The effect of different backfill technologies on the reduction of subsidence above potash mines

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During the 140 years of life of the German potash industry, backfill was used for the reduction of mining losses as well as for decreasing the surface subsidence above the mine fields. The last latter was influenced by the continual increasing of the potash mine fields in relation to a relatively high density of built-up areas on the surface. Different backfill technologies were developed due to the technical changes. Rock salt from the development drifts and tailings were especially used as backfill materials.

The Presentation will show the strong interdependent relationship between the chosen backfill technology and the system. We will look at some practical solutions to tackling this problem.

![Figure 1: Time-dependent subsidence above potash mine fields](image_url)
Summarizing data from different potash mines the dependency between the subsidence reducing effect and the used backfill technology will be demonstrated (fig. 1). We will look at the following methods of backfill:
- Dry backfill by manual or mechanised methods,
- Backfill with rock salt, moist and compressed,
- Backfill technology using pneumatic transport,
- Hydromechanical (slurry) backfill.

The characterization of different backfill technologies due to the attainable effect can be done using the parameters grade of filling und backfill density (fig. 2). A significant influence on the potential reduction of subsidence above potash mine fields is also the time-span between the end of mining and the start of backfilling.

![Figure 2: Reachable backfill density in case of different backfill technologies](image)

For abandoned potash mines, the subsidence-induced danger risks can effectively be deleted or reduced by subsequent backfill of the mine fields. The following aims play an essential role:
- Reduction of the long-term subsidence and the induced damages at the surface,
- Saving of the integrity of the protective layers to prevent the uncontrolled flooding of mines.

The presentation will show specially modified backfill technologies and possibilities of using alternative backfill materials.