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BEST PRACTICES FOR COAL MINE METHANE DRAINAGE GLOBALLY - Polish Mine Practices

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Indexes of methane hazard increase in the years 1998-2008:

- Increase of methane release from the coal mines from 763.3 mln m^3 (1998) up to 880.9 mln m^3 (2008) with drop of coal output from the gassy seams from 94.3 mln Mg (1998) down to 66.6 mln Mg (2008) at the same time,

- Increase of relative methane-bearing capacity calculating it per 1 Mg of average annual coal output from the gassy seams from 8.09 m^3CH_4 (1998) up to 13.23 m^3CH_4 (2008), what results in the increase of methane hazard by 63.5%,

- Increase of of methane drainage effectiveness in above period only by 4.5%.

What are the reasons for methane hazard increase ?

- growing saturation with methane of the coal seams together with the growth of coal exploitation depth,

- increase of coal output concentration mainly due to continuously increasing length of the longwalls (by about 40%), what in consequence increases volume of released deposit ,

- increase of methane released to the longwalls' gob (60-80%), comparing with methane release to the longwall's workings (20-40%) as a result of increased longwalls' length,

- in the conditions of conducting the ventilation of the longwalls' with the „U" type along solid coal, increase of methane release to the gobs results in the increased hazard in the exploitation area,

- assuming „a priori" in the conditions of endogenous fires' hazard in the longwalls' gobs, designing the longwalls in heavy gassy conditions with the „U" type ventilation along the coal solid – what has direct impact on the increase of methane hazard,

- not sufficient effectiveness of conventional drainage of the longwalls when using „U" type ventilation system along the coal solid, which typically is 35%,

- decreasing the ventilation abilities of the exploitation areas located below the exploitation level minimize ventilation capacity to fight methane hazard,

- 75% share of the longwalls ventilated using „U” type system along the coal solid.

How to increase the conditions of safe coal exploitation in the gassy seams when using „U"type ventilation systems along the coal solid ?

- properly design for the forecasted methane hazard system of longwall ventilation and technology of drainage,

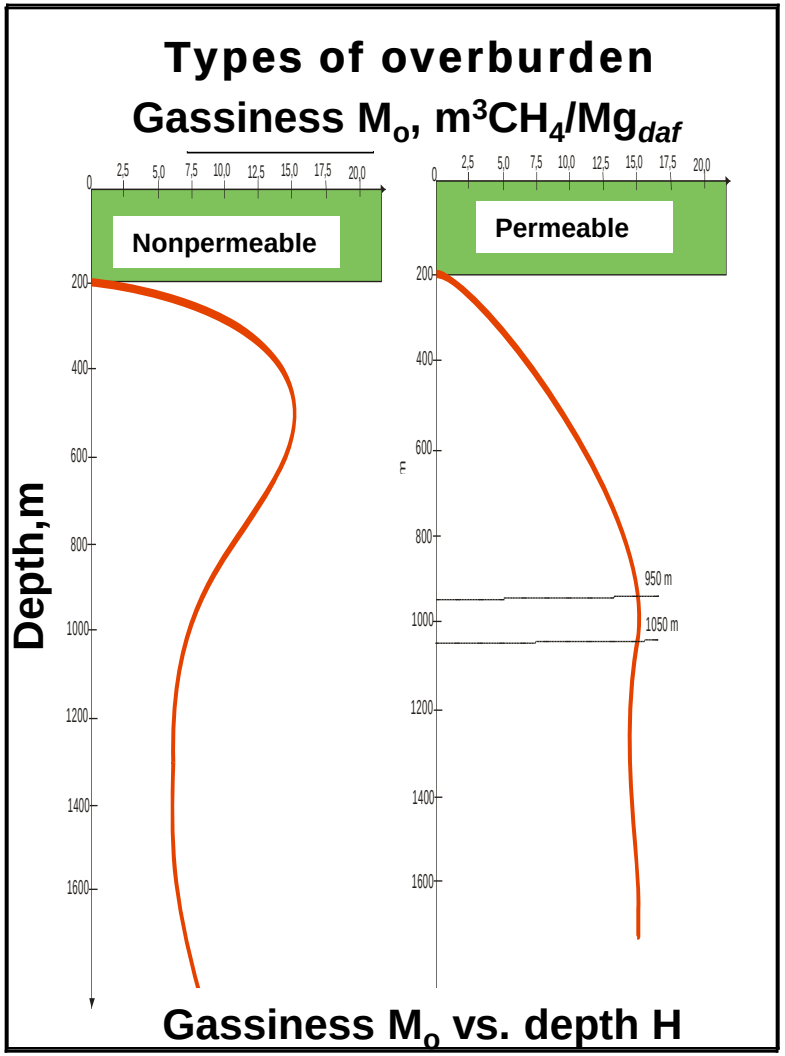
- when assuming „a priori" system of „U" type ventilation along the coal solid at the stage of designing appropriate length of the longwall and realistic effectiveness of drainage should be considered,

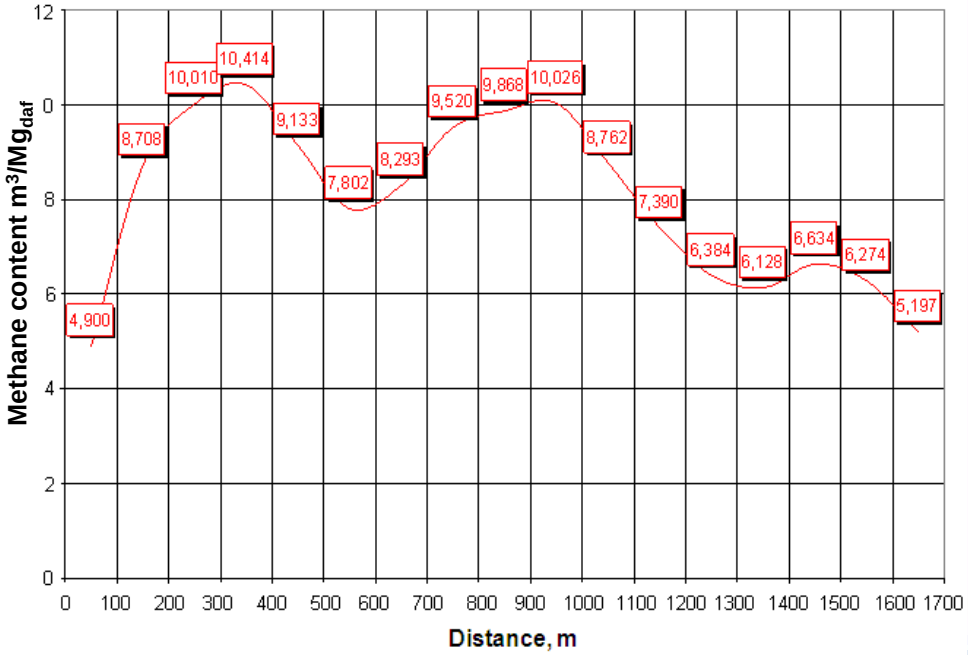
- for the heavy gassy longwalls ventilated with the „U" type system along the coal solid, possibility of highly efficient drainage (70-80%) based on the drainage of the overlying strata (drainage road way or directional drainage wells) should be considered.

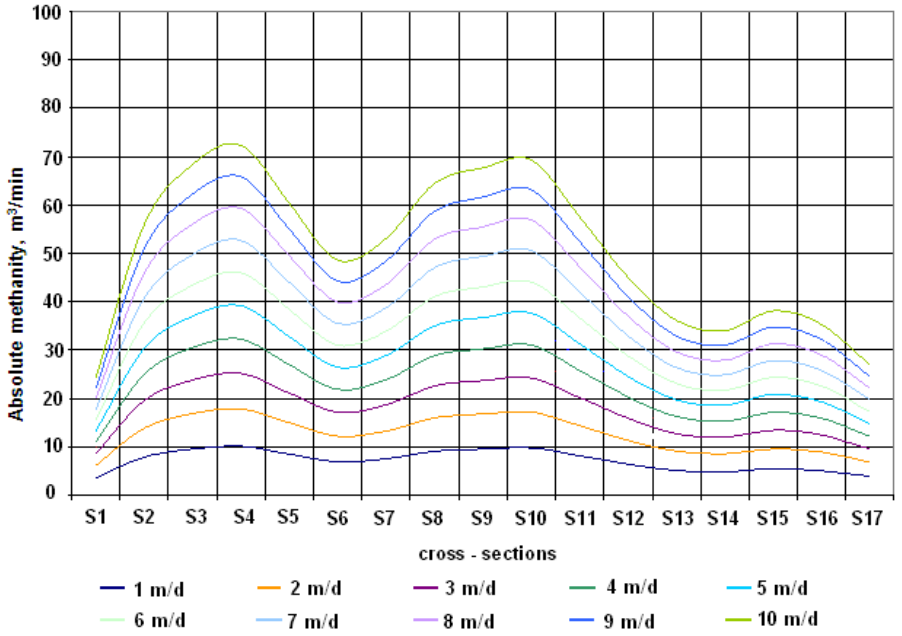
Motto:

Technology of longwall's drainage based on drainage of the overlying strata in the „U" type ventilation system along the coal solid is sufficient guaranty of the effectiveness in order to provide the ventilation-methane conditions, which are in accordance with the present regulations.

- In some parts of the world the shallower seams were already excavated
- The new deeper coal reserves in majority cases are more gassy and also exposed to other mining hazards
- Societies expecting safer mine working conditions and greater environmental attention from the coal industry.



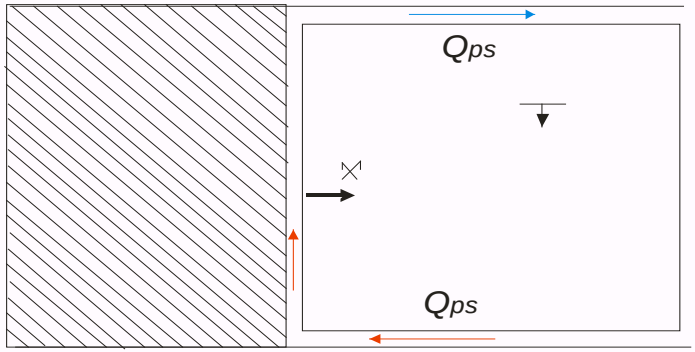




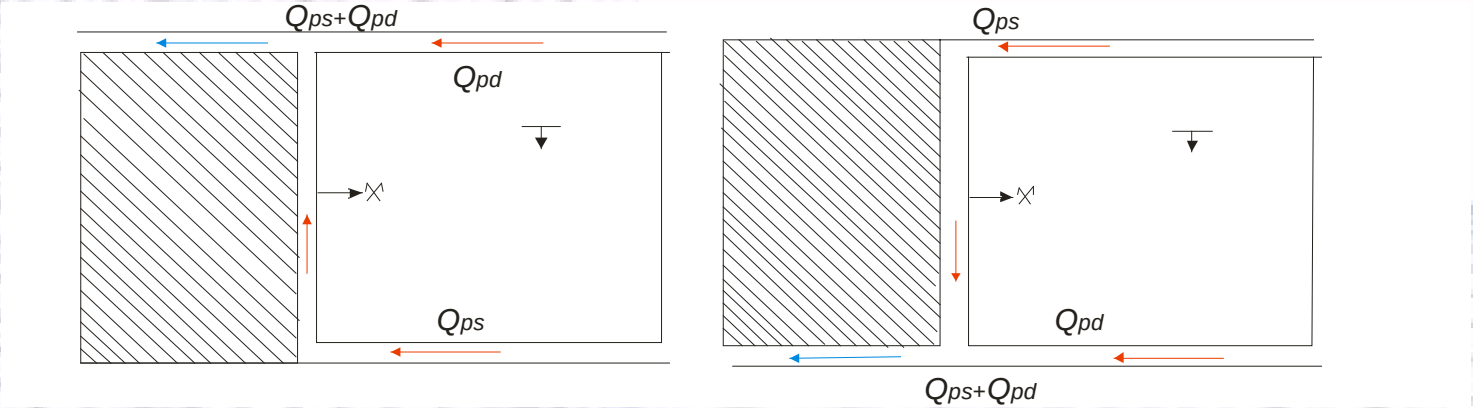
Distribution of average methane content at the longwall life (in terms of distance)

Prediction of the absolute methane emission (methanity)

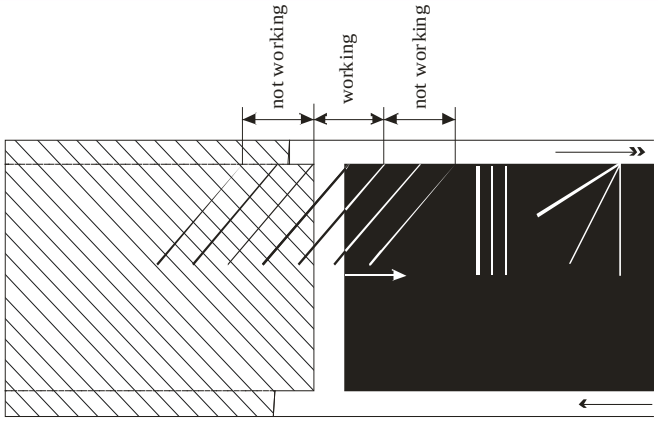
Results from the Polish hard coal mine



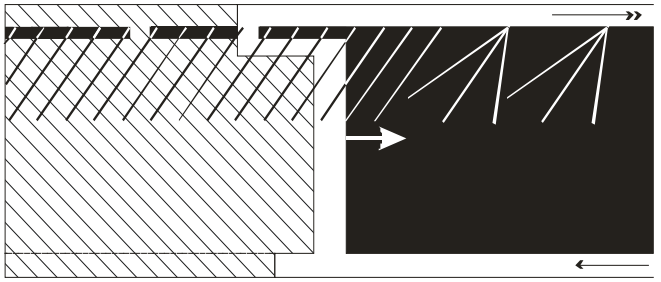
Method of longwall ventilation using the „U" system (on the coal solid) by air current Q_{ps} flowing through the longwall



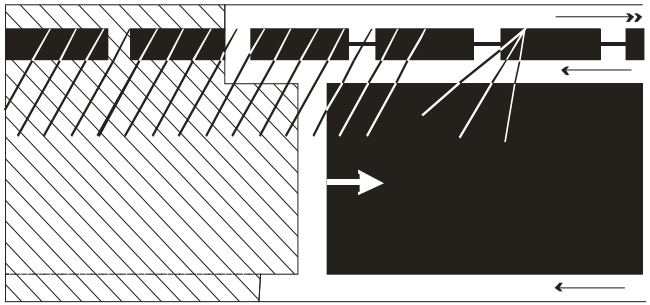
Method of longwall ventilation using the „Y" system with current Q_{pd} refreshing the air flowing out from longwall Q_{ps} and with discharge of return air along gobs – air current in the longwall working: a – towards the rise of the seam , b – down the dip of the seam



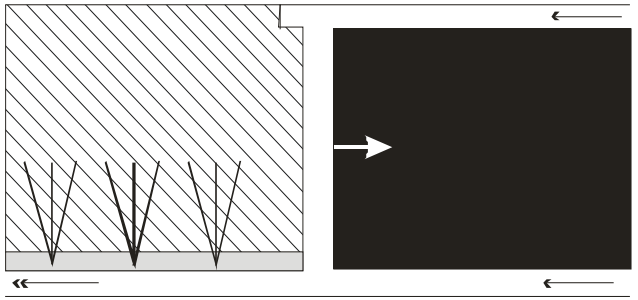
A) type“U”ventilation system



B) roadway isolating the gobs



C) two ventialtion raodways

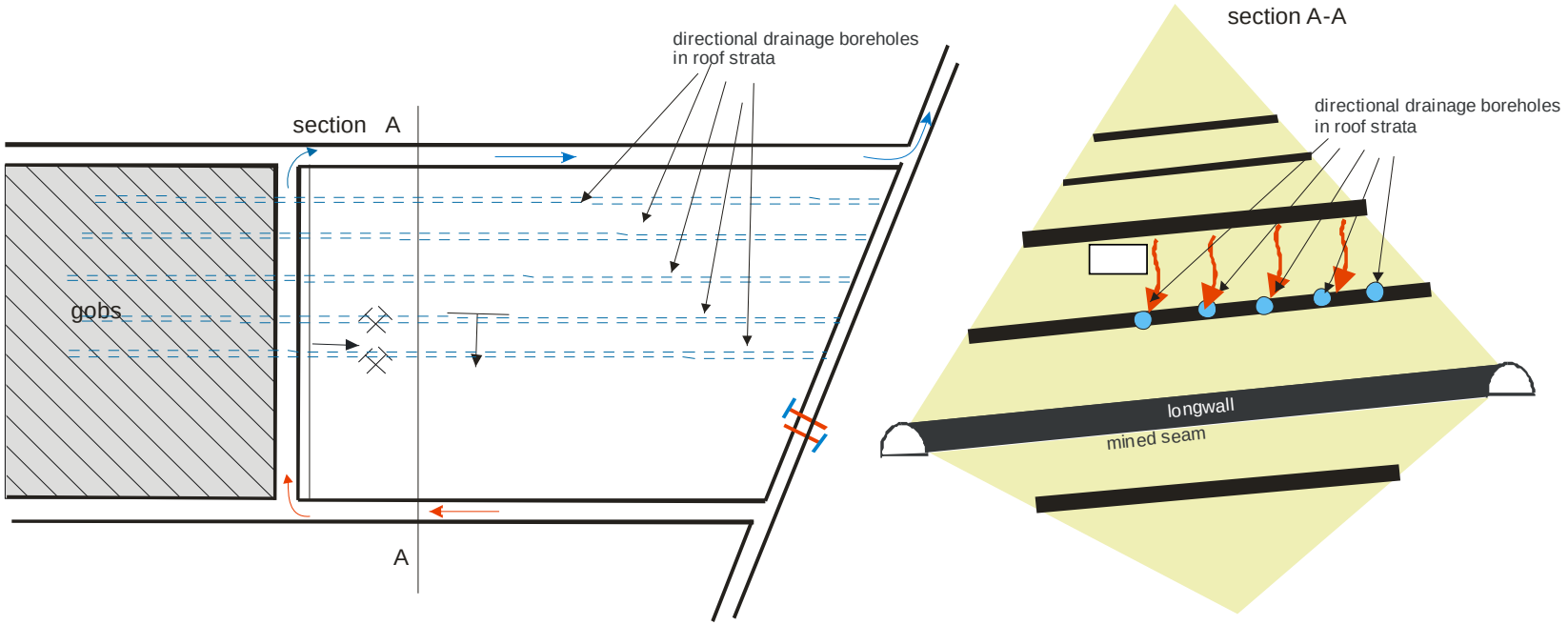


D) type “Y” ventilation system

Drainage drillings for different types of longwalls’ ventilation

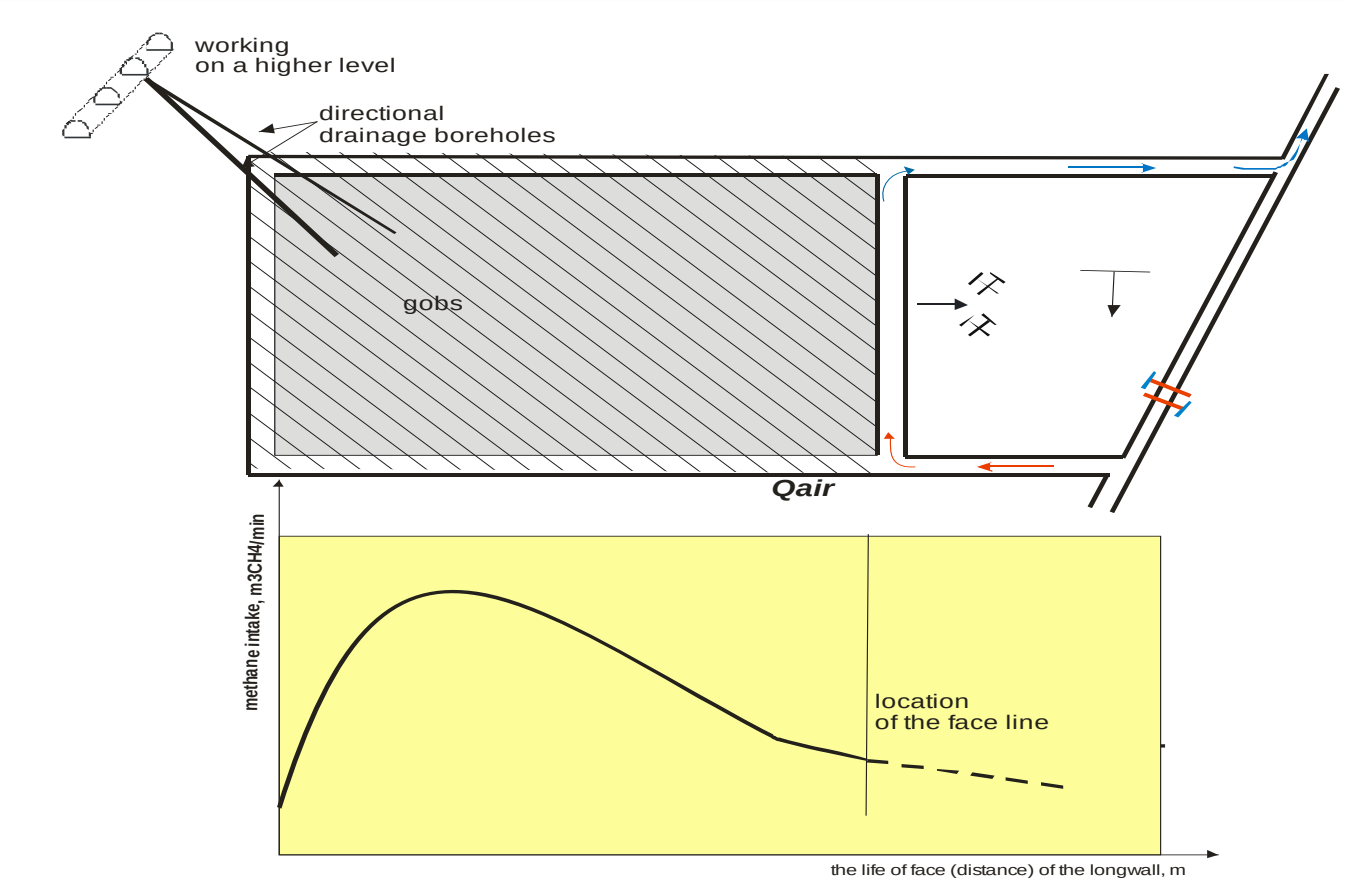
drainage heading

directional boreholes

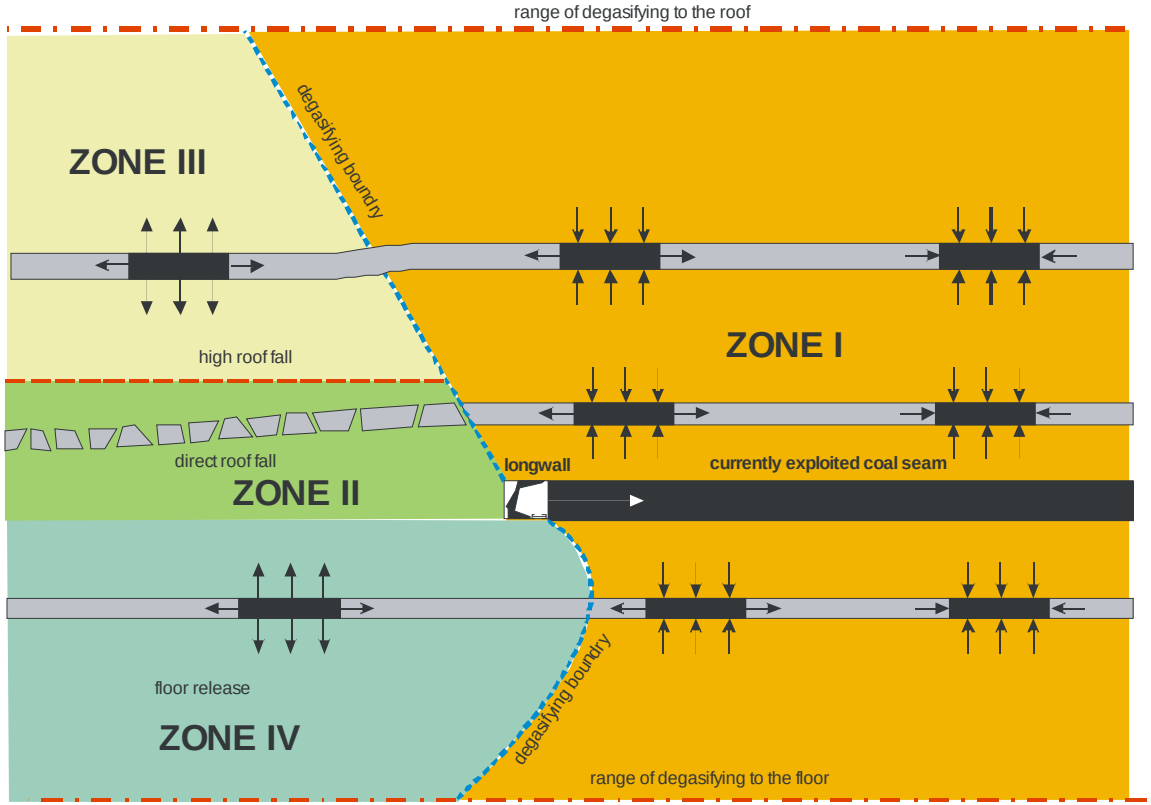


Methane drainage of the longwall areas with directional holes from the overlying seams

drainage heading

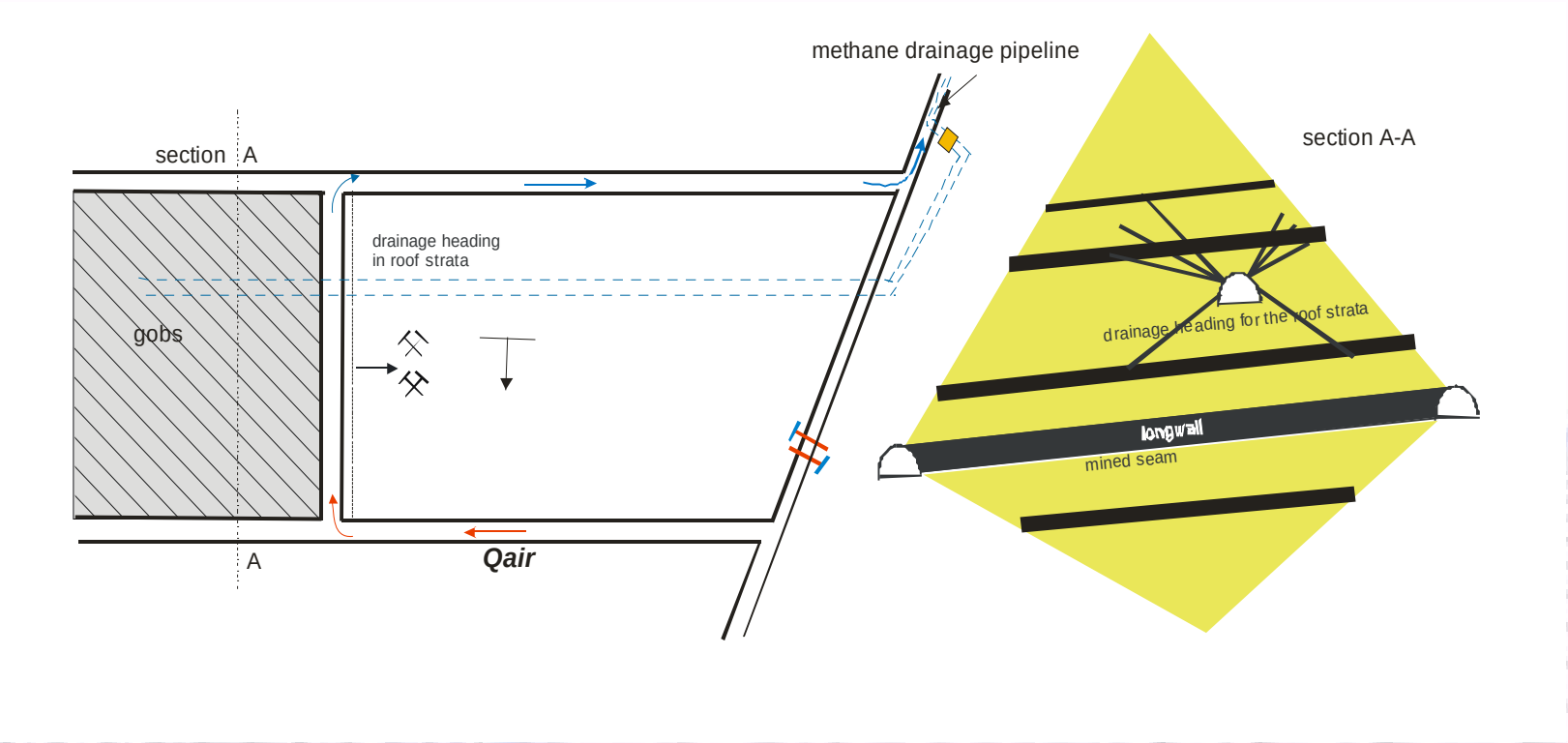


Methane drainage of the longwall areas with long directional boreholes from the active overlying galleries

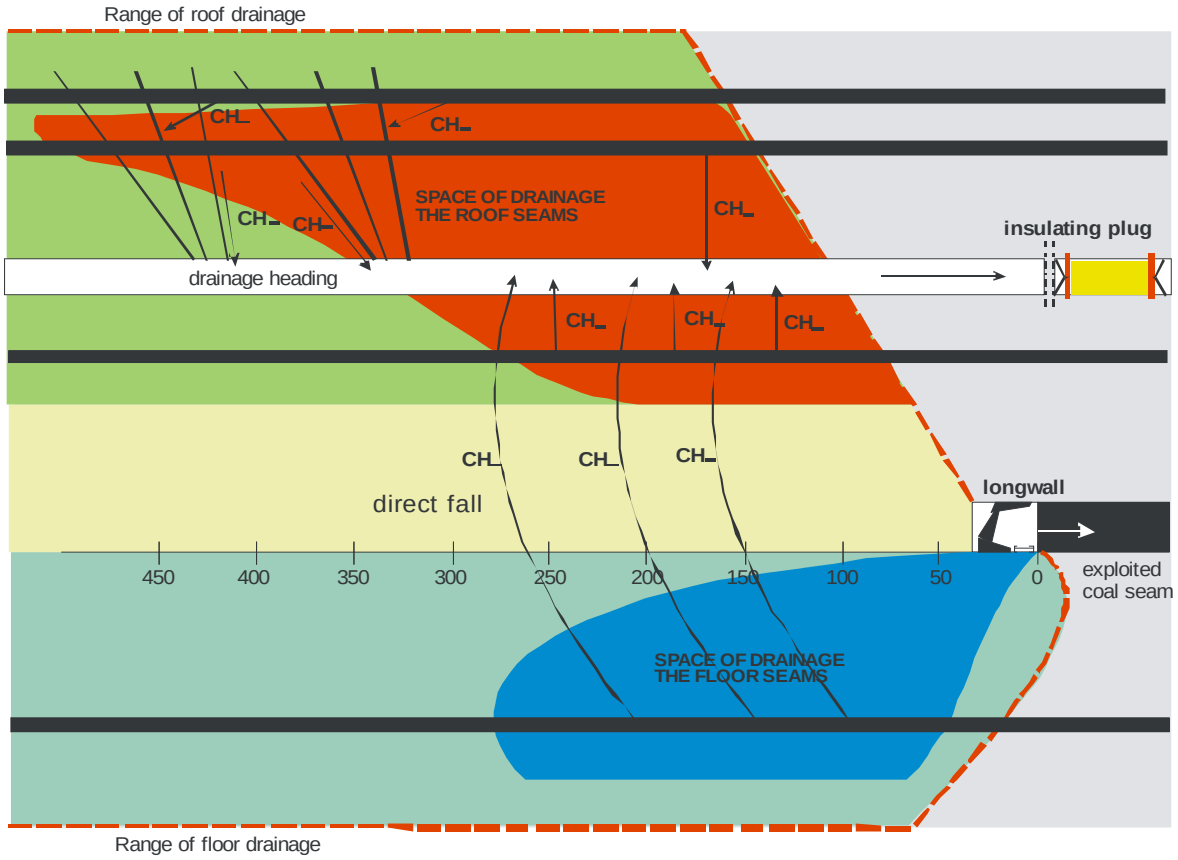


Zones of distribution gas permeability in the vicinity of the coal exploitation

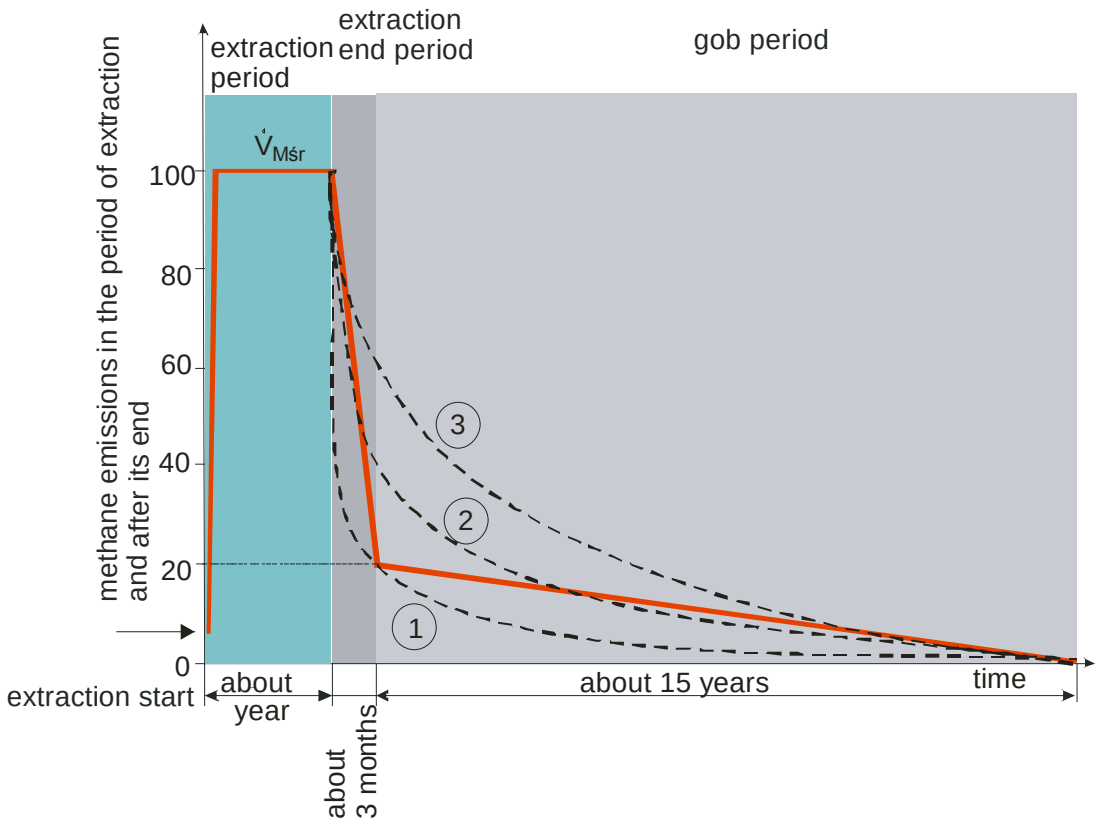
drainage heading



Methane drainage of the longwall conducted on the strike of the seam with the drainage heading in the roof strata



Location of drainage heading in longwall environment



$V_{Mśr}$ – average longwall absolute methane emissions,

1, 2, 3 – estimated methane quantities

Model of methane emissions from longwall gobs after extraction

THANK YOU FOR YOUR ATTENTION !!!