

ACID MINE DRAINAGE IN CZECH REPUBLIC – LEGAL REGULATIONS, POLLUTION, MANAGEMENT¹

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Abstract: Brown coal is a significant raw material for power in the Czech Republic. At present each year approximately 50 millions tons of brown coal is mined and almost the whole quantity is used for power purposes. Brown coal is currently mined only at opencast mines in two areas situated in the western part of the Czech Republic. Every year around 12 million m³ mining waters (AMD) are drained to the drainage canals.

Brown coal and the overlaying materials in some localities have an increased content of sulfur (2 – 8%; largely as pyrite) and of course it is an important contributor to pollution by AMD.

Characteristic AMD from brown coal opencast mines (*Table 1*):

Table 1

PARAMETER		LONG-TIME VALUES	EXTREME VALUES ^{**)}
pH		5 - 9	2,5
SO ₄ ²⁻	(mg/L)	400 – 2 500	> 5 000
Fetot.	(mg/L)	< 0,1 – 30	> 500
Mn	(mg/L)	< 0,1 – 5	> 30
Undissolved Solids	(mg/L)	< 5 – 200	> 10 000
Dissolved Solids	(mg/L)	800 – 3 000	> 6 000
PAH ^{*)}	(mg/L)	< 10 ⁻⁵ – 10 ⁻⁴	10 ⁻³

^{*)} PAH (a total of 6 compounds – Ffluoranthene, Benzo[b]fluoranthene, Benzo[k]fluoranthene, Benzo[a]pyrene, Benzo[ghi]perylene, Indeno[1,2,3-cd]pyrene)

^{**)} Effect of geological conditions, no climatic cond.

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Czech laws determine the limit concentration for these indices of pollution (*Table 2*):

Table 2

PARAMETER		LIMIT CONCENTRATION
pH		5 - 9
Fe _{tot.}	(mg/L)	3
Mn	(mg/L)	1
Undissolved Solids	(mg/L)	40
PAH	(mg/L)	0,01
SO ₄ ²⁻	(mg/L)	none
Dissolved Solids	(mg/L)	none

AMD from opencast mines are currently treated before being discharged. Familiarly used technology:

- Neutralization (mainly CaO)
- Iron and manganese removal
- Undissolved solids removal

The technology used for AMD treatment ensures that AMD quality will be in accordance with the limit concentrations (pH, Fe, Mn and undissolved solids). Content of dissolved solids (sulphate, calcium etc. in the AMD is almost unchanged by treatment.

AMD is not the only environmental problem, but AMD could be utilized as a potentially important sources of water for industry, irrigation, landscape design etc.

AMD is not directed exploited in Czech Republic goal - at present, because it contains increased concentrations of dissolved solids (e.g . water with dis. solids > 1200 mg/L and/or sulphate > 300 mg/L is not suitable for irrigation).

In the year 2004 field tests were carried out on desalting of AMD by the reverse osmosis method (Pisa 2005). Test data proved that reverse osmosis is applicable for effective treatment of AMD. It was also demonstrated, that the waste from reverse osmosis (the concentrate) can be safely mixed with wastes from fluid-combustion brown coal.

AMD treated by classical methods and/or technology of reverse osmosis could be a source of high quality waters for different branches of industry or other usage.

Literature Cited

Pisa V. and Gulikova E.. 2005. Desalting of Acid Mine Drainage by Reverse Osmosis Method – Field tests. Proceedings of the 9th International Mine Water Association Congress. Oviedo (5th – 7th September 2005), Spain.