rigging, and patient packaging systems to be taken to the training tower.
- Establish team assignments which will include but are not limited to: hauling/lowering, belay, patient packaging, and edge attendant.

Priorities:

- The safety of all members in any situation at all times
- Evacuation and safety of known casualties
- Prevent further harm to known casualty while on rope rescue system









Captain:

During simulation the team Captain's role:

- Responsible for overall safety of each team member
- Responsible for maintaining control of each team member
- Assess the situation and develop a plan in consultation with the Incident Commander when necessary
- Provides clear and concise direction to each team member
- Determines and identifies priorities of each team member

Victims/Casualties

• No first aid or casualty care will be required; however, patient packaging may be required to transport injured patients to safety.

Location Reporting:

• Mine rescue teams must be assigned a target destination/task and time limit by the Incident Commander and Assistant. The next report to the Incident Commander must come from the assigned destination or following completion of the assigned task.

Hazards:

- Hazards to the safety of the Mine Rescue Team at the site must be eliminated and reported to the Incident Commander prior to proceeding. Safety takes priority over any other task. Hazards include, but are not limited to:
- Unsafe or damaged equipment
- Water of any quantity on rope rescue equipment
- Fire and or electrical hazards
- Machinery
- Members within 10 feet of any edges or holes without fall protection

At any time if any Judge or Safety Officer feels that a team member's safety may be compromised, the action will be stopped and penalty points will apply:

• Proper knots, rope rigging, and patient packaging must be used to ensure safe operations while suspended on rope rescue systems. At no point will any team members be suspended from ropes in any unsafe manner and not using proper ropes and knots as outlined in CMC Field Guild under section Rope Rescue Field Guide.

Rope Rescue Time Limits:

- The rope rescue evolution will have a time limit determined by the Chief Judge and Lead Simulation Judge
- Each team will be given the time prior to the simulation.









• The event will be timed from the initial report of injured victim until the last rescuer is hauled to safety and disconnected from the rope rescue system.

Rope Rescue Skills IMRC 2020

• This document is intended to serve as a guideline so the participants can prepare for the proper use of rope rescue systems, mechanical advantage systems, lowering systems, belay, anchors, and patient packaging. It is not intended to be used as a set of rules to govern the rope rescue component of the IMRC 2020. The components of the rope rescue portion of the IMRC 2020 will be building a lowering system, hauling system, belay line (for safety), and patient packaging which will be carried out in a training tower at the previously state coordinates. Time will start when the location of the injured victim is communicated to the participating Mine Rescue Team and stopped when all victim(s) and rescuers are hauled to safety. Judges will be evaluating key aspects of the rope rescue skills.

Anchors

- For the IMRC 2020, anchors will be established and utilized by the Mine Rescue Team. If no suitable anchors can be established within the specified radius, a tripod will be available to establish a temporary anchor.
- The anchors will be utilized in a manner where the safety factor never falls below a safety factor of 10:1.
- Any software attached to an anchor must be done in a manner that it can take a force of no less than 9000 LBS.
- At any time if more than one anchor is needed to attach any type system to said anchor, then a load sharing self-equalizing knot must be applied.
- If ¹/₂ inch tubular webbing is used at an anchor, the webbing shall be a least looped and doubled for added safety.

Lowering Systems

- Some rescue teams use single rope technique (SRT) for single-person loads—climbers use single rope technique exclusively. A single rope is more than adequate to maintain a good <u>safety factor</u> and single rope technique adds safety through simplicity (i.e., it requires half the rigging), but SRT does not pass the "<u>critical point</u>" (aka scissors) test.
- If one rope is used to lower rescuers or victims it is required a belay line be a second means of safety and an attendant must tend the belay line while any personnel are on the ropes.
- Double rope technique (DRT) is the most common method of supporting rescue loads (i.e., raising or lowering two people). One rescuer normally controls the descent of the load and a second rescuer belays the load with the goal of catching it should the main line fail (an almost unheard of occurrence). The resulting two-rope system clearly passes both the "critical point test" and the "whistle test."
- The rescuer lowering the load uses a descent control device. The belayer uses <u>tandem Prusiks</u> or a device that is designed to catch a rescue load. It is important that the belayer minimizes slack in the belay line to avoid a <u>shock load</u> in the event the main line fails.









• Note that some descent control devices (e.g., CMC's MPD) are designed to catch the load if the rescuer lets go of the rope.

Mechanical Advantage System/ Haul System

- In most cases, raising a rescuer and/or patient is a last resort, because overcoming gravity requires significantly more effort than <u>lowering</u>. That said, there certainly are times when raising is a better choice than lowering. These include when raising the load a short distance will avoid a very long lower, when your ropes aren't long enough to reach a safe landing, when there are additional hazards below, when the only egress is above you, when communication will be difficult, etc.
- The term "mechanical advantage" is a measurement of how much your rope and pulley system will leverage the force that you put into them. For example, without mechanical advantage you would need to pull 100 kg to raise a 100 kg load. That is "1:1" mechanical advantage (pronounced "one-to-one"), because for each unit of force you put into it you will get the same amount of force out.
- However, in a "3:1" mechanical advantage system, for each one unit of force you put into it (e.g., one pound or one kilogram), you will get three times that amount of force out of the system. A 3:1 system will let you raise a 100 kg load by pulling 33.3 kg. (You would actually need to pull a little more than one-third due to <u>friction</u>.)
- RopeRescueTraining.com provides details on <u>1:1</u>, <u>2:1</u>, <u>3:1</u>, <u>4:1</u>, <u>5:1</u>, <u>6:1</u>, and <u>9:1</u> systems, although the most common systems used by rescuers are <u>1:1</u>, <u>3:1</u>, <u>5:1</u>, and occasionally <u>9:1</u>.

Team Safety:

- Prior to any team member loading a lowering or haul system, a safety check will be required by the team Captain to ensure the system is safe. During the safety check every carabiner in the system will be observed for possible side loading or unlocked. If either situation is observed it must be immediately corrected.
- The lowering, hauling, and belay system but be tested to ensure the load would be caught if all members of the teams were to let go of the rope. Note: the MPD will automatically lock if installed correctly on any of the above mentioned rope rescue system.
- The haul team will and cannot haul or lower the system with a rescuer if they can't be seen from the team Captain. (there will be no radios in this evolution, so this can only be accomplished through sight).
- Only knots in the CMC field guide will be permitted for use throughout the simulation.

Evaluation Criteria:

General:

- There will be a minimum of two Simulation Judges per competing team.
- Simulation Judges will be competent in the judging of Rope Rescue simulations.
- Simulation Judges will keep accurate start and finish times on the score cards.







• The Rope Rescue Lead Judge will ensure the Rope Rescue simulation is reset in an identical manner for each team.

Tasks:

- Mine Rescue Team Members are encouraged to carry out tasks as safely, efficiently, and quickly as they normally would during an actual mine emergency at their home jurisdiction. However, any unsafe tasks observed by any Judges or Safety Officers will result in a pause in the evolution until the action can be corrected. Note: during this time the time clock will continue to run without delay.
- Verbal communication of tasks between the Mine Rescue Teams and Judges will not be required or encouraged to remove any disadvantage to non-English speaking teams.

Scoring:

- The Rope Rescue Scenario will be judged using a merit point system with teams receiving points for each task that is completed or partially completed.
- In the event of a tied score the Mine Rescue Team with the faster completion will break a tie.
- Scoring of each task will be scored by more than one Simulation Judge independently. Simulation Judges will create a consensus score based on the independent observations.

Judges Instructions:

- Scoring
 - 0 = Not Done
 - 1 = Poor Attempt
 - 2 = Needs Improvement
 - **3** = Meets all Requirements

Every line must be scored.

- A score of 0, 1 or 2 must be explained by the scoring Judges or the Chief Judge may reinstate the points due to lack of justification.
- When a score of 3 is applied, comments are encouraged.
- If a team runs out of time, a score of 0 will apply to remaining actions.
- In the event of a scored tie in the High Angle Rope Rescue Scenario, the Team with the faster completion time (working time) for High Angle Rope Rescue Scenario will break a tie









SECTION 7:

Theory Assessment: Location: Library at the National Mine Health and Safety Academy (Coordinates: N 37⁰ 46.7176', W 081⁰ 07.2980) Photographs and video are available to teams for reference on the Competition Page of www.IMRC2020.com

LIBRARY AT THE NATIONAL MINE HEALTH AND SAFETY ACADEMY



Format: General:

- A total of six (6) Mine Rescue Team members will participate in the testing. Teams will be notified of the number and position of team members participating prior to the event.
- All testing areas will be secluded and kept quiet as possible during testing.
- No spectators will be present during any testing.
- A single team Technical Translator will be allowed to conduct the testing with each team.
- There will be one 24-question exam administered via computer input.
- Each Team Member will answer at least 4 questions: The Team Member answering a question will be selected by the Team Captain.
- The question format may include pictures, videos or charts.
- In the theory exam, teams will have a choice of answers for all questions (Multiple Choice Questionnaire) with only one (1) correct answer for each question..
- Any questions relating to calculations or referencing technical manuals need not be memorized in advance. Copies of notes and an explanation will be provided where appropriate.

Equipment:

General:

• None required









Technical Standards

General:

Any necessary subject matter and reference manuals used for theory testing are posted on the Competition Page of www.IMRC2020.com Questions will come from modules 2 and 4 of MSHA's IG-7, Appendix 18- Modules 2 and 4 of MSHA's IG 7

Team Procedures, Roles, Responsibilities:

General:

- The competing team will provide the names of the required team members who will partake in each of the testing scenarios.
- The team member names must be provided at the competition orientation session. Substitutes will only be allowed with proof of injury or illness.
- Six members will compete in the written section.
- The Chief Judge will rule on acceptable team member selections, if so required.

Evaluation Criteria:

General:

- The Simulation Lead Judge (or designate) will supervise and administer the written test.
- Theory / Knowledge Testing questions found during competition to contain errors or misprinted information will be automatically removed from scoring for all teams competitors.
- During testing, discussions between members of the same competing team will be allowed. Discussions with members of other competing teams will not be permitted.
- Teams will be awarded three (3) points for a correct answer with their first response.
- Teams incorrectly answering on their first attempt will be allowed 3 more attempts and will be awarded two (2) points if the second attempt is correct.
- Teams incorrectly answering on their second attempt will be allowed 2 more attempts and will be awarded one (1) point if the third attempt is correct.
- Teams incorrectly answering on their third attempt will be allowed 1 more attempt and will be awarded zero (0) point if the fourth attempt is correct.
- In the event of a scored tie in the Theory Assessment, the Team with the faster completion time (working time) for the Theory Assessment will break a tie.

Time Limit:

- Total time limits will be communicated before the start of the examination.
- Time status will be communicated periodically during the examination with a one (1) minute final warning.
- The theory test will have a maximum of 70 minutes for completion.









Immediate Feedback Assessment Technique (IF-AT):

• As previously specified, theory examination questions will be presented with multiple possible answers available for selection. Teams will be notified if their initial answer is incorrect. If the initial answer submitted is incorrect, the team will be given subsequent opportunities to select the correct answer from the remaining choices. Points will be awarded based on the number of attempts required to determine the correct answer. In this manner, Mine Rescue Teams will learn from any errors. Because points are awarded even in the event of an incorrect answer, Mine Rescue Teams have the opportunity to maintain a close gap with other teams rather than falling too far behind.









SECTION 8

Technician Benching Equipment Maintenance Competition:

Location:

Classroom C 117 at the National Mine Health and Safety Academy

(Coordinates: N 37⁰ 46.7176', W 081⁰ 07.2980)

Photographs and/ video are available to teams for reference on the Competition Page of www.IMRC2020.com

Format:

General:

• Each team is allowed to appoint one participant (technician) to compete in maintaining the breathing apparatus. Registration will be made with the team registration.

General:

- Drager PSS BG-4 Plus or Biomarine 240R (Contestants Choice)
- Each participant shall be provided with a fully assembled breathing apparatus, a kit of tools, an isolation test kit and a RZ 7000 or Biomarine tester for checks and maintenance, liquid for detection of leaks as well as all spare parts that are necessary to carry out the task. During execution of their tasks the participants are allowed to use exclusively the tools and measuring instruments provided by the organizer.
- Should any unpredicted defects of the breathing apparatus be revealed during the contest, the referee shall advise the participants that such failures are out of the competition scope. The participant should turn back when only the referee stops the time count. After the defect is remedied, the time count shall be restarted and the participant is allowed to carry on his/her task.
- When defects are caused by a participant's fault, the time count is not stopped.
- If the defect caused by the participant, fault prevents from further inspection, the participant shall be disqualified.
- When any test instrument is damaged by the participant, such a participant shall be disqualified.

Technical Standards:

General: Contestant's Choice of:

- Drager PSS BG-4 Plus Or
- Biomarine 240R

Technician Procedures, Roles, Responsibilities: General:

- The scheduled inspection shall be carried out in accordance with the maintenance manual of the apparatus manufacturer. All items of the inspection are awarded with the score of 0 1, 2 or 3 points.
- All checks must be listed on the inspection sheet in the sequence required by the breathing apparatus manufacturer and accompanied with values test parameters to be indicated by measuring instruments.









- Use of incorrect units; e.g. 'bar' instead of 'mbar' shall be considered as error in the specific check and the participant shall score no points for such a check.
- If a defect or deficiency is detected the participant should remedy it in the appropriate manner and write down the defect on the inspection sheet.
- Failure to write down the detected, defect on the inspection sheet shall be considered an omission in seeking for a defect or skipping the inspection item.
- The task shall be considered as successfully performed when the breathing apparatus is completely assembled, checked and ready for use.
- The participant is allowed to return to remedying defects that have not been eliminated beforehand provided that the assigned time limit is still sufficient.
- When the checks are carried out not in line with the sequence prescribed by the maintenance manual, the participant shall get no score (zero points) for each such check, even it is carried out correctly.
- The overall time limit assigned for completion of the task, i.e. to carry out all checks and remedy all defects and deficiencies shall be 30 minutes. After that time the breathing apparatus should be ready for use. In five minutes prior to expiring of the time limit the referee shall advise the participant that his/hers time limit is just about to expire.
- The time count is started by the judge upon the participant's appearance at the inspection work bench.
- If the time limit assigned to complete the competition is exceeded, the participant shall be disqualified.

Evaluation Criteria:

General:

- The Technician Simulation Lead Judge and team shall prepare workbenches to carry out the contest. Workbenches shall be assigned to participant by drawing prior to commencement of the contest.
- Equipment and instruments as well as defects of breathing apparatuses shall be the same on all workbenches for the specific breathing apparatus type.
- Technician Simulation Judges shall evaluate performance of participant on the current basis in line with the score card but are not allowed to meddle in execution of tasks by the participants. Upon completion of the task the participant shall hand over his/her "Breathing apparatus Inspection Sheet" to the Judge.
- The decision of the Technician Simulation Lead Judge is final and binding. In the event of a scored tie in the Technician competition the Technician with the faster completion time (working time) for Technician will break a tie.
- Judges Instructions:
 - Scoring:
 - 0 = not done
 - 1 = poor attempt
 - 2 = needs improvement
 - 3 = excellent meets all requirements

Every line must be scored.

- A score of 0, 1 or 2 must be explained by the scoring Judges or the Chief Judge may reinstate the points due to lack of justification.
- When a score of 3 is applied, comments are encouraged.







- If a team runs out of time, a score of 0 will apply to remaining actions •
- In the event of a scored tie in the Technician Competition, the Technician with the faster • completion time (working time) for Technician Scenario will break a tie.

DRAGER PSS BG 4 PLUS

RZ 7000 TESTER









TOOL KIT FOR BG 4











DRAEGER BG-4 BREATHING APPARATUS Testing Procedures

STEP	TESTER	PROCEDURE HINTS
	SETTING	
1. Visual Inspection		Check for good
na watalona ang		condition.
2. Insert O_ Cylinder		Fully Charged.
3. Insert Canister		Factory Sealed or
		Reusable.
4. Facepiece and Hoses		Check for good
		condition.
5. Low pressure	Pos. Pres.	Watch pressure gauge,
warning	Pumping	activation should
		sound at 1.25 mbar.
6. Inhalation Valve	Pos. Pres.	Pinch exhalation hose –
	Pumping	10 mbar indicated on
		gauge.
7. Exhalation Valve	Neg.Pres.	Pinch inhalation hose –
	Pumping	10 mbar indicated on
		gauge.
8. Drain V al ve	Pos. Pres.	Pump until 10mbar is
	Pumping	indicated on gauge.
		Fit sealing cap over
		tappet of relief valve as
		bag inflated.
		Drain valve must not
		open at 10 mb.
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.	Pump until relief valve
	Pumping	opens.
		Opening pressure,
		should lie between 2 &
		5 mbar.







STEP	TESTER SETTING	PROCEDURE HINTS		
11. High Pressure Leak	Leak Test	Open cylinder valve. Alarm sounds once. CCR (Close Cylinder). Alarm sounds once, green indicator flashes. OCR (Open Cylinder)		
12. Constant Metering Valve	Pos. Pres. Pumping Dosage .05-2 L/min	Inflate breathing bag. Fit sealing cap over tappet of relieve valve. Constant metering dosage should lie between 1.5 and 1.9 L/min.		
13. Minimum Valve	Neg. Pres. Pumping	Pump slowly until minimum valve is opening. Minimum Valve should open between 0.1 and 2.5 mbar.		
14. Bypass Valve	Leak Test	Press red button. Breathing bag inflates.		
(Alternate Relief Valve Test)		Observe Reading on tester, relief valve should open between 2 and 5 mbar.		
15.	Low Pressure Warning	Close cylinder valve. Warning sounds at 55 bar.		
16.	Battery Check	If Failing: Alarm sounds 5 Times. Red indicator flashes for 30 sec. Bat is displayed.		

(Alternate Relief Valve Test, can be performed after Step 14.)







Dräger RZ-7000 BG-4 Test Procedure					
STEP	TESTER SETTING	PROCEDURE			
1. Visual Inspection		Facepiece, Hoses, & Refillable Canister			
2. Insert O2 Cylinder		Cylinder pressure must be greater than 2,600 PSI.			
3. Low Pressure Warning	Zero Adjust (Automatic) Connect Hose Coupler to RZ				
	Positive Pressure Pumping	Low-pressure warning should activate at less than 1.4 mbar			
4. Inhalation Valve	Positive Pressure Pumping	Tighly pinch exhalation hose & pump slowly until 10 mbar is indicated			
5. Exhalation Valve	Negative Pressure Pumping	Tightly pinch inhalation hose & pump slowly until -10 mbar is indicated			
6. Drain Valve	Positive Pressure Pumping	Fit sealing cap over relief valve & pump until the drain valve opens.			
		The drain valve should open between 10 mbar and 18 mbar.			
7. Leak Test w/Positive Pressure	Leak Test	Press button to reduce pressure to 7.5 mbar.			
		Press the OK button to activate timer.			
		riessure should not change by more than 1 mbar in one minute.			
	Vent Tester	Remove sealing cap.			
8. Relief Valve	Positive Pressure Pumping	Pump until relief valve opens. It should be between 2 & 5 mbar.			
9. High Pressure Leak Test	Leak Test	Open cylinder valve. (Cylinder pressure must be greater than 2,600 PSI.) Sentinel Displays the CLOSE CYLINDER ICON: Close Cylinder Valve. Sentinel Displays the OPEN CYLINDER ICON: Oper Cylinder Valve.			
	Vent Tester	Breathing bag will deflate.			
10. Constant Metering Valve	Positive Pressure Pumping	Fit sealing cap over relief valve & pump until breathing bag is inflated.			
	Dosage L/min.	Constant dosage should lie between 1.5 and 1.9 L/min.			
11. Minimum Valve	Negative Pressure Pumping	Gently pump & remove sealing cap from relief valve.			
		Pump slowly until hissing sound is heard.			
		Minimum valve should open between 0.1 & 2.5 mbar.			
12. Bypass Valve	Leak Test	Press red bypass valve button. Oxygen must be heard flowing into the			
		circuit. Breathing bag inflates.			
13. Residual Pressure Warning	Leak Test	Close cylinder valve. Watch Sentinel display unit.			
		Warning should be generated at approxmately 700 PSI.			
		Unplug coupling from K2 tester & replace sealing cap on plug-in			
		coupling when pressure reaches 0 PSI.			
14. Battery Check		On activation & deactivation the Sentinel automatically checks &			
		aispiays partery capacity. Battery Warning 1 When Benching: REPLACE BATTERY			
		Battery Warning 2: REPLACE BATTERY BEFORE ANY NEW OPERATION			
		Turn unit off by simultaneously pressing right & left buttons.			



(💓)





BG4 FUNCTION TEST RECORD UNIT#_

Function Test Date (month as Jan – Dec)	mmm/dd/yy	
First initial, last name of technician		
Visual Inspection (incl. belt & lanyard)	OK/Repaired	
O2 Cylinder Hydrostatic Test	OK/Replaced	
Face Mask Inspection	OK/Repaired	
Low Pressure Warning	<1.4 mbar	
Inhalation Valve	OK/Repaired	
Exhalation Valve	OK/Repaired	
Moisture Relief Valve	>15 mbar	
Positive Pressure Leak	OK/Repaired	
Pressure Relief Valve Activation	2-5 mbar	
O2 Cylinder Pressure	>185 bar	
Constant Dosage Rate	1.5-1.9L/min	
Minimum Valve Activation Pressure	.1-2.5mbar	
Bypass Valve	OK/Repaired	
Low Pressure Alarm	55 bar	
Battery Test	OK/Repaired	
Date battery to be replaced	mmm/dd/yy	
Date soda lime to be replaced (6 months)	mmm/dd/yy	
Unit sealed and dated	Y/N	
	_	 _







Team No. _____

Technician _____

Company _____

Problems Found Corrected

0 Bug_____

1st Bug _____

2nd Bug _____

3rd Bug _____

4th Bug _____

5th Bug _____

Judge's Signature

Bench Person's Signature









BG-4_TECHNICIANICONTESTANT______WORKING TIME_____MIN_____SEC.

	VISUAL APPARATUS CHECKS		HAND TIGHT CONNECTIONS		
1	Check If ok		Cap on Drain Valve		
	FRAME/HARNESS ASSEMBLY		Drain Valve to Breathing Bag		
	Switchbox/Sentinel/Sealing Rings/O2 Reg/Anti-vibe		Minimum Valve to I	Breathing Bag	
	Backsoner		Minimum Valve to	02 Supply Line	
	BREATHING BAG		Cylinder Connectio		
	Sealing Surfaces		Regenerative Canis	ter Connections	
	Manipulate or Massage (pliability)		Relief Valve to Rege	merative Canister	
	Minimum Valve & Drain Valve		Crossover Hose Switchbox and Relief Valve		
	Lever		Cooler to Breathing	Bag	
	Springs		Distribution Hose		
	CYLINDER TEST		Breathing Hoses		
	Hydrostatic Test Date		Hose Adapter on R	Z-25 or Test-It 6100	
	Cylinder Pressure on Gauge		TEST APPARATUS		
	Pressure Rating on Cylinder	1	Check If ok		
	REGENERATIVE CANISTER		ZERO ADJUSTMENT ON TESTER		
	Check for Defects		LOW PRESSURE WARNING TEST		
	Sealing Surfaces		INHALATION VALVE TEST		
	Expiration Date or Screens/Filler Mats/Seal		EXHALATION VALVE TEST		
	Seal Strap with Tension Spring Hook		DRAIN VALVE TEST		
	RELIEF VALVE		LEAK TEST with POSITIVE PRESSURE		
	Check for Defects		RELIEF VALVE TEST		
	Valve/O-Ring		State Opening Pressure		
	COOLER		HIGH PRESSURE LEAK TEST		
	Check for Defects		CONSTANT METERING VALVE TEST		
	Sealing Surfaces		State Final Reading		
	HOSES		MINIMUM VALVE TEST		
	· Sealing Edges		State Opening Pressure		
	Stretching of Hose for Pliability		BYPASS VALVE TEST		
	COUPLING		LOW PRESSURE WARNING TEST		
	Sealing Surfaces		State Warning Reading		
	Valve Discs		BATTERY TEST		
	FACE PIECE TEST	VI	TES	T APPARATUS	
	Head Strap Assembly				
	Maxk Body				
	Sealing Edges				
	Speaking Diaphragm				
	Lens				
	Winer				
<u> </u>	Dafor Mark (Simulata)				
	Delog Mark (Simulate)				









BIOMARINE 240 R + TESTER












BIOMARINE 240R TECHNICIAN

TEST	PROBLEMS ENCOUNTERED DURING TEST
VISUAL INSPECTION - FACEPIECE	
HOSES & SCRUBBER	
CYLINDER PRESSURE	
GREATER THAN 1500 PSI.	
CONSTANT FLOW TEST	
CONSTRUCTIEOW TEST	
DEMAND VALVE TECT	
DEMAND VALVE IESI	
BYPASS VALVE TEST	
VENT VALVE TEST	
VENT VALVE TEST	
LOW PRESSURE LEAK TEST	
RMS GAUGE AND TRIM TEST	
HIGH PRESSURE LEAK TEST	
IIIOII I RESSURE LEAK TEST	
LOW PRESSURE ALARM TEST	
MAINTENANCE TAG VALIDATION	
UNIT TESTED BY	







2020 INTERNATIONAL MINES RESCUE CONTEST BENCH MAINTENANCE LOG SHEET

BioPak Model: BioPak 240R

BioPak Serial Number:

		30 Day- Maintenance									
Date	Turnaround Maintenance Verification	Visual Inspection	Demand Valve Test	Constant Flow Test	Vent Valve Test	Low Pressure Leak Test	High Pressure Leak Test	Bypass Valve Test	Alarm Test	Maintenance Tag Validation	Comments, + Benchman Signature









BIOMARINE BIOPAK 240 Revolution BREATHTING APPARATUS

Testing Procedures For 2020 IMRC

STEP		TESTER SETTING	PROCEDURE HINTS
1.	Visual Inspection		Inspect for good condition
2.	Insert Oxygen Cylinder		Fully Charged
3.	Insert CO2 Canisters		Factory Packed, PAD IN
4.	Facepiece and Hoses		Check for good condition
5.	Demand Valve Test		O2 ON Listen Valve On/OFF
6.	Constant Flow Test	Test Fixture attached	O2 ON 1.8 LPM to 2.4 LPM
7.	Vent Valve Test	Tester Attached	By-Pass/Vent Opens Less 2"
8.	Low Pressure Test	Tester Attached	Keys In/6-8" WC/1 minute
9.	High Pressure Leak Test		Leak Tech, 60 second test
10.	By-Pass Valve Test		Audible ON/OFF
11.	Alarm Test ON		O2 ON Buzzer ON/OFF Lights
11E	8. <u>Alarm Test OFF</u>		O2 OFF Buzzer On/OFF Lights

Attach Maintenance CARD to Carrying Handle







BIOMARINE 240R TECHNICIAN

Technician Team's Blank Testing Card

TEST PROCEDURES	Team No _ Technician(s) Company				
	Problems Found	Corrected			
	Bug				









BIOMARINE 240 R JUDGE"S CHECKLIST

BioPak 240 R TECHNICIAN CONTESTANT

___VORKING

	VISUAL APPARATUS CHECKS			TEST APPARATUS		
\checkmark	Check if ak		COM	INECTIONS		
	UPPER HOUSING		- V.	ent Valve Assembly - Hand Tight		
	LOVER HOUSING		D	iaphragm Worm Gear - Wrench Tight		
	Harness Assembly		FI	ow Restrictor - Wrench Tight		
	External Gage		В	reathing Hose Worm Gear - Wrench Tight		
	O2 Regulator		A	dd / Constant Fittings - Hand Tight		
	RMS		C	enter Section Lid - Hand Tight		
	CENTER SECTION ASSEMBLY		C	enter Section Push Pins - Hand Tight		
	Diaphragm		C	ulinder Connection - Hand Tight		
	Check O-Ring for damages/lubrication	tion	A	dapter to Facepiece - Hand Tight		
	Sealing Edges		Te	est Fixture Connections - Hand Tight		
	Demand Valve Assembly	\checkmark	Che	ck if ck		
	Moisture Pads		Zere	o Adjust the Mag. Gauge		
	PCM		COM	ISTANT FLOW TEST		
	CARBON DIOXIDE SCRUBBER		FI	ow Between 1.6 and 2.4 Lpm - State Reading		
	Defects / Damage		DEM	AND VALVE TEST		
	Gasket		EMERGENCY BYPASS TEST			
	Expiration Date		YEN	IT VALVE TEST		
	CENTER SECTION LID ASSEMBLY	٢	A	t or below 2 inches wg - State Reading		
	Examine for defects / damage		LOY	PRESSURE LEAK TEST		
	Sealing Edges		BM	S GAUGE AND TRIM TEST		
	lce Canisters		0	bserve lights/gauges +/- 10% - State Reading		
	Coolant Lids		HIG	H PRESSURE LEAK TEST		
	CYLINDER TEST		LOY	PRESSURE ALARM TEST		
	Hydrostatic Test Date		Alarm 650-1000 psig - State Reading			
	Cylinder Pressure on Gauge		Power down below 25 psig			
	Pressure Rating on Cylinder	٧I	С	TEST BUGS		
	Outlet tube O-Ring Damage/ Lubrication					
	HOSES					
	Sealing Edges					
	Stretching of Hoses for Pliability					
	Adapter Assy O-ring damage & lubrication					
	FACE PIECE TEST					
	Head Strap Assembly					
	Mask Body / Nose Cup	٧I	С			
	Sealing Edges					
	Speech Diaphragms					
	Lens / Anti-Fog Insert					
	Magnetic Wiper					









SECTION 9

Mine Rescue Team Skills

Location:

"Conveyor Lab" at the Mine Simulation Lab at the National Mine Health and Safety Academy (Coordinates: N 37^0 46.7176', W 081^0 07.2980)

Photographs and video are available to teams for reference on the Competition Page of www. IMRC2020.com



Mine Simulation Lab

Participation in the Mine Rescue Team Skills is optional, but encouraged for all participants. As specified in the 2020 IMRC Rules, teams must select which of the two optional scoring events will contribute to their Overall score. They may, however, participate in the non-scoring event in the interests of learning and the potential to win the individual task category. There will be a sixty (60) Minute Time Limit for the completion of the Mine Rescue Team Skills. The Mine Rescue Team Skills will be conducted upon a Team's completion of the Underground Mine Rescue Simulation

Format:

General:

- Each team will consist of six (6) members to compete specific "Skills" that a Mine Rescue Team needs to be competent in during actual emergency work. Registration for the Mine Rescue Skills will be made when the team registration is conducted.
- Each team of the six (6) team members that competed in the Underground Mine Rescue Simulation, excluding Incident Commander (Briefing Office) and Assistant will compete in a Mine Rescue Team Challenge. The team members will wear the self-contained breathing apparatus that they wore during the Underground Mine Rescue Simulation. Upon competition of the Mine Rescue Team Challenge the team will perform the remaining Mine Rescue Team Skills:









Mine Rescue Team Skills:

- Two team members from the six (6) working members, Incident Commander (Briefing Officer and Assistant are not included) will be selected to perform each of the required Mine Rescue "Skills".
- 2 Team Members will perform the gas detector skill.
- 2 Team Members will perform air and pressure readings.
- 2 Team Members will perform air lift bags.
- The use of self-contained breathing apparatus will not be required for the gas detector, air and pressure readings and air lift bags/

Equipment:

General:

- IMRC will provide the following equipment:
 - ANEMOMETER
 - SMOKE TUBES + ASPIRATING BULB
 - MAGNEHELIC
 - MX-6 MULTI-GAS DETECTOR
 - AIR-LIFT BAGS
 - MEASURING TAPE
 - PENCIL + PAPER
 - HIGH PRESSURE AIR LIFT BAGS

Technical Standards:

General:

Any necessary subject matter and reference manuals used for "Mine Rescue Skills" are posted on the Competition Page of IMRC2020.com. of MSHA's IG 7(a) manual.

Scoring:

The Mine Rescue Skills will be judged using a merit system with "0" being assigned to a task that is not done or skipped. Merits will range between 0-3 depending on the difficulty of the task.

Scoring of each task will be done by more than one Simulation Judge independently. Upon completion of all tasks, Simulation Judges will create a consensus score based on their observations.

Simulation Judges will reward or penalize teams based on the relative safety and effectiveness of each task.

- Judges Instructions:
 - Scoring:
 - 0 = not done
 - 1 = poor attempt
 - 2 = needs improvement
 - 3 = excellent meets all requirements

Every line must be scored.







- A score of 0, 1 or 2 must be explained by the scoring Judges or the Chief Judge may reinstate the points due to lack of justification.
- When a score of 3 is applied, comments are encouraged.
- If a team runs out of time, a score of 0 will apply to remaining actions.
- In the event of a scored tie in the Mine Rescue Skills Scenario, the Team with the faster completion time (working time) for Mine Rescue Skills Scenario will break a tie.

TASKS:

MINE RESCUE TEAM CHALLENGE:

IMRC will provide all items and equipment

- Each member of the six (6) person team will compete in the following challenges (see below) while being timed by the judges. The cumulative time of the six (6) persons will be recorded for the total time for the team. A Judge will start the clock when the first team member begins the first challenge and a Judge will stop the clock when the final team member completes the last challenge. Team members can complete the challenges in any order that they chose but they must complete all challenges:
 - Log Sawing Challenge
 - Team member will saw a log in half with a handsaw
 - Carry Challenge
 - Team member will carry (2) forty one (41 lbs) pound items (Dragersorb Kegs) for a distance of fifty (50) feet and return to the starting point while carrying the items
 - Fire Hose lay out Challenge
 - Roll out two (2) sections of fire hose from the designated starting point
 - Connect the two sections of fire hose
 - Un-connect and reroll the fire hose
 - Return the fire hose to the starting point
 - Sledge Hammer Challenge
 - Team Member will use a sixteen (16) pound sledge hammer to move an 8 inch wide by 8 inch thick by 4 foot long log a distance of 4 feet.

The Challenges will not be scored but will be timed. The cumulative time of the challenges will be added to the cumulative time for the other Mine Rescue Skills for a total time for the Mine Rescue Skills segment of the competition:

NOTE: A video presentation of a Mine Rescue Team Member performing the Mine Rescue Team Challenge will be available on the <u>www.IMRC2020</u> website









AIR MEASUREMENTS SKILL: IMRC will provide the Anemometer.

• Team will be required to take air readings with an Anemometer.

Team will give a brief description of the anemometer (how to zero and turn on the anemometer) Example: An anemometer is a small sort of windmill with a mechanical counter for recording the number of revolutions caused by the moving air current. It is used to measure air velocities of over 120 feet per minute.

- Team will take a measurement of the area to be tested.
- Teams will traverse the entry while taking a 1 minute reading in the area.
- Team will calculate correctly the air reading for the area (air reading must be calculated with pencil or pen and submitted to the Judge). No calculators will be allowed.

EXAMPLE OF ANEMOMETER AND CORRECTION CHART THAT WILL BE USED













PROCEDURE FOR USING AN ANEMOMETER (TRAVERSING THE AIRWAY)



1) Stand with your back to one rib and hold the anemometer in a vertical position out in front of you at full arm's length. The anemometer should be positioned so that the air current will enter the back of it (that is, the side without the dials). Your free arm should be kept close to your body.

2) Turn the anemometer on and walk slowly to the opposite rib, pacing yourself to get a one minute reading. Be sure to keep the anemometer out in front of you (to decrease resistance as much as possible). The anemometer should be raised and lowered as you walk to the opposite rib so that the average velocity of the air is measured.

3) At the end of one minute, turn off the anemometer and read the dials. This reading will have to be corrected by using the manufacturer's table of corrections for the various velocity readings.

4) Determine the cross-sectional area of the entry by multiplying the width times the height.









CALCULATION WITH ANEMOMETER

ANEMOMETER READING

- 1. Zero the anemometer.
- 2. Determine the direction of airflow.
- 3. The gauge on the anemometer is on the downwind side. Hold anemometer so that the gauge is on the opposite side that the air is coming from. (gauge on the return side)
- Hold the anemometer is the airstream and wait for it start spinning before you flip the switch to activate the anemometer and begin the reading.
- 5. Note the time when the switch is activated. Traverse the entry for exactly 1 minute with the switch activated moving in a "W" pattern from near the roof to near the floor as you traverse the airway. Deactivate the switch at exactly 1 minute.
- 6. Note the reading on the gauge. Observe each of the dials on the gauge.
 - _____ reading

7. Look for the correction factor on the side of the anemometer.

_____ correction factor (note whether + or -)

- 8. Measure entry width and height
 - e _____width
 - X height

_____area in square feet

9. Calculate CFM:

- ____Gauge reading
- +/- correction factor
- e = _____ corrected reading
- X _____area
- e = ____CFM
- 0

Calculations:









SMOKE TUBES

IMRC will provide the Smoke Tubes and Aspirating Bulb.

Teams will be required to take air readings with a smoke tube.

- Team will measure off a distant (10 foot).
- Team will determine the area to be tested in square feet. To determine square feet the time will measure the height and width of the area to be tested and multiply the height and width to arrive at the square footage. Example- 8 feet high by 20 feet wide: 8 x 20= 160 square feet
- Team members will verbally explain how smoke will be released and timed through each of the four quadrants
- Team will apply smoke and time the travel time of the smoke to each of four (4) quadrants: Upper Right, Lower Right, Upper Left, Lower Left, testing each quadrant individually

Procedures for using smoke tubes:

1. Measure off a distance in a relatively straight and uniform airway. Ten (10) feet will be the distance for this measurement.

2. Station one person with the smoke tube at the upwind point of the measure distance, and station one person with a stopwatch at the downwind point.

3. The person with the smoke tube then releases a smoke cloud at each quarter point within the airway. The person with the stopwatch then must time each cloud from the moment it is released until it reaches the downwind point. The measurements are taken separately, that is, the first smoke cloud is timed, then the second, and so forth.

For Uniformity: The judge will give the team the travel time of the smoke.

• Team will calculate smoke air reading for the area (air reading must be calculated with pencil or pen and submitted to the judge) CALCULATION EXAMPLE IS FOLLOWING









Example of using a Smoke Tube



SMOKE TUBE CALCULATION

SMOKE TUBE READING

 Pull 10 foot out on the tape measure in the entry and observe the time it takes

 for a puff of smoke to travel the length of the 10' tape measure in each

 quadrant:
 1st quadrant ________ seconds

 2nd quadrant ________ seconds

 3'rd quadrant +________ seconds

 4th quadrant +________ seconds

 Total =
 /4 = _______ Average

 _______X 60 = _______ FPM Velocity

 Average in seconds _______ 10.00 distance

 Entry Width _______X FPM Velocity ______ = _____ CFM

Calculations:









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EXAMPLE OF SMOKE TUBE CALCULATION:

<u>æ</u> VTS_01_1VOB - VLC media player Media Playback Audio Video Subtitle Tools View Help	
1st quadrant = 10 seconds 2nd quadrant = 13 seconds 3rd quadrant = 11 seconds 4th quadrant = 12 seconds Total = 46 seconds 46 / 4 = 11.5 seconds (average)	18 feet (entry width) x 7 feet (entry height) = 126 Area in Square Feet
10 feet (distance)11.5 seconds (average)0.87x 60 seconds= 52 fpm (velocity)	126 square feet (area) x 52 fpm (velocity) = 6552 cfm (volume)
	01:40
	x ^R ^ 🛥 📾 🌄 🕼 🛷 <u>920 AM</u> 🖵









MAGNEHELIC

IMRC will provide the Magnehelic:

- Team will explain what the Magnehelic is used to measure.
- Team will demonstrate how to zero the Magnehelic.

For contest purposes, all returns will be low pressure and all intakes will be high pressure. Teams will be given information on their location and area to be tested.

• Team will connect the hoses to Magnehelic properly and simulate the reading.

Judge will have a preset Magnehelic properly or a picture of a preset Magnehlic to simulate the reading.

• Team will give and explain the proper reading of the Magnehelic to the judge (positive or negative pressure should be included in the explanation)

Picture of a Magnehelic











Operation of the Magnehelic Gauge:

Zero the gauge by setting the indicator pointer exactly on the zero mark, using the external adjust screw on the cover (bottom).

• Positive Pressure:

Connect tubing from the source of pressure to the high-pressure port. Vent low pressure port to atmosphere

• Negative Pressure:

Connect tubing from source of vacuum or negative pressure to low pressure port. Vent one or both high-pressure ports to atmosphere.

• Differential Pressure:

Connect tubing from the greater of two pressure sources to high-pressure port and the lower to low pressure port.

Schematic of a Magnehelic Gauge:





Dimensions, Standard Series 2000 Magnehelic* Pressure Gages. (Slightly different on medium and high pressure models)









Gas Testing Proficiency

IMRC will provide a Drager X-am 8000 Detector and Testing Gas

- The following gases will be tested in: CO, CH4, NO 2, and O2.
- Correct gas concentrations will be attained when reported gas concentrations fall within the following ranges:
- Correct readings will be within 20% (inclusive) of the gas concentration within the test cylinder and observed on the analytical instruments.

Drager X-am 8000

Clearance measurement, release and documentation in no time

The X-am 8000 effectively supports various applications with specially developed assistant functions that guide you through each process step by step. During clearance measurement, for example, the smart assistant calculates the necessary flooding time for the device and probe (FKM hose) based on parameters such as measuring gases, temperature limits, and the indicated hose length.

When monitoring for high methane concentrations, a configurable automatic measurement range switch makes it easier to take a reading: if the Cat-Ex sensor measures values above 100% LEL, the display switches to the range of 0 to 100 vol%



Clear signaling design

The signal system of the Dräger X-am 8000 is based on a clear color code:

- Red light = gas alarm
- Yellow light = device-related alarm, e.g. low battery
- Green light = device is ready for use









The green glow of the D-light allows you to see from a distance whether the device has been properly tested and is ready for use.

In case of an alarm, the X-am 8000 alerts you with colorful alarm LEDs, a loud horn (100 dB(A) at a distance of 30 cm), and clearly palpable vibration. Optionally, four preset hazard symbols are available for the display which explicitly indicate the presence of explosive or toxic gas hazards, for example. This allows the user to easily recognize the type of hazard based purely on the symbol displayed.

The X-am 8000 is equipped with a shock detection system. The event report indicates whenever severe mechanical impacts have occurred that might result in functional impairments of the device or the sensors. These are also documented in the data logger.

Alarm	Symbol	Trigger	Procedure	Alan India	m sators	acknow
A1 pre alarm	Δ_1	Gas concentration is more than pre-set alarm limit	Take account of pre alarm	-	8	1
A2 main alerm	Δ_2	Danger to life - Gas concentration is more than pre-set alarm limit	Immediately leave hazard area	•	1	X
STEL alarm	6	Gas concentration is more than pre-set. limit for 15 minute average limit (STEL * Short Term Exposure Limit)	Leave hazard area	•	8	X
TWA alarm	4	Gas concentration is more than pre-set. limit for 8 hour shift average limit (TWA = Time Weighted Average)	Leave hazard area	-	1	X
Battery pre alarm		Remaining life of battery is approx. 20 minutes	Charge / exchange instrument	••	8	1
Battery main alarm	C!D	Battery has reached end of capacity	Charge / exchange instrument	•	8	X
Device error	X	Device error is present	Bring instrument to service	••	8	1
Channel error		Channel error is present	Calibrate / repair instrument	•	8	1
Blocking alarm	11	Measuring range exceeded for CatEx channel, sensor is switched off for protection	Switch off and on instrument in fresh air	1	1	1
Overrange alarm	i	Measuring range exceeded - gas concentration is above measurement range of sensor	Immediately leave hazard area	•	8	X
Underrange alarm		Measuring range exceeded - gas concentration is below measurement range of sensor	Calibrate instrument in fresh air	•	1	X









Gas Test Scorecard

Team Name_____

IMRC will provide:

- Instrument: MX-6
- Sampling Gas
- Sampling Hood and Hose

Gas Tests

- Team will take gas tests in proper order
- Team will follow proper procedure when testing with gas detectors
- Team will determine gas concentration within the prescribed error rate of the detector used

METHANE

% CH 4 in cylinder	Min. Accepted	Max.Accepted	% by Examiner
	CARBON N	MONOXIDE	
ppm CO in cylinder	Min. Accepted	Max. Accepted	ppm by Examiner
	OXYGEN I	DEFICIENCY	
%O 2 in cylinder	Min. Accepted	Max. Accepted	% by Examiner
	NITROGE	N DIOXIDE	
ppm NO2	Min. Accepted	Max. Accepted	ppm by Examiner
Total			

Gas Judge's Signature









AIR LIFT BAGS

Instruction Manual for High Pressure Air Lift Bags is available on the IMRC2020.us. Website.

IMRC will provide:

- "Mat-Jack" High Pressure Air Lift Bag
- Compressed Air Cylinder
- Regulator
- Hoses with Connections
- Flow Controller

Tasks:

- Team will properly connect the regulator to the compressed gas cylinder.
- Team will properly connect the air lift bag hose to the regulator.
- Team will properly connect the hose from the regulator to the flow controller.
- Team will properly connect the hose from the flow controller to the air lift bag.
- Team will properly place the air lift bag under the object to be lifted.
- Team will properly turn on the compressed gas cylinder and regulate the flow.
- Team will properly adjust the flow controller and inflate the air lift bag.
- Team will properly place blocking under the object being lifted.
- Team will properly deflate the bag.
- Team will properly remove the bag from under the object being lifted..

Team Safety:

If at any time the Simulation Lead Judge feels that a team member's safety may be compromised, the action will be stopped and re-direct negative (penalty) points will apply:



HIGH PRESSURE AIR LIFT BAG









PROPERLY CONNECTED HIGH PRESSURE AIR LIFT BAGS:













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REGULATOR THAT WILL BE USED:



CONTROLLER THAT WILL BE USED:











PROPERLY INSTALLED HIGH PRESSURE LIFT BAG



Evaluation Criteria:

General:

- There will be a minimum of two Simulation Judges per competing team.
- Simulation Judges will be competent in the judging of Mine Rescue "Skills" simulations.
- Simulation Judges will keep accurate start and finish times on the score cards.
- The Mine Rescue "Skills" Simulation Lead Judge will ensure the Mine Rescue "Skills" simulation is reset in an identical manner for each team.
- The Mine Rescue "Skills" Simulation Judges will reward or penalize teams based on the relative safety and effectiveness of each task.

Time Limit:

- Total time limits will be communicated before the start of the examination.
- The Mine Rescue Skills will have a maximum of 60 minutes for completion.









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END OF DOCUMENT





