

## WHICH IS THE LEGAL BASIS OF THE FACILITY OPERATION?

Recovery of waste is done in compliance with the Ordinance on the Use of Waste for Backfilling in Underground Mines. The necessity to backfill does exist for decommissioned, localised areas within certain claims. Backfilling requires authorisation by the competent mining authorities. All of the K+S recovery facilities have been issued indefinitely valid mining-technical certificates.

All facilities function based on BAT ("best available techniques") and have been certified as Qualified Waste Management Facilities (Efb). Additionally, we use a strict Quality Management System.

## WHAT IS NECESSARY IN ORDER TO REUTILISE WASTES?

Wastes and individual components are assessed separately. A chemical analysis and a declaration analysis of the wastes are required. On this foundation, two expert opinions are prepared. The assessing authorities are the Institut für Gefahrstoffforschung (IGF) and the Hygiene Institut. As soon as the material and geo-mechanic suitability and admissibility in accordance with the criteria of Occupational Health and Safety Regulations has been certified, the competent authority issues an approval for the respective recovery measure.

## WHAT DOES K+S DO IN ORDER TO MAINTAIN LONGTERM STANDARDS?

Our own control system serves to inspect the wastes' composition and to match the results of the analysis with the information provided in the declaration. This allows for speedy reaction in case of deviation.

All technical equipment, which is directly related to the recovery process, is controlled continuously. The results of these measurements are documented and are regularly controlled by the competent authorities.

### Packing and transport

#### The decisive factors are:

- The backfilling method
- The waste characteristics
- Local conditions at the mines

#### Transport options:

- Tautliner truck
- Silo truck:
- Tipping trucks
- Rail (combined transport solutions)

#### Packaging:

- Big-bags

The majority of the wastes does not require special packaging. Due to their powder form, they can be conveyed pneumatically and are delivered in bulk, by silo truck.

### Types of waste (examples)

- Fly ashes
- Incinerated clearing sludges
- Soils
- Building materials
- Sands
- Salts

### Conditions for the recovery of wastes

- Wastes may not be radioactive, explosive, highly flammable, liquid, contagious, malodorous or under backfilling conditions easily flammable.
- Under backfilling conditions, reactions of the wastes with each other or the surrounding rock bed may not cause volume expansions, the generation of self-ignitable, toxic or explosive gases or substances, or any other dangerous reactions.

#### K+S Entsorgung GmbH

Bertha-von-Suttner-Straße 7, D-34131 Kassel

Tel. +49 561 9301-1575 Fax +49 561 9301-1714

entsorgung@k-plus-s.com www.ks-entsorgung.com

UNDERGROUND RECOVERY  
Technical Information



## WHAT IS UNDERGROUND RECOVERY?

Underground Recovery uses the material characteristics of the deposited wastes in order to stabilise older, decommissioned mine segments. This so-called 'back-filling' may be necessary in certain, clearly defined mine segments, which no longer comply with today's strict standards. In this case, mining authorities stipulate compulsory back-filling.

K+S employs three different recovery procedures

- Stacking backfill
- Tipping backfill
- Slurry backfill

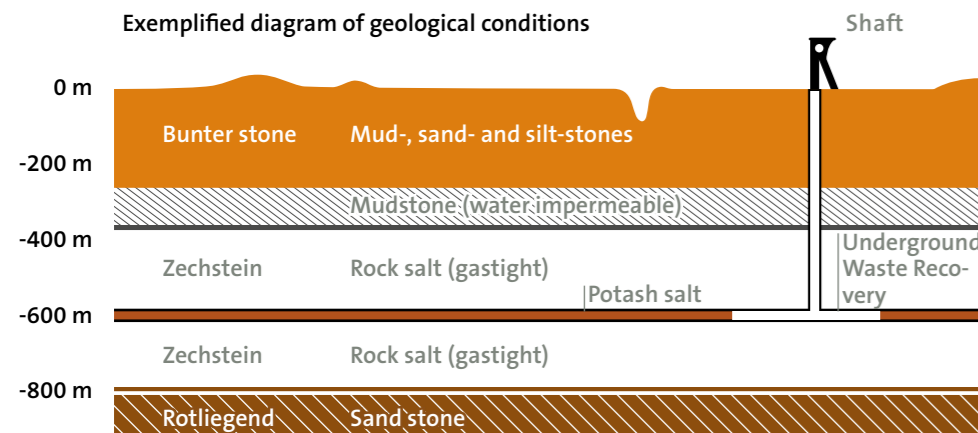
## LONGTERM-SAFETY | GEOLOGICAL SITUATION

The deposits' geological conditions have been stable for millions of years, thereby safeguarding dependable closing off of the wastes against the biosphere. All of the K+S underground waste recovery facilities have been issued long-term-safety certificates.

The recovery sites are located in the potash and rock salt layers.

Properties of the rock salt:

- formed 250 m years ago due to the evaporation of seawater
- fleece thickness up to 500 metres
- gastight
- plastic reaction to forces moving the earth crust; formation of open crevices not possible



## THE STORAGE FACILITIES

### BERNBURG | TIPPING BACKFILL

Our partner AUREC processes wastes with low contaminant content above ground, into a consistency structurally suitable for backfilling. Via a drop shaft the material is taken below ground. Conveyor systems and dump trucks transport the materials to the mining caverns, where they are deposited as tipping backfill. As a last step, the materials are compacted.

This transport system also allows wastes packed in big-bags to be brought below ground and to be deposited.

### ZIELITZ | TIPPING BACKFILL

Pneumatically transportable material is transhipped in above-ground upright silos, and are fed into plastic bags by a packaging machine. After these bags have been stacked in a transport container they are taken below ground, and the material is stacked at the backfilling location. The surfaces created are then covered with rock salt.

### WINTERSHALL | STACKING BACKFILL

Pneumatically transportable wastes are transhipped in upright silos and are then filled into big-bags. On a vibrating plate the content of the big-bags is compacted mechanically. It is also possible to accept materials already packed in big-bags, as long as these materials comply with the underground recovery requirements. Below ground these big-bags are stacked. Remaining gaps are then filled with moistened salt. This assures direct connections with the pillars.

### HATTORF | STACKING BACKFILL

At the Hattorf facility, pneumatically transportable wastes are transhipped into upright silos and are processed in a mixing plant, using company-own formulations. After the wastes have been filled into big-bags they are left to harden. Suitable wastes already delivered in big-bags are directly taken to the site of deposit, or are discharged into a special plant, where they may undergo further treatment.

Big-bags are stacked under ground. Any remaining gaps are filled with moistened salt. This ensures direct connection with the pillars.

### UNTERBREIZBACH | SLURRY BACKFILL

Pneumatically transportable material is initially transhipped to upright silos, and is then taken below ground via a closed pipework system. The addition of liquids (salt solution) results in a slurry, which can be pumped into the caverns. There the slurry hardens and sets, thereby supporting the rock salt layer.

