

PROTOTYPE REPOSITORY

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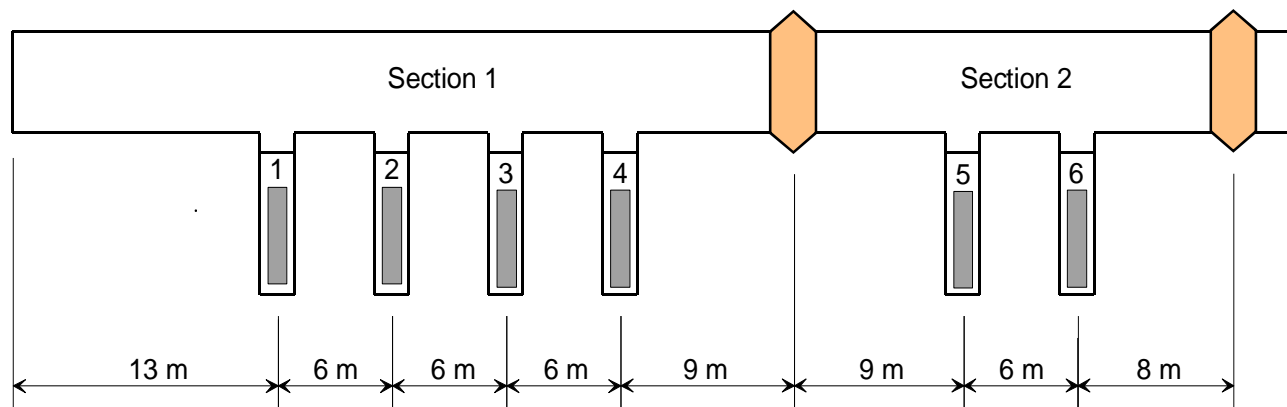
Outline

- The main objectives with the retrieval
- Layout and status before dismantling
- Preliminary results from the excavation of the backfill
- Preliminary results from the excavation of the buffer
 - The technique used at the excavation
 - The displacement of the buffer
 - Water content and density of the buffer
- Retrieval of the canister in Dh6
- Ongoing activities



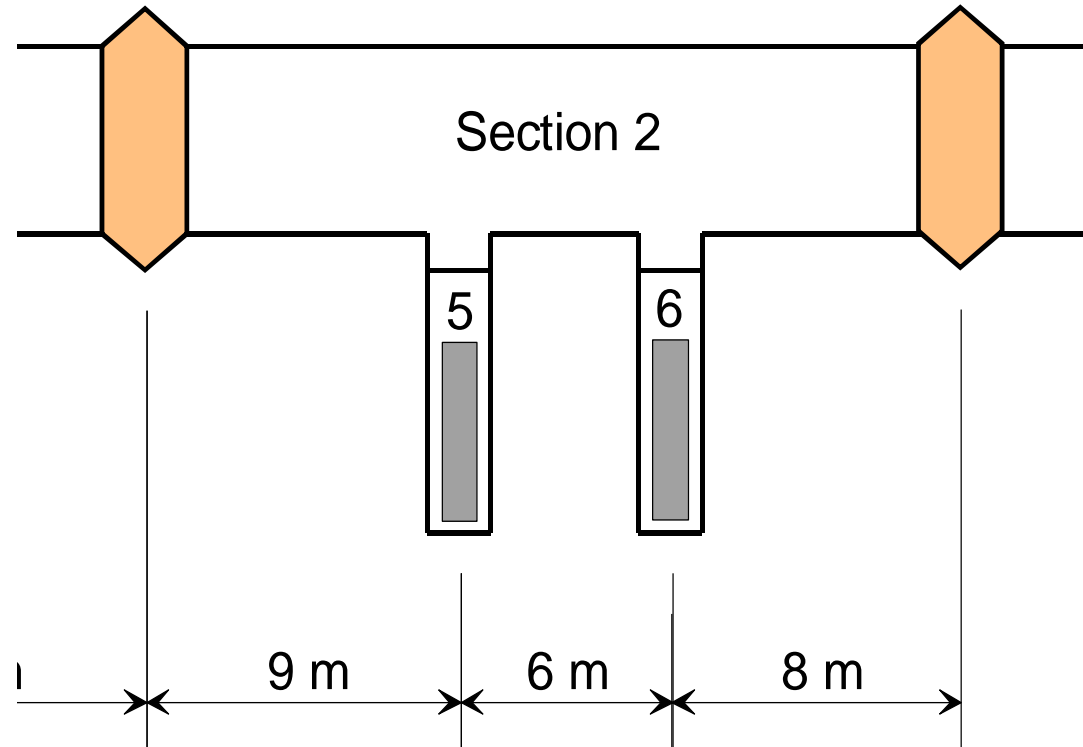
The main objectives with the retrieval

- Unique test
 - Full scale test
 - All components from a real repository
 - The test has been running for a long time
 - "Natural" saturation



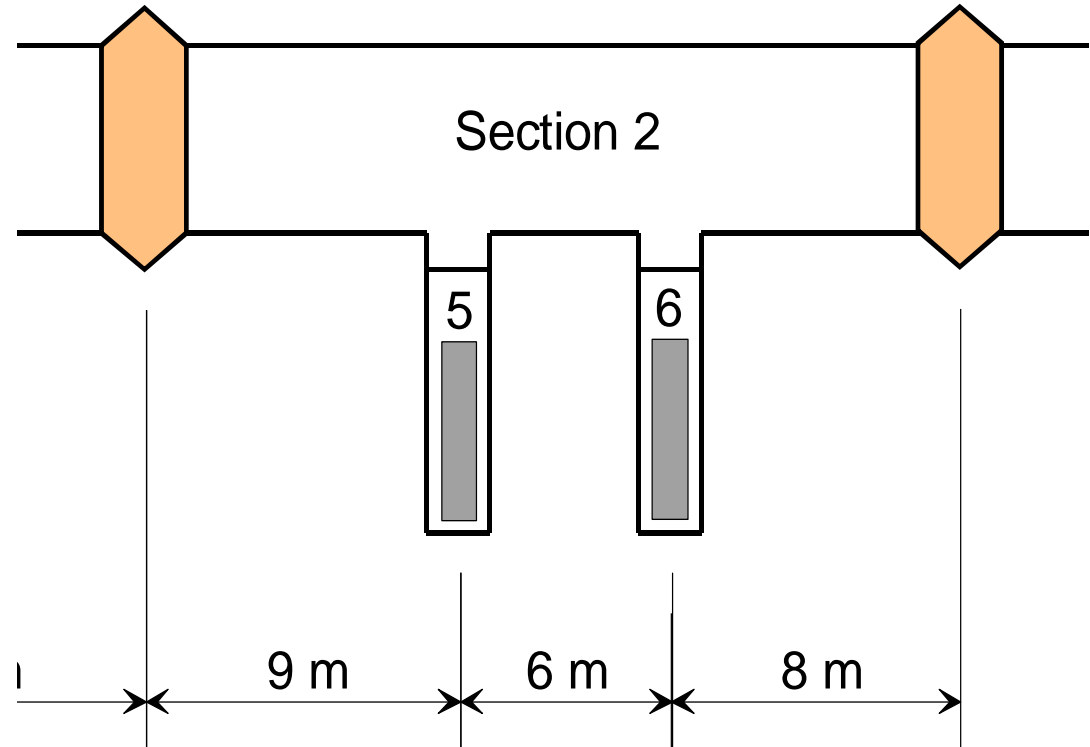
The main objectives with the retrieval

- By extensive sampling investigate the density and water saturation of the buffer and backfill.
- Investigate the interface between buffer – backfill and between backfill – rock surface after 7 years wetting.



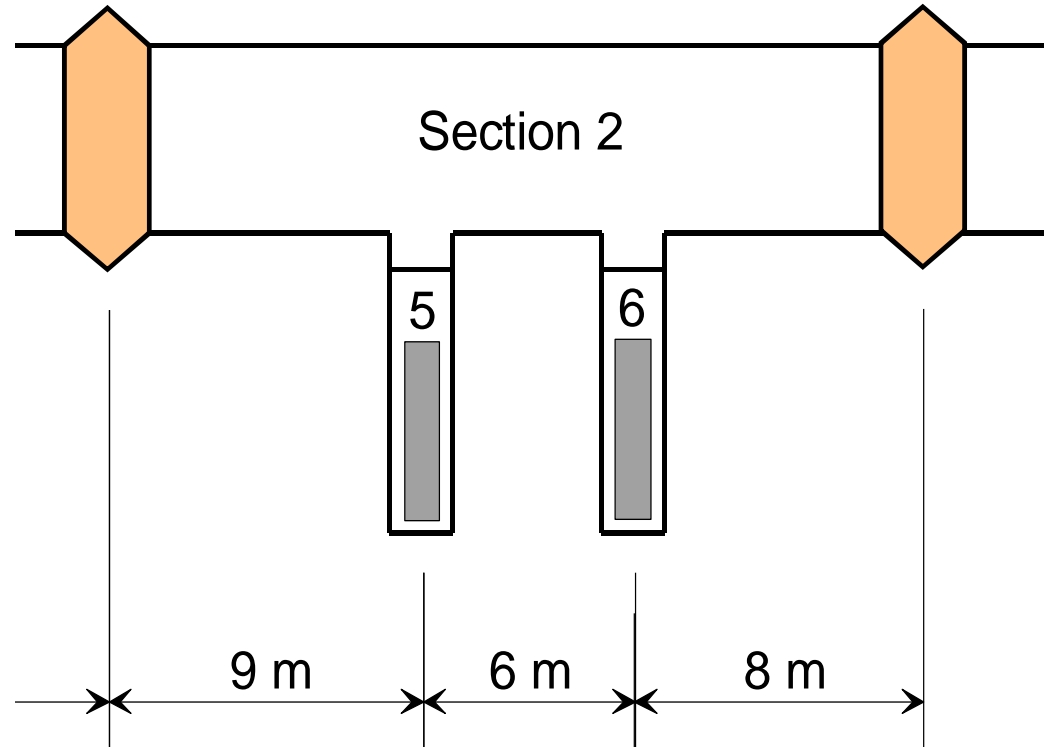
The main objectives with the retrieval

- Investigate the outer plug
- Investigate the canisters
- Investigate the bedrock after dismantling

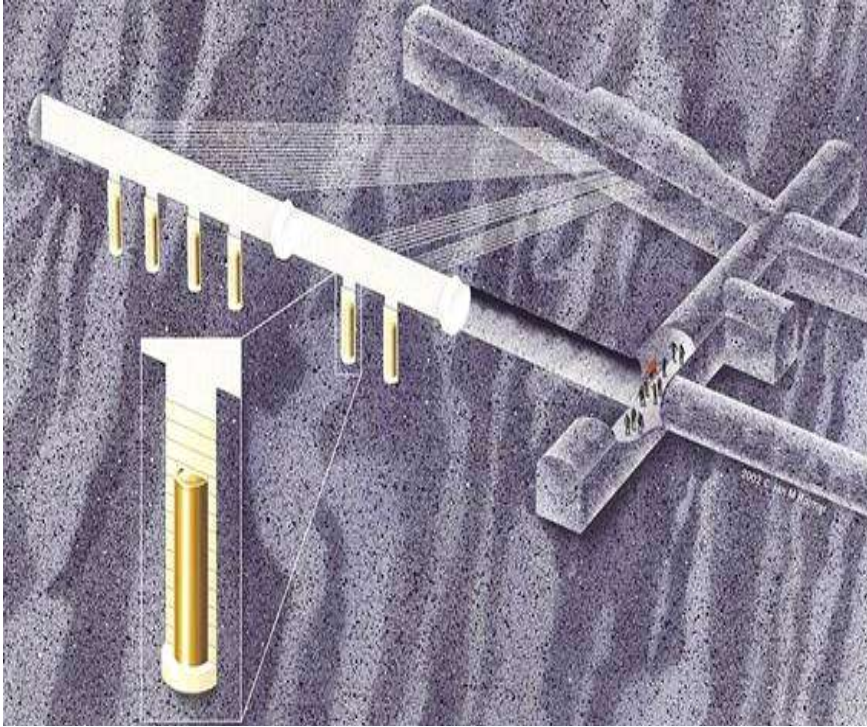


The main objectives with the retrieval

- Study biological and chemical activities in the buffer and backfill
- Study possible changes of the buffer material caused by the temperature and the saturation process
- Study possible corrosion of the canisters

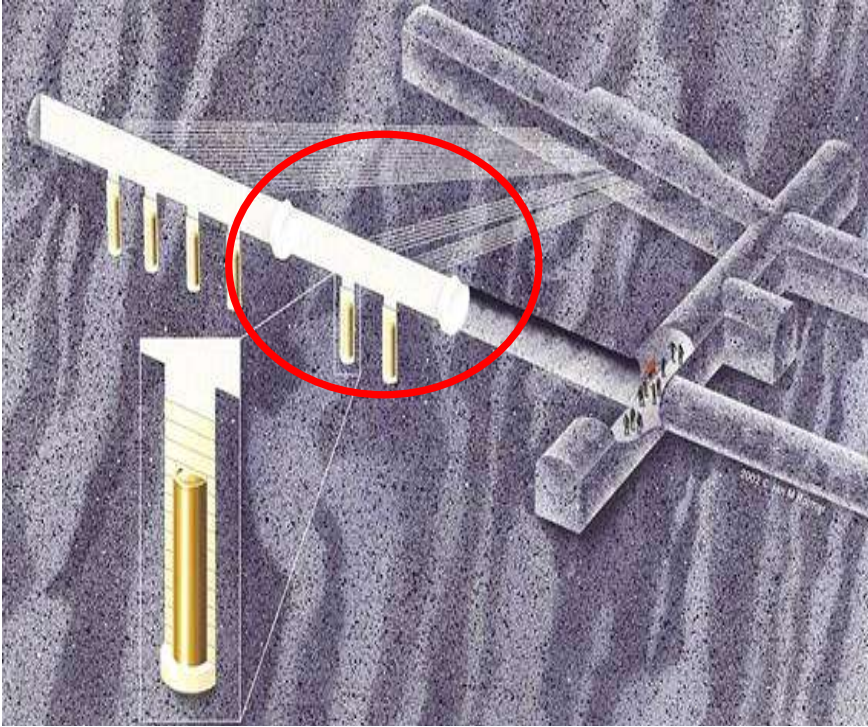


Layout Prototype Repository



- The inner section was installed 2001
- The outer section was installed 2003

Layout Prototype Repository

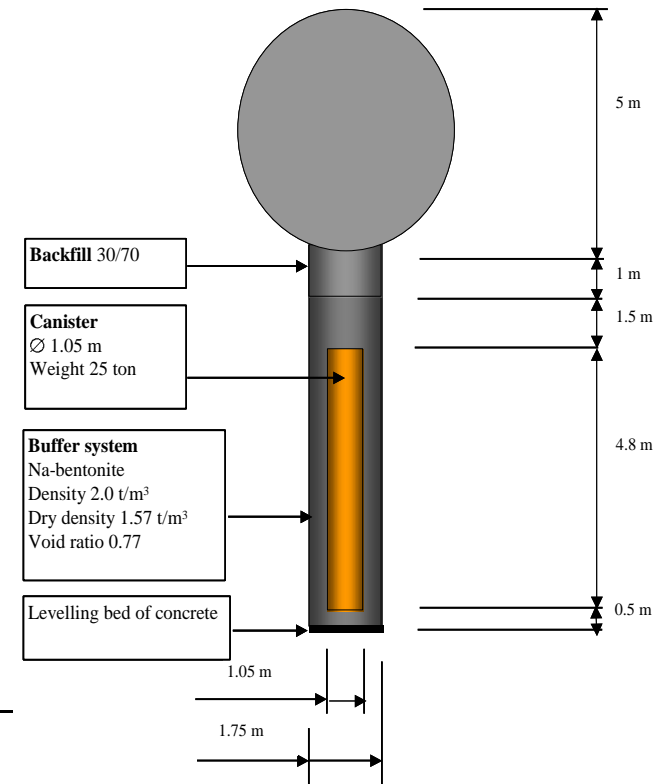
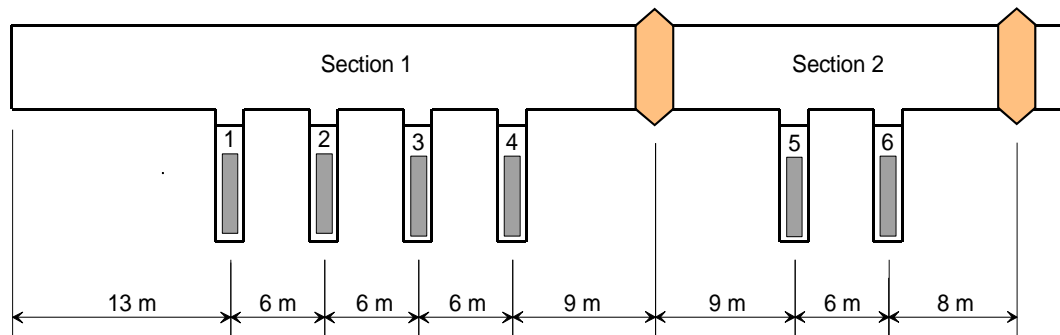


- The inner section was installed 2001
- The outer section was installed 2003
- The retrieval of the outer section started during 2011

Layout Prototype Repository

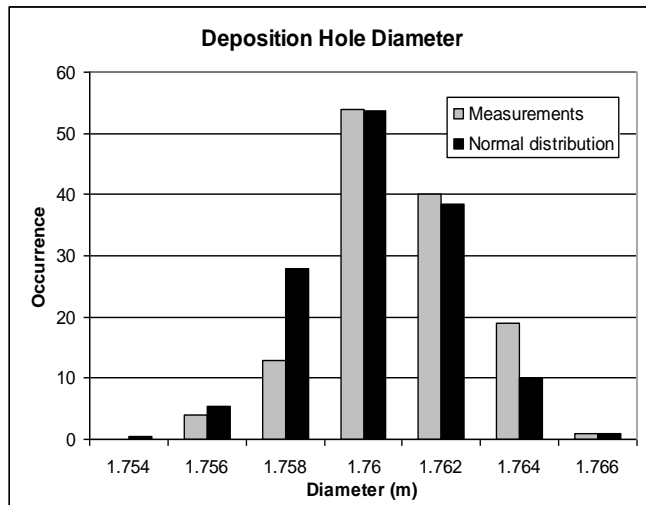
Table 5. Measured inflow to deposition holes.

Dep. hole	Recorded inflow litres/minutes.
Dh 1	0.0800
Dh 2	0.0020
Dh 3	0.0030
Dh 4	0.0007
Dh 5	0.0027
Dh 6	0.0030

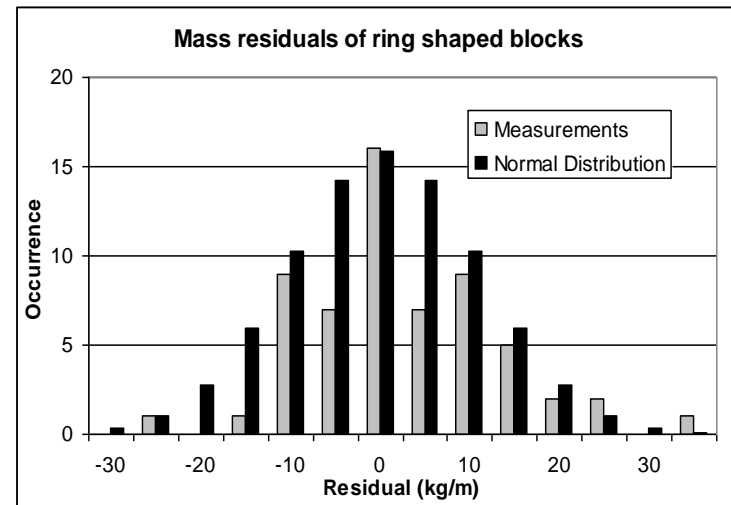


An example of how data was used in SR-site

Statistical evaluation of buffer density



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An example of how data was used in SR-site

Statistical evaluation of buffer density

Hole no.	Ring Shaped Blocks				Disc Shaped Blocks			
	mean	std	95% C.I.		mean	std	95% C.I.	
	ρ_d (kg/m ³)	ρ_d (kg/m ³)	ρ_m (kg/m ³)		ρ_d (kg/m ³)	ρ_d (kg/m ³)	ρ_m (kg/m ³)	
DA3587G05	1605	7,5	2018	2037	1636	5,6	2041	2055
DA3581G01	1610	7,6	2021	2040	1636	10,2	2035	2060
DA3575G01	1589	7,0	2009	2026	1630	5,5	2037	2051
DA3569G02	1608	7,4	2021	2039	1635	15,0	2028	2066
DA3551G01	1587	11,4	2002	2030	1634	11,1	2032	2060
DA3545G01	1581	9,2	2000	2023	1626	8,0	2031	2051
All Holes	1597	14,9	2003	2041	1633	10,1	2033	2058

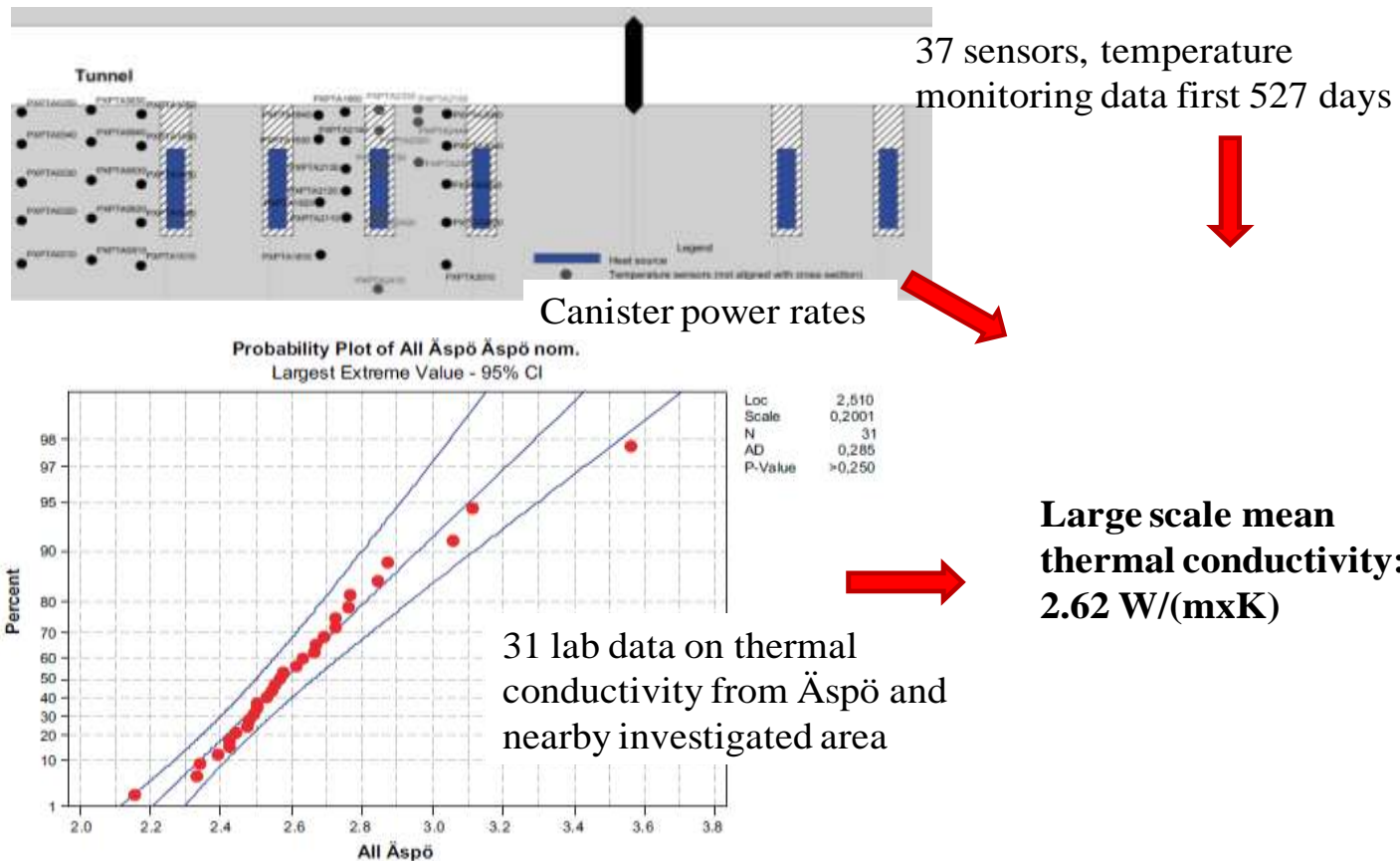


Deposition hole PROTOTYPE			
mean	std	mean	95% C.I.
ρ_d (kg/m ³)	ρ_d (kg/m ³)	ρ_m (kg/m ³)	ρ_m (kg/m ³)
1610	5,8	2031	2024 2038

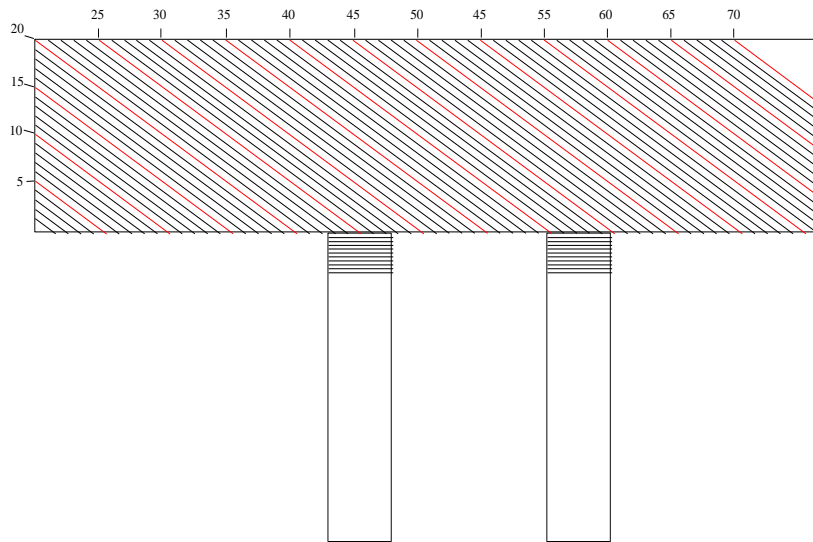


Another example of how data was used in SR-site

Inverse modelling of thermal conductivity at prototype repository scale (R-05-82)



Excavation of the backfill

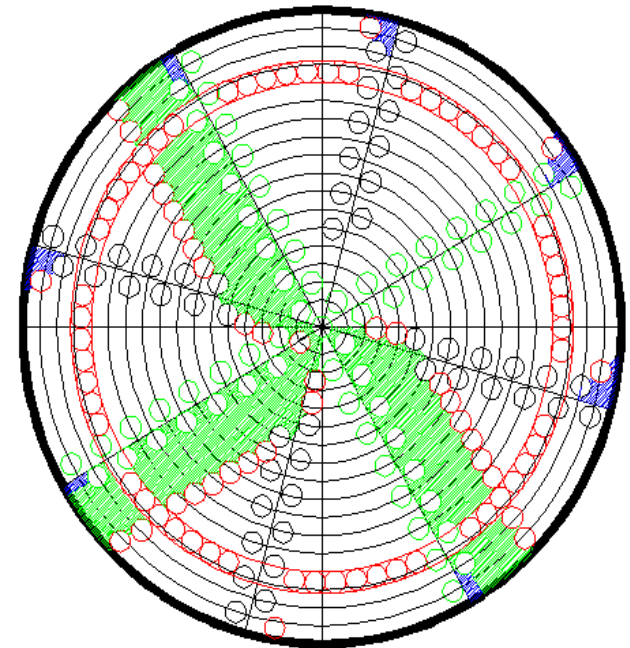
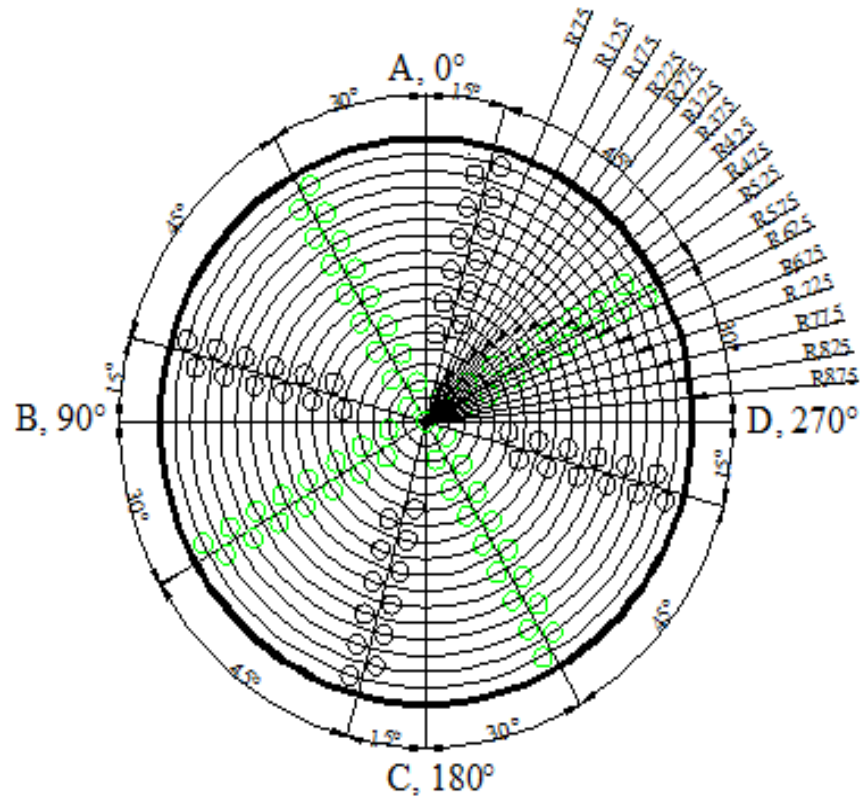
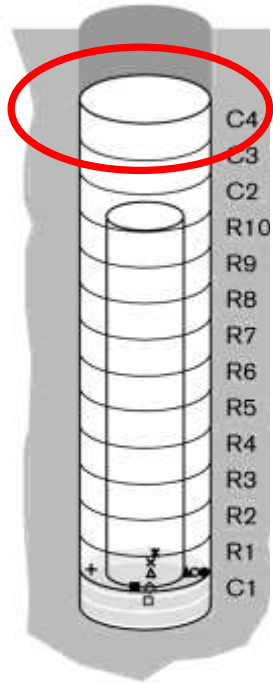


Excavation of the backfill

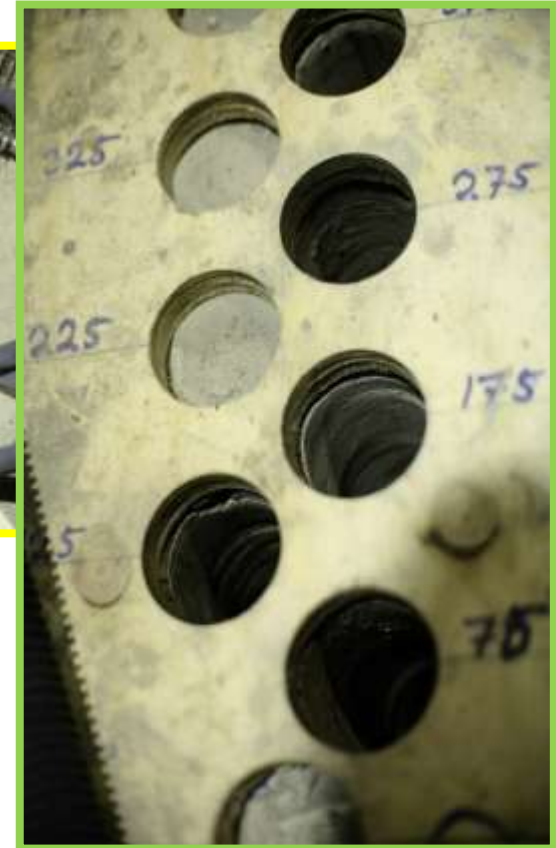


- The backfill has been removed (about 900 tons)
- About 1100 determinations of water content and density on samples have been made
- Preliminary analyses indicate that the backfill is fully saturated
- No evidences of erosion and piping of the filling

The technique for sampling of the buffer

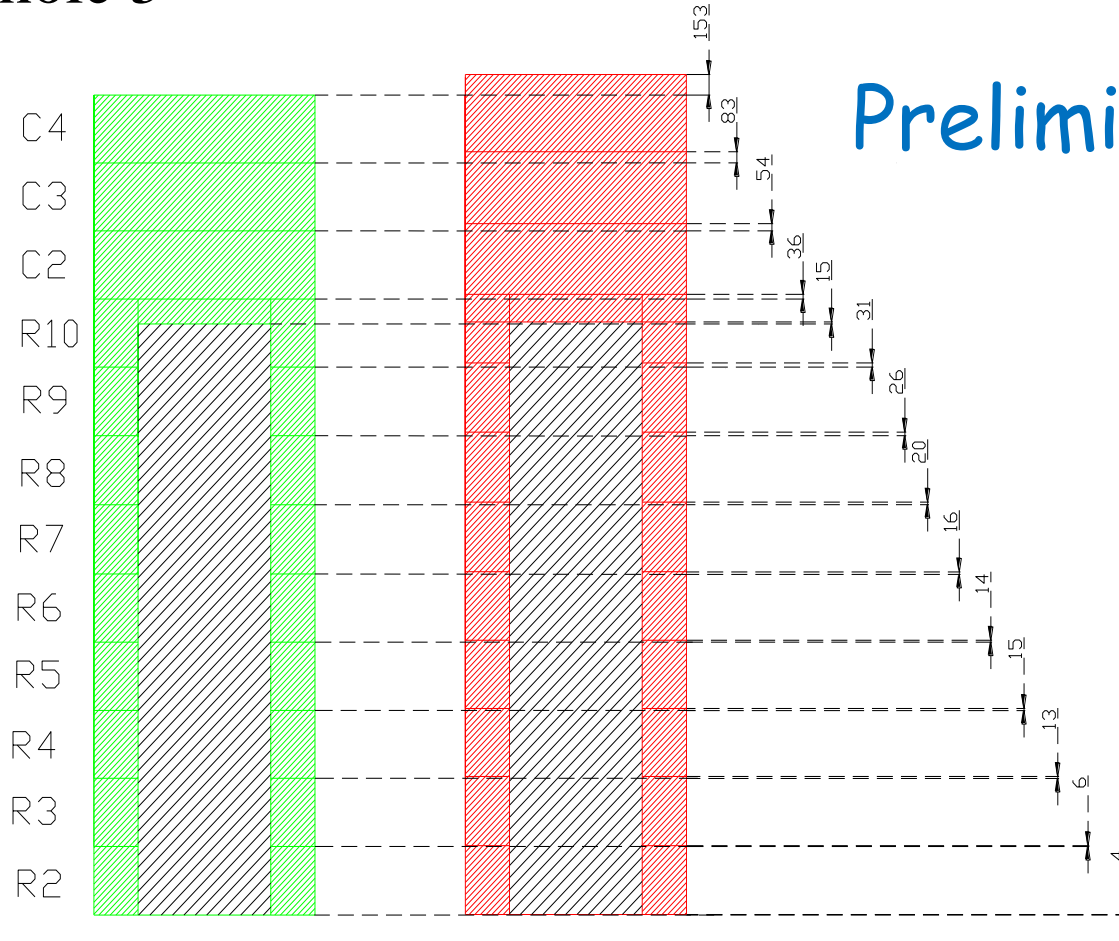


The technique for sampling of the buffer



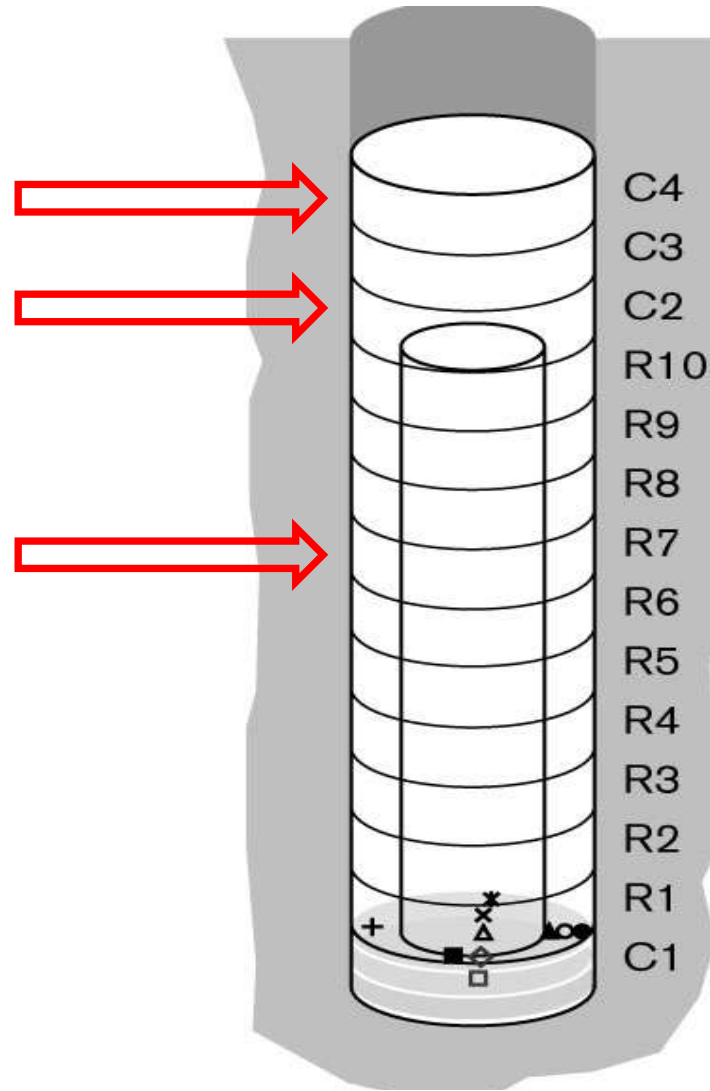
Displacement of the buffer

Deposition hole 5



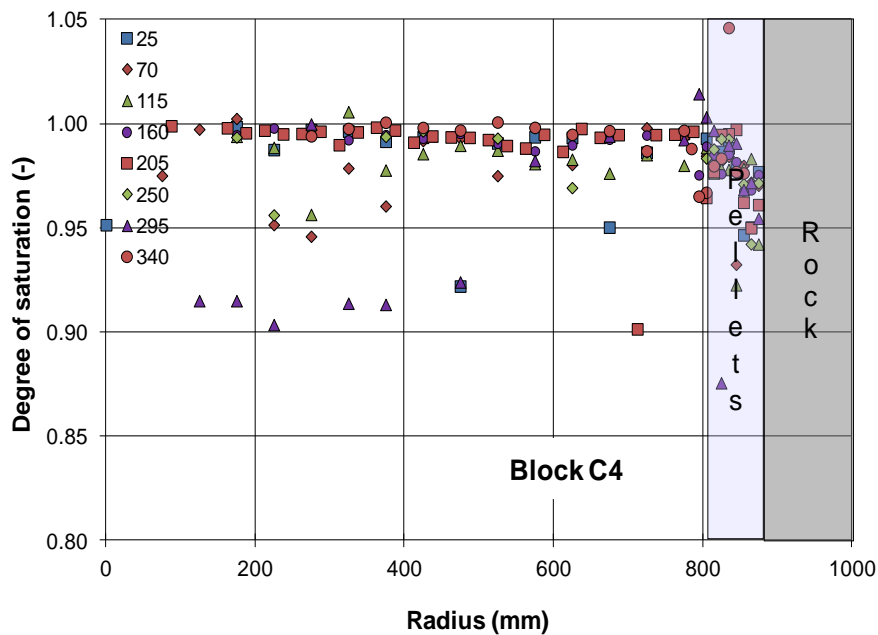
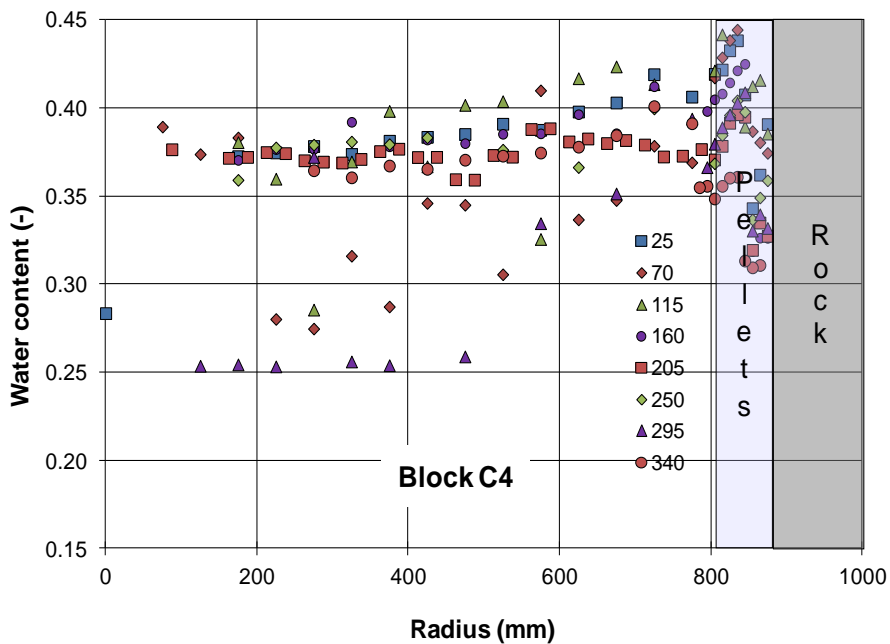
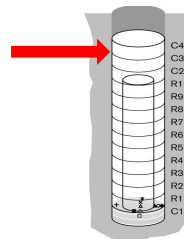
Preliminary data

Water content and density of the buffer



Water content and density of the buffer

Water uptake in block C4 Dh 5

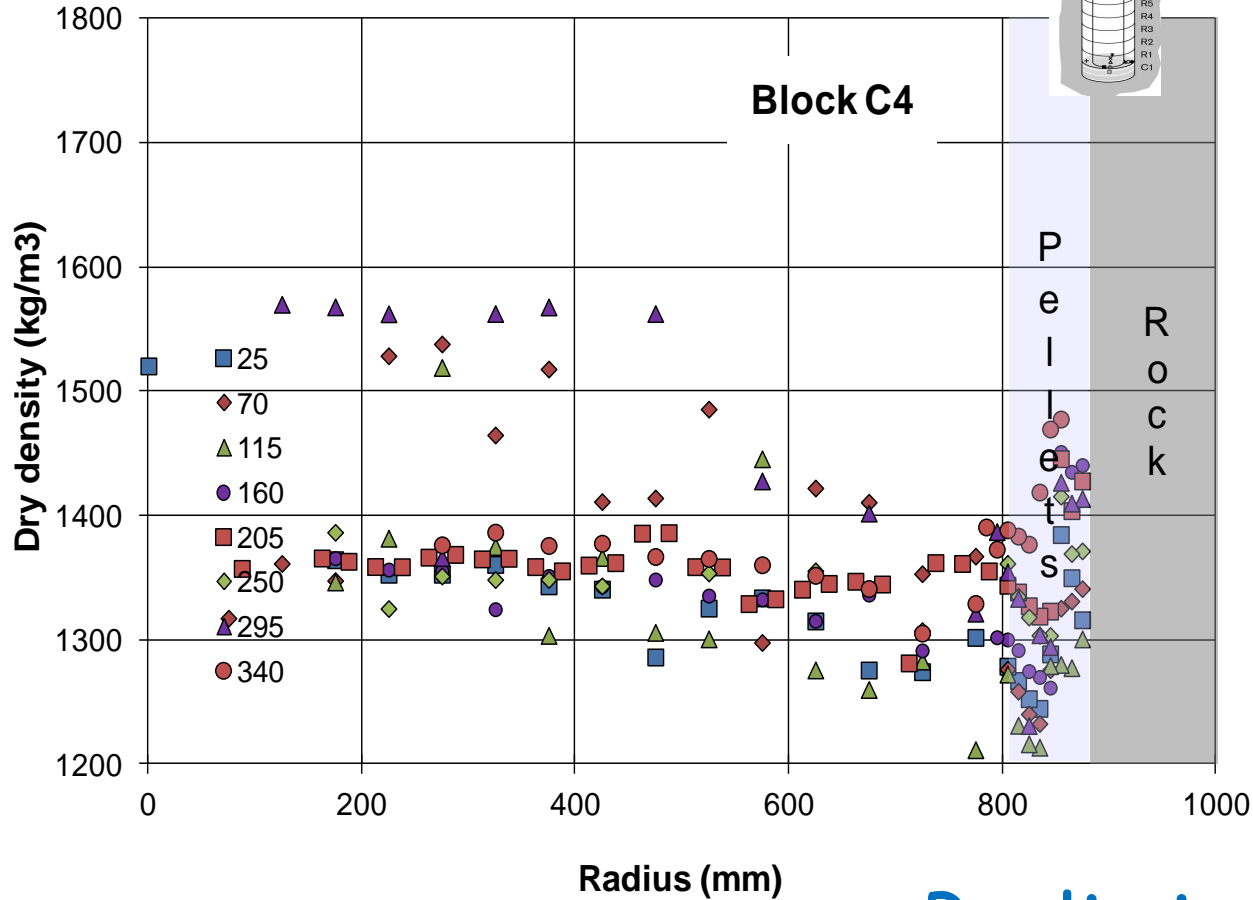


Preliminary data



Water content and density of the buffer

Water uptake in block C4 Dh 5



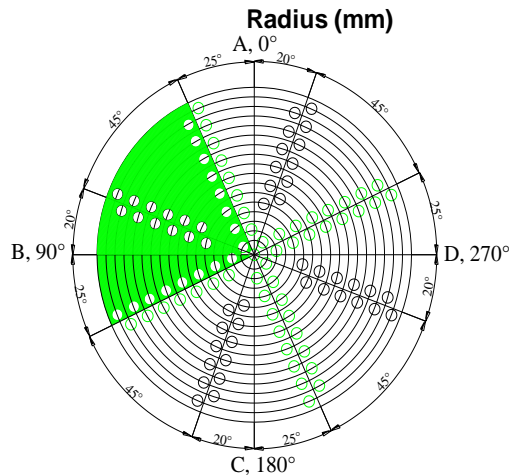
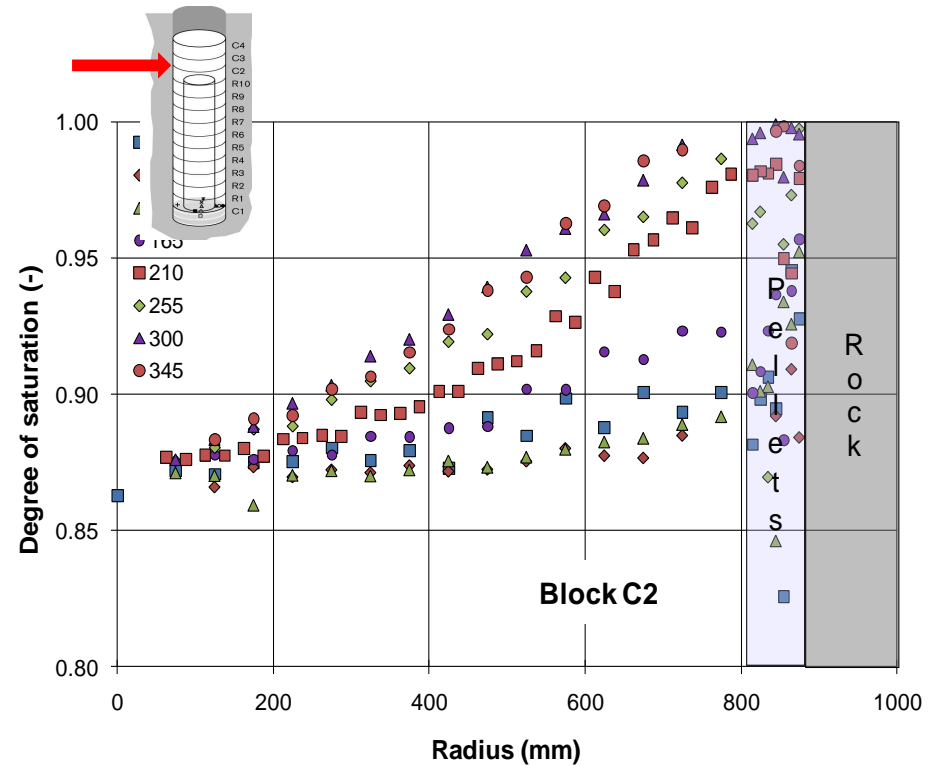
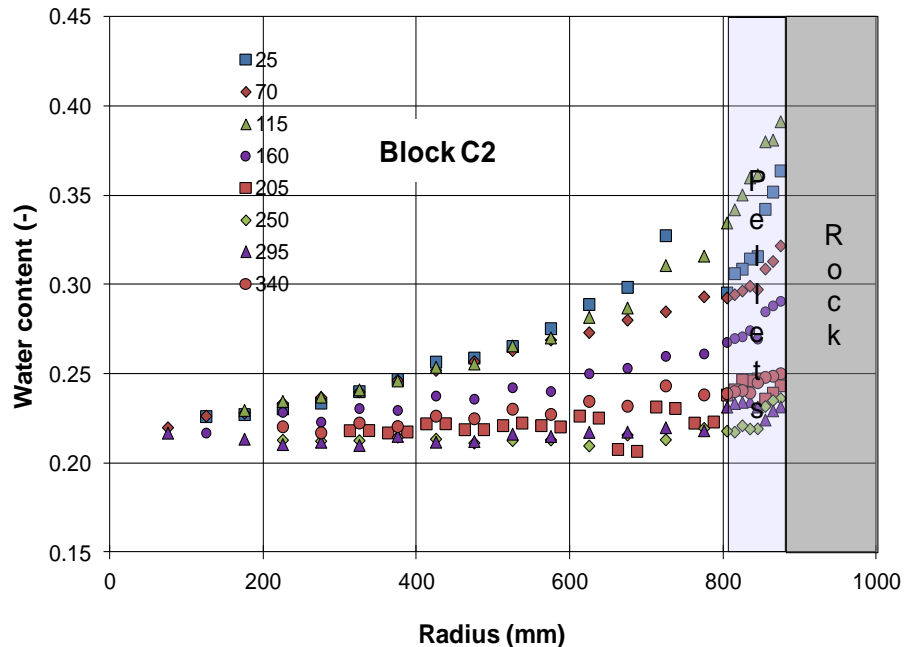
$1950 \text{ kg/m}^3 < \rho_m < 2050 \text{ kg/m}^3$
 corresponds to
 $1484 \text{ kg/m}^3 < \rho_d < 1640 \text{ kg/m}^3$

Preliminary data



Water content and density of the buffer

Water uptake in block C2 Dh 5

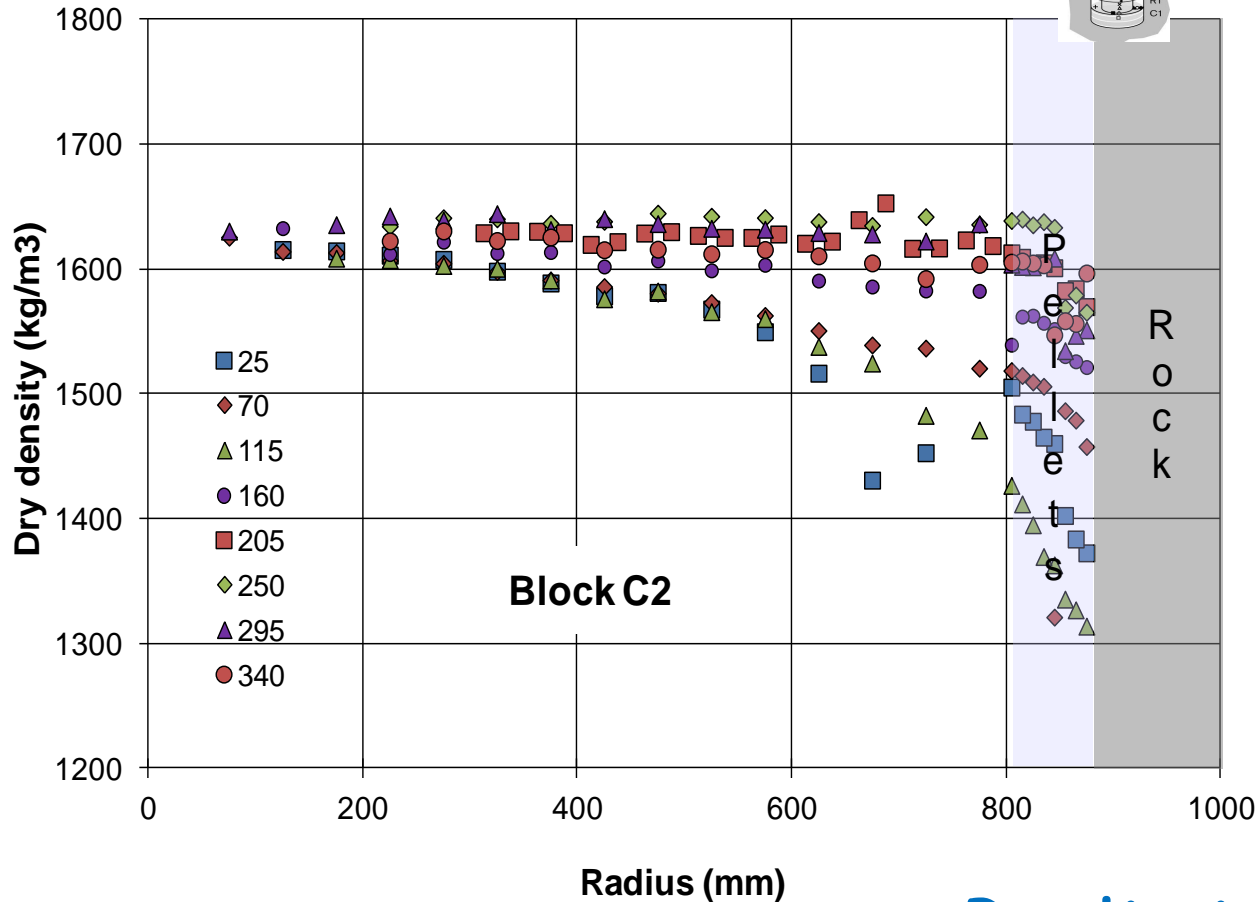
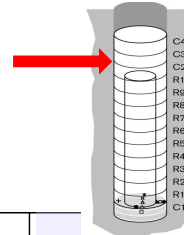


Preliminary data



Water content and density of the buffer

Water uptake in block C2 Dh 5



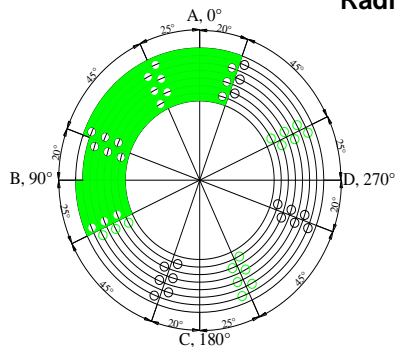
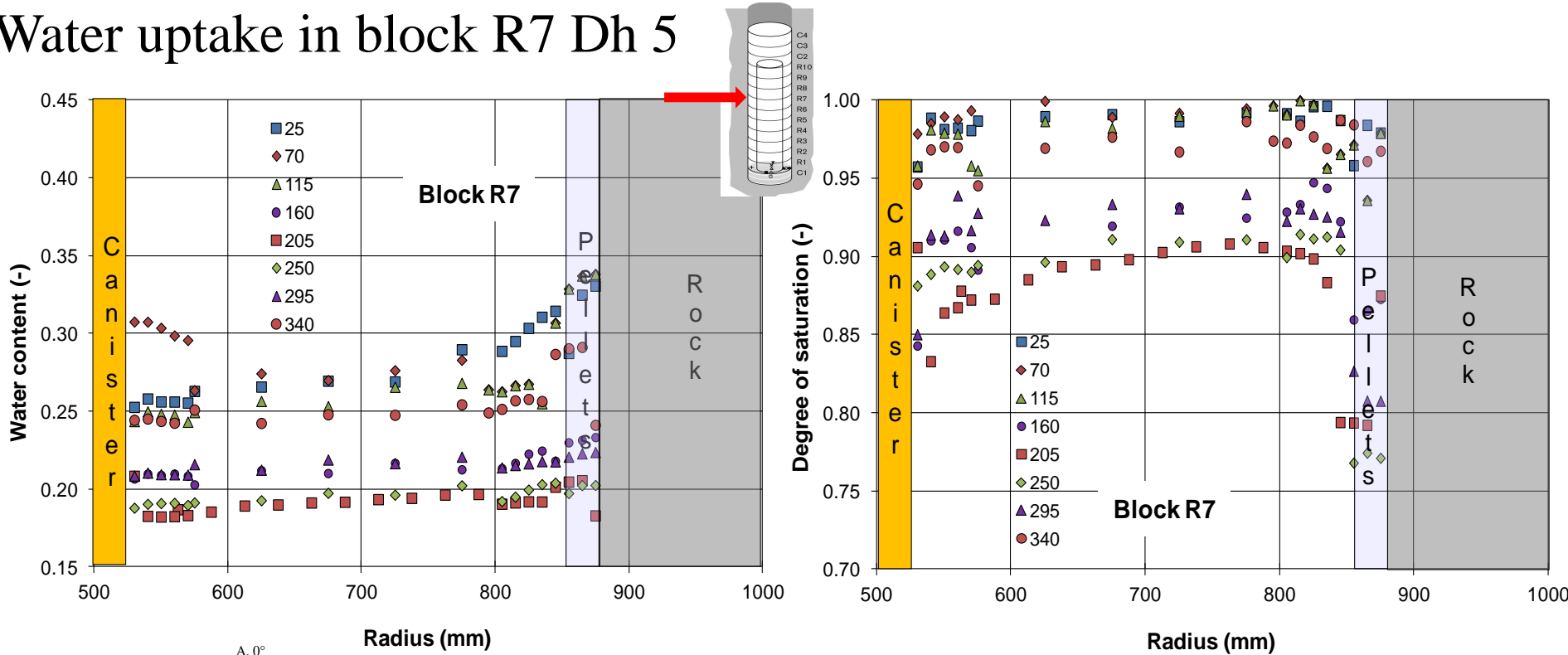
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Preliminary data



Water content and density of the buffer

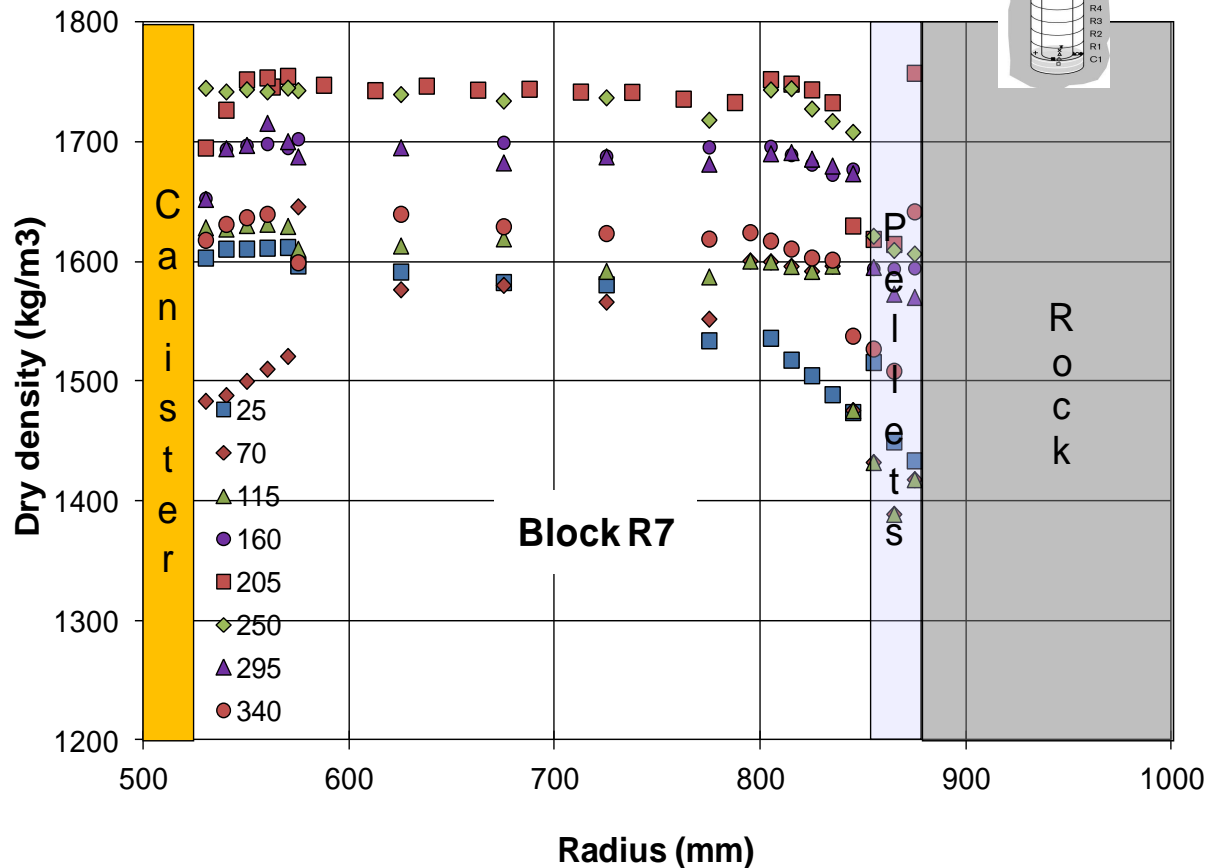
Water uptake in block R7 Dh 5



Preliminary data

Water content and density of the buffer

Water uptake in block R7 Dh 5



$1950 \text{ kg/m}^3 < \rho_m < 2050 \text{ kg/m}^3$
 corresponds to
 $1484 \text{ kg/m}^3 < \rho_d < 1640 \text{ kg/m}^3$

Preliminary data



Retrieval of the canister in Dh 6



- The deposition machine in place over Dh 6

Retrieval of the canister in Dh 6



- The limited space at the retrieval of the canister

Retrieval of the canister in Dh 6



- The canister tilted towards a horizontal position on the deposition machine

Retrieval of the canister in Dh 6



- The canister in horizontal position on the deposition machine

Ongoing activities

- Hydro-mechanical characterization of buffer material
- Chemical characterization of buffer and backfill material
- Microbiological investigations
- Investigations of the retrieved canisters
- Continuous work within the subproject “Rock examinations”

- Investigation of samples taken from the two copper canisters

Thank you!

