Presentation Transcript

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1. **Underground Waste Disposal** Alexander Baart Sales and Marketing of Chemical Division Since 2004 at K+S Entsorgung
2. **The K+S Group | Facts and figures** A world wide leader in the sectors of: • Special and standard fertilisers • Plant care products • Salt products • More than 12,300 employees • Revenue 2008: 4.79 billion € • Since september 2008 one of 30 DAX-listed companies, Germanys most important stock exchange index Sites in 22 countries
3. **The K+S Group | Worldwide presence** Kassel and Werra region Evaporation caused by solar heat Revenues by region (2007) Germany 19.6% Rest of Europe 47.1% Overseas 33.3%
4. **Die K+S Gruppe | Business units**
5. **Die K+S Gruppe | Business units**
6. **K+S Entsorgung | Profile** • A K+S Group business segment since 1991 • Disposal activities are centrally steered from Kassel • Reutilisation, disposal and recycling at company-owned facilities • Largest number of sites and technologies on the market • Internationally active, with representatives in eight countries • Pioner of underground waste disposal with first facility woldwide: Herfa-

Neurode (1972) • Revenue 2008: 71.1 m. € Europe´s leading company in the field of underground waste disposal

7. **K+S Entsorgung | Solutions** • Underground disposal: • Solution for highly contaminated wastes • Goal: The permanent and sustainable exclusion of the contaminants from the biosphere • Underground disposal plants (UTD): • Herfa-Neurode (technical capacity: 200,000 metric t / year) • Zielitz(technical capacity: 40,000 metric t / year) Long-term-safe disposal solution

8. **Disposal facilities | Germany** • Underground Waste Disposal Plant Zielitz • Underground Waste Disposal Plant Herfa-Neurode

9. **Werk Werra** Werk Werra | Facts • Extraction of crude potash and magnesium salts: 21.7 m. t/a • Production of special fertilisers: 3.4 m. t/a • More than 4,000 employees • Mining method: room and pillar-system • 1 underground disposal plant • 3 underground reutilisation facility In the heart of Germany - the largest works alliance within K+S

10. **Werk Werra | Dimensions** • WINTERSHALL • Potash extraction • Underground reutilisation • Underground disposal as a reference: City-motorway Munich (A 99) • MERKERS • Visitor mine • HATTORF • Potash extraction • Underground reutilisation Hesse Thüringia •

UNTERBREIZBACH • Potash extraction • Underground reutilisation

11. **Werk Werra | Formation of the salt and potash deposits** Evaporation caused by solar heat Barrier Semi-enclosed sea Salted sea water Potash deposit Salt deposit Formation of the salt layers 250 million years ago
12. **Werk Werra | Geology** Deposit thickness up to 500 metres | Gastight
13. **Werk Werra | Potash mining** Two potash deposits | Mining with room-and-pillar-system
14. **Werk Werra | Potash mining** 100 m 1. potash layer 60-70 m 2. potash layer Mining with room-and-pillar-system
15. **UTD Herfa-Neurode | Prerequisites** • Prerequisites for underground waste disposal • Waste storage only in disused, excavated areas of the mine • Storage area has to be remote from extraction area with possiblity to be sealed off from it • Cavities remain open and have no backfill obligation • Cavities have to be stable and must remain accessible even after prolongend time • Mine has to be dry and free of water • Storage areas have to be sealed off from water-bearing layers The safest solution for the disposal of hazardous waste
16. **Underground Disposal | Specific safety assessment** Technical planning • Long-term-safety • evidence • Assessment of: • natural and technical barriers • incidents and

contingencies • the overall system Hydro-geological data • Risk assessment of the operational phase • Safety of: • operation • stability of cavities Geological data Safety concept Waste data Environ-mental impact assessment Geotechnical risk assessment

17. **UTD Herfa-Neurode | Preparation of the caverns** Safety Measures • Installing steel bolts into the top rockto reinforce it • Deployment of rock anchors Extensive measures are taken in order to prepare the caverns
18. **UTD Herfa-Neurode | Preparation of the caverns** Construction of roadways • Application of rock salt • Levelling • Humidification • Compacting Extensive measures are taken in order to prepare the caverns
19. **UTD Herfa-Neurode | Storage Conditions** • Not acceptable for underground disposal • are wastes that are: • explosive • self inflammable • spontaneous combustile • infectious • radioactive • releasing hazardous gases • liquid • increasing their volume Acceptance control
20. **UTD Herfa-Neurode | Acceptance control**
21. **UTD Herfa-Neurode | Shaft transport**
22. **UTD Herfa-Neurode | Underground Transport**

23. **UTD Herfa-Neurode | Storage Chambers**
24. **UTD Herfa-Neurode | Sealing off by walls**
25. **UTD Herfa-Neurode | Material groups** • Wastes are separated by 17 material groups: • Alkaline wastes • Alkaline wastes, moisture sensitive • Acid wastes • Acid wastes, moisture sensitive • Cyanides (acid / alkaline) • Mercury (acid / alkaline) • Organic wastes (acid / alkaline) • Hydroxide sludges • Capacitors • Transformers (Cu / Fe) • Parts of transformers (Cu / Fe) • Other wastes Structure and documentation
26. **UTD Herfa-Neurode | A unique disposal plant** • First underground waste disposal plant worldwide • Complex safety installations • Complex documentation to allow precise backtracking • Retain samples of every single waste delivery • Retrievability of wastes for recovery of resources • High capacities and flexibility • Infrastructure of a major company Shaft at Werk Werra
27. **UTD Herfa-Neurode | Multi-barrier-system** • Natural barriers • Salt (gastight) 300 m • Clay (watertight) 100 m • Bunter stone 500 m • Artificial barriers • Packaging • Brick walls • Field dams • Waste repository zone dams • Watertight filling of the shafts Long-term-safe and maintenance-free
28. **UTD Herfa-Neurode** T h a n k y o u f o r y o u r a t t e n t i o n !