

Prevention of ARD through stabilization of waste rock with alkaline by-products – result from a meso-scale experiment

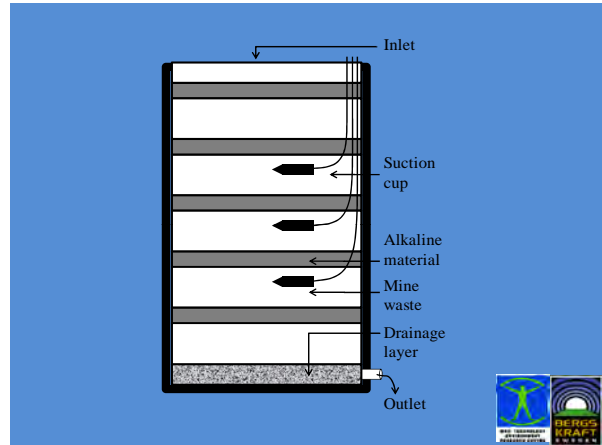
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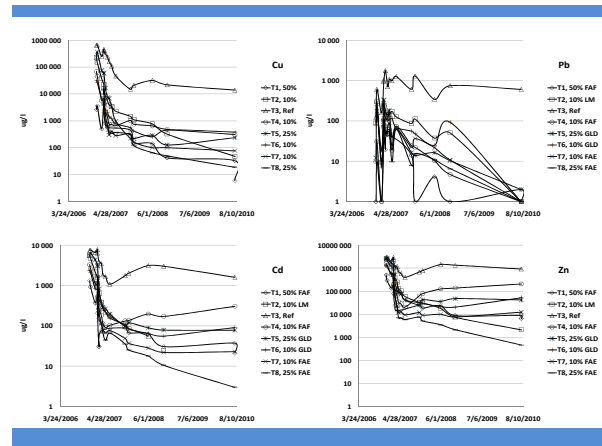
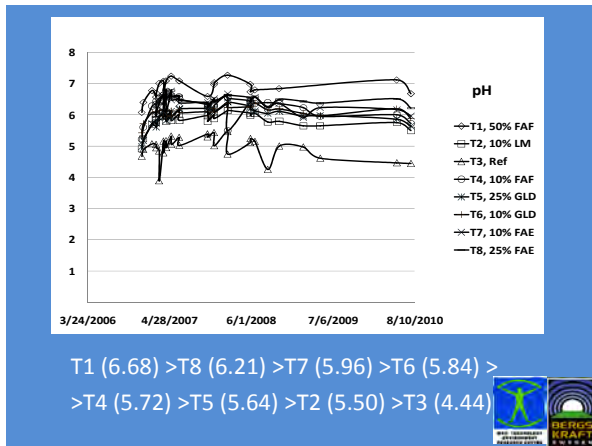


- Eight systems
- Four alkaline materials: Fly ash (2), lime mud, green liquor dreg
- Alkaline addition between 10 and 50 % (by volume)
- Ongoing experiment (been in operation during 44 months)



System	Alkaline material	Alkaline addition	NP/AP
T1	Fly ash F	50 %	4.9
T2	Lime mud	10 %	2.7
T3	None	0 %	-
T4	Fly ash F	10 %	0.53
T5	Green liquor dreg	25 %	14.3
T6	Green liquor dreg	10 %	2.6
T7	Fly ash E	10 %	0.62
T8	Fly ash E	25 %	1.5

Results



System	pH	Pb		Zn		Cd		Cu	
		Conc	%	Conc	%	Conc	%	Conc	%
T1	6.68	1.0	99.8	6 450	99.3	21	98.7	6.0	100.0
T2	5.50	1.0	99.8	2 140	99.8	<0.1	100.0	48	99.6
T3	4.44	606	-	918 000	-	1 600	-	13 900	-
T4	5.72	1.0	99.8	208 000	77.3	305	80.9	312	97.8
T5	5.64	2.0	99.7	41 400	95.5	78	95.1	237	98.3
T6	5.89	1.0	99.8	52 200	94.3	90	94.4	383	97.2
T7	5.96	1.0	99.8	12 500	98.6	23	98.6	77	99.4
T8	6.21	1.0	99.8	460	99.9	3.0	99.8	19	99.9

- Flow rate measurements through the systems showed a strong correlation between pH and the flow rate.
- Longer residence time clearly improved the quality of the leachates.
- Systems containing fly ashes had at least double residence times compared to lime mud and green liquor dreg amended systems.

- ### Conclusions
- pH in systems amended with alkaline by-products increased between 1.1 and 2.2 pH units compared to the untreated reference.
 - The increase in pH resulted in a significant decrease in trace element concentrations, averaging a concentration reduction around 97 %.
 - The main trace element reduction mechanism was probably sorption.
 - Flow rate measurements showed that there were a strong correlation between pH and the flow rate. Longer residence time clearly improved the quality of the leachates.

- ### Conclusions, cont.
- The type of alkaline material and the number of alkaline layers were of less importance than the flow rate when it came to quality of the leachates.
 - Systems T7 and T8 (containing FAE) are working best, followed by T1 (containing 50 % alkaline material). The systems that seem to be the least effective are T4 (10 % FAF), T5 (25 % GLD) and T6 (10 % GLD).
 - Alkaline materials can be used in order to reduce the leaching of trace elements from historical mine waste deposits.

Thank You for Your Attention!

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