



TGW2 – Bentonite homogenization

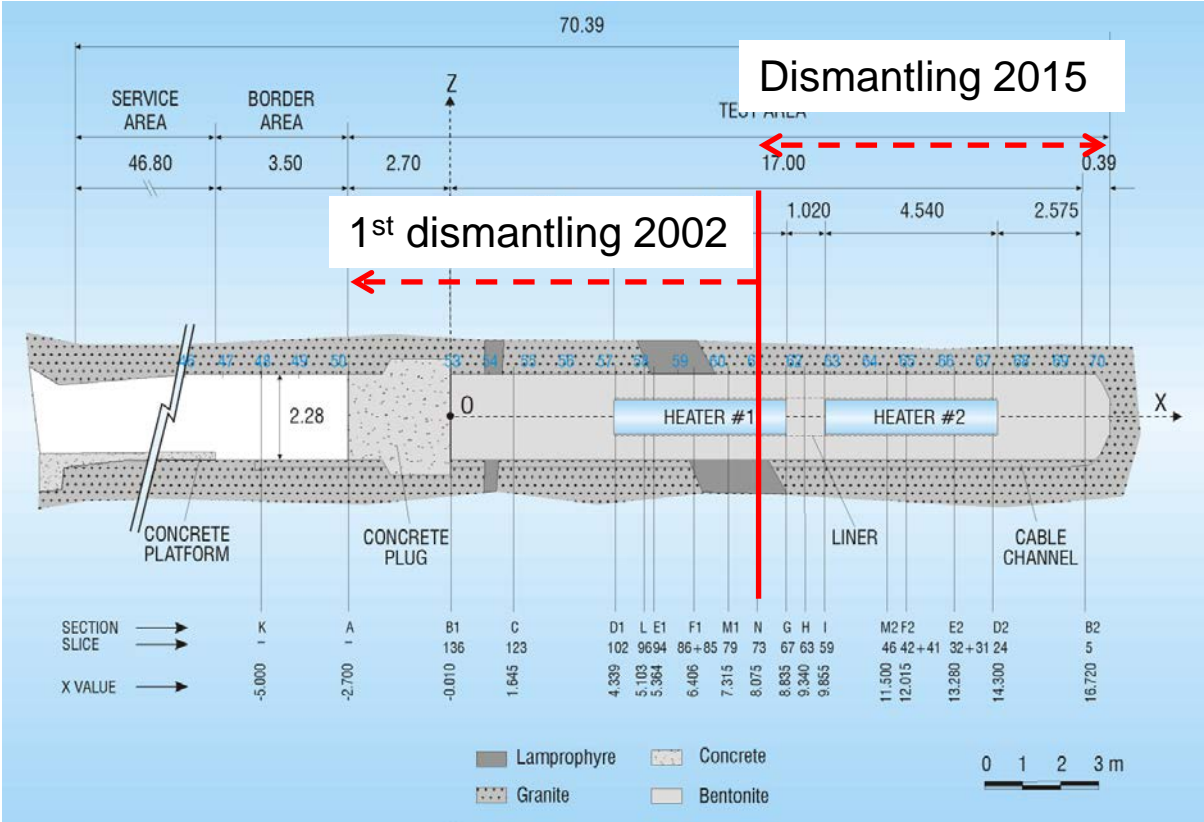
IGD-TP 6th Exchange Forum,

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STATE OF A BARRIER OF BENTONITE BLOCKS AFTER 18 YEARS OF OPERATION

M.V. Villar

- Full-scale in situ test: bentonite blocks barrier, natural hydration, two heaters
- In operation since 1997
- Partial dismantling in 2002
- Final complete dismantling in 2015

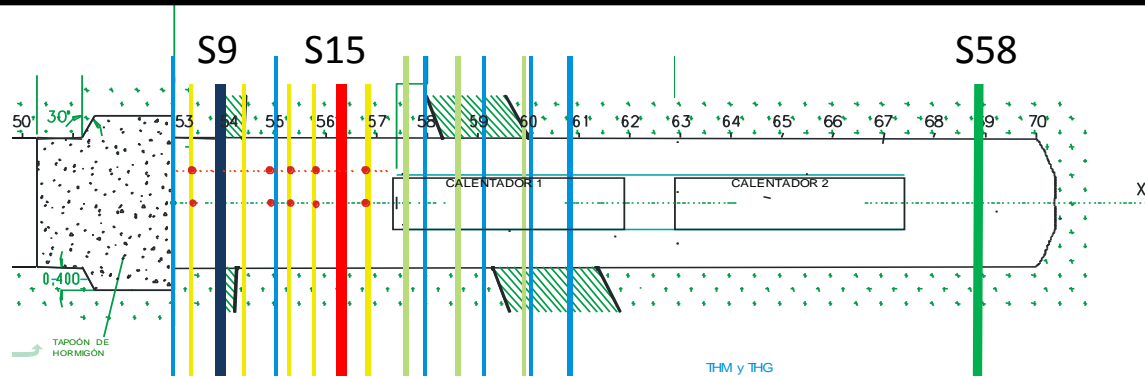


The project was supported by:

- different scale laboratory tests, including mock-up
- modelling and model development

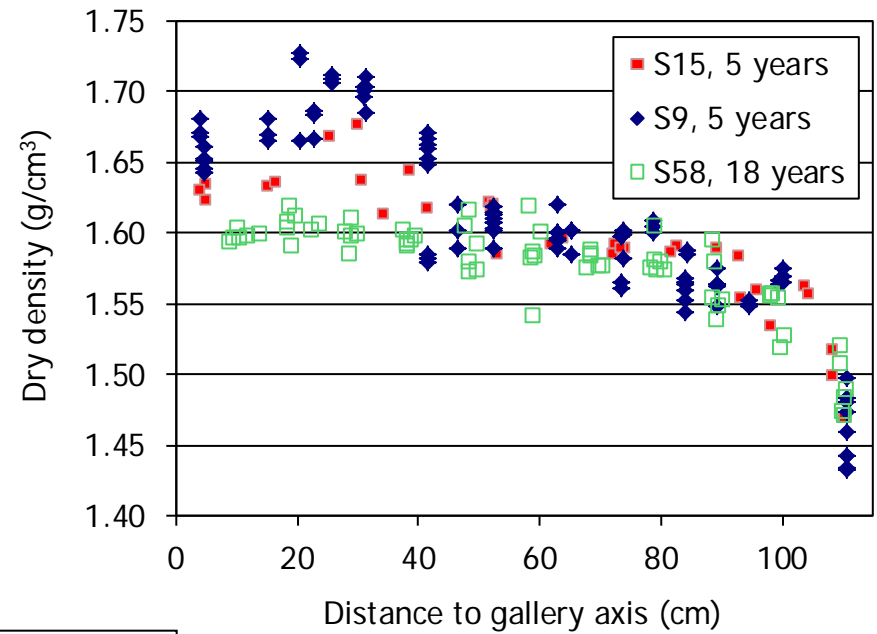
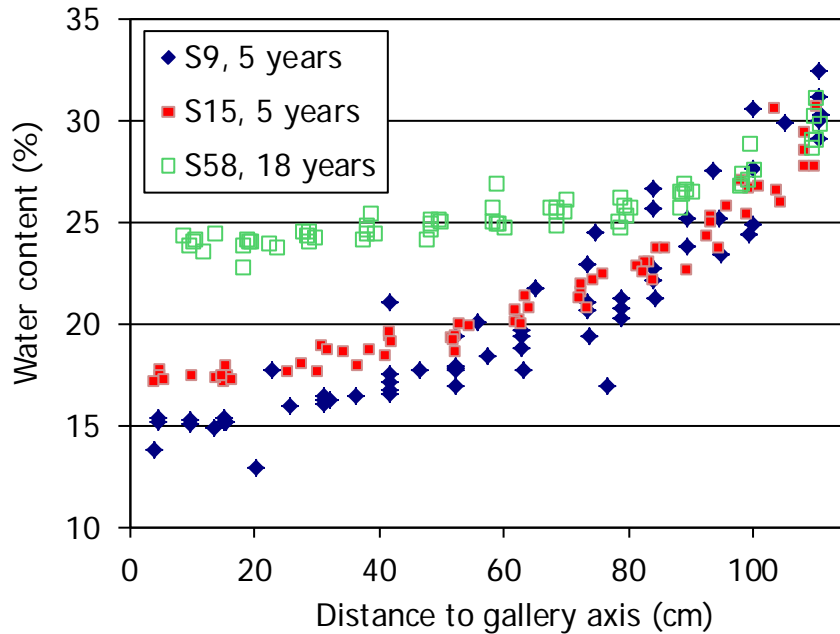


COMPARISON PARTIAL DISMANTLING



COLD SECTIONS

COLD SECTIONS



w (%)

S9: 22.9%
S15: 22.8%
S58: 27.1%

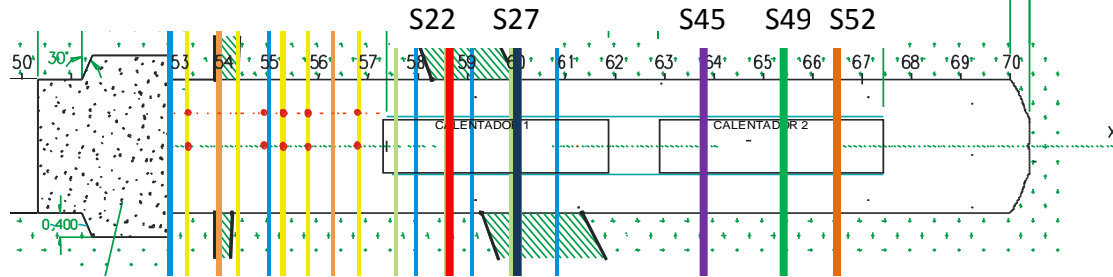
S_r (%)

S9: 85%
S15: 86%
S58: 98%

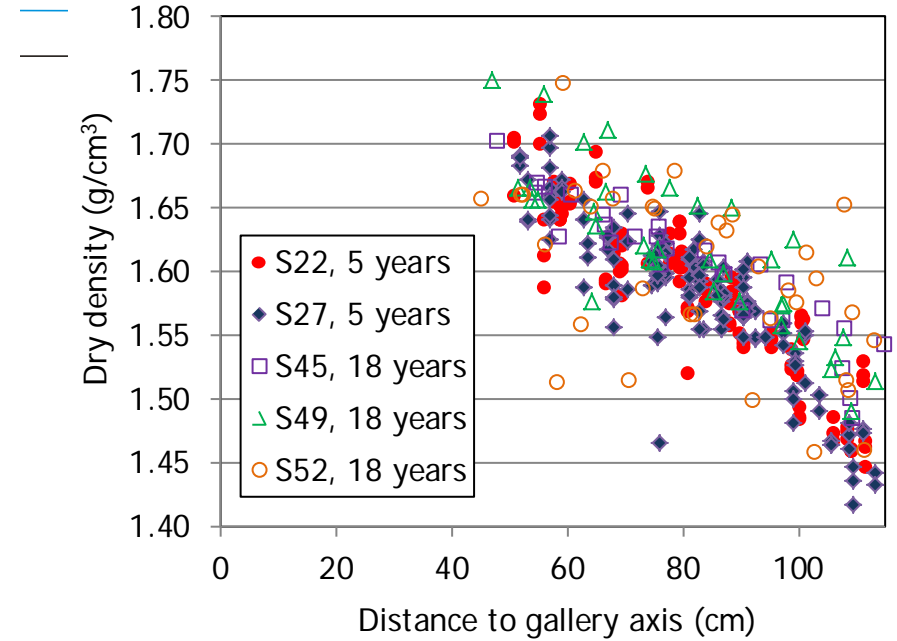
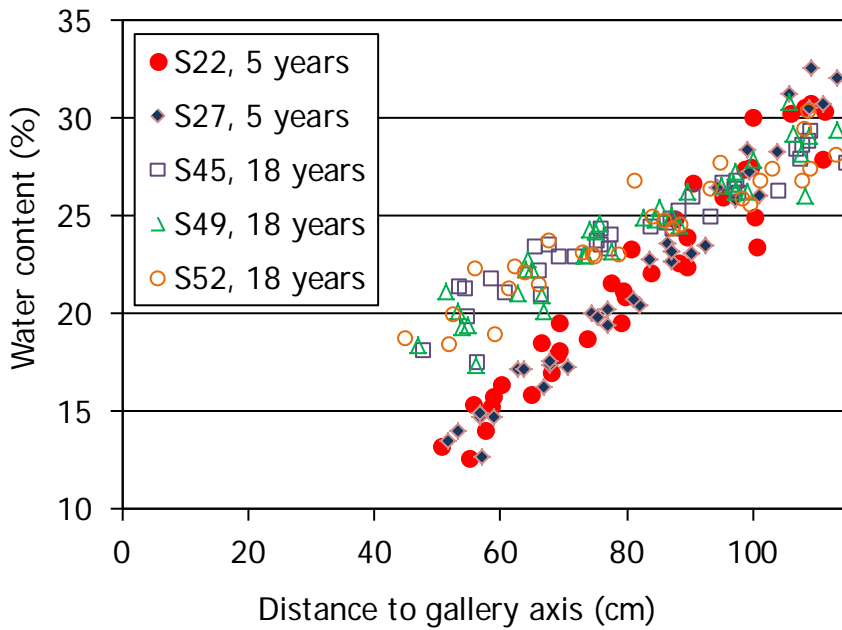
ρ_d (g/cm³)

S9: 1.58 g/cm³
S15: 1.58 g/cm³
S58: 1.55 g/cm³

COMPARISON PARTIAL DISMANTLING



HOT SECTIONS



HOT SECTIONS

w (%)

S22: 22.6%	S45: 25.7%
S27: 22.6%	S49: 25.9%
	S52: 25.6%

S_r (%)

S22: 85%	S45: 98%
S27: 84%	S49: 99%
	S52: 98%

ρ_d (g/cm³)

S22: 1.57 g/cm ³	S45: 1.59 g/cm ³
S27: 1.56 g/cm ³	S49: 1.59 g/cm ³
	S52: 1.59 g/cm ³

SUMMARY OF OBSERVATIONS

- ✓ Sealing capacity develops quickly **if water availability is enough**
- ✓ The thermal gradient delays homogenisation, because it **hinders(?)** saturation
- ✓ The dry density changes take place not only radially but also **longitudinally** along the barrier (effect of the back of the gallery)
- ✓ The state in the external part of the barrier has barely changed with respect to the first dismantling: **irreversibility** of initial deformation
- ✓ Low density favours homogenisation (**initial strains** are not too large)

UNCERTAINTIES AND FUTURE WORK

- ✓ Homogeneous water content is not imperative for homogeneous S_r : implications on dry density homogenization
- ✓ Role of thermal gradient on homogenisation
- ✓ Scale effect: homogenisation under thermal gradient was observed in small cells. Is the geometry (radial vs. axial) also a discriminating factor?
- ✓ Data base generated in FEBEX-DP very valuable for modellers