

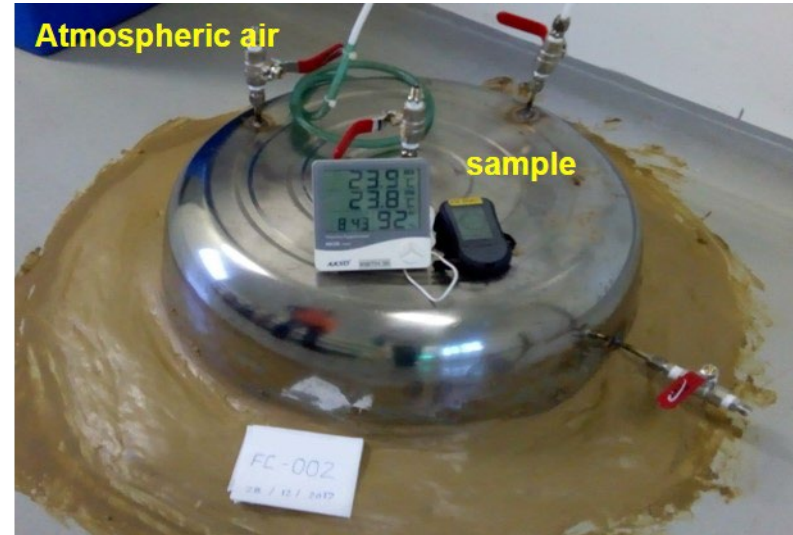
Evaluation of Flux Chamber Test Procedures for management of contaminated sites

Lina Araki; Andreia Yoshinari, Rodrigo Cunha, Rafael Franklin

GE●KLOCK

A company of **EBP**®

- What is the Flux Chamber Test?
- When we use FC?
- There are 3 FC methods.



Flux Chamber Test - Available methods

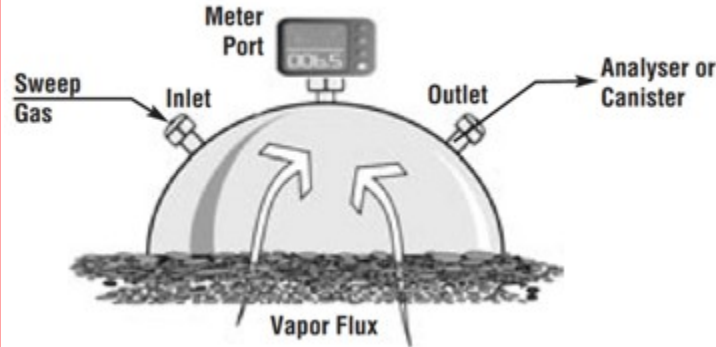
Static Flux Chamber



GEOKLOCK

- Sites with low vapor intrusion;
- Accumulated concentration at the end of test;

Dynamic Flux Chamber



Hartman

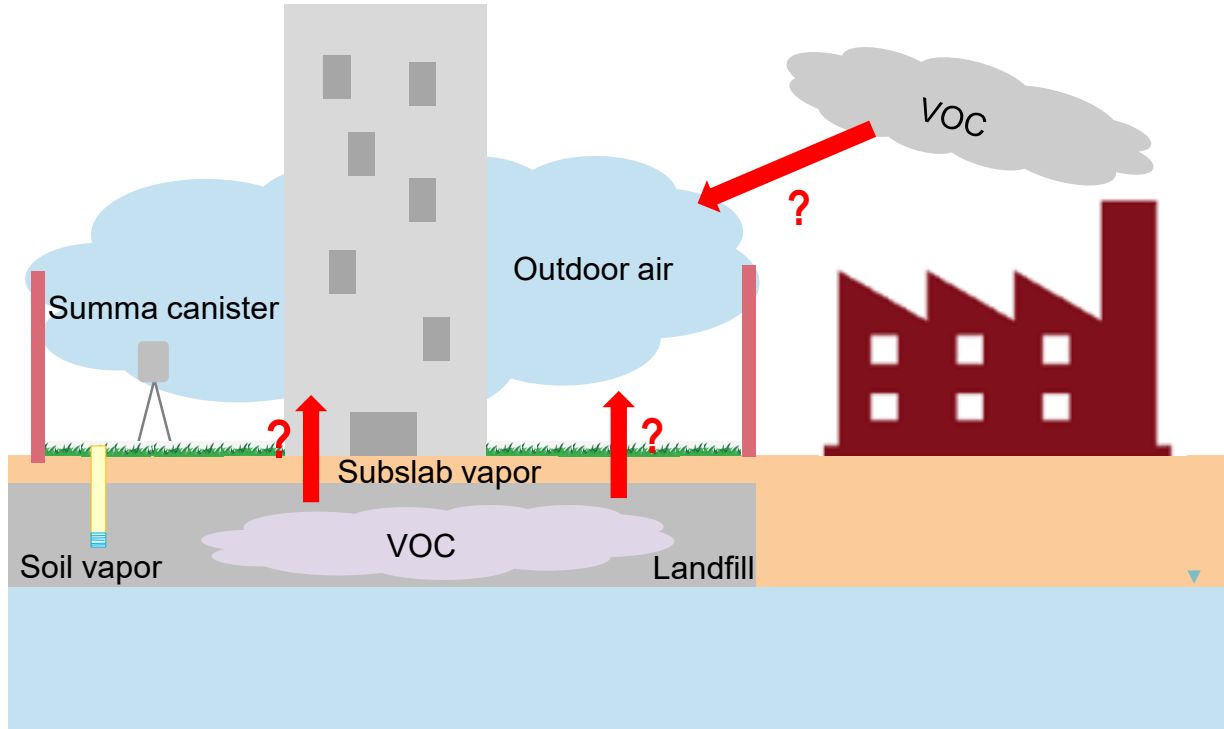
- Sites with high vapor intrusion.
- To clear trapped air;
- Avoid saturation;

Passive Flux Chamber



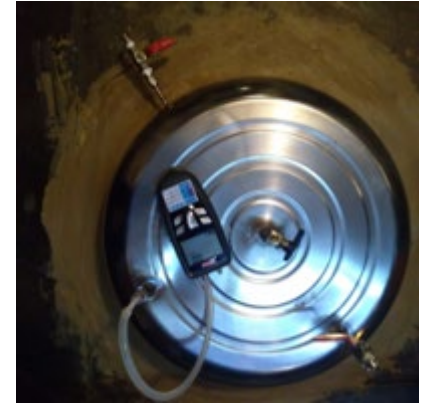
Heggie and Stavropoulos, 2018

- Smaller chamber;
- Minimize the weather changes effects;
- Sites with low vapor intrusion.

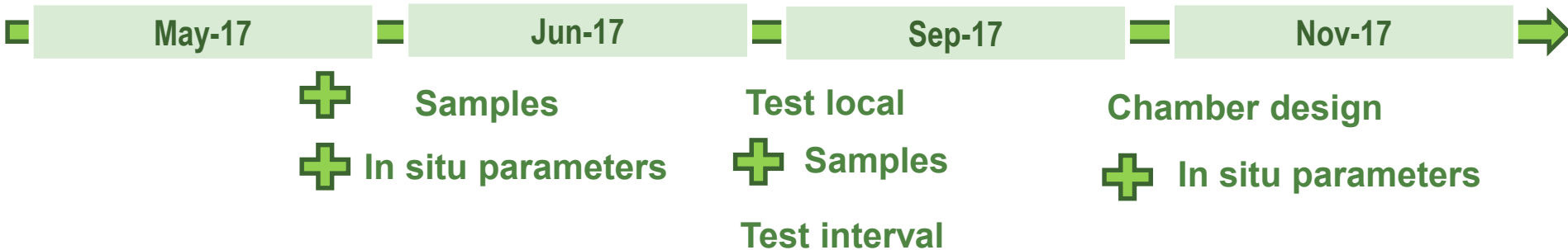


- Contribution of background

4 FC test campaigns → Reliable data
→ Answer questions



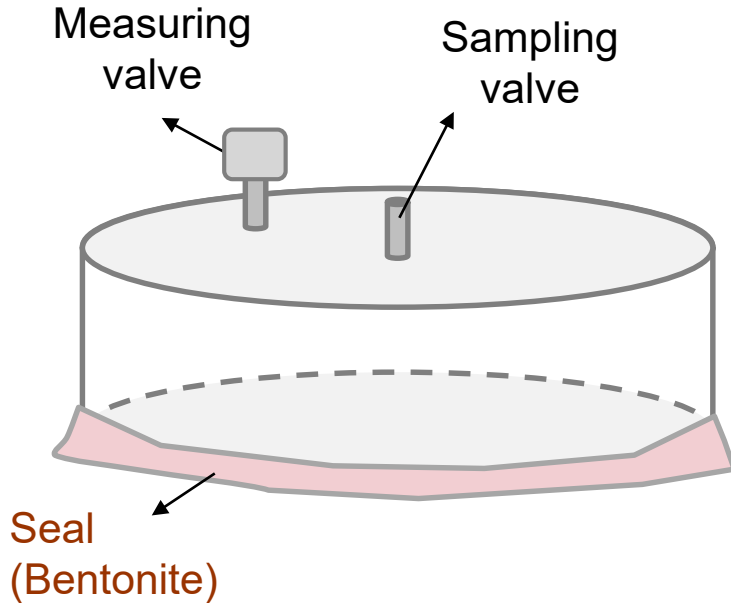
GEOKLOCK



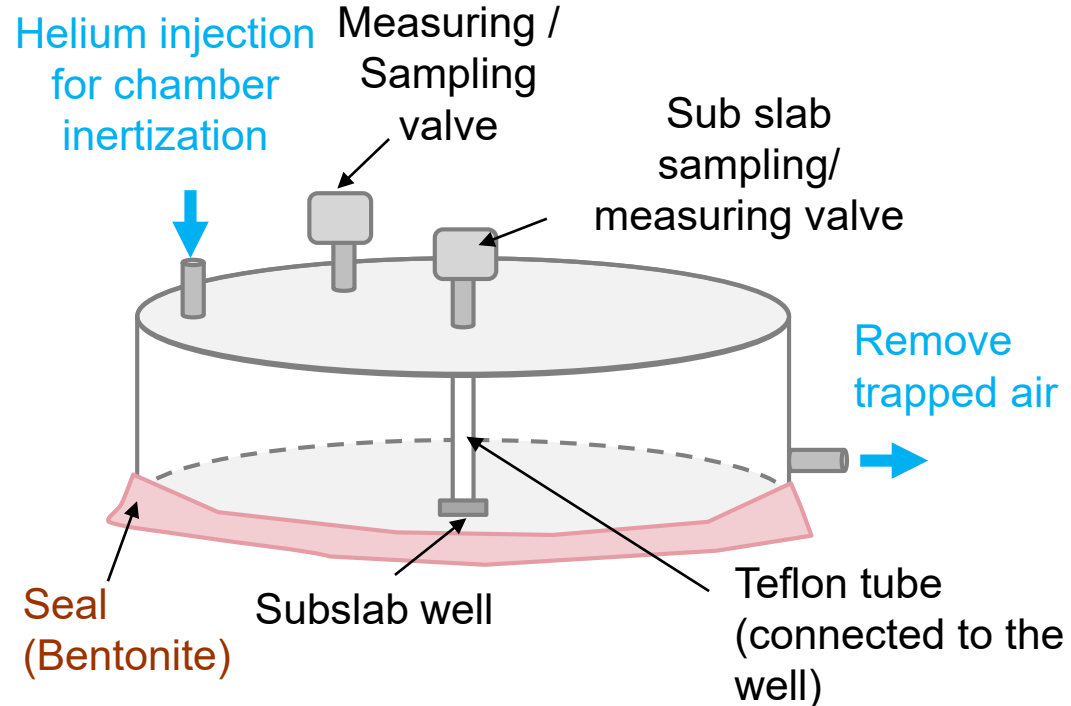
Flux Chamber Test

Last version:

Static FC



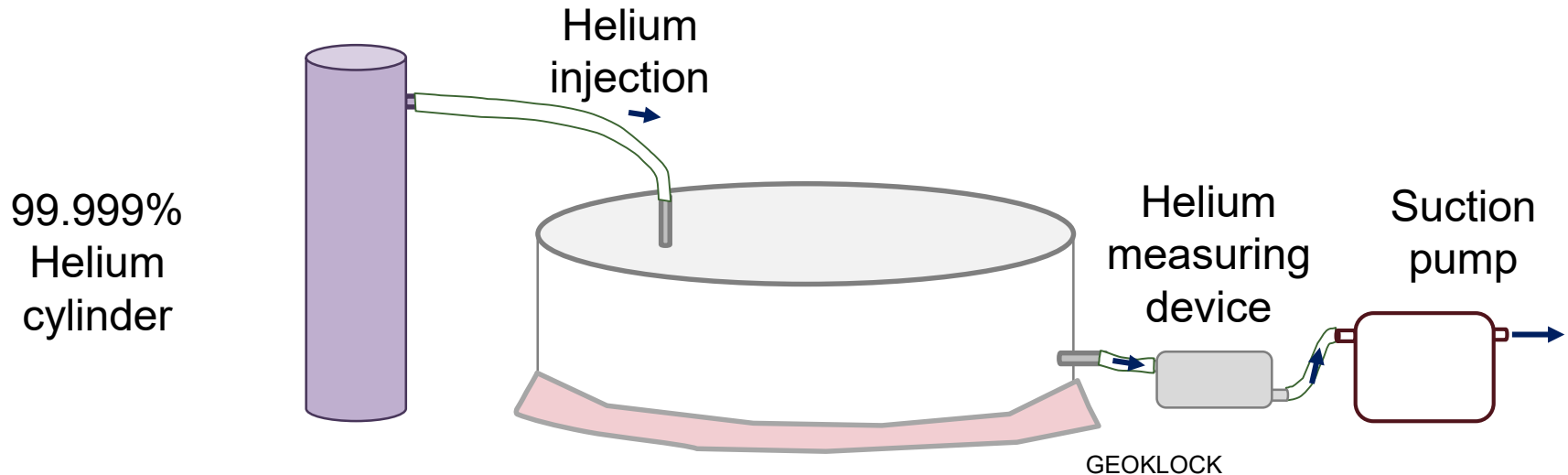
Inert FC



Inert Flux Chamber Test

How does the inertization work?

- Same removal and injection flow rate;
- Measure in situ parameters and percentage of helium.



Inert Flux Chamber Test

How does the inertization work?

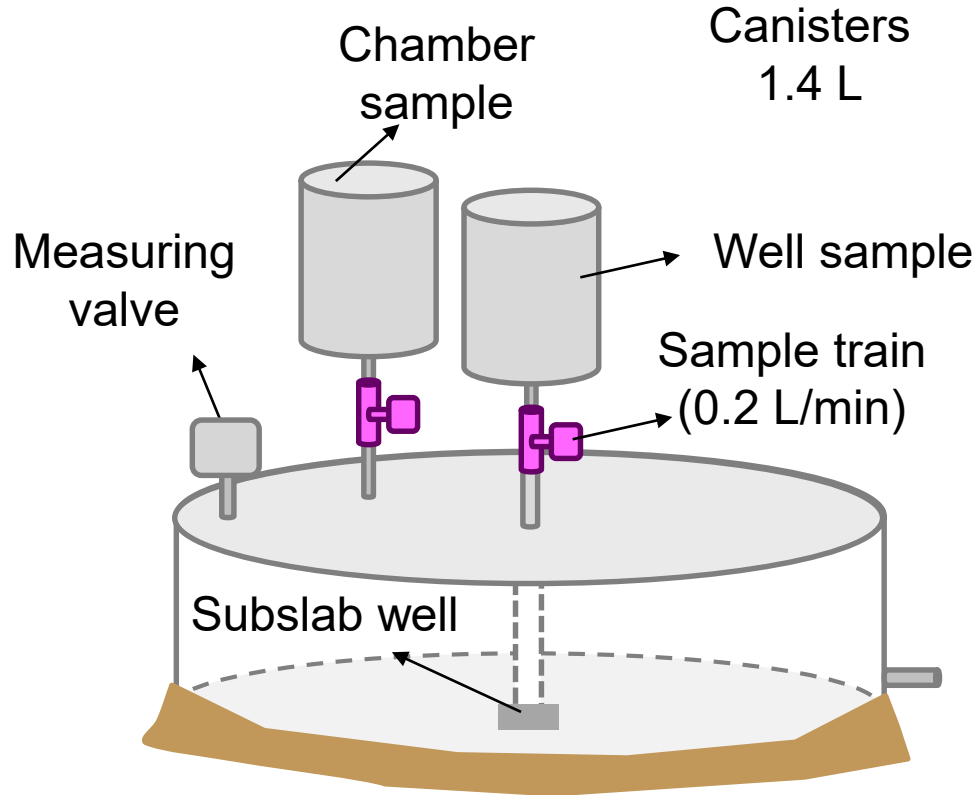


GEOKLOCK



Flux Chamber Test

Sampling (TO-15)



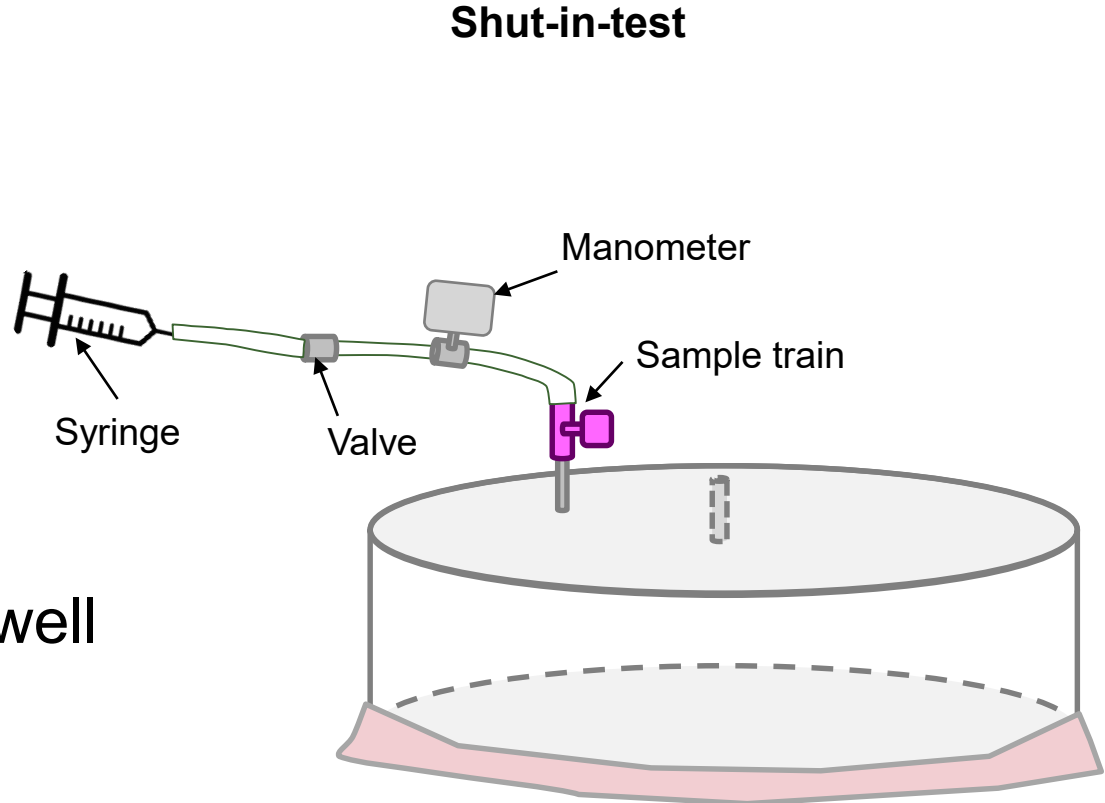
GEOKLOCK



Flux Chamber Test

Quality control

- Bentonite seal;
- Shut-in-test;
- In-situ parameters;
- Measure % of helium;
- Static chamber;
- Sample from subslab well and chamber



Flux Chamber Test

Quality control



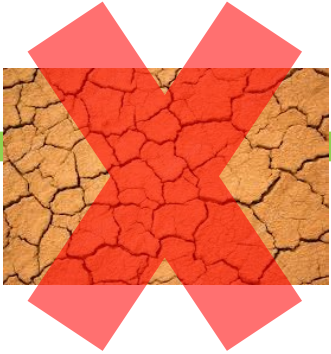
GEOKLOCK



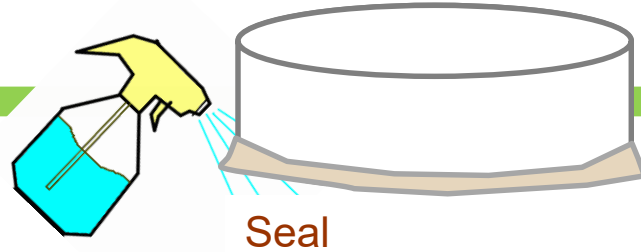
Lessons Learned

Bentonite seal

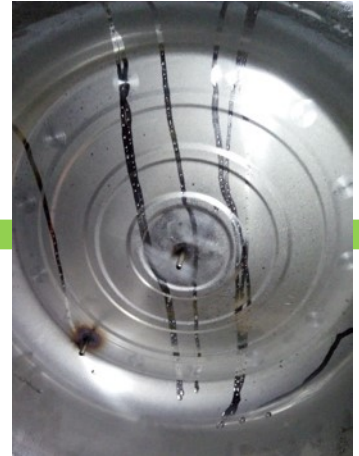
Clay cracking



Seal needs to be humidified



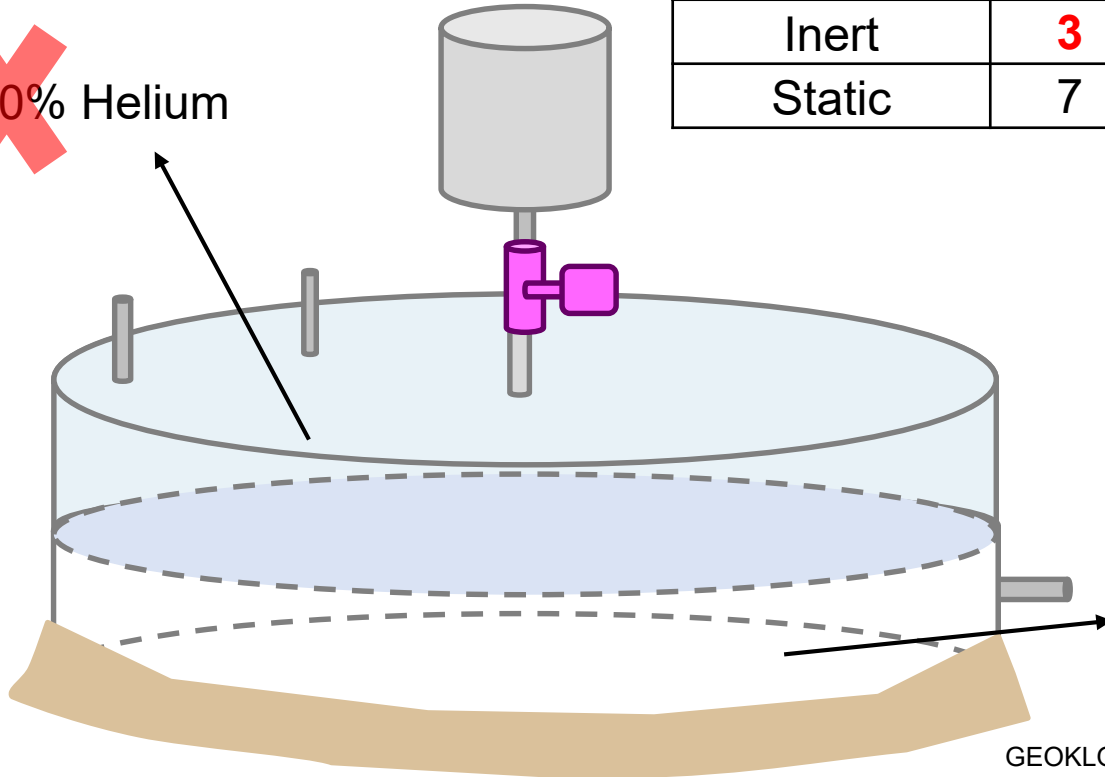
Moisture inside the chamber



Lessons Learned

Inertization with Helium

X
100% Helium



	Sampling duration (min)				
Sampling time	07:09	11:43	16:21	23:24	07:15
Inert	3	5	6	6	7
Static	7	8	8	7	7

Canister: 1.4 L

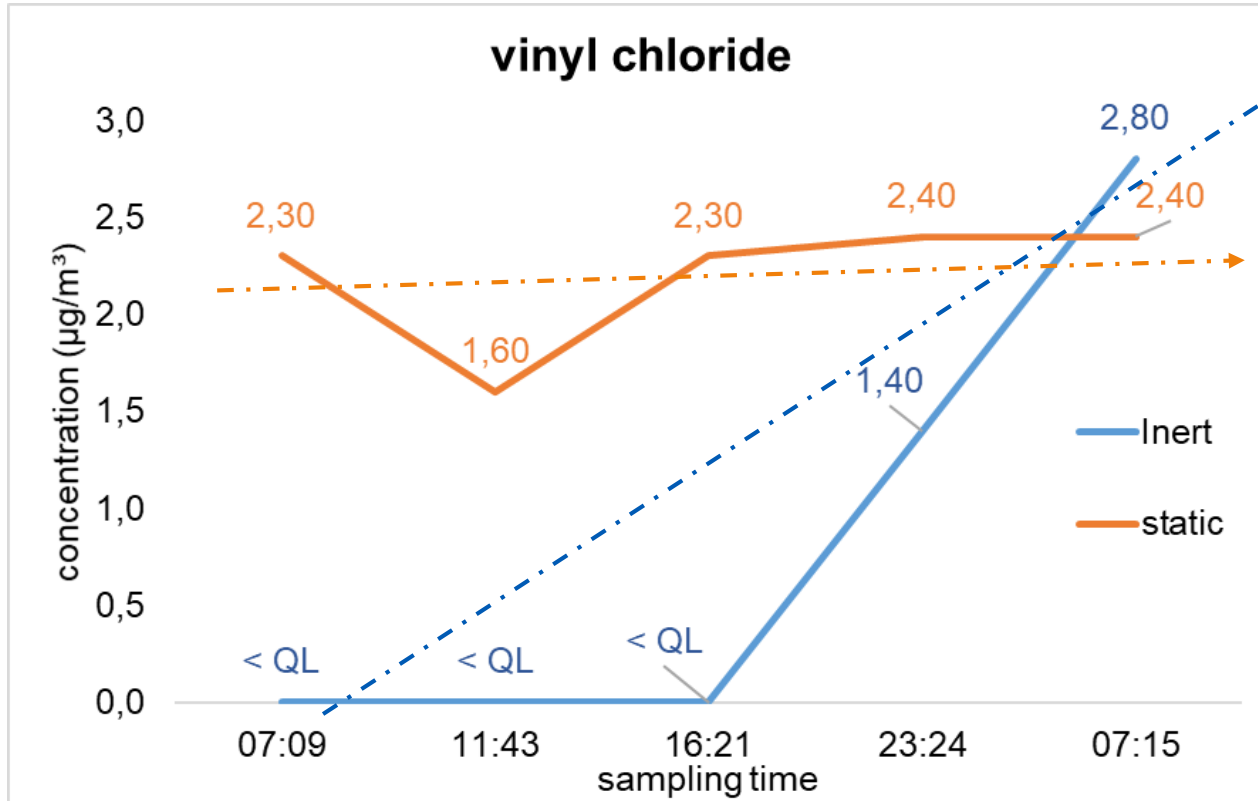
Sample train: 0.2 L/min

Sampling duration: ~7min

Trapped air
(with background compound)

Lessons Learned

Inertization with Helium



QL: Laboratory Quantification Limit

Remains
background
concentration

Masks results!

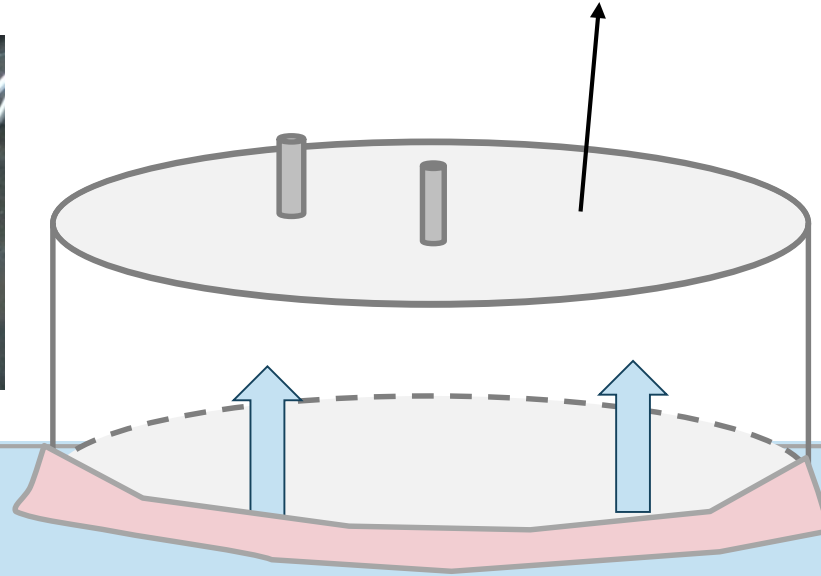
Lesson Learned

- Contribution of cleaning products on the floor

1,2,4-Trimethylbenzene

Sampling time	07:19	11:54	16:23	23:25	07:25
1,2,4-Trimethylbenzene ($\mu\text{g}/\text{m}^3$)	8,6	18,8	23,8	30,6	32,8

30 $\mu\text{g}/\text{L}$



1,2,4-Trimethylbenzene

< 4,9 $\mu\text{g}/\text{m}^3$

Subslab well

Conclusion

The choice of method is according to:

- Objective;
- Site characterization (quantity of vapor intrusion, area, background concentration...).



ATTENTION

But changes are needed:

- Inertization gas: nitrogen or synthetic air
- Seal: modeling clay, blu tack, or other material.

Important

- Measure relative pressure of chamber and subslab well
- Inertize the chamber

Thank you!

GE●KLOCK

A company of **EBP**

lina.araki@geoklock.com.br