Mercury Stabilisation Technologies

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$Hg + S \Rightarrow HgS$

1. NQR (DELA) Germany, operating since 2010
   product: HgS, red cinnabar powder

2. MAYASA Spain, planned 2015
   product: HgS, metacinnabar microencapsulated in a polymeric sulfur matrix

1) NQR Mercury Stabilsation Technology

Presentation courtesy of

Volker Warrelmann, NQR Managing Director

NQR acquired DELA assets in September 2014

NQR is a subsidiary of Remondis, a divisions of the RETHMANN Group offering specialised recycling and environmental services and products

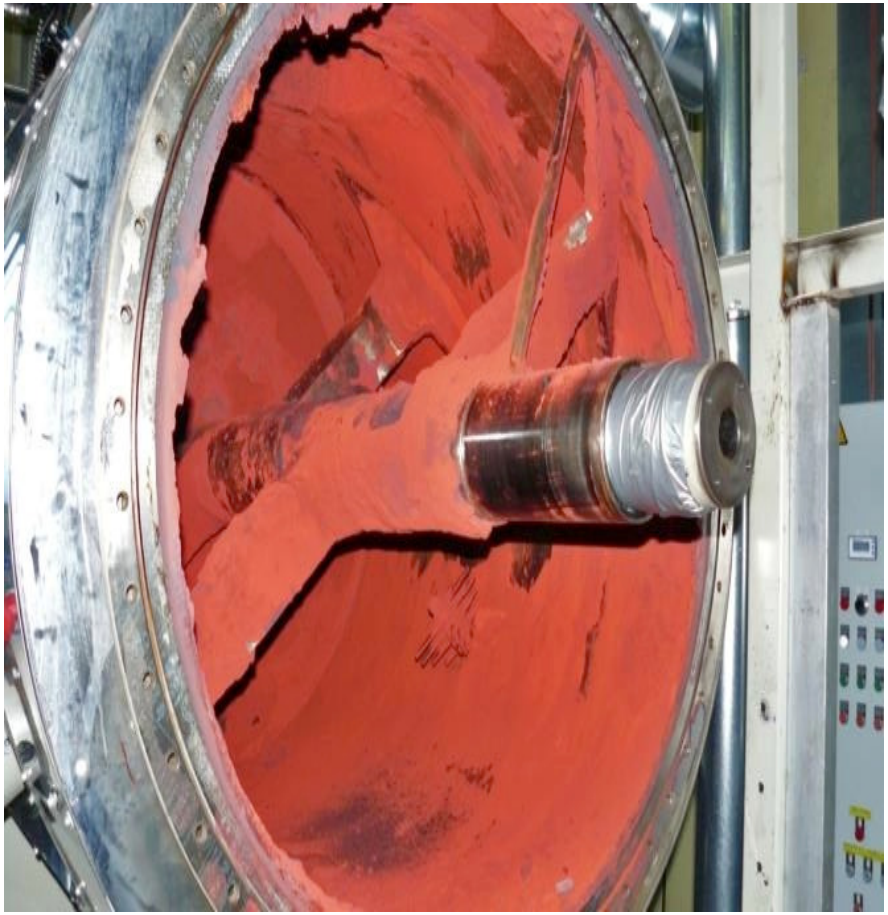
Vacuum mixer for stabilisation of metallic mercury in Dorsten

- <u>Input:</u>
  Toxic metallic Hg and sulphur
- <u>Output:</u>
  Non-toxic mercury sulphide, HgS

- Sources of mercury: Mercury cells chlorine alkali industry, mining industry, instruments, recovery from different types of mercury waste
- Annual Capacity: 1.000t

Vacuum mixer for stabilisation of metallic mercury in Dorsten

- Mercury and sulfur reacts to mercury sulfide
- stoichiometric reaction / complete conversion in vacuum mixer at 0.9 Bar, 250 – 350 ˚C
- Very toxic mercury is transferred to non toxic HgS – the most stable mercury compound
- Currently the only large scale technology available on the market



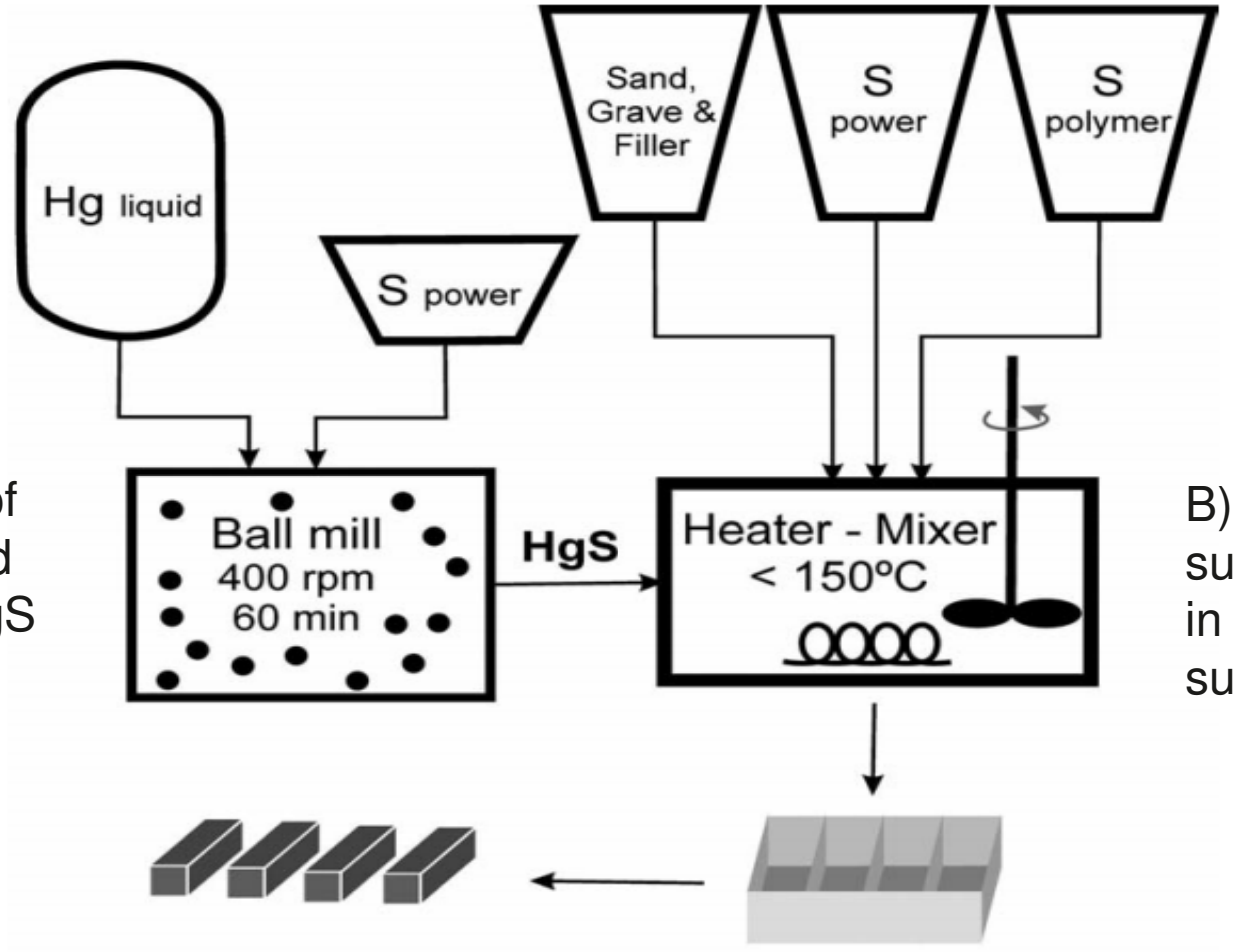
Vacuum mixer for stabilisation of metallic mercury in Dorsten

- The stabilisation of metallic mercury is a Disposal-operation
- HgS disposed of in German salt mines

2) MAYASA Technology

MAYASA Process

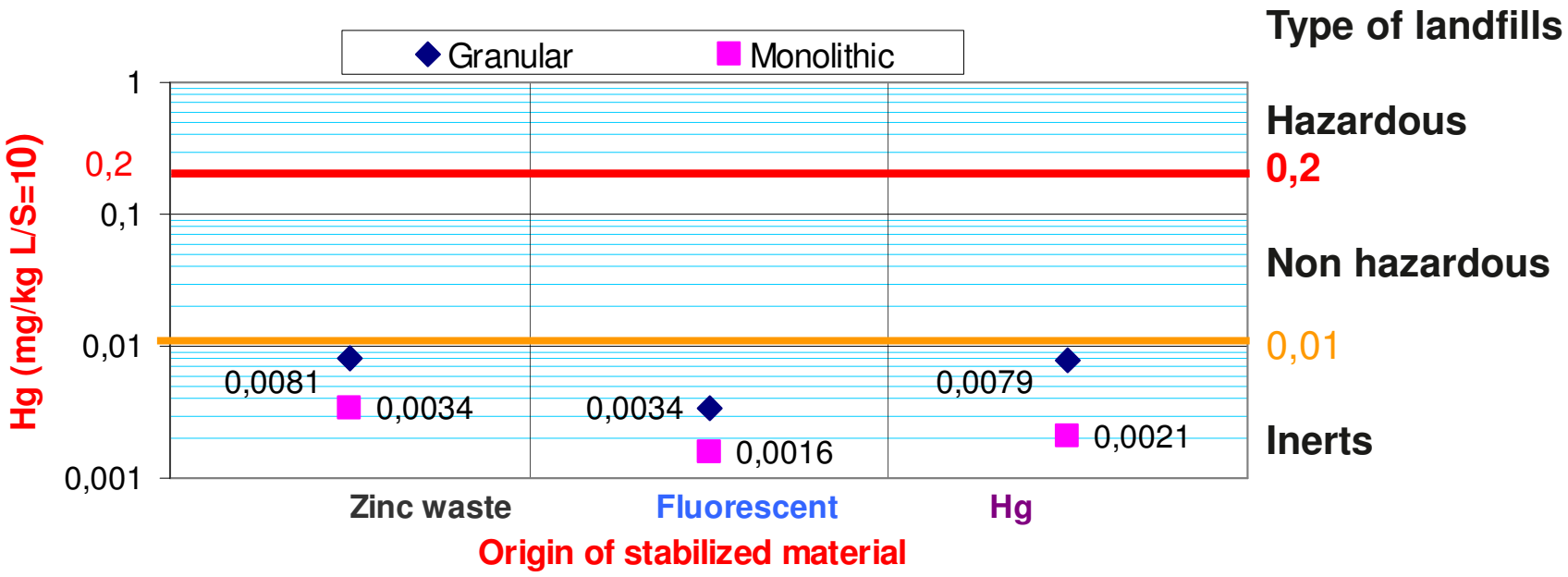
A) reaction of liquid Hg and solid S to HgS



B) microencapsulation of HgS in a polymeric sulfur matrix

MAYASA Hg stabilisation product

Leaching values of final products fulfill the EU acceptance criteria for landfills for inert wastes (<0,01 mg/kg, Decision 2003/33/EC)



EU standard (CEN/TS 14405:2004 and UNE-EN-12457)

Final products also fulfill the TCLP leaching test USA EPA (crushed sample)

Mercury Stabilisation Technologies

1. NQR (DELA) Germany, operating since 2010
   stoichiometric reaction / complete conversion
   in vacuum mixer at 0.9 Bar, 250 – 350 ˚C
   product: red cinnabar powder

2. MAYASA Spain, planned 2015
   a) reaction in a planetary ball mill to HgS
   b) microencapsulation in a polymeric sulfur matrix

3. Further developments e.g.mobile installations?

Mercury Stabilisation, References

1. UNEP, 2013 Update on mercury stabilisation technologies, www.unep.org/chemicalsandwaste
2. A. Guerro et al, Revista de metallurgica, 2012, 48, 45-57
3. Gesellschaft für Anlagen- und Reaktorsicherheit, Report GRS - 252, 2009, Hagemann et al., Technologies for the stabilization of elemental mercury and mercury-containing wastes

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Thank you very much

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