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## **JRGH, an important link in Polish mine rescue system**

### **1. Tasks and Structure of mine rescue system in Poland**

The Act "Geological and Mining Law" established in 1994, novelised in 2001 and following the Act executing rules in mining rescue area define: the task, the organization, the requirements regarding equipment needs and rescuers competences, the training needs and the way the rescue operation are to be performed. The main purpose of the mine rescue organization is to administer first aid to miners involved in catastrophic events like: rock bursts, fire, methane and/or coal dust explosions, roof-falls, water irruptions, etc. Mentioned above Act has opened possibilities for new forms of organization in Polish mine rescue system structure which is considered now more flexible. In Poland mine rescue organization depending on mine's hazards classification is based on:

- local mine rescue units and teams,
- local mine rescue station,
- four specialized mine rescue companies (Central Mine Rescue Station (CSRG) in Bytom, Mine and Smelter Rescue Company (JRGH) in Lubin, Gas and Oil Rescue Station Company in Krakow, District Rescue Company in Tarnobrzeg.

These Companies in co-operation with particular mine units (owned by mine operators) create an adequate rescue organization which covers all needs in the rescue field for coal, copper, sulphur and oil and gas mining industry.

Generally, the Rescue Stations of mentioned Companies are seats for emergency group quartering, base for training and technical equipment storage place.

### **2. Mine and Smelter Rescue Company in Lubin, (JRGH)**

JRGH is the subsidiary company of KGHM POLSKA MIEDZ S.A. and composes a part of the Polish mine rescue system serving copper mines, anhydrite mines and

brown coal mines located in the South - West part of Poland. The mine rescue system in the South West part of Poland is composed on two levels:

1. Rescue units in each mine.
2. JRGH Emergency Station.

More than 400 volunteer rescuers coming from different mines participate in rescue activities and emergency services in this station. JRGH teams are equipped for the following disasters and events:

- rock bursts and roof falls,
- flood (with diving equipment),
- emergency shaft and alpine works,
- fires.

All the time three teams of rescuers from one of the mines are quartered (gathered) in the emergency service staying for period of one week at the Rescue Station located in Sobin, not far from all copper mines. This means that every rescuer goes for emergency service at least twice a year.

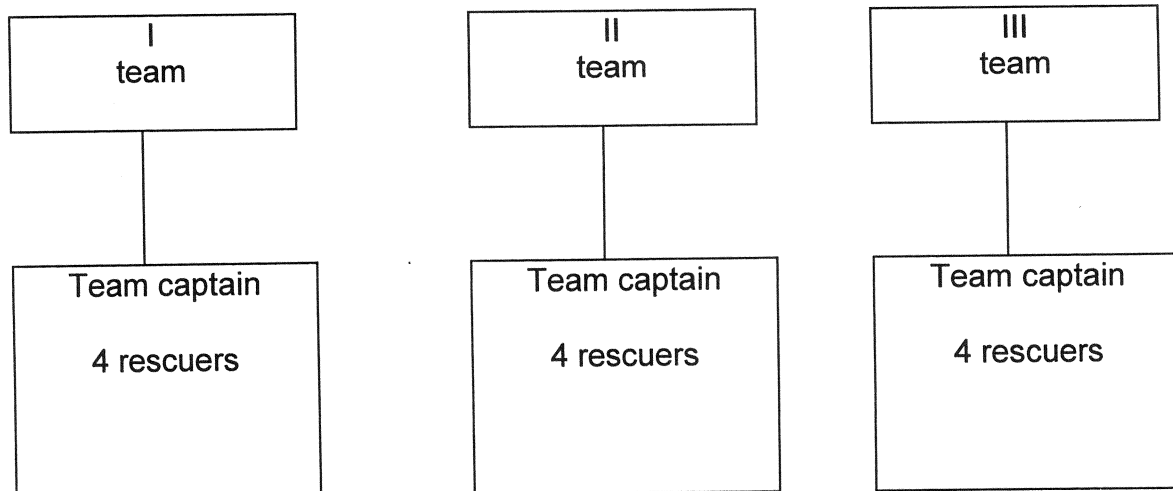
Organization and structure of the rescue system as described above has been developed within 30 years (from the very beginning of KGHM) and is functioning effectively.

### **Scheme of functioning of JRGH Rescue Station**

Station structure:

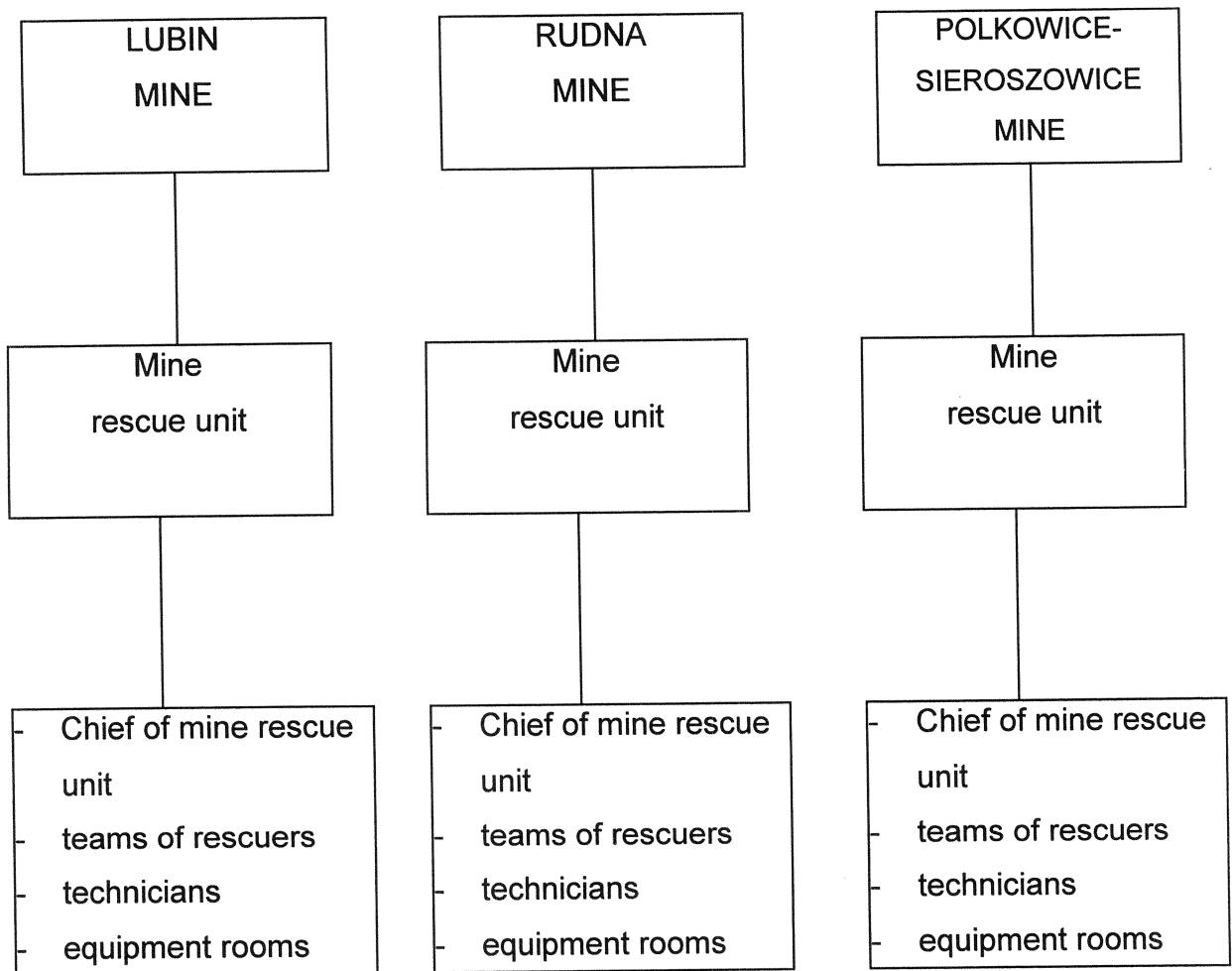
1. Managing Director and his deputy.
2. Maintenance Technicians.
3. Physicians –rescuers
4. Rescuers in emergency service from mines – emergency group

Emergency rescue group quartered in Station



## KGHM copper mines rescue units

(each mine provides teams of rescuers for emergency services)



### 3. Organisation of mine rescue units

Each mine has its own rescue team(-s) and a properly equipped mine rescue unit (mine station).

The mine rescue unit consists of:

- chief of the unit and his deputy,
- maintenance technicians for rescue equipment,
- rescue teams with members of a different specialisation.

The rescue team consists of five members:

- Captain,
- Four rescue workers,

Rescue teams are under command of a mine rescue unit chief. The chief of the mine rescue unit is designated from within the mine managing staff by the mine

manager. The chief of the mine rescue unit is not allowed to fulfil other duties in the mine. Selection of rescue workers in a unit and their duties are strictly defined by regulations. Some of the criteria of the selection are: background in underground work, organism efficiency as determined by medical examination, psycho-physical predisposition, specialist training as well as professional experience. Numbers and structure of the rescue teams are determined by the mine manager on the basis of existing hazards.

#### **4. Equipment in mine rescue unit**

Mine rescue units and stations are supplied with proper basic and auxiliary equipment suitable to existing hazards and category of the mine rescue unit. All above mentioned rescue teams are properly equipped and prepared for standard rescue operation like disasters after rock burst, fires etc. They cover of 90% needs of typical emergency services. There are also two special purpose teams in JRGH, equipped with necessary devices and accessories.

The first is the diving team, the second is the alpine team. The diving team takes part in the under water operations in mines and on the surface.

Because of very good and versatile experience our rescue teams were sent many times abroad to fight disaster ravages JRGH teams took part in rescue action after the catastrophic earthquake in Armenia in December 1988, and twice in Turkey in 1999. The need for information system to co-ordinate rescue operations in such cases has just been and should be again discussed during international conferences and meetings.

#### **5. Rock burst and other hazards**

The main hazards in South West region of Poland in underground mines are:

1. rock bursts and roof falls (copper mines),
2. fires,
3. water infusion.

There are many factors causing a rock burst and a roof fall in the copper basin.

These are the hazards most likely to involve JRGH forces into rescue activities.

Rescue operations in copper mines mainly cover events related to rock bursts and roof falls events . Together with a growing exploitation depth from 600 m to 1200 m and increasing size of excavated area, roof falls and bumps as well as rock burst hazards have become more frequent. Both of the two last factors with occurrence of

rocks prompt to accumulate energy make this phenomena more and more powerful energetically.

In the case of rock burst or roof fall the first purpose of the rescue operation is immediate localization and attainment to trapped and/or injured miners with rescue team. There are many ways to achieve a goal. The simplest is a voice contact (useful in lucky situation when trapped miner is conscious). It is a rule that each miner has own lamp containing a small GON transmitter with own personal frequency cod. During operation, rescue teams use OLPI system to localize particular signals coming from buried in rocks miners and their lamps. An infrared camera may often be used in the search of "warmer" points under rocks. These may be human bodies or engines that may help to determine positions of machines and drivers.

As our trials were sometimes unsuccessful to determine positions of miners, in the last period, simulations with the use of dogs were carried out to find the clothes of "buried people". Trials took place at the depth of 1000 m underground, at temperature of 30° C and above and 90% humidity. Tests were very positive and the method is to be developed and put into practice.

After localization, according to needs simple means are used, such as pickaxes and crowbars, and/or more sophisticated means such as HOLMATRO hydraulic and pneumatic tools, LIFTON drills, DARDA cylinders for crushing rocks without explosives and LHD loaders.

Fires in metal and non metal mines are exceptional , however, if not extinguished in the early phase they could be very dangerous. A large amount of air and its high velocity in the main ventilation drifts can easily contribute to a high concentration of smoke and hazardous gases within some regions of mine. The most frequently used method to fight the fire is active extinguishing. Rescuers are equipped with Polish breathing apparatus FAZER W-70. All miners are equipped with rescue apparatus Dräger OXY K-50S.

The potential sources of fire such as diesel machines, fuel and grease rooms and belt conveyers have to have built in extinguishers. Despite performed every year prevention activities there are still noticed occurrences of fires. The ventilation's scheme of copper mines depending on large number of drifts and shafts and the large number of workings existing in room and pillar exploitation system in some

occurred fires has made rescue operation very complicated and showed to us necessity to follow specific training for miners, rescuers and mine's managing staffs. To achieve this goal State Mining Authority supervises preparedness in each underground mine for fire disasters once a year. For this purpose employees of Mining Authorities prepare "fire problems" and then supervise and check rescue training carried on during simulated (with dense smoke) fires.

Water is a rather technical problem because in some mines the continuous infusion is 25,0 m<sup>3</sup>/min. JRGH teams are equipped with movable pump units and sets of pipes ready to carry out rescue operations everywhere.

KGHM Polska Miedź S.A. is a company with deep traditions, rich in experience and numerous achievements. It is enough to mention that in 2001 we celebrated the 40<sup>th</sup> anniversary of the founding of KGHM, and a year later the 45<sup>th</sup> anniversary of the discovery of the copper deposit by Dr Jan Wyżykowski.

KGHM Polska Miedź S.A. is above all one of the largest companies in the world involved in the production of refined copper and silver. In 2002 KGHM produced 508 674 tonnes of copper (3.4% of world production, 6<sup>th</sup> place globally). This is mainly electrolytic copper, referred to as "four zeros copper" because of its quality (99.99 percent pure copper) and the more highly-processed wire rod, produced in accordance with the ISO 9002 norm. The cathode copper produced by the Company is registered as "Grade A" by the London Metal Exchange.

KGHM Polska Miedź S.A. is also amongst the world's top four silver producers - in 2002 silver production amounted to 1 192 tonnes (2nd place globally) - the silver being recognized as "Good Delivery - Silver" and traded both on the London Bullion Market as well as on the London Metal Exchange (the world's largest market for non-ferrous metals). Thanks to this the silver produced by the Company may be used in bank settlements. Other products of KGHM include: gold, lead, sulphuric acid, rock salt, and others.

## **Production results for 2002:**

Electrolytic copper	-	508 674 tonnes
Metallic silver	-	1 192 139 kg
Other products:		
Metallic gold	-	296 kg
Crude lead	-	17 552 tonnes
Sulphuric acid	-	564 100 tonnes
Copper sulphate	-	6 953 tonnes
Nickel sulphate	-	1 955 tonnes
Technical selenium	-	68 tonnes
Slime Pt-Pd	-	34 kg

The production of non-ferrous metals in KGHM is performed in three mining divisions (ZG Lubin, ZG Polkowice-Sieroszowice and ZG Rudna), two smelting/refining facilities (HM Legnica and HM Głogów), a copper wire rod plant (HM Cedynia) and a precious metals plant. Copper resources in the Copper Belt are estimated at 33.5 mln tonnes. This is one of the largest single deposits of this metal in the world. Current mining of this deposit is done at a level of from 650 do 1150 m. KGHM will be in a position to mine at a level deeper than 1150 m in a decade or so. Initiating mining at deeper levels requires the solving of problems connected with higher temperatures, which affects mining costs.

