



IGCP/SIDA Project 594, IMPACT OF MINING ON THE ENVIRONMENT IN AFRICA

TRAINING COURSE: Applications of geochemical modelling and reactive transport with emphasis on the impact of mining industry was held in Windhoek, Namibia on July 4th, 2012

Instructor: Ondra Sracek, Palacky University Olomouc, Czech Republic



Some attendants of the Training course Applications of geochemical modelling and reactive transport with emphasis on the impact of mining industry held in Windhoek, Namibia, July 4, 2012.

Itinerary:

09:00-09:45 Fundamentals of transport, geochemistry and sampling

10:00-10:45 Introduction to geochemical and reactive transport modeling

11:00-11:45 Introduction to acid mine drainage

11:45-13:00 Lunch

13:00-13:45 Installation of the PHREEQC software (freeware), installation of input files

14:00-16:00 Interactive exercises:

1. Modification of data base and speciation in PHREEQC: Example of arsenic
2. Inverse geochemical modeling of permeable reactive barrier (PRB) at Milovice, Czech Republic
3. Direct geochemical modeling of mine drainage at Smolnica site, Poland
4. Iteration of acid mine drainage (AMD) water with calcite
5. Direct geochemical modeling of acid mine drainage neutralization by calcite
6. Modeling of acid mine drainage in a column, breakthrough curve (concentration vs. PV)
7. Adsorption of zinc in a batch
8. Transport of cadmium in column with adsorption, a breakthrough curve (concentration vs. PV)
9. Transport of cadmium in column with adsorption, concentration vs. distance curve
10. Kinetic dissolution of quartz
11. Acid injection into carbonate reservoir: equilibrium dissolution of calcite, kinetic dissolution of quartz
12. Modeling of diffusion in a column

16:00-17:00 Discussion: Capabilities of the PHREEQC program in dealing with issues arising from contamination of waters in South Africa, Namibia and in other African countries, possibilities of further education in geochemical modeling.

Attendance:

Amukwa Lovisa (Student, University of Namibia),
Kaundikiza G (F and G Mineral resources)
Shigwedha S. R. (Student, University of Namibia)
Tjikuzu Manuella (Student, University of Namibia)
Muroua Don (CSA Consulting Company)
Ipinge Helmi (Student, University of Namibia)
Hijamutiti Michelle (Student, University of Namibia)
Mileusnic, Marta (University of Zagreb, Croatia)
Huisamen Althus (Student, University of Pretoria)
Shaningwa Johanna (Student, University of Namibia)
Uukulev Selma (Student, University of Namibia)
Jeremiah Simon (Geologist, Ministry of Mines, Namibia)
Simubah Gloria (Geologist, Geological Survey of Namibia)
Hamakwa Justina (Student, University of Namibia)
Nesonga Lisias (Student, University of Namibia)
Emwula Monika (Student, University of Namibia)
Benjamin Mapani (University of Namibia),
Shivoko N.H (Geologist, Geological Survey of Namibia)
Bohdan Kribek (Teacher, Czech Geological Survey)
Vít Penížek (Teacher, Czech University of Life Sciences, Prague).

Scope of the Meeting (program or outline of geological study)

The course participants were taught and trained in the use of geochemical modeling to solve the problems arising from contamination of surface and ground waters in mining districts.

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Geochemical modeling enables:

- to establish the speciation of contaminants in aqueous environment, the kinetics and thermodynamics of their dissolution, transport and precipitation,
- to solve problems linked to mixing of contaminated and uncontaminated waters,
- to predict the spread of contamination of surface and ground waters,
- to assess the rate of neutralization of acid mine waste waters by carbonates.

Geochemical modeling also enables to select and propose the most efficient methods and procedures of remediation of contaminated waters and to assess the effectiveness of applied remedial measures.

Achievements of the Meeting

The course was intended to teach and train the participants in using geochemical modeling to solve problems linked to contamination of surface and ground waters in mining districts.

The course participants received a software for geochemical modeling (PHREEQC, freeware, USGS) and an operating manual enabling the trainees to learn progressively and independently the methods of geochemical modeling.