

# Possibilities for a Discharge Reduced Salt and Potash Production

Experience from worldwide engineering activities of K-UTEK AG

Dr. Heiner Marx

Stephan Kaps | Dr. Heinz Scherzberg | Dr. Bernd Schultheis

Dipl.-Phys. Jürgen Bach | Dr. Axel Stäubert



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# European Legislation

According to the actual European Legislation ....

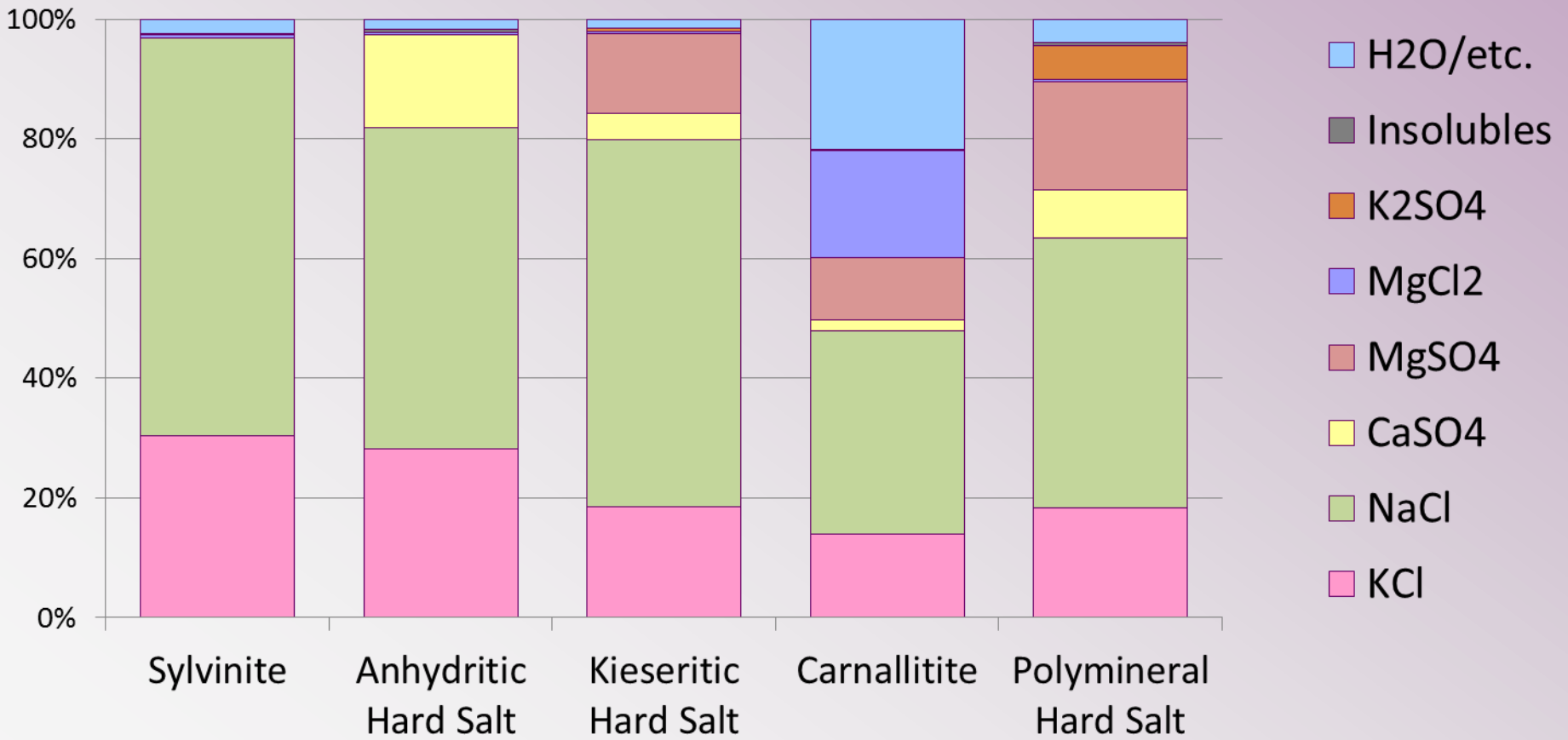
- ... mineral deposits generally have to be used sustainably.
- ... aqueous systems have to achieve a good status until 2015.



# Types of Crude Potash Salts

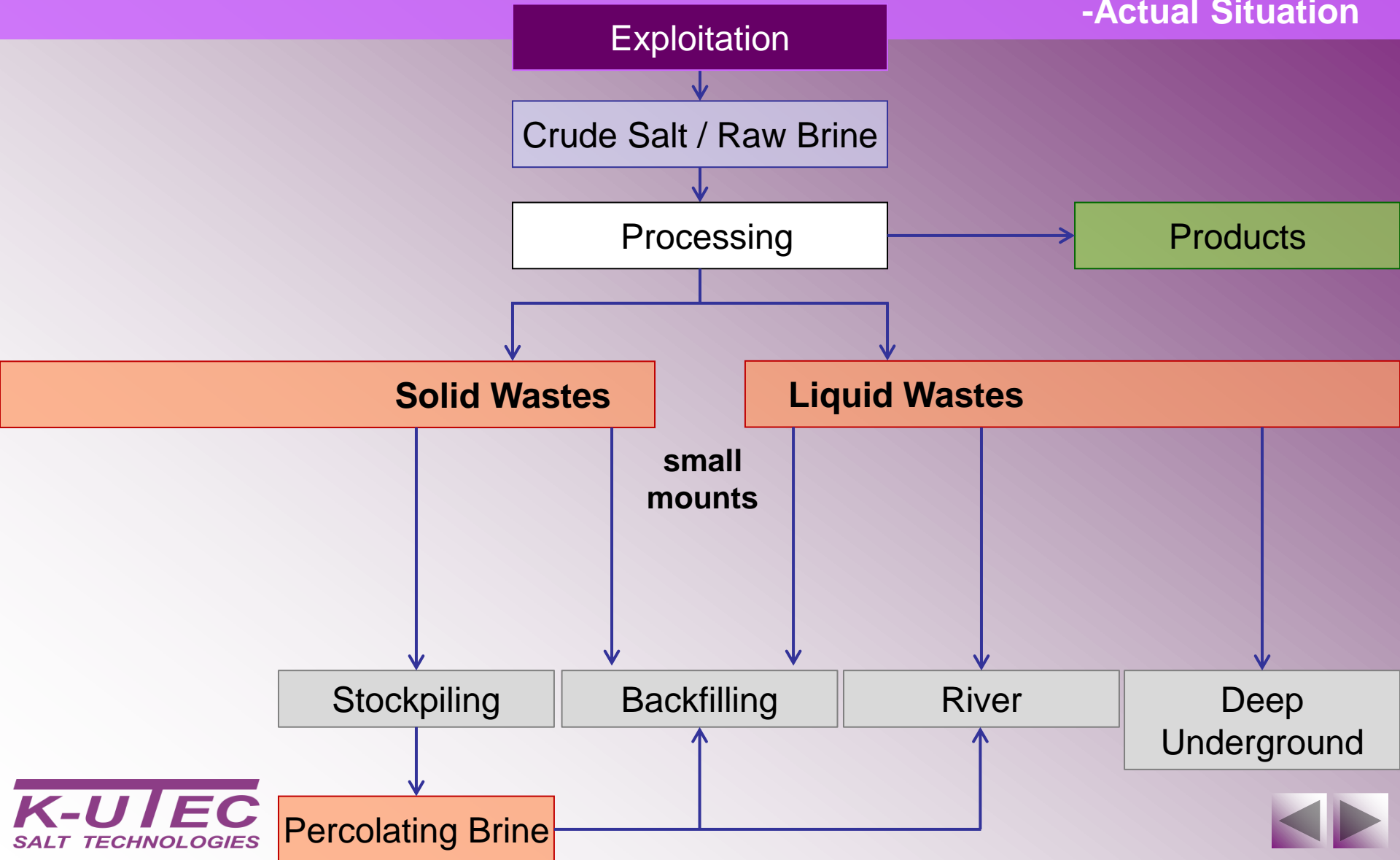
... in Europe

-Chemical Composition



# Processing and Residues

-Actual Situation



# Residue Utilization Options

- Recovery of saleable salts
- Backfilling (water reduced and/or solidified by additives)
- Stockpiling according to the state of the art



# Recovery of Saleable Salts

-Treatment of the Liquid Wastes Resulting from Processing

**Crude Salt**

**Liquid Wastes**

**Products**



SALT TYPE (ORE)

PROCESS

RECOVERED SALTS

Sylvinite:

Evaporation, Cooling

NaCl, KCl

Anhydritic Hard Salt:

Glaserite-Process, Cooling

$K_2SO_4$

Kieseritic Hard Salt:

Schoenite-Process;  
poss. separate  $MgCl_2$ -Treatment

$K_2SO_4$

Carnallitite:

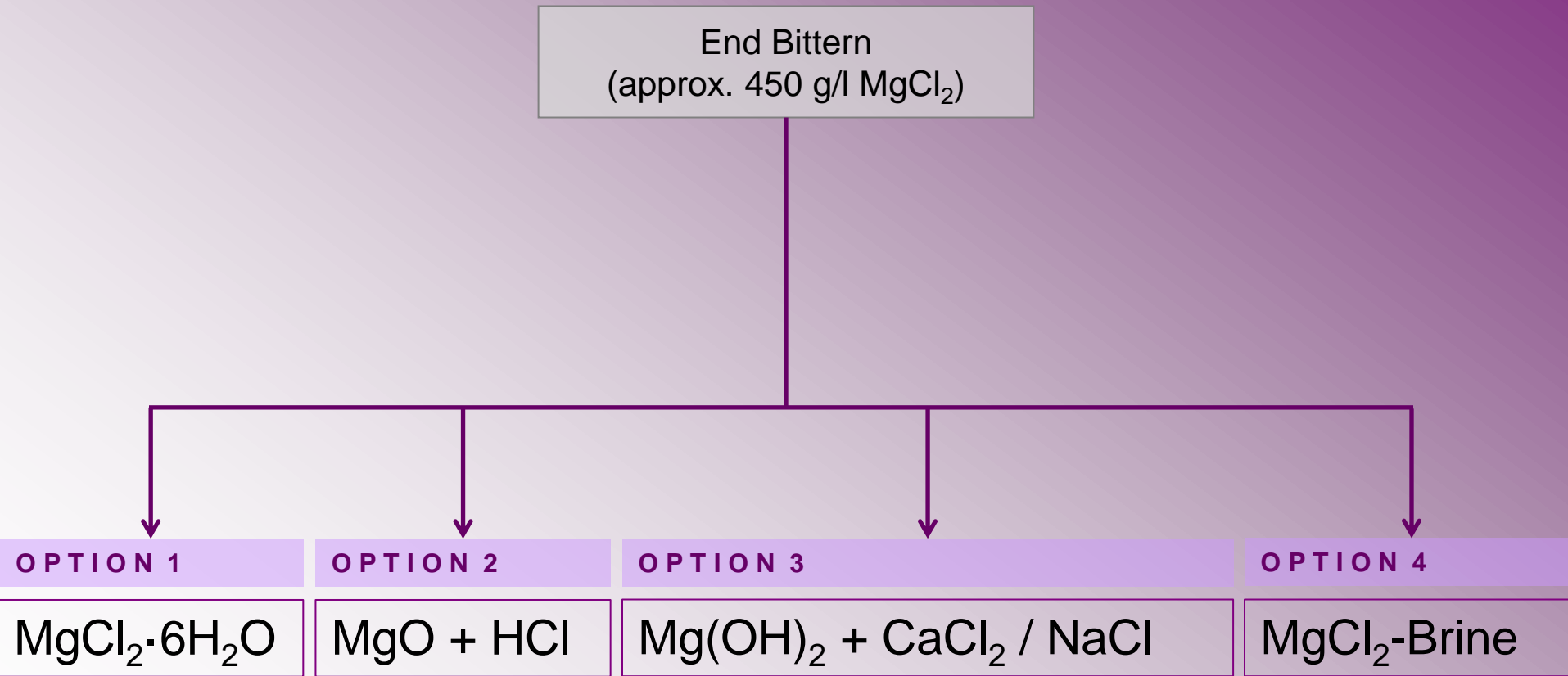
Carnallite-Process;  
separate  $MgCl_2$ -Treatment

KCl



# Recovery of Saleable Salts

-Options for  $\text{MgCl}_2$ -Solution (End Bittern)



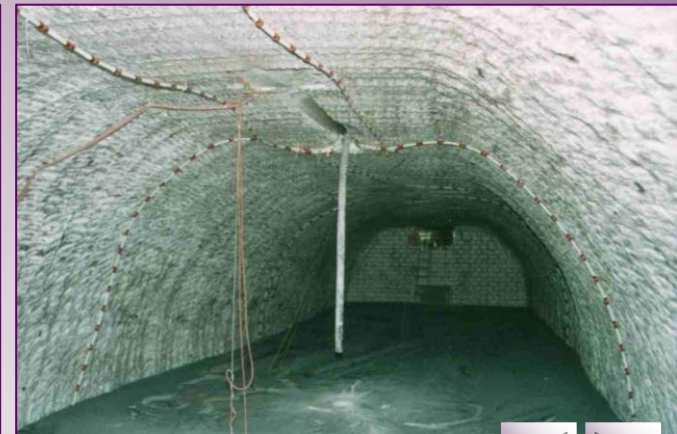


# Backfilling

## -History and Effects

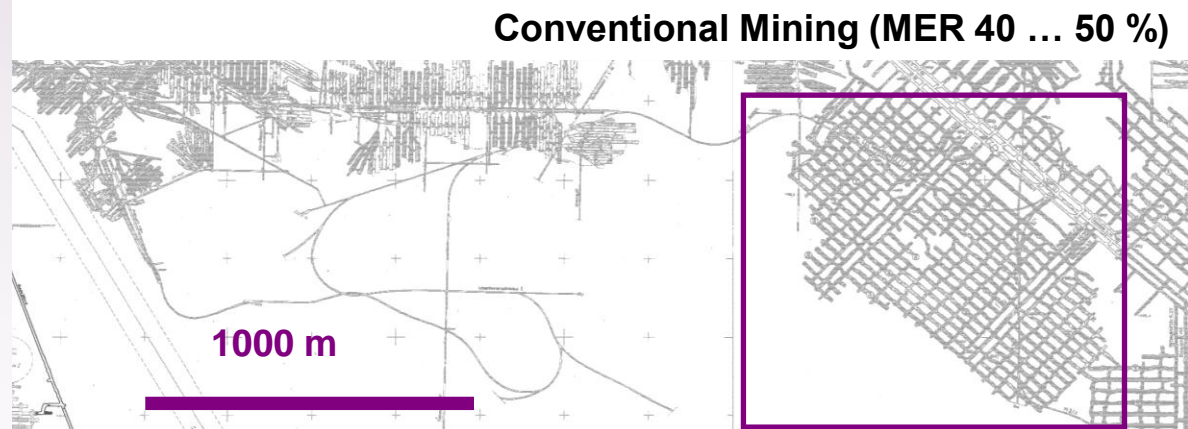
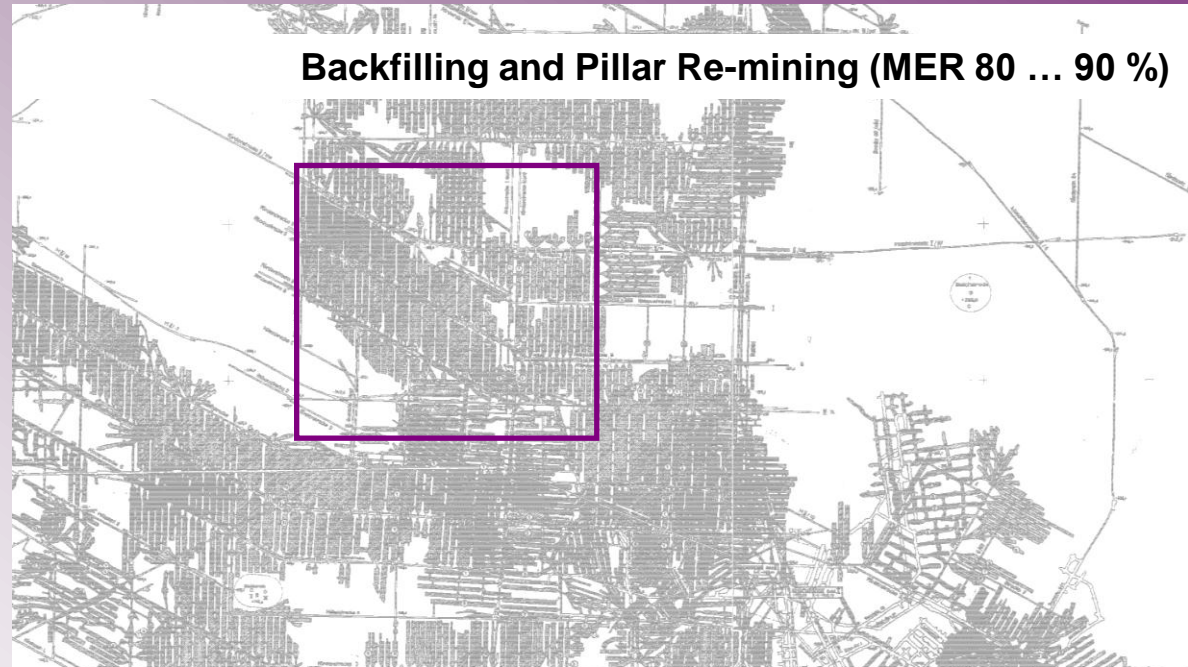
Since **1908**, hydraulic stowing for backfilling has been applied in the German Potash industry.

- Protection of the surface
- Optimized utilization of the resources
- Recycling of waste materials

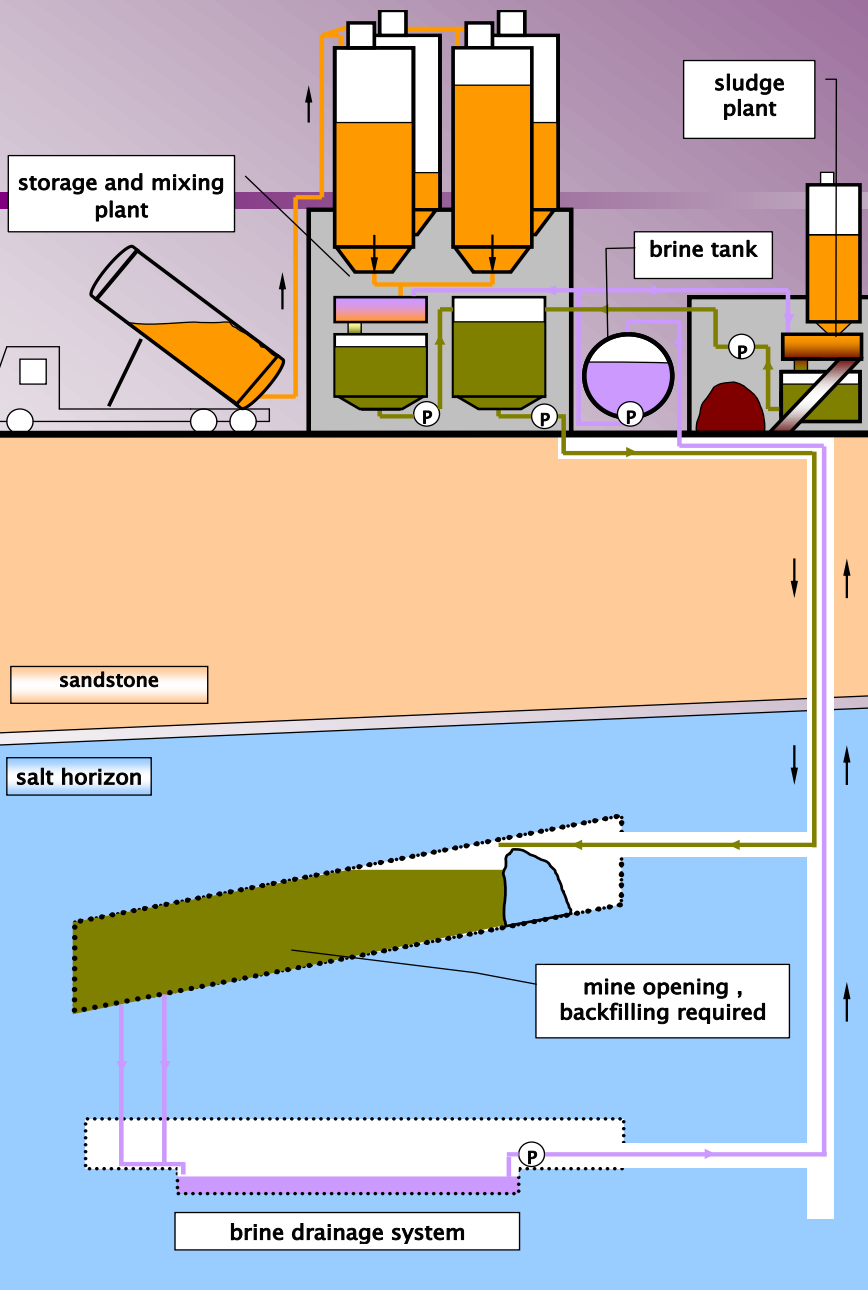


# Backfilling

-Backfilling in Combination with Pillar Re-mining | Mine Bleicherode



# Backfilling



Solid and Liquid Waste Materials from the Processing Plant

Solid and Liquid Industrial Waste Materials

Hydraulic Backfilling



# Project Examples

## Realized Projects

- Iberpotash | Spain: Production of common salt (NaCl) based on flotation tailings
- Salinen Austria | Austria: SOP and NaCl production from purges of salt winning plant
- Thangone | Lao: Purge free MOP production based on Carnallite solution mining

## Concepts

- GSES | Germany: Concept for a new Potash production in Sondershausen
- Rossleben | Germany: Concept for a new Potash production in Rossleben
- K+S | Germany: Proposal to avoid the discharge of waste brines



# Project Examples

Salinen Austria | Austria

Solution Mining

Purification

Evaporation

Disposal Brine

Sludge

NaCl

Backfilling

SOP Plant

Reduced Effluent

NaCl

K<sub>2</sub>SO<sub>4</sub>

Bromine Plant

NaBr

No Effluent

Process since 1978

Discharge into River

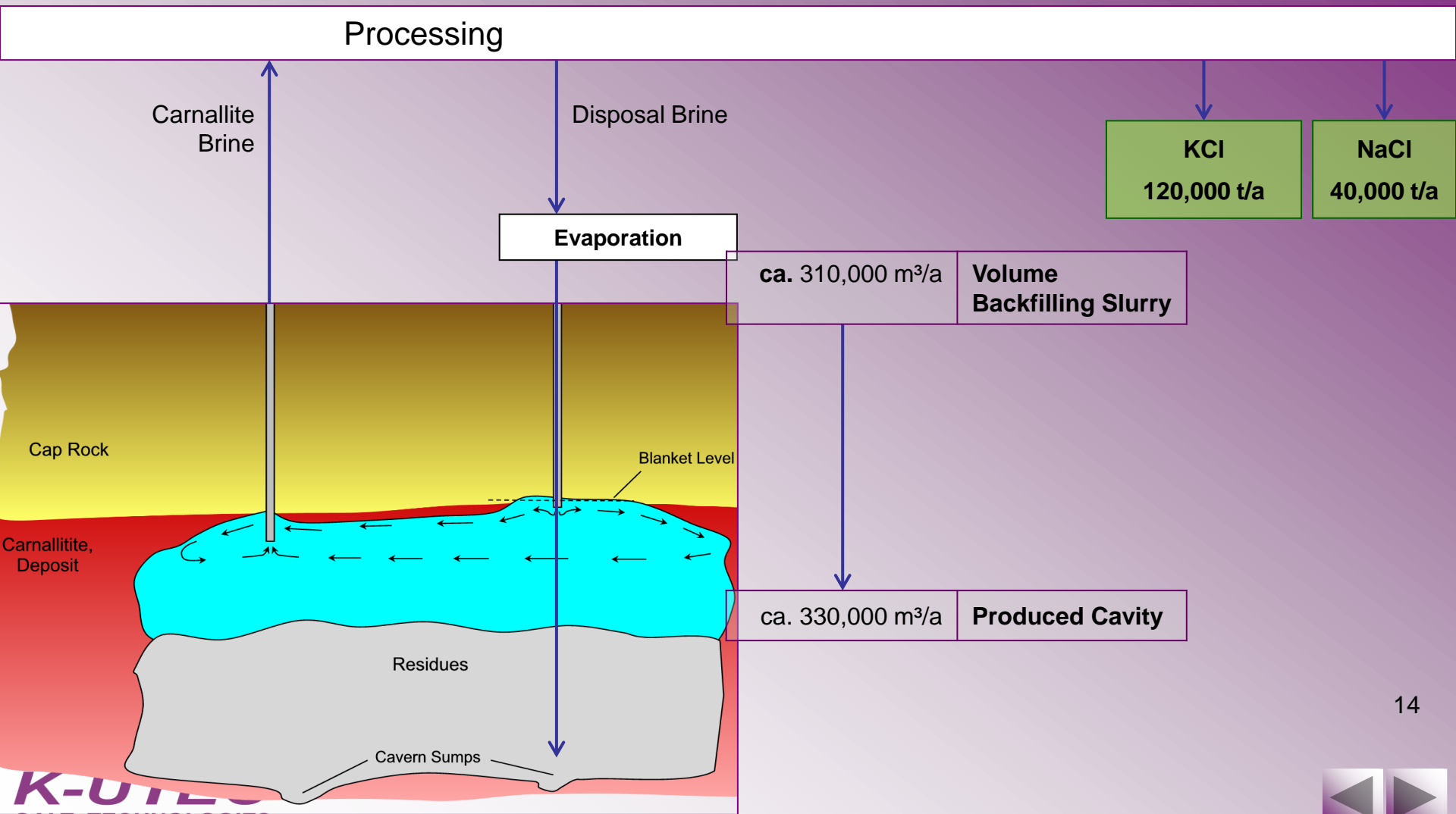
Modification since 2006

Future



# Project Examples

Thangone | Lao



# Project Examples

Concept GSES | Germany

Objective: Production of KCl

Ore: Carnallite with 10 % Hard Salt

Products:

Kieserite

Anhydrite

KCl

NaCl (98 %)

MgCl<sub>2</sub>-Solution (ca. 450 g/l MgCl<sub>2</sub>)



MgCl<sub>2</sub>-Solution for Backfilling  
d ~ 1.44 t/qm

MASS

VOLUME

1,000,000 t/a

525,000 m<sup>3</sup>/a

135,000 t/a

16,000 t/a

137,000 t/a

350,000 t/a

399,000 t/a

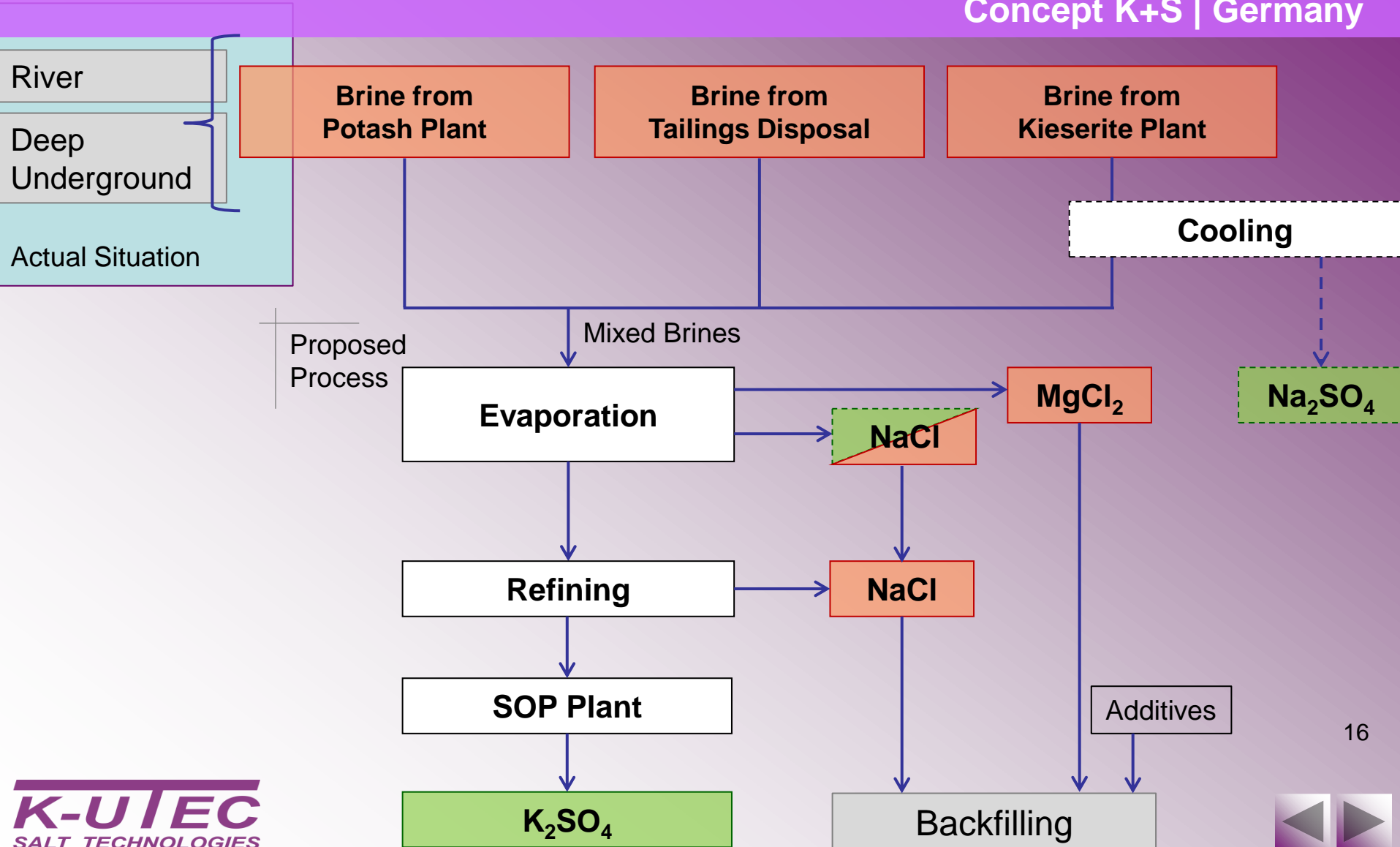
198,000 t/a

138,000 m<sup>3</sup>/a



# Project Examples

Concept K+S | Germany



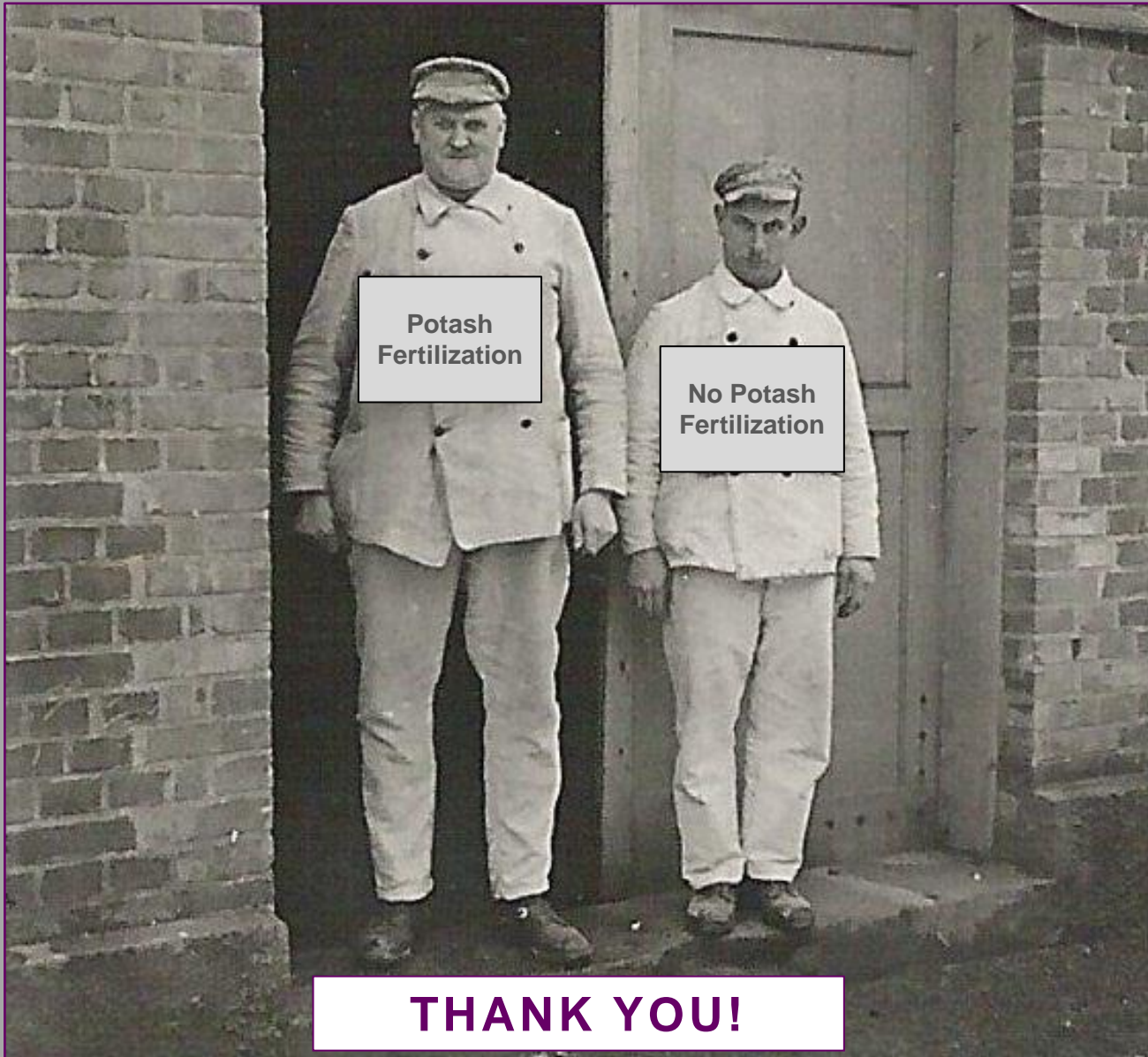


# Conclusion

- Avoiding of discharge of waste brines is possible.
- Minimizing of valuables loss is possible.
- Sustainable use of the desposit by backfilling is possible.

**Each crude salt and each process need their specific way in order to find out the right answer.**





Potash  
Fertilization

No Potash  
Fertilization

**THANK YOU!**