
„Intervention of Divers Underground“

Diving team HBZS

Central Mine Rescue Station Ostrava

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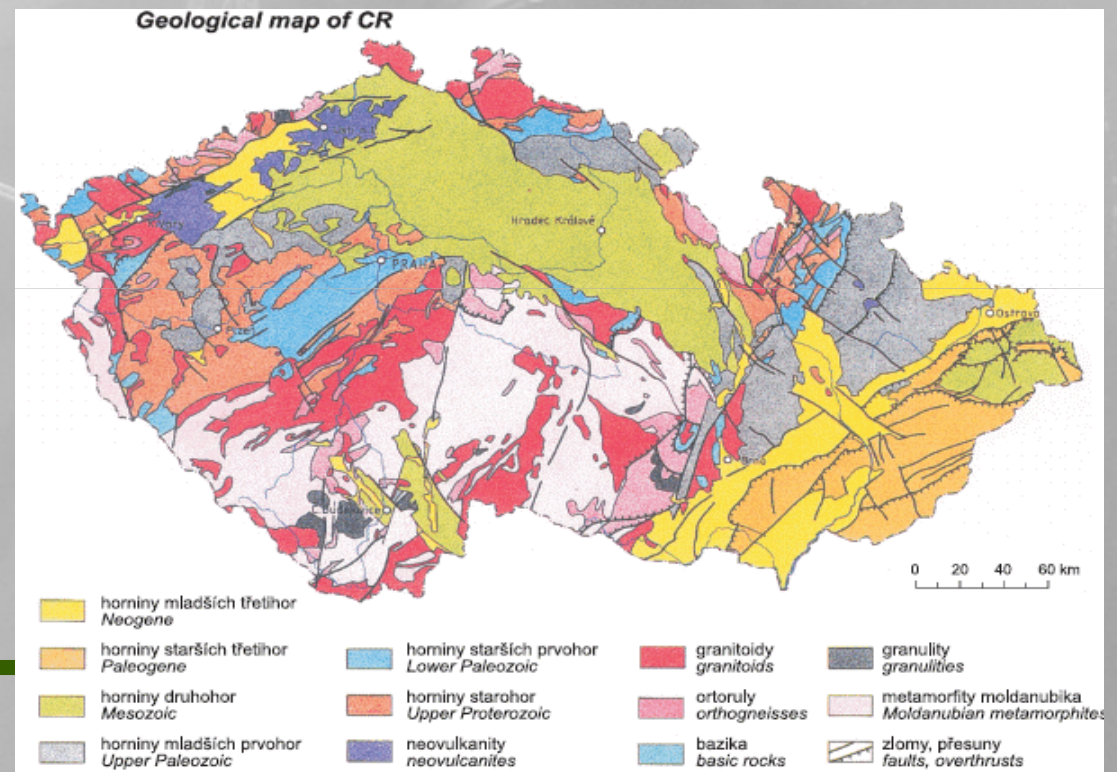
Diving team HBZS Ostrava

- Reason for a team establishment
- The team establishment
- Structure of the diving team
- Team equipment
- Education and Training
- Diving problems in mines
- Examples of rescue actions and various operations
 - Specifications of rescue operations in deep mine environment



Hydrogeological proportions OKR

In active OKR mines is a part of mining activity done in the neighbourhood or subsoil of main local hydrogeological structure, known as DETRIT. It is a plant hydrogeological area, huge about 200m, area dimension about hundreds of km² with a water pressure up to 7 MPa, with a water supply around 3 billions m³.



DETRIT

- What is DETRIT - water horizon

soaked and gas contained crushed ground layers and rubble

Other complications in OKR is -

source of many springs of mineral water. Their origin is either from detrit area or from the sand layers.



Accidents in OKR caused by floods from the detrit in the mines

History:

- * Water flood on the coalface of Eduard Urx Mine 7.1.1963 :
(9 affected, 1 rescued)
- . Water flood after demolition job on the coalface on CSA Mine 4.8.1964 : 5 miners in danger (all rescued), flooding of the whole level in the 19. coal seams
- * Water flood of a base material in liquidate windy shaft in Zápotocký Mine 11.11.1966: (4 affected)
- . Flooding of the Bedřich shaft



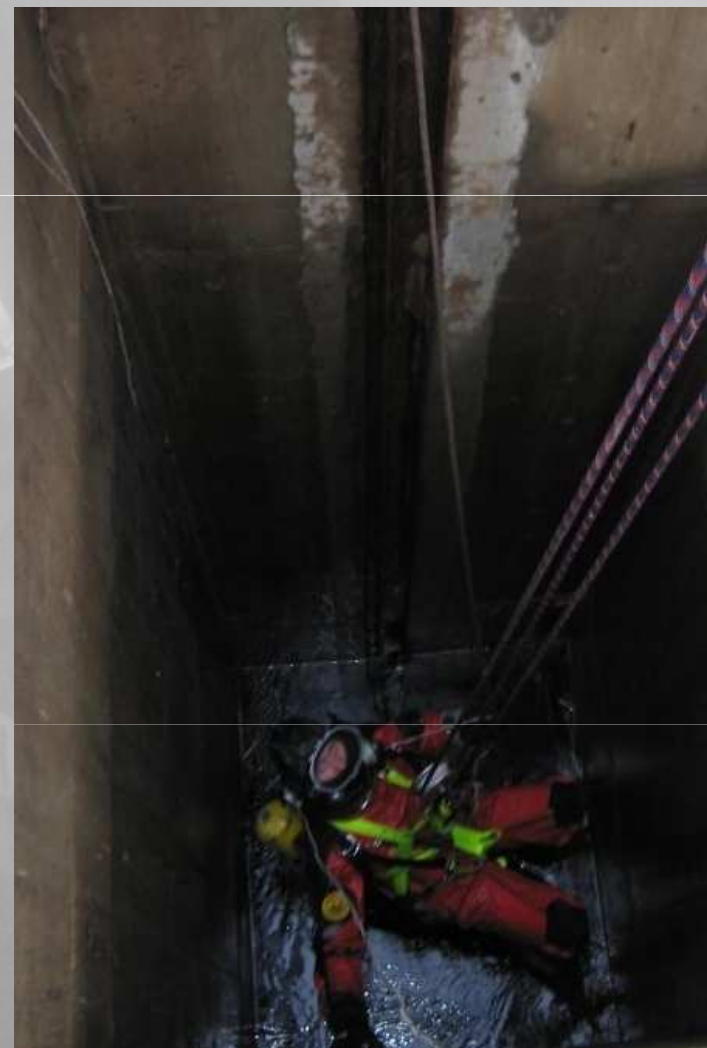
Establishment of the diving team in HBZS Ostrava in 1963

- The first 12 rescuers – divers were educated
- From 1963 until 1964 were done 8 complicated rescue actions (January in 1964, rescue action by saving mining construction from the depth of 43 m under the surface)



Main role of HBZS Diving team is

- Rescue people during the accidents caused by flooding water
- Manage the work during the flooding accidents
- Rescue people or property in the scope of integrated rescue system
- Discharge other assignment during the work under the surface



Legislation:

- Is included in the HBZS code system and regulation of ČBÚ - Czech mine department bill # 447/2001
- Current divers are periodically re-educated and train according to the methods HBZS code system, most of them dive and are qualified in well-known world organizations - IANTD, CMAS, PADI etc.
- The medics are also educated in the advisory centre for divers in the diving medicine
- 1 medic works as an external consultant for Hyperbaric Medicine Center of Municipal Hospital Ostrava and is a member of medical commission of Czech divers association



Current structure of HBZS diving team in Ostrava

- 8 mine rescuers – divers
- 4 leading sergeants of diving squads
- 4 diving equipment mechanics specialized in deco chamber, Air compressor etc.
- 4 doctors –rescuers educated and trained in diving medicine
- 2 leaders – divers



Current structure of HBZS diving team in Ostrava

- Technical guarantee of the education: Active divers

- MUDr. David Skoumal
Instructor Trainer IANTD for
Trimix, Nitrox, Technical Wreck and Cave
- Instructor CMAS, DAN, CSS, IWD

Jaroslav Provázek
Chief Mechanic HBZS
Chief of diving team

CMAS, AEAN IANTD Diver



Diving Equipment in HBZS

- Multi-purpose rescue vehicle Mercedes UNIMOG equipped by decompression chamber HAUX Profimedicom 5,5
- Departure in 60min in case of the urgency of the HBZS station



Diving Equipment in HBZS

- Heavy diving suit with helmet Dräger DM 220
- Light diving equipment Dräger PA-38, MODULAR with light flexible hood



Diving Equipment in HBZS

- New diving equipment - model HBZS contains cylinders 2 x 6l/300 bar, special manifold for two independent breathing regulators Apeks DST4 with full-face mask Dräger Modular and back up regulator Apeks, stainless backplate and safety stainless cage with BCD LOLA



Diving Equipment in HBZS

- Viking Heavy Duty rubber dry suits designed for extreme conditions in contaminated water with dry gloves provided with Check up connection systém, with the possibility to inflate Argon to improve the thermal insulation
- Diver's head is covered by Draeger soft light hood from resistant and durable rubber with a full face mask - this is necessary for diver's comfort and flexibility.
- The hood is provided with telephone and second stage of Draeger breathing regulator



Diving Equipment in HBZS

- Solid connection with the surface coordinator with help of the carrying telephone cable, air hoses and signal ropes



Special equipment

ROV - Remote operate vehicle Colombo Mini Rover MK-II
Benthos



Max. depth: 150m
Achieved during the
descent in Hranicka
abyss



Special equipment HBZS

- Pneumatical drilling machines and hammers
- Burning set - exothermal sticks, carbon sticks
- Air Lift bags
- Air ejector
- Personal cutting and chop tools



Training of the HBZS divers

- Yearly, 5 training days under the ice



Training of the HBZS divers

- Yearly, 6 training days of diving into the depth of around 40m



Training of the HBZS divers

- Yearly, 2 training days in the swimming pool



Training of the HBZS divers

- Rehearsal of solving the critical situation under the water, breathing from the back up regulator



Training of the HBZS divers

- Part of the education in the swimming pool is also the rescue of the near drowning victim according to the methods of the rescue service



All divers are qualified climbers and therefore they are able to use the climbing techniques

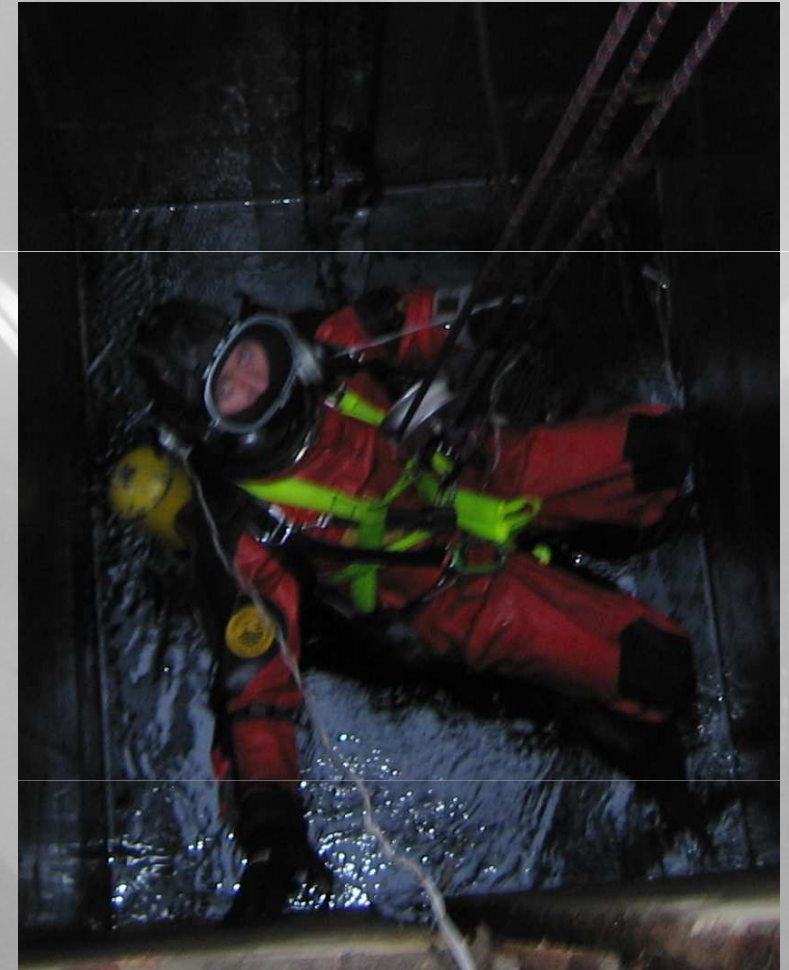


Training of the mechanics while operating with the decompression chamber and simulating the decompression accident



Specifications of rescue operations in deep mine environment

- Impossibility to ascent the free surface-overhead environment
- Mostly zero visibility
- Obstacles under the water
- Combination with the possibility of breathless atmosphere in dry parts
- Combination with the vertical techniques in deep shafts



Examples of rescue actions and various operations

- 1993 Mine 9. KVĚTEN Stonava

Penetration in the fully flooded corridor in the lenght of 100m. Behind that part, the divers had to dress up, in a breathless enviroment, into a rebreather BG-174 and adjusted pipes for nitrogen distribution. The action was complicated because of the transportation of the breathing equipment BG-174 sealed in a special polythene cases over the water cork.

- 1994 Gabčíkovo - Bratislava

Removing the consequences after the water collision onto the shipping penstock chamber. Our divers discharge the burning on the steel gate with the help of exothermal sticks and carbon electrodes.

- 1994 Dlouhé Stráně

Work in the depths up to 50 m during the controls of the over pumping in the water power station.

- 1995 Case Orlík

- Searching for the subjects in depths over 57m for Police with the use of ROV



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- . 1997 Ostrava
 - . Assistance during removing the consequences after the flooding and evacuation of the people in danger.
 - . 2001 Jáma Nové pole v Karviné
 - . Monitoring of the flooded holes with the help of the robot into the depth of 90m. The deepest use of the robot in the mine so far.
 - . 2001 Kaliště u Dolu ČSM
 - . Excavator release from coal sediments. Dive was in extreme conditions in very dense environment
 - . 2002 Nová Huť Ostrava
 - . Diving work in the pool for iron trash.
 - . 2003 Hranická Abyss
 - . Documentation of the flooded parts in the abyss with the help of ROV Minirower MK II. Into the depth of 140m, descent rehearsal into the depths over 100 m



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- 2003 Slezský mlýnský náhon v Ostravě
 - Cleaning of overpiped part in Slezského mill channel in Ostrava for IMGE, a.s.
 - 2004 Třinecké Železárny
 - Survey of the iron scale in the underground space in the depth of 10m and temperature over 40°C.
 - 2004 Území bývalé koksovny Karolina v Ostravě
 - Perforation renewal in the decontaminated overpiped area of a former coking plant Karolina for GHE.
 - 2005 Koryto řeky Odry - výstavba dálnice D 47
 - Burning and cutting of the larsen wall under the water surface
 - 2006 Hlučínské jezero
 - Survey of the tube under the water surface in the lenght of 200m - antiflooding prevention



View of different types of actions





Thank you for your attention...