



Reference sheet
Remediation,
indoor air

Time of assignment

2019-2020

Client

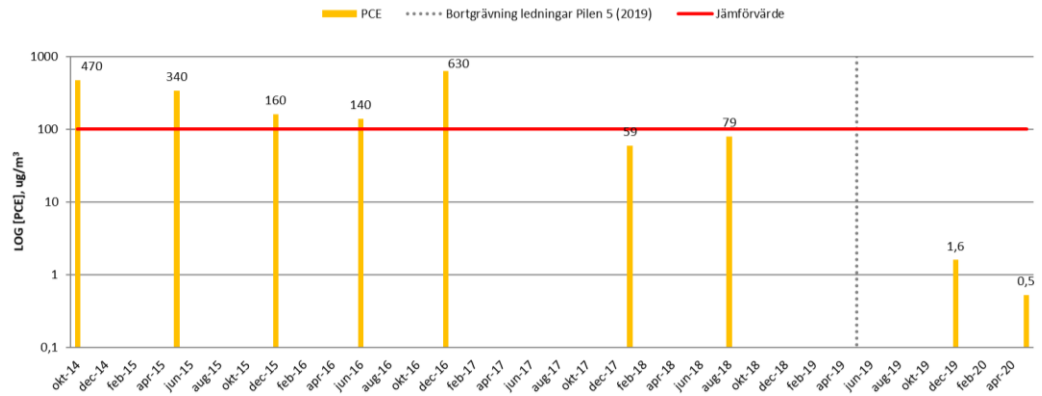
SGU

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PCE-content (μm^3) in indoor air. The sewer line was removed in May 2019 (grey dashed line).

Remediation method to reduce vapor intrusion in a building

Between 1970 and 1979, two different operators ran dry-cleaning operations at the former Bodentvätten in central Boden. The operations resulted in extensive soil contamination, but the transportation in groundwater was relatively limited and did not pose significant risks to recipients. However, the contaminants spread in gaseous form to surrounding buildings, where indoor air benchmark values are exceeded in a limited part of a nearby apartment building.

NIRAS conducted extensive sampling, measurements, and investigations to document how the gaseous contaminants penetrated the building. Detailed mappings of soil and groundwater contamination revealed that free phase PCE (DNAPL) has indeed spread under the building in question, but also that the free phase was overlain by a lesser-contaminated groundwater, dominated by degradation products. Therefore, the severe soil contamination was not expected to cause the clearly elevated PCE levels in indoor air.

Further investigations revealed an older underground sewerage system, used as a “process drain” by the former dry-cleaning operations. Although the underground sewerage had a natural slope away from the apartment building, the airflow in the pipe was directed towards it, due to a negative pressure in the building. NIRAS designed and supervised a simple remedial solution, where the sewer line was removed between the apartment building and a manhole. Subsequent environmental monitoring showed that PCE levels in indoor air decreased from an average of $268 \mu\text{g}/\text{m}^3$ ($n=7$) to $0.5 \mu\text{g}/\text{m}^3$. For comparison, the Swedish benchmark value for indoor air in residential buildings is $100 \mu\text{g}/\text{m}^3$.