Title of the presentation:

Seismological and geotechnical long-term monitoring of a closed down potash mine

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Abstract

Geophysical and geotechnical methods for long-term monitoring in all kinds of mines, underground and on the surface, have become increasingly important in recent years. During the phases of mining as well as during backfilling, closing and post-mining the combination of geophysical methods and classical geotechnical measurements allows the long-term assessment of mine and public safety.

Seismological monitoring offers a reliable assessment of potentially hazardous conditions of stability of galleries and voids of the mine and several working areas. Within the monitoring we are able to estimate states of destabilization as well as the hence resulting effects of stress and demands at the surface or the mine caverns. Monitoring can be applied over a long period of time without entering or frequenting the relevant area. Thus, the method is appropriate to ensure or to increase the safety of staff, infrastructure and environment.

This presentation shows the example of a former potash mine in the South Harz Mountains. It reveals the technical possibilities and displays monitoring with engineering methods over a very long period of time – also after closing and leaving the mine. The displayed potash mine was closed in 1993 and is actually in a state of abandonment and non-guided, independent flooding, already finished in some parts of the mine. The presented measuring system carries out geophysical monitoring of seismicity caused by fractures as well as the observation and measurement of flood levels or the density of the dumped salt brines to prove the correct progress of the non-guided flooding. The monitoring can be realized under hard conditions, e.g. in areas with a potentially explosive atmosphere or under the influence of aggressive brines. This requires several conditions of both transducers and seismometers and the transmission technologies for the signals.

The presentation shows a measurement method, the assembly in the mine and on the surface as well as the protection of the transducers and seismometers. First measurement results are displayed, too.

figure 1: shaft tower shaft II with hauling engine

figure 2: main roadway with sensor cables for the post-shutdown operation and their covering with salt on the floor on both sides

figure 3: seismological measuring site in the mine with mounting and isolation against explosive atmosphere