M. Sc. Eng. Zygmunt Goldstein

M Sc. Eng. Stanisław Parol

M. Sc. Eng. Jacek Wicher

ORGANISATION AND FUNCTIONING OF MINES RESCUE IN POLAND

1. INTRODUCTION

Mines rescue in Poland in an organised form has an old 90-year tradition initiated by the initiative and funds of the Upper Silesian Fellowship Company that led to the appointment of the Main Mines Rescue Station in Bytom in 1907. The Station, as one of the first facilities of this type in the world, undertook the efforts to organise the mines rescue, rescue operations methodology, improvement of professional equipment and training of the rescue workers.

This humane activity that was developed consistently in line with the development of the coal mining, ore and rock mining has been currently continued by the Central Mines Rescue Station in Bytom.

Previous years account for the period that provided broad experience in combating setbacks of nature as well as the period of creative technical and organisational development. The Polish science and mining practitioners contributed an abundant array of technical means and methods for protection of mines staff lives and health and combating natural hazards to support this development.

The scope of current mines rescue covers the entire Polish mining industry including mining of coal, metal ores, oil and gas as well as chemical and construction minerals.

A system of the Polish mines rescue that provides response in all and any cases of disastrous accidents or incidents in underground or open-pit mines is also able to undertake broad preventive measures to protect people and work stations from any adverse phenomena that may affect their safety.

2. LEGAL FRAMEWORK FOR MINES RESCUE SERVICES

The Act of 4 February 1994, "Geological and Mining Law" and the guidelines of the Minister of Economy of 8 12 June 2001 on the organisation, mines rescue tasks and equipment of the plant and the entity that is professionally engaged in the mines rescue, and managing rescue operations, regulate the organisation and functioning of the current mines rescue in Poland.

A basic provision of the Geological and Mining Law (GML) that regulates the mines rescue issues is article 75. This article specifies in details the responsibilities of an enterprise required to ensure the safety outlined in article 73, paragraph 1. The responsibilities include, but are not limited to, the necessity to have adequate assets and proper organisation of the workforce. Therefore, article 75 of GML obliges an enterprise to:

1)have an organised mine rescue system,

2)ensures permanent possibility of participating in rescue operations to specialised, professional service of the Central Mine Rescue Station or another entity which professionally deals with mine rescue activities.

While maintaining properly organised rescue workforce, an enterprise should also ensure participation of such rescue workers in rescue operations whose equipment, organisation and scope of services significantly exceed the requirements defined for the rescue staff in a mining plant.

Simultaneously, the plant have been given the freedom of choosing the way in which the imposed obligation of having organised mines rescue is going to be met.

An enterprise may act independently or meet the requirement by running continuous, well-organised co-operation of mines rescue workers from a number of plants or commission the rescue services as a whole or in part to a professional rescue unit.

The above ways of meeting the obligation defined in article 75 (paragraph 1 item 1) of the Geological and Mining Law are restricted to some extent in the following sense:

- if a plant operates independently or meets this obligation by continuous, organised co-operation of rescue workers from a number of plants, then the plant, notwithstanding the requirements specified for the mines rescue staff in a mining plant, should meet the requirements specified for a rescue unit,
- compliance with the above requirements by establishing continuous, organised co-operation of rescue workers from several plants or commissioning the mines rescue services to a professional rescue unit requires a consent of the relevant state mining supervision authority.

A requirement to obtain the above consent ensures:

- adequate supervision provided by a mining supervision body over mines rescue,
- elimination of the entities - rescue units that do not meet the requirements specified for these entities.

In the case of continuous, organised co-operation of rescue workers from several plants or compliance with the requirement by operating independently, plant rescue workers should meet the requirements specified for rescue units.

Detailed principles of co-operation of plant mines rescue staff and a rescue unit, organised co-operation of rescue workers from several plants and

commissioning of rescue services as a whole or in part to a rescue unit are governed by relevant civil and legal agreements.

The plant running open-pit operations that does not have any underground workings and there is no chance for the environment unsuitable for breathing to occur is allowed to meet the obligation of ensuring mines rescue by commissioning the rescue services to entities other then mines rescue units but professionally involved in providing assistance in the cases when human life/ health or property is in danger.

3. ORGANISATIONAL STRUCTURE OF MINES RESCUE

The Polish mines rescue is made up by:

- plant rescue workers,
- Central Mines Rescue Station and other entities professionally involved in mines rescue referred to as rescue units.

These entities are obliged to provide immediate assistance in the event of any risk to the life or health of mining plant staff or other people on the premises of a mining plant, and threat to the safety of mining plant operations particularly when it is caused by fire, gas or coal dust explosions, breakout, flooding, caving, rockburst, blow-out or power/mechanical failure.

3.1. Plant Mines Rescue

Plant mines rescue covers plant rescue brigades operating in specific mines and colliery mines rescue stations.

In Poland, there were in coal mine (31.12.2002:

- 48 colliery mines rescue stations,
- 2 mines rescue centres,

A plant rescue brigade consists of: brigadesmen, rescue equipment operators, a rescue brigade leader and his deputies. Moreover, a plant rescue brigade is also staffed with the persons having special qualifications (experts) in combating mining hazards and managing rescue operations appointed by a plant operations manager.

The membership in a rescue brigade is voluntary. A person who meets the following criteria may become a brigadesman:

- finish 21years,
- at least one year of experience in a mining plant in a given area of expertise,
- adequate health and professional/ physical/ mental predisposition,
- successfully completed mines rescue training.

A number and staffing of a rescue brigade in a mining plant is decided by a plant operations manager in view of the type and extent of mining hazards that occur in a given plant and a number of underground workers per day.

A number of brigadesmen in a plant rescue brigade cannot be less than:

- 15 brigadesmen in a mine with the underground staff of up to 500 employees per day,
- 50 brigadesmen in a mine with the underground staff of 501 – 2000 employees per day,
- 80 brigadesmen in a mine with the underground staff of more than 2000 employees per day.

Rescue brigades are split into rescue teams that are smaller groups of brigadesmen that may conduct some rescue work on their own. A rescue team may not be further divided and consists of a team leader and four brigadesmen.

Colliery rescue brigades are basic executive units and support the entire mines rescue in the Polish mining industry.

The current number of brigadesmen in plant rescue brigades were about 7500.

Basic responsibilities of the mine rescue brigades:

- to conduct rescue operations in mines,
- to maintain – with respect to the hazards that occur in mines – adequately prepared and equipped professional teams,
- to exercise due care about adequate amount and quality of the rescue equipment as well as continuous usability of the entire equipment,
- to improve and enhance the skills of brigadesmen both in terms of their professional qualifications as well as rescue performance,
- to conduct preventive work of different type in mines,
- to maintain rescue teams fully prepared to respond to an emergency in mines during every shift,
- to participate in rescue emergency service in district mines rescue stations in line with the agreed timetable,
- to provide immediate assistance upon the command of any mining plant.

To ensure a fast response of mine rescue brigades to any emergency incident in underground plants mining combustible minerals, there are rescue teams on duty (one to three) during every shift on working days and holidays. A number of these teams is determined by plant operations manager.

In the cases justified by the requirement to ensure labour safety, mining plants maintain professional rescue teams to perform the tasks that require spe-

cial skills particularly in operating professional equipment and devices during rescue operations.

3.2. Rescue Units

At present, there are four entities professionally involved in mines rescue (rescue units):

1.	Central Mines Rescue Station in Bytom	- run as a state entity provides rescue services to plants mining coal and other minerals,
2.	Borehole Mines Rescue Station in Cracow	- established as a rescue provider to Polskie Górnictwo Naftowe i Gazownictwa S.A., [Polish Oil and Natural Gas Industry] provides services to plants mining and searching for oil and natural gas,
3.	Mine Rescue Unit Ltd. in Tarnobrzeg	- provides services to sulphur mines.
4.	Mine and Steelworks Rescue Division/Unit KGHM Polska Miedź S.A. Lubin	- established as a service provider to KGHM Polska Miedź S.A., provides services to copper ore mines, brown coal and minerals mines.

Every rescue unit has to meet the requirements required to conduct mines rescue services including availability of rescue teams and professional emer-

gency services on constant duty as well as availability of equipment necessary to perform the required tasks

Apart from provision of immediate assistance to mining plants, the rescue unit responsibilities include in particular:

- organisation and delivering training courses on mines rescue,
- mines rescue exercises,
- medical examination of brigadesmen,
- testing and evaluating rescue equipment,
- professional chemical analysis of air samples,
- meeting the liabilities under agreements concluded with other parties.

Central Mines Rescue Station

The Central Mines Rescue Station is a state-owned public utility company. The Central Mines Rescue Station was established by the Minister of the State Treasury.

The Central Mines Rescue Station perform its duties using professional staff and mines rescue emergency services on duty in district mines rescue stations (rescue teams on duty for groups of mining plants and plant rescue teams on duty).

The Central Mines Rescue Station employs the total of 194 staff members; 113 employees work in field branches i.e. district mines rescue stations.

Rescue services that require the application of special rescue techniques is performed by professional emergency services in the Central Mines Rescue Station; they are as follows:

1/ measurement emergency service – to measure physical and chemical parameters of atmosphere and fire gases and determine the explosiveness of gas mixtures,

2/ mine atmosphere inertisation emergency service,

3/ fire and foam emergency service – to perform rescue work while fighting underground fires that require the application of equipment and devices to inject foams and isolate workings, rockbed and goafs,

4/ caving and drilling emergency service – to perform rescue work related to providing rescue services to people buried in rockfalls and trapped from operational workings as a result from rockburst or caving,

5/ water emergency service – to remove the effects of water inrush or uncontrolled inflow or water/ water and slime to workings,

6/ mobile rescue hoists emergency service – to evacuate staff or perform other rescue work in shafts or large boreholes and emergency and inspection/control work in shafts and large boreholes.

The organisational structure of the Central Mines Rescue Station (CMRS) includes 5 district mines rescue stations (DMRS) in Bytom, Jaworzno, Tychy, Wodzisław and Zabrze that are field branches.

Each DMRS maintains a constant, 24-hour duty of rescue emergency services.

The Bytom DMRS has a team made up of professional brigadesmen (professional rescue teams on duty) delegated from their mining plant for indefinite period of time. The team is staffed as follows:

- professional rescue team manager,
- 2 team leaders,
- 9 brigadesmen,
- rescue equipment operator who is a professional brigadesman,
- physician – brigadesman.

Rescue emergency services in the remaining DMRSs (rescue teams on duty for groups of mining plants) are staffed with the brigadesmen delegated from mines for 15 days. The teams are staffed as follows:

- rescue team manager,
- 2 team leaders, at least one person in charge of mining supervision,
- 9 brigadesmen,
- rescue equipment operator – brigadesman,
- physician,
- rescue unit professional qualified to perform rescue work.

These teams are equipped with adequate equipment and transportation means; they are obliged to go to a mining plant that needs rescue operations immediately upon their call

CMRS also has medical staff that includes physicians.

Properly organised system of duties allows these physicians to ensure a 24-hour readiness to participate in the rescue operations under the rescue teams on duty in the DMRS.

The Central Mines Rescue Station also operates professional medical service centre to perform medical examination of brigadesmen.

The organisational structure of the Central Mines Rescue Station as presented in details ensures as follows:

1/ compliance with the requirements for performing mines rescue services defined by the existing legislation addressed to the entities that are professionally involved in mines rescue (rescue units) including in particular:
   - availability of rescue teams on duty in DMRS and professional teams that enable to provide assistance in cases of any threat to human life or health or mining plant operations safety as a result of mining hazards,

- organisation and delivery of training courses in mines rescue and mines rescue exercises,
- medial examination of brigadesmen in the professional medical centres and medical service points in field branches,
- availability of mines rescue medical staff,
- testing and evaluating rescue equipment and analysis air samples in lab conditions,
- availability of organised dispatching services maintained on working days and holidays,
- availability of staff in charge of communication means and transportation means to transport rescue teams and professional teams with the equipment required in rescue operations,

2/ meeting the corporate obligations of a business enterprise (finance division and independent organisational units),

3/ proper operation of an enterprise in market economy conditions including provision of commercial services.

The Central Mines Rescue Station was indicated by the President of the Central Mining Authority as:

- a proper entity to develop a mines rescue training syllabus; mines rescue management, rescue brigades officers, rescue brigades members, physicians-brigadesmen, plant operations management and supervision employees who are not members of rescue brigades are required to complete such training,
- a proper entity to define the criteria for a professional medical service centre to perform medical examination of rescue brigadesmen,

- a training centre to organise professional courses on individual respiratory system protection equipment.

As indicated by the President of the Central Mining Authority, the Central Mines Rescue Station also performs testing and issues certification documents pertaining to the equipment and devices.

Under executed agreements, the Central Mines Rescue Station supports the operation of other rescue units with its professional resources.

4. SUPERVISION, MANAGEMENT, DECISION-MAKING AND RESPONSIBILITY IN MINES RESCUE

Supervision and control over mines rescue in mining plants is exercised by mining supervision bodies (article 109,110 GML). This authorities in respect of specific labour conditions in a given enterprise (i.e. in terms of the type of a mining plant, geological and mining conditions, mining hazards, etc), within the scope of their supervision and control they exercise, may exempt the enterprise, as a whole or in part, from the obligation of having organised mined rescue or a permanent option of having professional staff from the Central Mines Rescue Station involved in the rescue operations (article 75 GML).

These authorities may instruct the enterprise to make necessary changes in the organisation and equipment of the mines rescue.

The mining supervision bodies also exercise supervision and control over mines rescue units in terms of compliance with the provisions of the above guidelines of the Minster of Economy of 12 June 2001, they are appointed to exercise supervision over the preventive operations and rescue operations in a mining unit. So in case of emergency or accident in a mining plant, a state min-

ing supervision body may determine the actual status as well as reasons for the incident.

A plant operations manager is in charge of the mines rescue status within a mining plant.

In the case of rescue operations in a mine, the mine management must organise and manage the operations and take full responsibility for an efficient and safe course of rescue operations.

Rescue staff involved in the operations, regardless to their organisational level, are fully subordinate to the decisions of the rescue operation manager. The rescue operations as a whole are managed solely by a mining plant operations manager or his deputy. The rescue staff from rescue units have advisory functions in the Operations Staff or in the rescue headquarters underground.

The responsibility of the rescue staff is to perform all the work that has to be accomplished to liquidate the hazard in compliance with the plan developed by the rescue operations manager.

All and any work related with removal of adverse effects of an event performed in the noxious gas exposure may be undertaken only by mines rescue brigadesmen.

Ancillary work related to the rescue operations, but performed outside this zone, may be undertaken by other mine workforce.

In special cases, the rescue operations manager has a right to make decisions pertaining to performance of rescue work in default to the principles defined in the effective regulations if he decides that it is required for the safety of people or the mining plant. He is solely in charge of making such decisions; they have to be in line with the existing principles of the mining practice.

There is no-one who would have a better understanding of the current situation in a mine, its ventilation system design and other matters than man-

agement and supervision people working full-time in a given mine. These people are most likely to make optimum decisions during rescue operations.

Efficient rescue operations management many a time depends on the understanding of these matters.

Therefore, delegation of decision-making competence to the people who know the environment of the rescue operations appears to be a right approach.

A rescue operations management system based on delegation of rescue operations management responsibility to a plant operations manager who conducts the rescue operations is fully justified. The efficiency of this rescue operations management system has been confirmed by tens of years of experience gained by the Polish mining industry. Thousands of rescue operations were carried out over this period; the final results of these operations were, in most cases, assessed as appropriate and most optimum to be achieved in given conditions.

Detailed principles of operation have been agreed for managing rescue operations. They apply to both the technical practice as well as organisational and strategic issues. They regulate the approach of both the people who are obliged to manage rescue operations and the ones who are to act closely on the hazard liquidation plan.

It is obvious that simultaneously with uniform principles, there must be mining-hazard-specific ones.

Every mining hazard is generated by specific situations that decide on the necessity to make adaptation steps taking account of their unique nature.

The hazards may be uniform, but every incident has some features that make it impossible to apply standard schemes. Many a time they require fully innovative decisions and an approach that incorporates courage and skills to undertake professional risk.

They require the decisions be made quickly but thoughtfully without exceeding acceptable risk limits.

The notion of rescue operations management is applied while managing rescue operations.

This should be understood as the employees of a mine and competent external institutions that are able to provide advisory services to the decisionmakers.

The notion of a rescue operations management does not violate the notion of a rescue operations manager and his one-person decision-making powers.

It provides a profile of a management level during rescue operations that, regardless of the executive instructions, is in charge of development of modes of operation, adopts them to specific and fluctuating situations, recommends specific optimum solutions to a rescue operations manager, analyses situations to determine the steps that should bring maximum results.

The rescue operations management construed in this way includes the following functions:

- rescue operations manager,
- underground rescue operations manager,
- rescue headquarters manager.
- Rescue Operations Staff.

These functions fully reflect all and any issues that need to be addressed during rescue operations. It is represented by the responsibilities of specific functions.

The way of addressing the issues (in a decision-making area, executive area or advisory area) has an implicit impact on the results and safety of the rescue operations.

The rescue operations management level at which a relevant decision is made or method or action is developed does not matter. Each of the above levels is obliged to undertake any effort to make such decisions and act on them while following a one-person management principle.

Such understanding of the responsibilities by all rescue operations management is inevitable. Such understanding prevents a misconception that an unquestionable principle of one-person management should make the decisions be made by only one person.