



K+S Entsorgung GmbH

**Euro Chlor Conference, 16-18 May 2017**

Underground Disposal of Mercury Waste for Long Term Safety

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**The K+S Group | Facts and Figures**



A worldwide leader in the sectors of:

- Special and standard fertilisers
- Salt products
- Underground disposal

- Approx.: 14,000 employees
- Revenue 2016: 3.5 billion €



Sites in more than 20 countries

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**The K+S Group | Corporate Structure**



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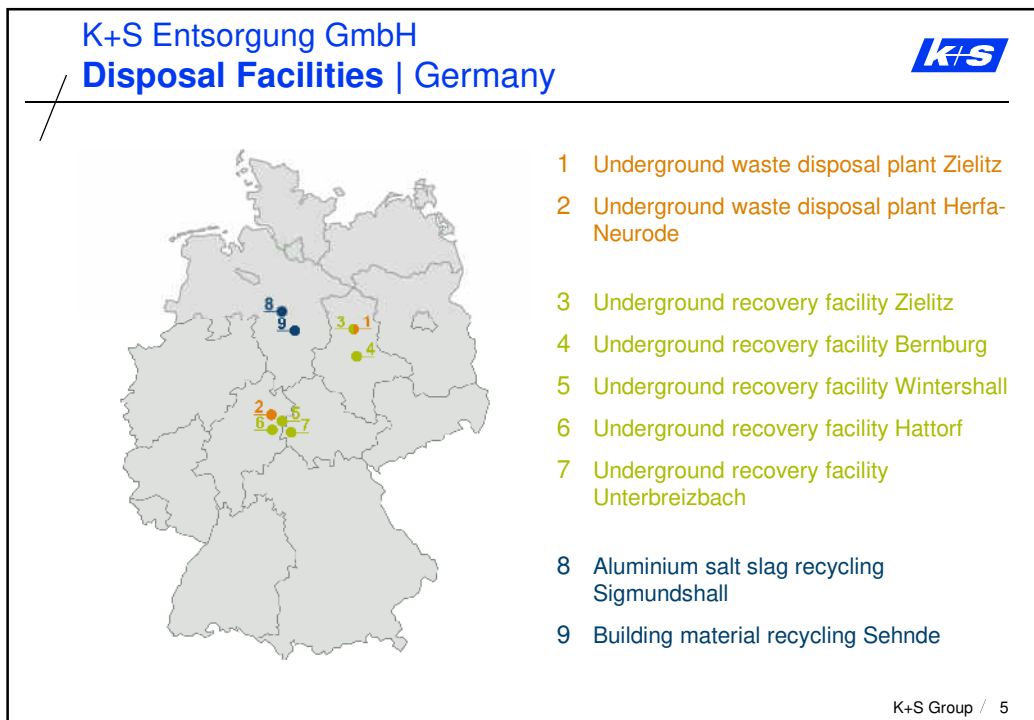
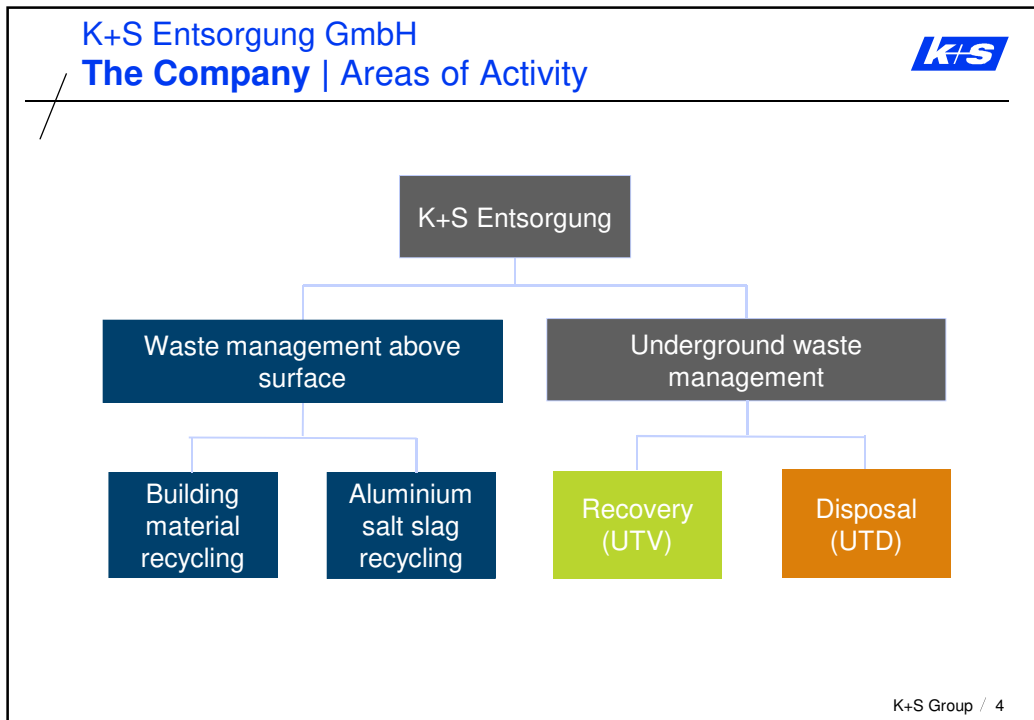
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**The Company | Profile**



- A K+S Group business segment since 1991
- Disposal activities are centrally managed from Kassel
- Internationally active, with representatives in eight countries
- Pioneer of underground waste disposal; first facility worldwide: Herfa-Neurode (1972)
- Revenue 2016: 89.5 m. €



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**The company | Areas of activity**



<b>Building material recycling</b>	<b>Recycling of construction materials</b> Utilisation as cover material for the greening of a potash tailings pile
<b>Salt slag recycling</b>	<b>Recycling of salt slags from the secondary aluminium industry</b> All slag components are recovered and recycled (e.g. utilisation as a substrate for the greening of a potash tailings pile)
<b>Underground recovery</b>	<b>Solution for less contaminated materials</b> <ul style="list-style-type: none"> <li>• Utilisation of the material's properties</li> <li>• Support of pillars by backfill material, prevention of deformations</li> </ul>
<b>Underground disposal</b>	<b>Solution for highly contaminated materials</b> Long-term removal from the biosphere

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**UTD | Underground Waste Disposal**



Long-term safe removal of hazardous wastes from the biosphere

- Ideal geological conditions and technical safety systems
- Deposit at depths of 500 to 800 metres
- Traceability of all deposits through detailed documentation

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## UTD | Prerequisites for Underground Waste Disposal



- Unused, excavated area of the mine
- Separated from extraction area with possibility to be sealed off
- Galleries remain open and have no backfill obligation
- Galleries have to be stable and must remain accessible even after a longer time
- Mine has to be dry and free of water
- Storage area has to be sealed off from biosphere by geological barriers
- Maintenance-free

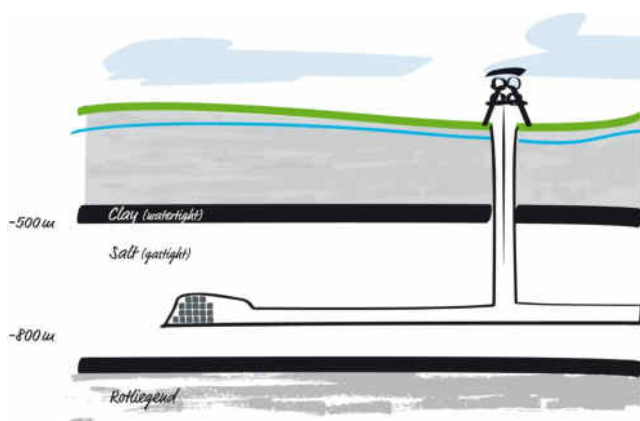


Safest solution for disposal of hazardous waste

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## UTD | Multi-Barrier System



### Natural barriers

- Bunter stone 500 m
- Clay (100 m) – watertight
- Salt (300 m) – gastight

### Artificial barriers

- Watertight sealing of the shafts
- Field dams
- Brick walls
- Waste packaging

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 UTD | Centre for Research and Analysis



In-house analyses: Professional waste declarations

- Waste declarations for the approval of national and international waste shipments are made internally
- Precise HgS (Mercury Sulfide) calibration
- Conditions of acceptance as guideline for waste permits

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 UTD | Acceptance Criteria



**The waste with the following properties cannot be disposed of underground:**

- radioactive
- liquid
- infectious
- causes odour
- biodegradable
- increases volume
- releases gases (toxic, self-ignitable, explosive)



Wastes need to have certain properties

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UTD | Service for Mercury Contaminated Sites



- All around service provider for various operators throughout Europe
  - Analyses and approvals
  - Packaging and logistics
  - End-to-end consultancy
- Possible mercury waste streams include:
  - Demolition material (concrete, rubber, plastics and wood waste)
  - Active carbon
  - Salt waste
  - Dehydrated sludge derived from cell room cleansing
  - Plant components (pumps, fittings etc.)
  - HgS

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UTD | Service for the Chlorine-Alkali-Industry



- Main service provider of the remediation of the Buna/Leuna plant in Schkopau, Germany (1999-2001)
  - Disposal of more than 230,000 t of mercury contaminated waste
  - The waste mostly contained soil and construction material
- Contract partner of chlorine producers all over Europe
- Final HgS disposal with transparent tracking and tracing



Contract partner all over Europe

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**UTD | Examples of Other Suitable Waste Types**

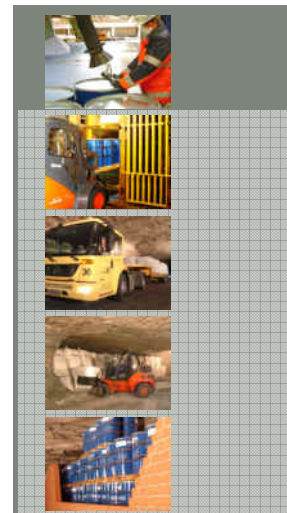


Sample Storage Underground approx. 800 metres below ground

- Contaminated soils (heavy-metal, dioxin, mercury, PCB)
- Hardening salt residues (cyanide and nitrate/nitrite contaminated)
- Arsenic waste
- Heavy-metal contaminated industrial waste

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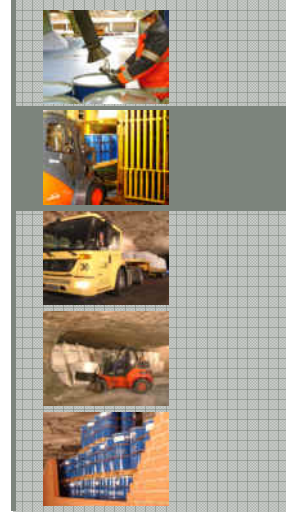
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**UTD Process | Acceptance Control**



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**UTD Process | Shaft Transport**



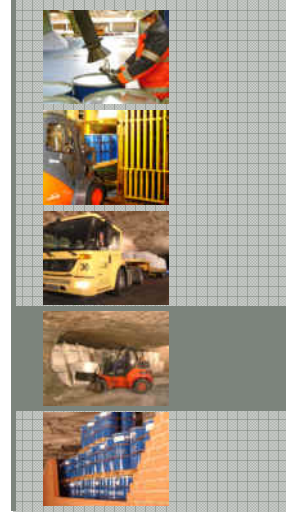
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**UTD Process | Underground Transport**



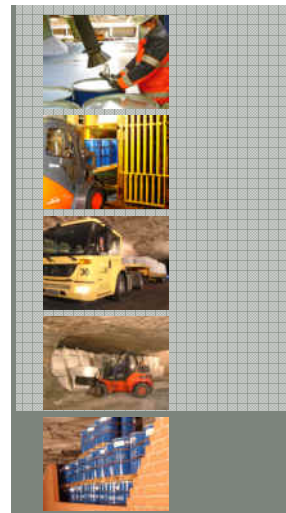
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**UTD Process | Disposal Galleries**



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**UTD Process | Sealing Off**



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**UTD | Room and Pillar System**



- Separation into waste groups
- Strict adherence to safety by clearly defined zones
- Precise documentation for tracking and tracing

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**UTD Herfa-Neurode | A Unique Disposal Plant**



Disposal gallery: Complex safety installations

- Long-term safety approved by authorities
- Ideal conditions for isolating hazardous waste from the biosphere
- High capacities

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**K+S Entsorgung | End-to-End Consultancy**



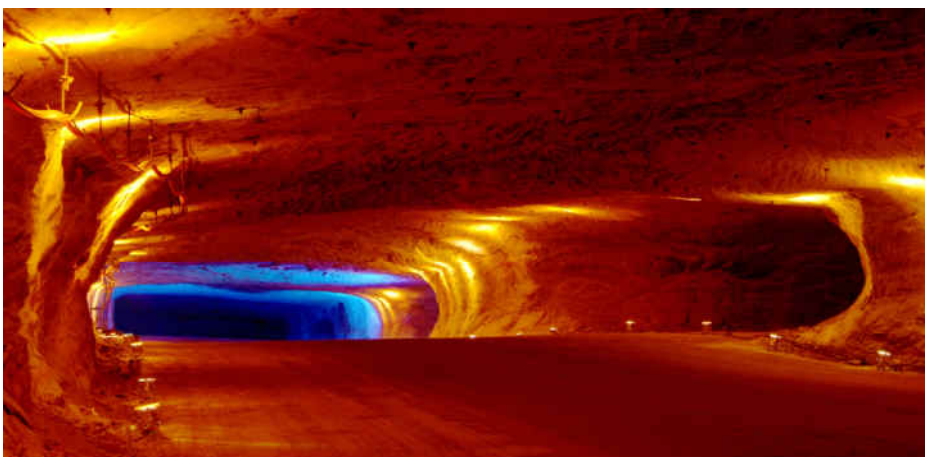
- Safe long-term disposal
- Full service package
- Longest experience in underground disposal
- Transfer of ownership of the disposed waste
- Maintenance-free



Sustainable disposal concepts

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**UTD Herfa-Neurode**



Thank you!

Visit [www.ks-entsorgung.com](http://www.ks-entsorgung.com) for further information

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