Mining waste management of Estonian mineral resources

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Estonia

• Small country (45000 km², 1,3 Mill.inhabit)
• Largest oil shale mining country
• Oil Shale is used for:
  ➢ power generation,
  ➢ oil production
  ➢ fuel for cement kilns
Estonian Mining areas

- Black shale (Dictyonema argillite)
- Oil shale (kukersite)
- Phosphate rock
- Limestone ja dolostone
- Granite
Aim of study

• What type mining waste facilities have
  – Hazardous
  – Inert
• Is mining waste usable
  – As a by product
  – New raw material
• Mining waste heaps properties
Oil shale waste rock
Burned black shale heaps
Flotation sand
Limestone production fines (0-4mm)
Mining waste facilities in Estonia

- Oil Shale Waste Rock: 14%
- Phosphate Rock Waste: 7%
- Limestone Waste: 79%
Estonian oil shale bed
Oil shale waste heaps

Main characteristics
- Volume
- Mining method
- Organic material
- Shape of heap
Oil shale seam

- **Mining methods**
  - Hand mining
  - Longwall mining
  - Room and pillar mining

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# Used mining methods

## Mined area

- **Hand-mined**
  - 70.75 km²
- **Longwall**
  - 14.10 km²
- **Room and pillar**
  - 133.60 km²
Oil shale waste rock

Oil shale for oil or electricity

Pilot unit

Limestone for aggregate or backfilling
Pilot unit process

Crushing with bucet

Sieving crushed material
Jigging

Separating oil shale and limestone
Oil shale on top

Limestone on bottom
Preliminary Results

- We have tested crushing bucket to crush
  - Hard lime
  - Oil shale waste rock
- We have testing separation unit
  - Oil shale waste rock from open cast
  - Oil shale waste rock from underground mine
Crushing hard lime
Crushing oil shale waste rock
Jigging oil shale waste rock
Mining waste information

http://mi.ttu.ee/db/

http://mi.ttu.ee/miningwaste/
EU Baltic Sea project MIN-NOVATION

- Min-Novation website: [www.min-novation.eu](http://www.min-novation.eu)
- Sign up for Min-Novation newsletters
- Min-Novation conference at the end of 2013 in Poland
- Contact project manager: [ostrega@agh.edu.pl](mailto:ostrega@agh.edu.pl)
  or communication officer: [piotr.szmigielski@fii.org.pl](mailto:piotr.szmigielski@fii.org.pl)
Conclusions

• Aim is find usage for mining waste
• We have established pilot unit
  – Crushing bucket, sieving unit and jigging unit
• We have promising preliminary results
• Database on mining enterprises
  – http://mi.ttu.ee/db/
• More information:
  – http://mi.ttu.ee/miningwaste
  – http://mi.ttu.ee/mining
THANK YOU!

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