Geopolymer matrix waste disposal experience in the Czech Republic

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Radioactive Waste Disposal in CR

- Main waste streams :
  - INSTITUTIONAL – subsurface disposal, Drum in drum, Repositories Richard(1965) and Bratrství(1975)
  - NPP – surface vault disposal, 200 l steel drum, Repository Dukovany (1995)

Main types of NPP waste disposed in DUKOVANY

- Liquid waste – evaporate and bituminized
- Solid waste – different treatment (mid pressure compaction, incineration, cutting and partitioning + cementation)

- Some waste was without suitable conditioning for disposal:
  - Ion Exchange resins
  - Sludges

2006 started conditioning these types of waste into geopolymer matrix SIAL®

Licensing considerations

2006 – new material – existing Slovak experience

- use approach applied to cemented waste
- no increase in activity limits above that for cemented waste
- Add clear indicator which prove quality of the conditioning process

Known approach in different countries

- Czech Republic, Slovakia derived WAC from cemented RW.
- In the UK, existing standards may be applied where useful, although each individual waste is treated separately when gaining approvals.
- In other countries, the first step in gaining approval to use a geopolymer matrix for the solidification of radioactive waste is to develop new standards for determining the properties of geopolymers. These standards are general and not only for geopolymers used for radioactive waste treatment (e.g. Australia, Japan).

Example of a campaign at Dukovany NPP

Retrieval - view inside the tank - pumping arm (180º rotated), remotely controlled from control room

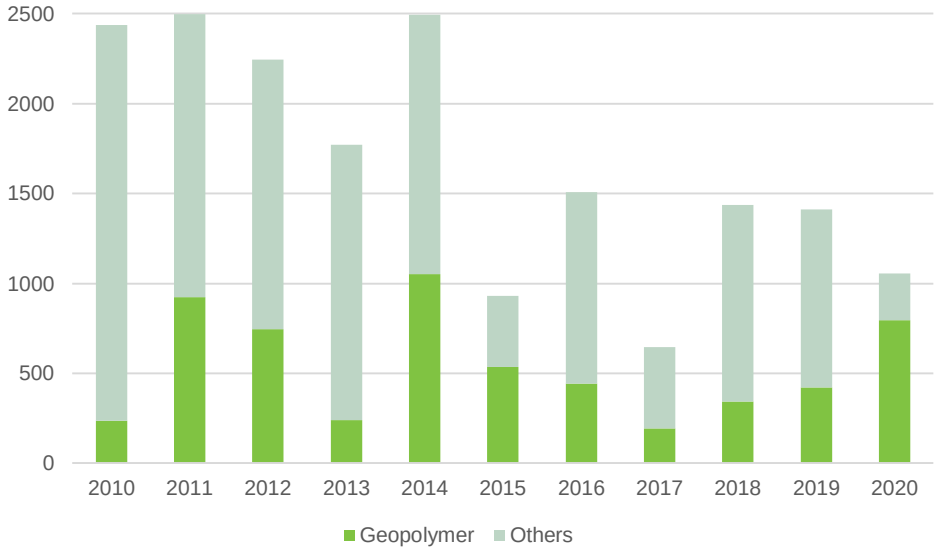
Pre-treatment

Result: 191 m^3 of spent ion exchange resins treated into the SIAL® matrix in 2,006 200 litre drums
Project Duration: May 2010 – Dec. 2012 (31 months - **3 years before original client target date**)
Workplace decontaminated and equipment transported out of NPP area in Dec. 2012
on completion

The international missions WANO and OSART evaluated it as an example of best practice

Number of disposed drums with geopolymer matrix 2011-2020

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total drums	2439	2499	2246	1774	2497	933	1510	645	1439	1413	1056
Geopolymer drums	236	923	747	241	1053	536	442	195	345	423	796
ratio	10%	37%	33%	14%	42%	57%	29%	30%	24%	30%	75%



Thank you for your attention