

Activity and organizing the Emergency Mine/Smelter Rescue Service at KGHM Polska Miedź S.A.

1. Introduction

KGHM Polska Miedź S.A. is a world metal tycoon dealing with production of copper, silver and other non-ferrous metals. The company has rich deposits, mines and production plants in Poland, the USA, Canada and Chile. Over 50 years of experience, qualified personnel and company expertise offer unique opportunities, which allow KGHM to successfully respond to the challenges of the 21st century.

The Emergency Mine/Smelter Rescue Service is a department of KGHM Polska Miedź S.A., which provides comprehensive aid in removing the effects of rock bursts, roof falls and fires and ensures safety of people and facilities within the process line.

The Emergency Mine/Smelter Rescue Service was established on 1 January 1997. It was composed of the following: District Mine Rescue Station together with the Specialist Medical Examination Centre in Sobin, the Company Professional Fire Service at 'Lubin' Mining Plants and the Company Fire Service at 'Głogów' Copper Smelter.

2. Organisation and responsibilities of the Emergency Mine/Smelter Rescue Service

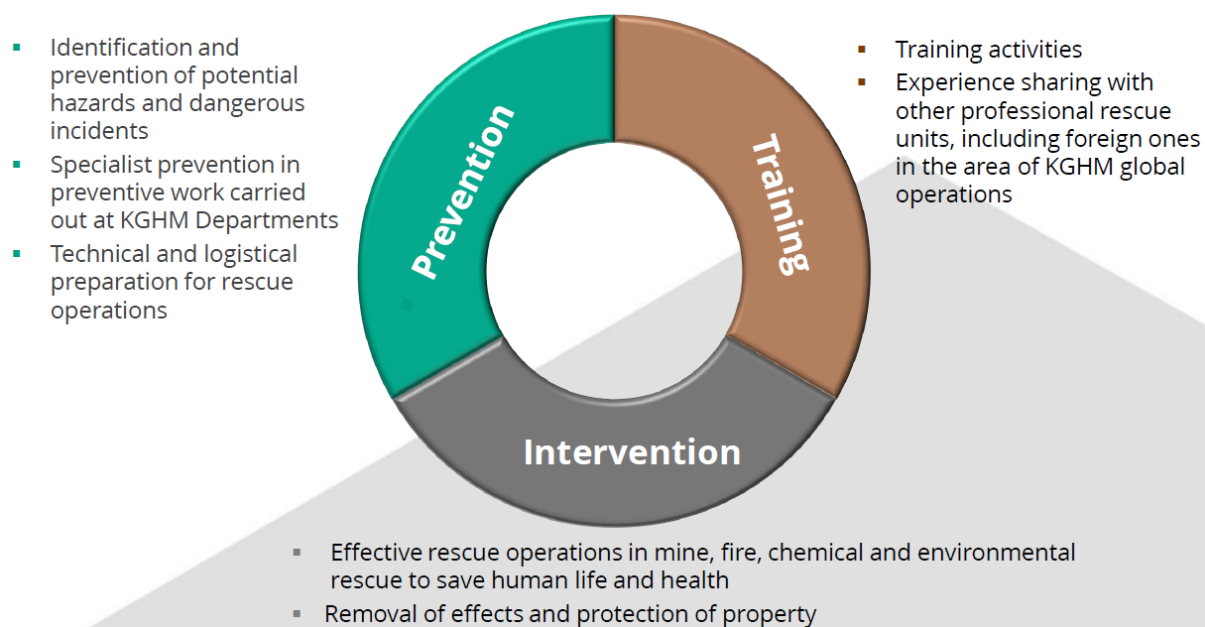
The Unit employs 114 people, including 81 firefighters and 14 professional mine rescuers. Their operations are continuously supported by ca. 400 highly-trained volunteers, who work as underground miners in their day-to-day jobs and are familiar with the working conditions underground.

Emergency Mine/Smelter Rescue Service is composed of three divisions:

- Division I – Fire Department based at 'Głogów' Copper Smelter, specialized in fire, environmental and chemical rescue;
- Division II – Fire Department based at the shafts of 'Lubin' Mining Plants, it is responsible for fire and technical rescue; a branch of this Division is situated at 'Legnica' Copper Smelter;

- Division III- **Mine Rescue Service** in Sobin, which is continuously on duty to ensure safety of KGHM mine workers.

Fig. 1 Responsibilities of the Emergency Mine/Smelter Rescue Service



2.1 Fire Service Complex

Fire Service Complex is an organizational unit in the structure of the Emergency Mine/Smelter Rescue Service of KGHM Polska Miedź S.A. subordinated to the Director of Emergency Mine/Smelter Rescue Service in Lubin, who decides about its organization and headcount. At the moment, it employs 81 firemen – rescuers, who meet the requirements in terms of education, professional qualifications and psychophysical fitness specified for particular positions in the fire protection units.

The basic tasks of the Fire Service Complex include:

- rescue operations during fires and other natural disasters,
- technical rescue operations,
- chemical rescue operations,
- environmental rescue operations,
- medical rescue operations.

2.2 Mine Rescue Service

A unit that is professionally involved in mine rescue, i.e. Division III of Emergency Mine/Smelter Rescue Service – the Mine Rescue Service (MRS) is based in Sobin, it secures all copper ore mining plants grouped in KGHM Polska Miedź S.A. and additionally 'Nowy Łąd' Gypsum and Anhydrite Mine, which falls within the area of MRS operations.

The basic tasks of the Mine Rescue Service include:

- immediate help in case of life or health risk to mining plant workers and other people present at the mining plant, and also in the case of threat to safety of mining plant operation, in particular, as a result of various types of hazards.
- organizing and providing training in mine rescue,
- carrying out exercises in mine rescue.

The Mine Rescue Service performs its responsibilities by means of rescue teams on duty for a group of mining plants. The composition of 3 rescue teams that are on duty 24 hours a day includes rescuers delegated from mining plants of the entrepreneur for an eight-day period.

The composition of the rescue teams on duty includes:

- MSRU Specialist (professional mine rescuer) 1 person
- Team Leader 1 person
- Patrol leader 3 people
- Rescuers 12 people
- Rescue equipment mechanic 1 person
- Rescue doctor 1 person
- Driver 1 person

420 mine rescuers employed at Mining Plants of KGHM Polska Miedź S.A. are constantly at the disposal if there is a need of rescue operations. These are employees selected in terms of health and physical conditions with various professional specializations, who have successfully completed the mine rescuer course and were included in the composition of the rescue team by the Manager of Mining Plant Operations.

Further, specialized sections are present in the structure of MSRU. One of them are rope rescue technicians, trained by the rescuers from the Mountain Volunteer Rescue Service and the Tatra Volunteer Rescue Service (rescue service working in vertical and high slope excavations). The second group are divers, trained to act in the most difficult underwater conditions. In addition to rescue and preventive activities (not just mine

rescue, but also chemical, environmental, technical and fire rescue, as well as removing effects of fire, rock burst, roof fall, water inrush, energo-mechanical failures, and technical, chemical and environmental emergencies and failures), the rescuers, by means of performing preventive work, also secure trouble-free production in the process line. In 2012, the divers helped, *inter alia*, in removing failure in the Ore Enrichment Plants, in 'Polkowice-Sieroszowice' Mining Plants or in replacing bars on water intake manifolds on the river Oder in the Copper Smelter 'Głogów'. Rope rescue technicians carry out, *inter alia*, preventive work that involves cleaning of retention tanks, shafts and inspection of enclosures.

Further, MSRU is provided with modern, specialist rescue equipment to carry out roof fall operations. Rescue teams are equipped with:

- air cushions and Holmatro heavy hydraulic equipment
- DARDA rock splitters,
- Dräger air or oxygen self-rescuers,
- CPS 7800 gas-tight suits, in which rescuers can work in an environment of poisonous gases,
- drainage pumps – as a minimum mobile Towerlight pumps on trailers with capacity 5.8 m³ /min.
- Kirby Morgan, Broco and Interspiro specialist diving equipment.

The Dispatching Unit of the Mine Rescue Service is on duty 24-hour a day. When the rescuers are called for action by the Mining Plant, the worker of the dispatching unit records the request and starts emergency procedure appropriate to the type of action. The MRS Dispatching Unit also provides services to the Fire Service Complex.

2.2.1 Medical service

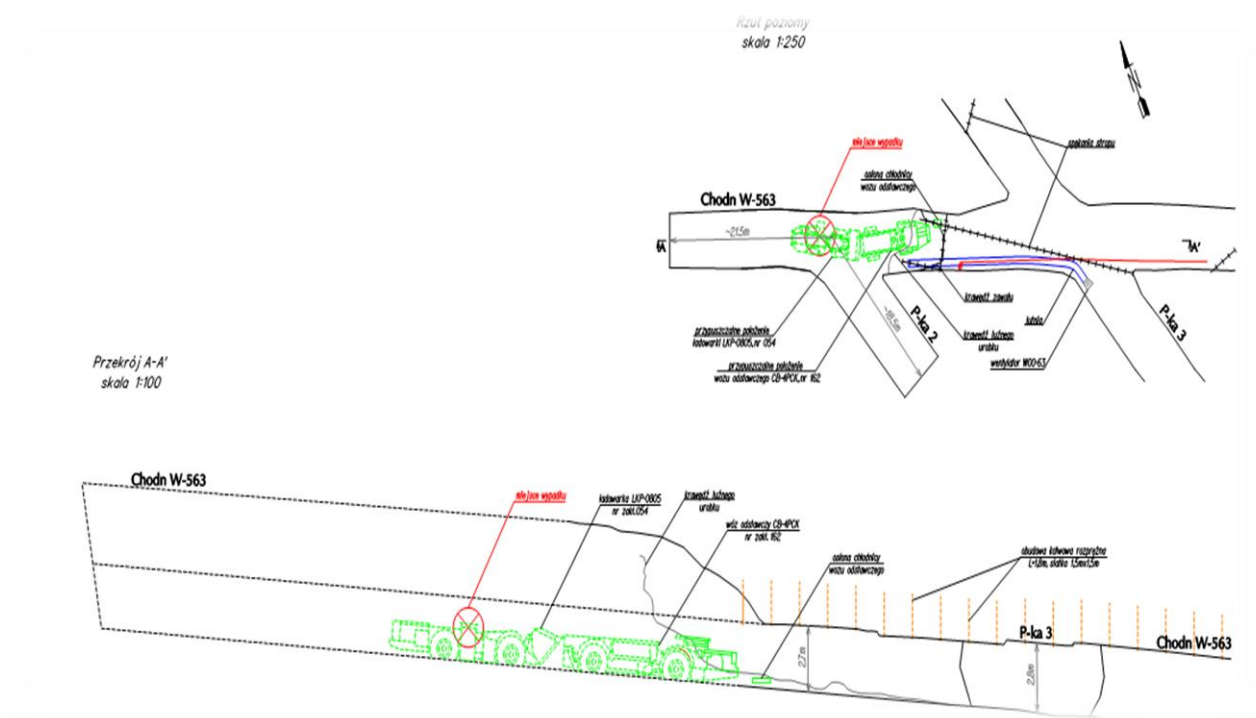
In its organizational structure, MRS in Sobin also includes the Mine Rescue Medical Service. The responsibilities of the medical service include:

- medical examinations of mine rescuers starting duty at MRS,
- outpatient care of mine rescuers, who are on duty at MRS,
- medical assistance to all participants of the rescue operations,
- checking the state of mine rescuers' health immediately before and after the operation,
- participation in rescue operations,

- medical examinations of mine rescuers to determine the state of rescuer's health,
 - operation of decompression chamber by doctors with appropriate license in this area.
- Further, medical facilities for rescue teams are also provided by the Copper Health Centre in Lubin equipped with the state-of-the-art equipment and employing emergency medical service specialists.

3. Roof Fall Operation at 'Lubin' Mining Plants

During the work of shift III, rock masses fell above anchors (ca. 2.5 m), when the excavated material was loaded by the loader to the haul truck. The area of the incident included crossing of W-563 heading with P- 2 cross-cut surrounded by such rocks as dolomite at the roof and sandstone at the floor. As a result of fall, the haul truck and loader were buried. The operator of the haul truck got out of the truck unassisted and without any injuries. The operator of the loader was trapped in the cabin under the rubble. The operator of the haul truck, who managed to get out of the truck unassisted, informed the mechanical foreman about the incident, who immediately notified the dispatcher. The rescue action to release the casualty was started at 21:30. During the operation, voice contact with the entombed operator was kept all the time. The operation was participated 7 rescue teams. The rubble was removed manually by the rescue teams that were changing on an ongoing basis. Duct system of ventilation was connected to the entombed loader and the casualty was provided air from air cylinder. The casualty actively supported the rescue operation by loosening 6 screws to the evacuation hatch. During the rescue, at the time of about 1:15, the rescue operation was stopped due to difficult roof conditions, i.e. falling of fine debris, the rescuers were withdrawn to a safe place outside the danger zone. After waiting to about 1:30, the rescue operation was restarted. At 2:40, the casualty was released. He left the loader through the evacuation hatch in the roof of the cabin. The rescue operation was finished at 2:50. After release from the cabin, the operator of LKP 54 loader was taken over by the rescue doctor, who stated that the general state of his health is good and without clear traces of injuries on his body. The doctor decided that the casualty should be taken to the Regional Health Centre in Lubin for observation. The cause of the accident was an inherent roof fall.



4. Fire-Fighting Operation at 'Lubin' Mining Plants

The fire of LKP-0805 wheeled articulated loader went out on shift IV lasting between 22:30 and 6:00. When driving the loader, the operator noticed fumes, and then fire coming out of the engine compartment. He stopped the loader and after the engine has been turned off, manually started the initiator of the fire-extinguishing system fixed in the operator cabin. Seeing that activation of the fixed fire extinguishing system has not put out the fire, he proceeded on to extinguishing with hand operated fire-extinguishing equipment. Despite the use of fire extinguishers, the operator failed to put out the fire. Using DOTRA communication system, he notified the mine dispatcher of the fire, who designated the danger zone and sent out alarm signals through the dispatching communication system about withdrawal of the crew from the danger zone and called the rescuers from the Mine Rescue Service. The crew consisting of 132 people withdrew unassisted to the designated safety gathering points, no one has been injured, and no self-contained escape apparatus have been used. At 0:50, the rescuers went to the fire area, where they started to actively extinguish the fire. The firefighting operation was alternately participated by 3 MRS teams and 1 team of 'Lubin' Mining Plants. The rescuers connected to 225mm diameter flushing-water pipeline and started active

extinguishing. After the fire has been put out, composition of the mine atmosphere analysed by means of gas and climatic conditions analysers and positive results obtained, the head of the rescue operation finished the action at 3:53.

The fire destroyed excavation timbering and devastated the roof and side walls of the rock structure, it caused collapse of various size rock blocks from the roof and destroyed external insulation of power and telecommunication cables and wires.