



Radioactive and Nuclear Wastes

15 Jan. 2015



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News

New decontamination tool – Catenacio PA expected to help Fukushima clean up

RISSET developed this material after its attention was drawn to the cation exchange capacity (CEC) of geopolymer. Noting the material's CEC level, the researchers decided to make use of this feature. *Catenaccio PA* is expected to make a significant contribution towards improved safety not only through its use in the treatment of contaminated water from nuclear power plants.

(6) Issues for the future

Since this adsorbent has only been developed recently, although its basic functions have been confirmed in the laboratory, full performance assessments against a variety of real-life effluents have not yet been undertaken. It is planned to deliver samples of the adsorbents for assessment by a third party beginning in January 2015.

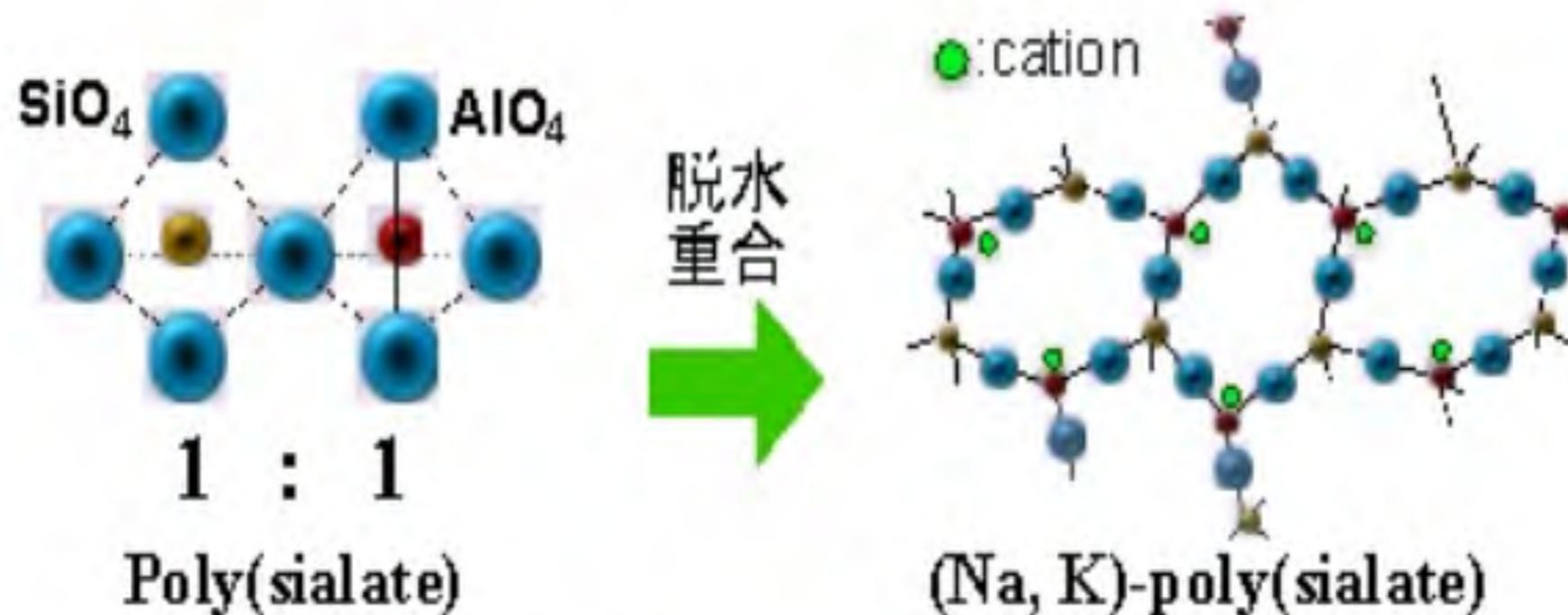


Fig. 1: Structural pattern of geopolymer-based adsorbents

June 2014

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Innovation investment bears fruit

Ceramic technologies could polish up sites

A unique technology has been developed that could help to treat radioactive waste at lower cost and more effectively in the future.

Current methods rely on immobilising both liquids and solids by blending them with a cement-based grout before packaging the mixture for storage and eventual disposal.

The approach being pioneered by Lucideon (formerly CERAM), a materials consultancy company whose expertise emerged from the ceramics industry of Stoke-on-Trent, involves pouring a slurry of mineral-like materials, or a *geopolymer*, onto the waste which hardens the material into a resilient solid.

One key advantage of the *geopolymer* over conventional cement-like encapsulating material is the potential to seep effectively into gaps or awkward spaces, while working equally well with solids, liquids or a mixture of both – avoiding the need to drain off liquid.

The slurry can be poured into waste containers, or pumped into the bottom, to solidify any liquids and also encapsulate solid Intermediate Level Waste (ILW). Control can also be exercised over the viscosity (or “flow”) of the encapsulant, offering more versatility than standard treatments and with potential for a wider range of applications.

Ian Buckley, Lucideon’s project lead, said:

“The study exceeded our expectations and the experimentation results provided advantages we had not foreseen. The nature of the geopolymer means the encapsulant product can be pumped into the skips either from the top or the bottom, whilst still permeating the entire waste volume and successfully immobilising it.”

1994



-

1997



European Research Project:

*GEO*polymer Cement for *Innocuous*
Stabilization of *Toxic EleMents*

Partners : European Commission, CORDI-Géopolymère

Geology : B.R.G.M. (France), Univ. Barcelona (Spain),
Univ. Cagliari (Italy)

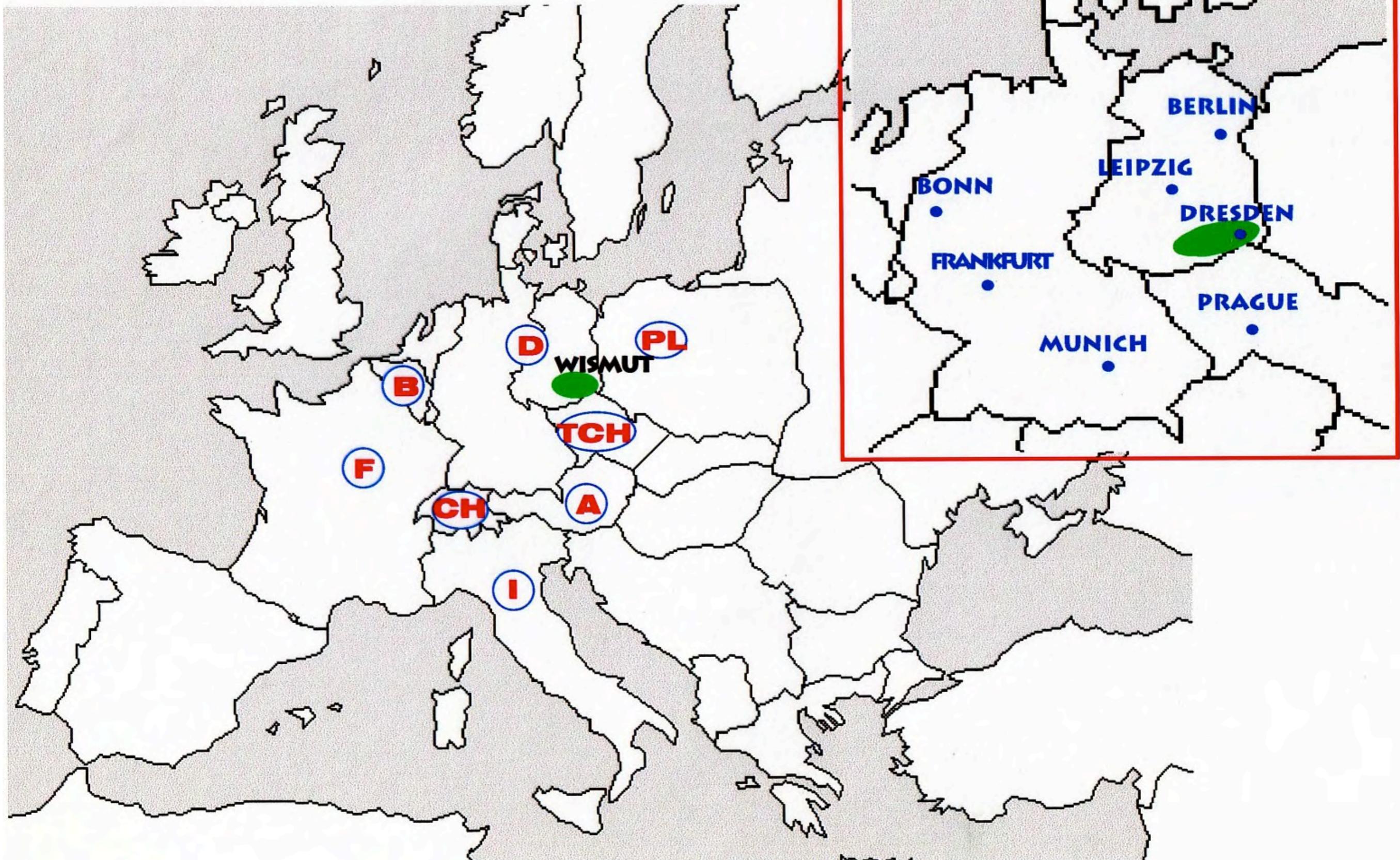
Industry : Cement : Cementi Buzzi (Italy)

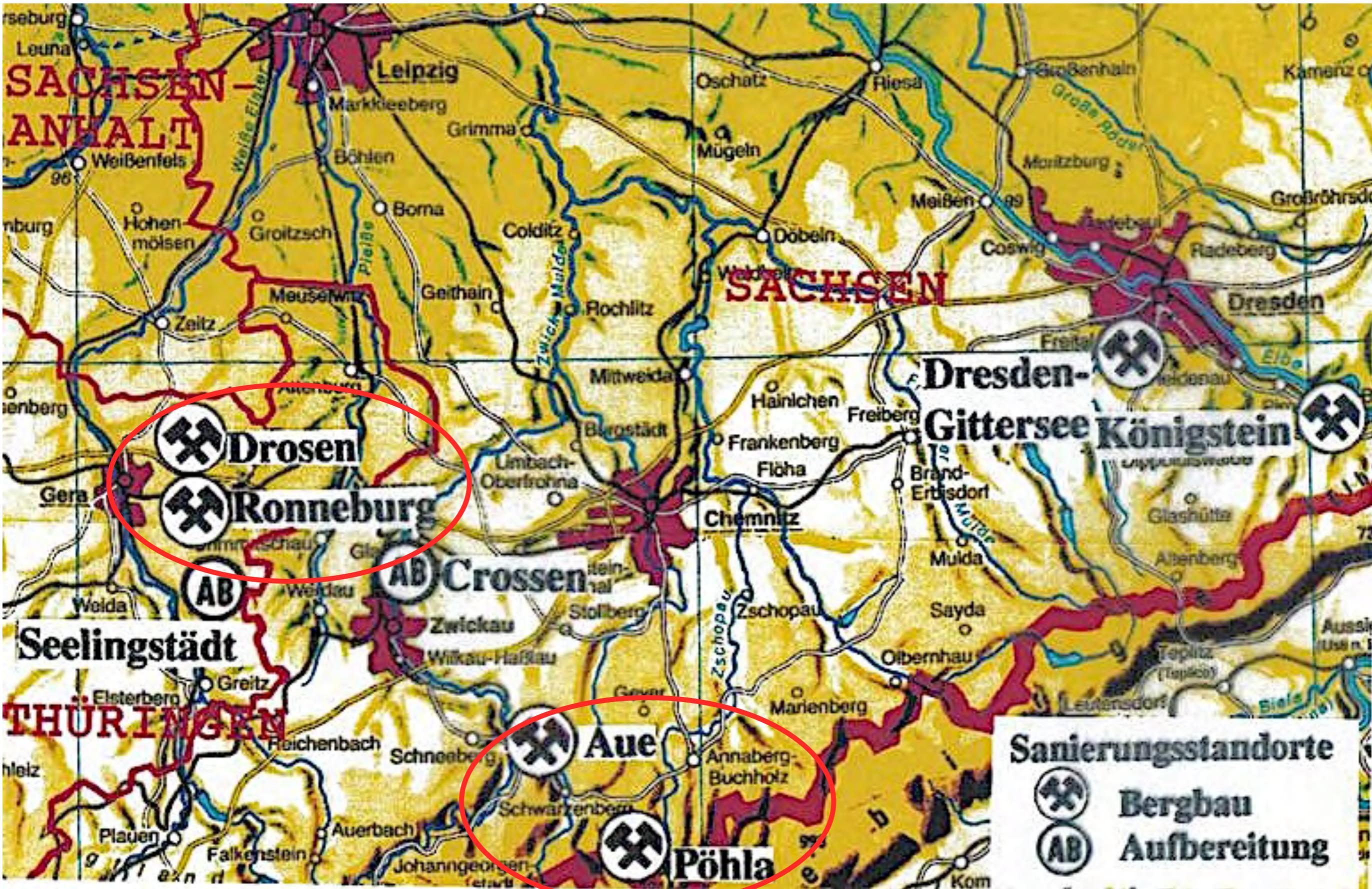
Toxic waste : Laviosa (Italy),

↓ Mine tailings : Wismut GmbH (Germany)

1998-2000 : Pilot experimentation with WISMUT
(Germany), Uranium mine tailings

WISMUT SACHSEN/THÜRINGEN



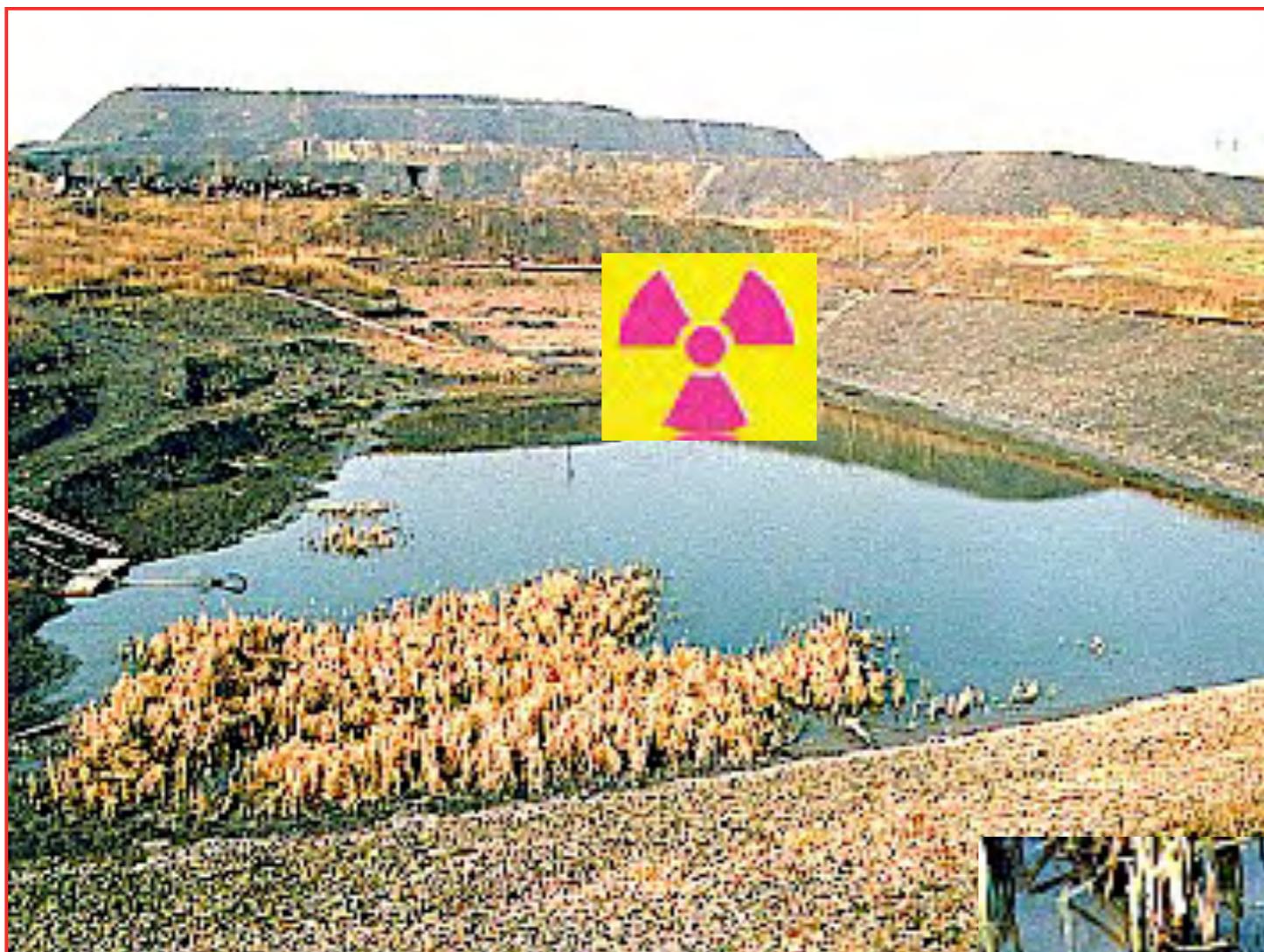


Sanierungsstandorte

- Bergbau
- Aufbereitung

Technical paper #13 Geopolymer LIBRARY**22****SOLIDIFICATION OF VARIOUS RADIOACTIVE RESIDUES
BY GÉOPOLYMÈRE WITH SPECIAL EMPHASIS
ON LONG-TERM-STABILITY****SOLIDIFICATION DE DIFFÉRENTS RÉSIDUS RADIOACTIFS AVEC LE GÉOPOLYMÈRE
POUR UNE STABILITÉ À LONG-TERME****PART I: LABORATORY INVESTIGATIONS
PART II: PILOT-SCALE EXPERIMENT****E. HERMANN (1), C. KUNZE (1), R. GATZWEILER (2),
G.KIEBIG (2), J. DAVIDOVITS (3)**

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- (2) WISMUT GmbH, Jagdschänkenstr. 29, D-09117 Chemnitz, g.kieszig@wismut.de**
- (3) Cordi-Géopolymère SA, 16 rue Galilée, F-02100 Saint-Quentin, info@geopolymere.com**



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géopolymère®



Engineering, Germany

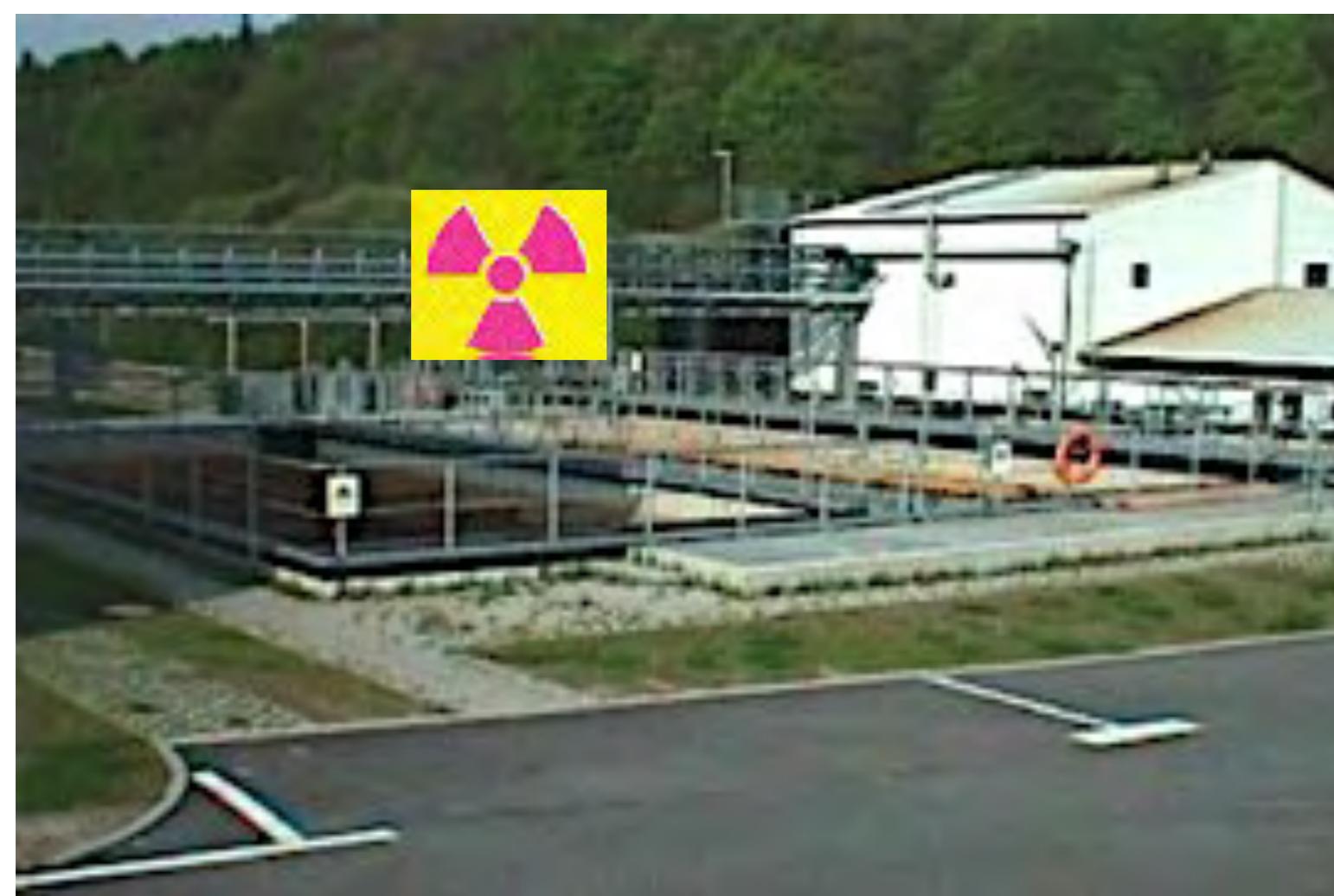


WISMUTH, Germany

Safe encapsulation of
sludge from
decantation pond

- hydrocarbon +
- radioactive +
- Arsenic +
- heavy metals





AUE, mine water,
450 m³/h
treatment plant

Filter cake with:

- radioactive +
- Arsenic +
- heavy metals



- 3.5 - 4 tons cake per day



**20 big-bags
30 tonnes**



CONCLUSION

« The new method for the solidification of sludges containing radionuclides and heavy metals as well as organics has been developed and shown to meet high standards with respect to long-term stability and contaminant retention.

The innovative technology which is based on the use of geopolymer binder is very easy to handle and requires basically the same equipment as conventional cement mortar methods.

It fills the gap between concrete-based solidification methods which do not satisfy the requirements of long-term structural stability, and vitrification which is too expensive for most cases in which larger amounts of sludges have to be treated. »

HOW LONG WILL IT LAST ?

video

Geopolymer for Newcomers #7



Low-energy cement
Mega Joule / 1 tonne

Portland
3430 MJ



Geopolymer
990 to 600 MJ

rock



fly ash

