

To Be or Not To Be a Risk? – That is the PerFluorcarbon Tracer (PFT)-indoor Air Question

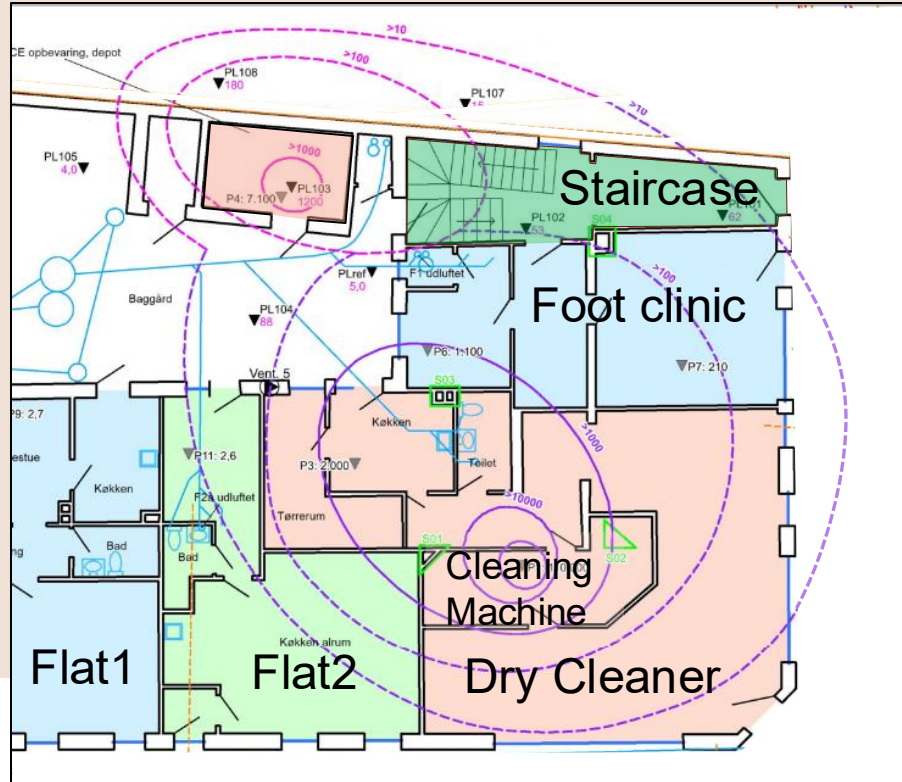
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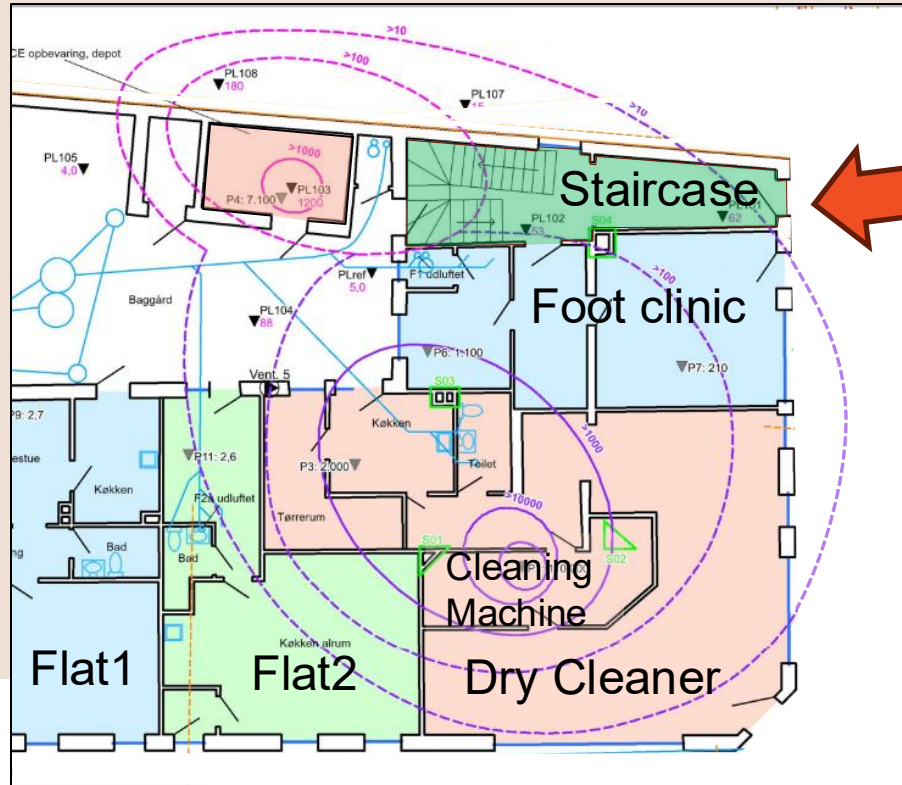
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Traditional Soil Gas Contamination From a Former Dry Cleaner



- Chlorinated solvents of primarily PCE
- Estimated evaporation: 300 g TCE and 1 kg PCE pr/yr
- Below dry cleaner: 110.000 $\mu\text{g}/\text{m}^3$
- Below backyard depot: 1.200 $\mu\text{g}/\text{m}^3$

Traditional Soil Gas Contamination From a Former Dry Cleaner



Potential risk for the indoor air above:

The staircase may act as a pathway for to the flat on the 1st and 2nd floor

Danish acceptance criteria for indoor air from soil contamination: $6 \mu\text{g}/\text{m}^3$ PCE



To complicate things

- A new and active dry cleaner has been established.

Danish acceptance criteria for indoor air above active dry cleaner's operation:
 $100 \mu\text{g}/\text{m}^3$ PCE

Danish acceptance criteria for indoor air from soil contamination: $6 \mu\text{g}/\text{m}^3$ PCE

1st and 2nd Floor

- The active dry cleaner has a ventilation/vacuum system
 - The 2nd floor flat has established a ventilation.
- Thus, the ventilations result in very complex indoor air pathways through the building





The aim of the project

Determine the contributions to indoor air on the 1st and 2nd floor.

- What is the contribution from soil contamination?
- What is the impact from the active dry cleaner?



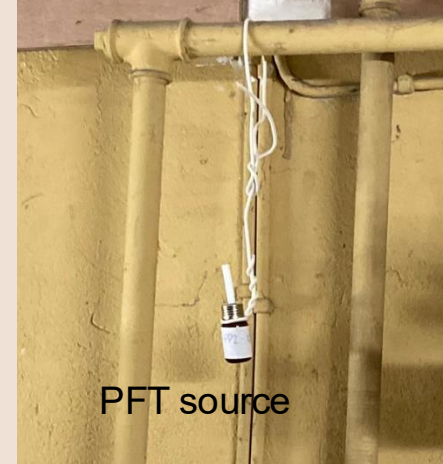
The aim of the project

Determine the contributions to indoor air concentrations on the 1st and 2nd floor.

- What is the contribution from soil contamination?
- What is the impact from the active dry cleaner?

PerFluorocarbon Tracer (PFT) investigation method

- Chemically stable and inert tracer gas
- Detectable at low concentrations
- Identify and quantify contamination pathways
- Multizone method
- Comparable to dye in groundwater



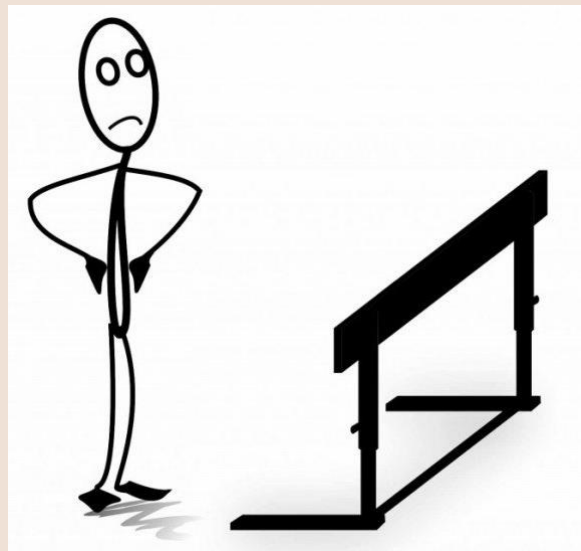
PFT source



Collector and
ORSA tube

Limitations of method

- Measurements are an average of the tracer gas
- Tracer behavior may not perfectly represent contaminant behavior
- Sensitive to environmental changes
- Position of collectors and sources are vital for the result
- Complex interpretation in large buildings
- Costs



Source: gamescrye.com

4 periods of PFT investigation

- 1st exposure in November – December 2023
- 2nd exposure in March - April 2024
- 3rd exposure in April 2024
- 4th exposure in March - April 2025

35 - 42 ORSA-tubes and collectors



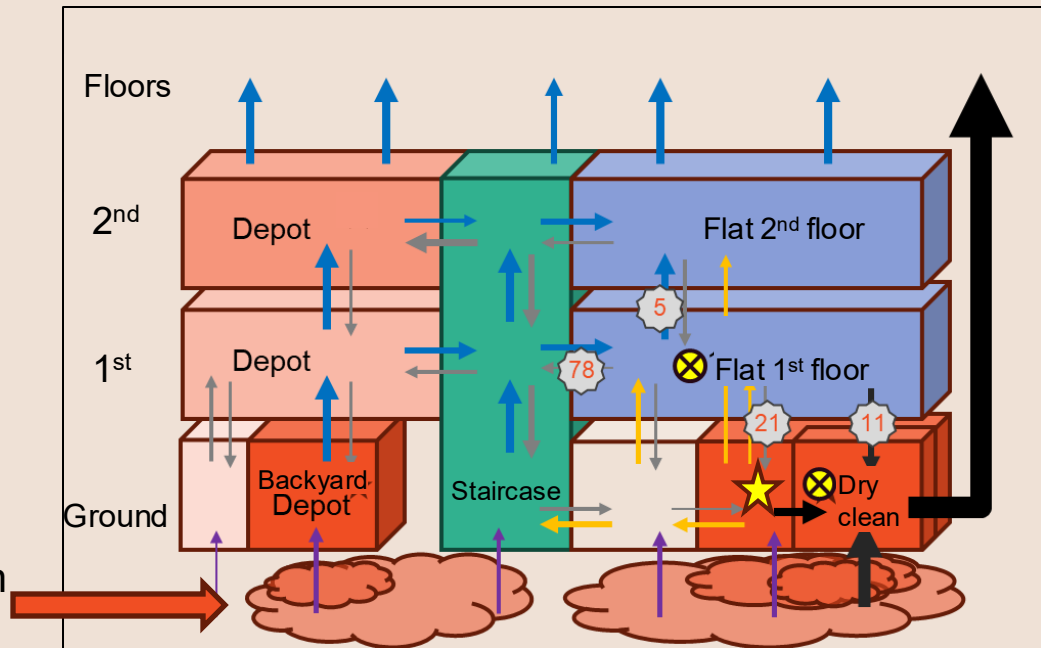
Results of 1st exposure



Internal source
PFT source



- PCE values was above acceptance criteria in both the 1st and 2nd floor flats
- High PCE values was detected on the staircase, in the backyard depot and in 2nd floor depot.
- Hotspot below the backyard depot seem to be the source

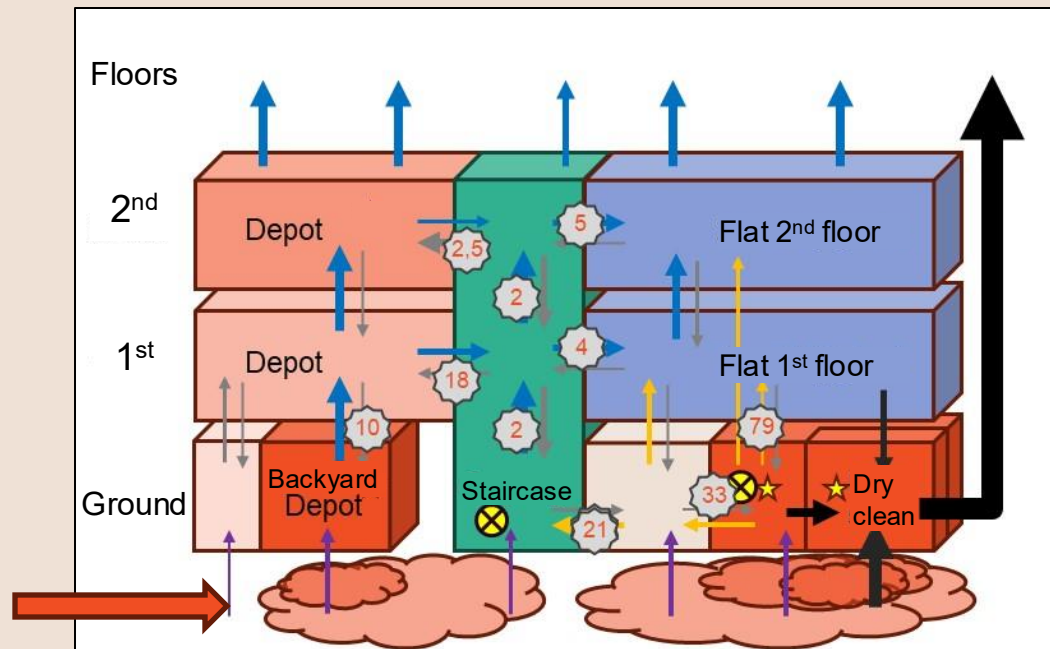


Results of 2nd exposure

 Internal source
 PFT source

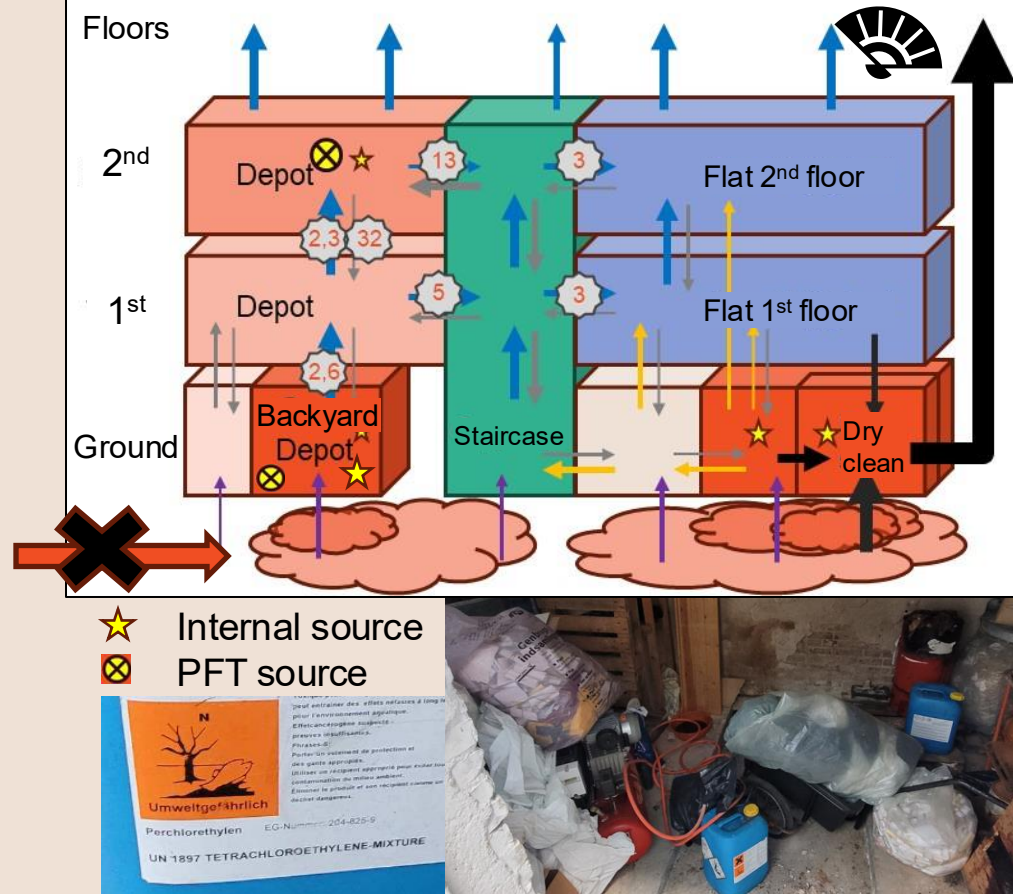


- The staircase is a dominant pathway for the indoor air.
- PCE pathway runs through the depots
- PCE values does not pose a risk for the indoor air with an active ventilation on the 2nd floor.



Results of 3rd exposure

- An internal PCE source is found in the backyard depot
- Continued high values of PCE spread via the depot and staircase to the flats on both the 1st and 2nd floor.
- PCE values does not pose a risk for the indoor air with an active ventilation on the 2nd floor.

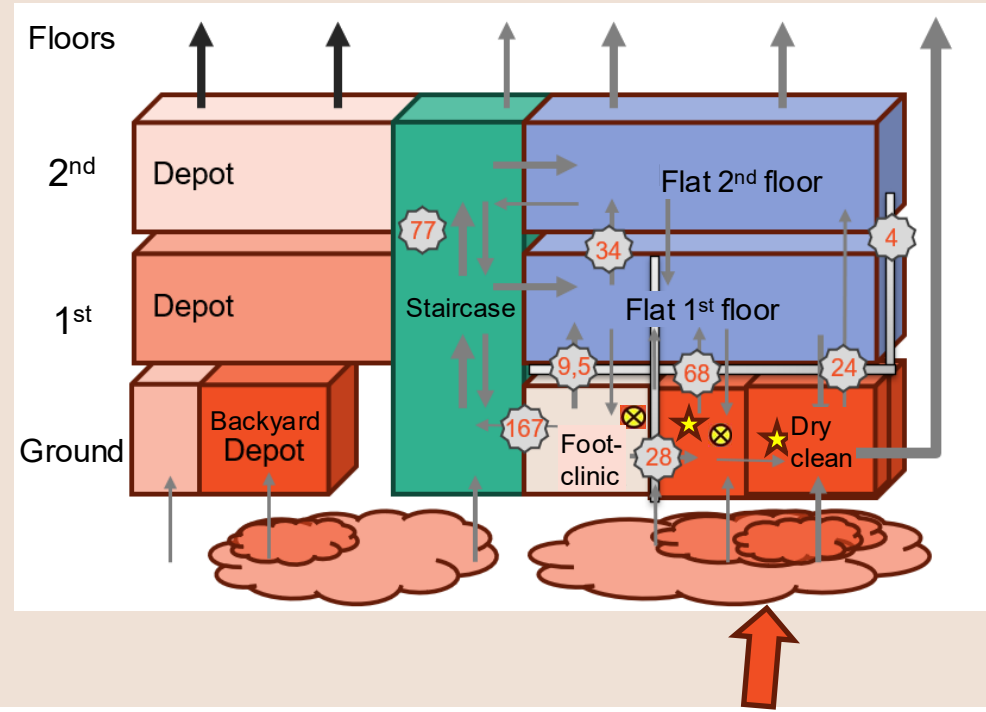




Results of 4th exposure

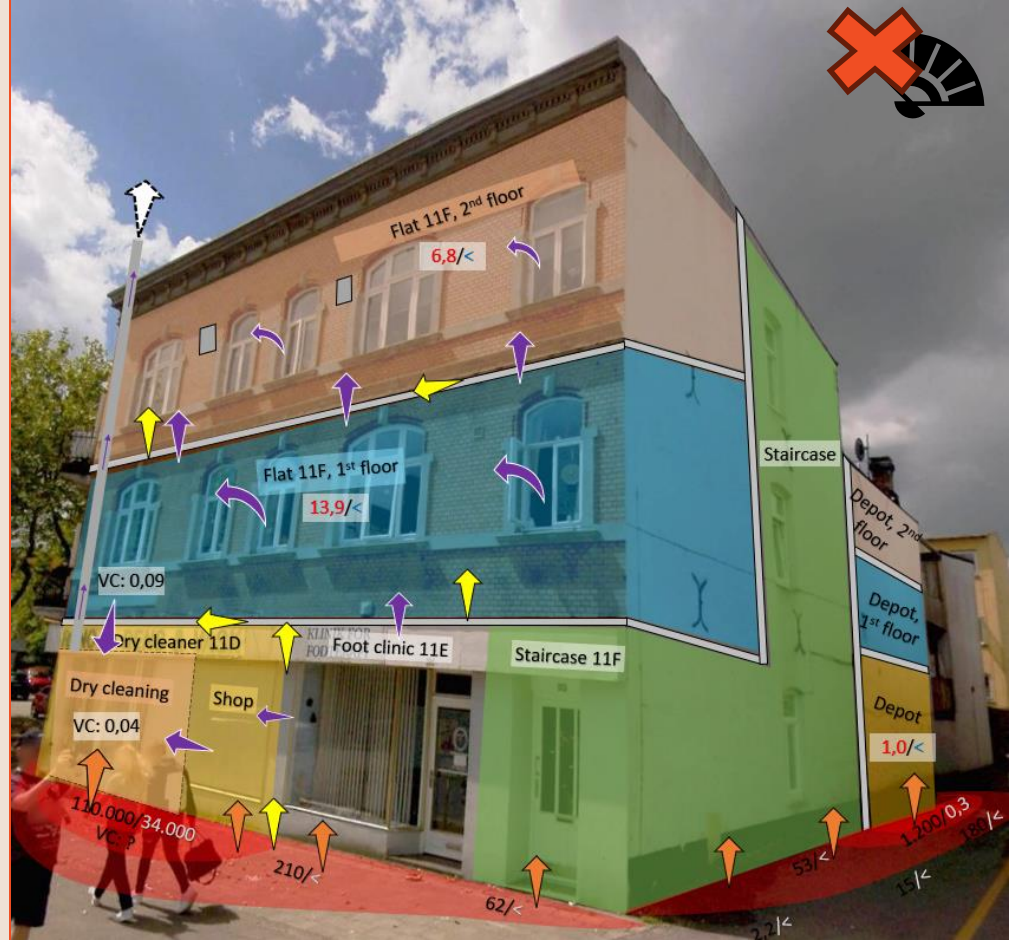
- The depots no longer constitute a PCE pathway.
- Vinylchlorid is measured on ORSA-tubes in the Foot clinic.
- PCE values does not pose a risk for the indoor air with an active ventilation on the 2nd floor.

★ Internal source
☒ PFT source



Monitoring

- Vinylchlorid was measured in the dry cleaner and in the room above.
- PCE values in both the 1st and 2nd floor flats pose a risk for the indoor air when the ventilation on the 2nd floor is off.



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14. September 2026
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