NOTE: This submission is based on discussion and input from highly-skilled mine rescue personnel (Mr. Shawn Deforge & Mr. Joseph Wojtus) of the submitter's mine and from the Kirkland Lake (Ontario) District Mine Rescue Officer, Mr. Greg Hobson.

A. Rapid Deploy Systems
1. PED system > this would need researching to make it a two-way communication system (A company from Dowling, Ontario, CANADA called Hardline Solutions is apparently working on an advanced system).
2. Low frequency radio waves from surface to underground and vice versa
3. System currently only transmits from surface to underground

B. Breathing Apparatus
1. Draeger BG-174 still in use in South Africa, but it will be obsolete soon (no more parts being made). Also, Ontario, Canada mine rescue crews use OXY-SR 45 units (bottled breathing oxygen) and SSR-90 units where oxygen is generated by chemical reaction
2. Don’t know
3. To our knowledge, these are technologically sound
4. Possibly increase the OXY-SR 45 breathing limit from 45 minutes to 60 minutes

C. SCSR’s
1. Refuge chambers and emergency air “tents”; ventilation holes drilled from surface to refuge chambers to ensure a continuous supply of uncontaminated breathing air
2. Yes, develop a SCSR of greater capacity oxygen (but, not the type that generates through chemical reaction > gets hot), but keep in mind that bigger usually means bulkier/heavier. If go to the SSR-90, these are bulky and difficult to be worn as part of PPE > maybe cache on personnel carriers
3. One / miner @ designated locations
4. As per manufacturer’s recommendations
5. Don’t know

D. Rescue Chambers
1. Yes
2. As per Regulations for Mines and Mining Plants 854, Section 26(a)(b)(c)(d)(e) (Ontario, Canada). Chamber should be built into mine and ideally incorporate a hole connecting it to surface for breathing air supply – maximum 15 minutes walking distance from furthest workings to chamber
3. 48-72 hours depending on rescue capabilities
4. As per number working in proximity to chamber
5. One @ each left / right, wherever crews are working

E. Communications
1. Regular “touch” phones, pager phones, radios, PED system
2. Don’t know
3. Don’t know
4. Don’t know
5. Keep all information internal until company officials have scrupulously scrutinized and deemed OK to release (must be careful depending on system used; radios/cell phones may be monitored externally)
6. Ensure direct contact with mine rescue team briefing officer (as per standard practice in Ontario, Canada mine rescue protocol)
7. The BG-4 system allows for clear communication while speaking with a breathing mask
8. Yes – they can be used to transmit evacuation orders to miners in possible areas unaffected by the emergency
9. Don’t know – manufacturers must be consulted

F. Robotics
1. Transporting SCSR's in explosive atmospheres, carrying thermal imaging cameras, "listening" by carrying an audio device
2. As a tool, but not to replace manned rescue teams
3. As noted above
4. Don’t know
5. Maybe difficult / costly / inconvenient for @ mine to have > maybe make available from a central location that a number of operations could access

G. Thermal Imagers and Infra-Red Imagers
1. Infra-red cameras
2. Yes
3. Approx. $8,000
4. Not recommended > have one centrally located as per F. 5. above

H. Developing New Mine Rescue Equipment
1. High cost. May be useful to utilize R&D of other countries; develop a national R&D branch of government funded by all mines
2. Don’t know
3. Don’t know
4. Don’t know
5. Provide them with funding; develop partnerships with mining companies and governments

I. Mine Rescue Teams
1. Draeger BG-4’s, standard equipment as per Ontario, Canada mine rescue protocol
2. Apparatuses per station should mirror requirement of Ontario, Canada mine rescue protocol
3. Expect that numbers of each should be sufficient; increase number of cap lamps for prolonged emergencies to ensure enough cycle time regarding charging
4. At a central station or @ site and by trained technicians
5. Don’t know
6. Yes, if possible
7. Be proactive – keep abreast of changing technologies – consult regularly with manufacturers
8. Yes – ensure it is properly researched before using; company in Sudbury, Ontario, Canada – MIRARCO, is developing a 3D modeling program that can assist individual mines in underground emergencies

J. Government Role
1. Standard equipment and training for mine rescue as per Ontario, Canada, protocol; thermal imaging camera, $ for research
2. Set minimum standards in legislation (e.g. Ontario, Canada mine rescue requirements)
3. Review operations in other mining districts
4. Emergency preparedness / evacuation plans, gas hazards, breathing apparatuses appropriate to mine, barricade erecting
5. Tools located at appropriate locations to facilitate use of emergency supplies
6. Don’t know
7. Set minimum response times to mines – implement processes that meet those response times; set up mutual assistance programs with other mines

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