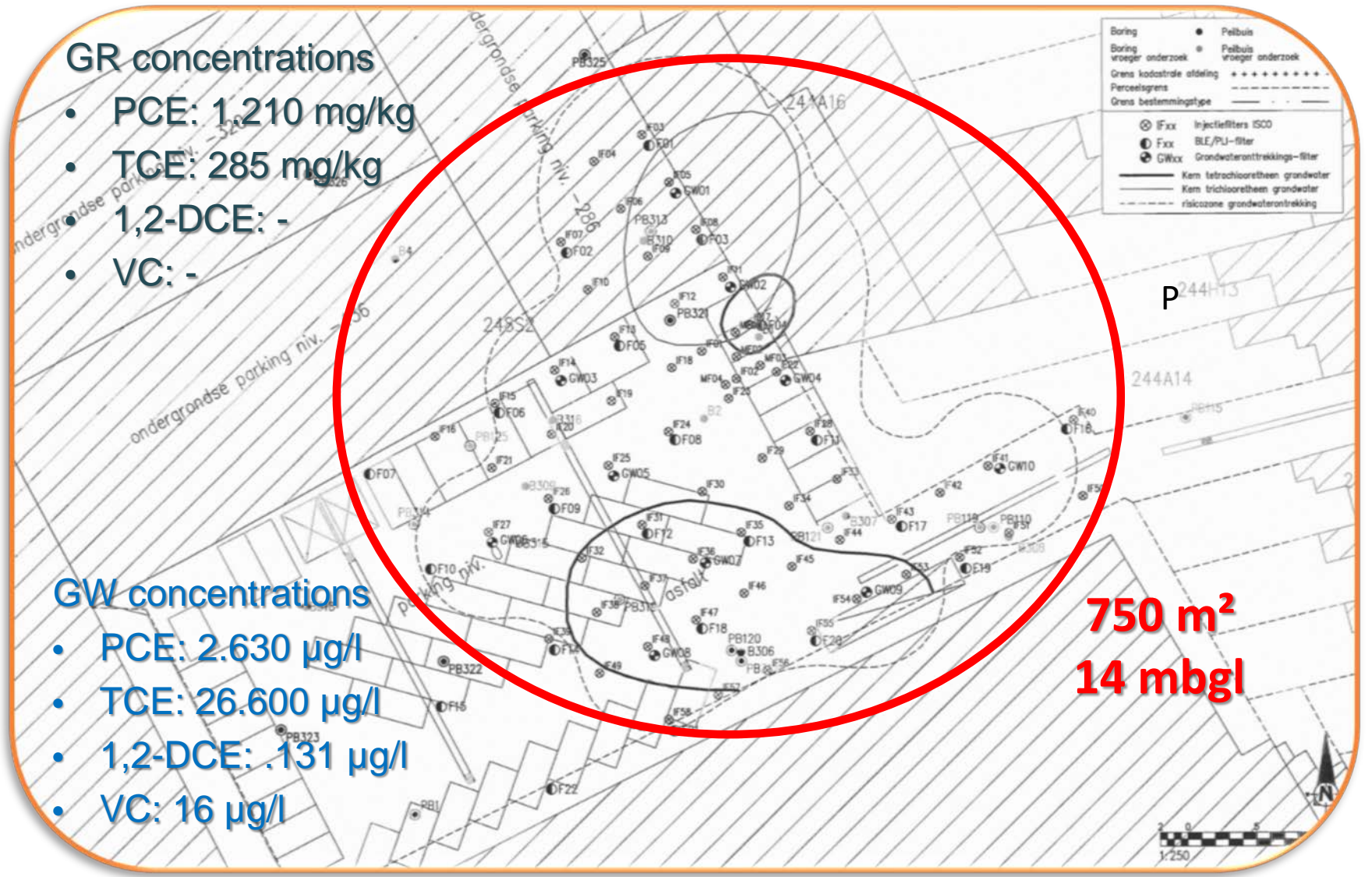




IN SITU CHEMICAL OXIDATION TO ENHANCE THE PERFORMANCE of an AIR SPARGING AND SOIL VAPOUR TREATMENT of CHLORINATED SOLVENTS IN GLAUCONITIC SANDS BELGIAN SITE

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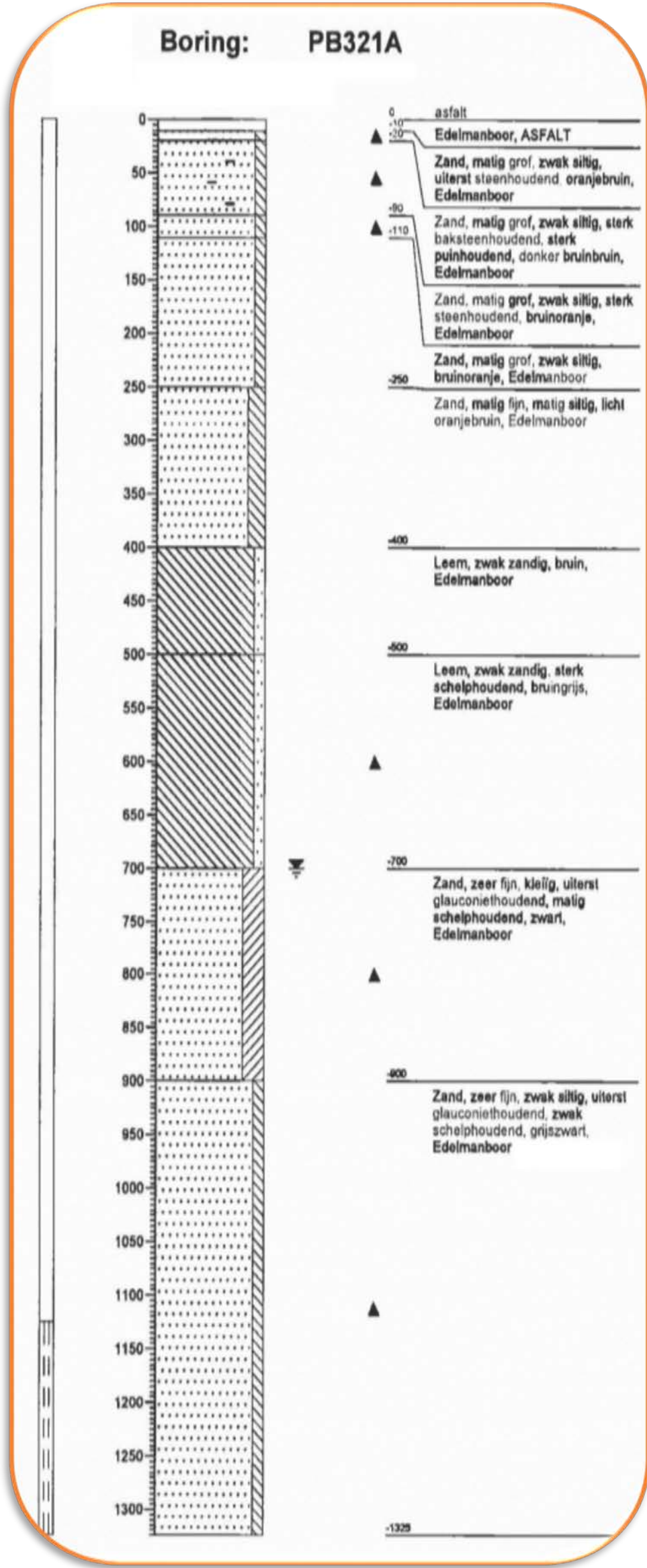


Situation on site in 2009

- Geology
 - 0 – 4 mbgl: top layer with a lot of debris / old foundations
 - 4 – 7 mbgl: Loamy till clayey sand layer
 - 7 – 27 mbgl : glauconitic clayey sand (shells ($k = 5.10\text{--}5\text{ m/s}$))
- Groundwater level: 6 to 7 mbgl
- High levels of calcium (Ca: 200 till 500 mg/l)
- High levels of sulphate (150 till 1.000 mg/l)
- Chlorinated solvents in soil & groundwater till 14 mbgl
- No indication of any biological degradation
- Centrum of Antwerp: difficult access, no space

→ Neighbour with analogue pollution started an
airsparging & soil vapour extraction treatment in 2004
and has still not reached the remediation target

→ Mission: find a quick and radical treatment



Pilot test in 2010

Goal:
Fasten the SVE/AS remediation by lowering the highest concentration between 6 and 10 mbgl by means of fast and drastic in situ technique.

Labtests: Modified Fenton's & Activated Persulfate
Pilot test: Modified Fenton's

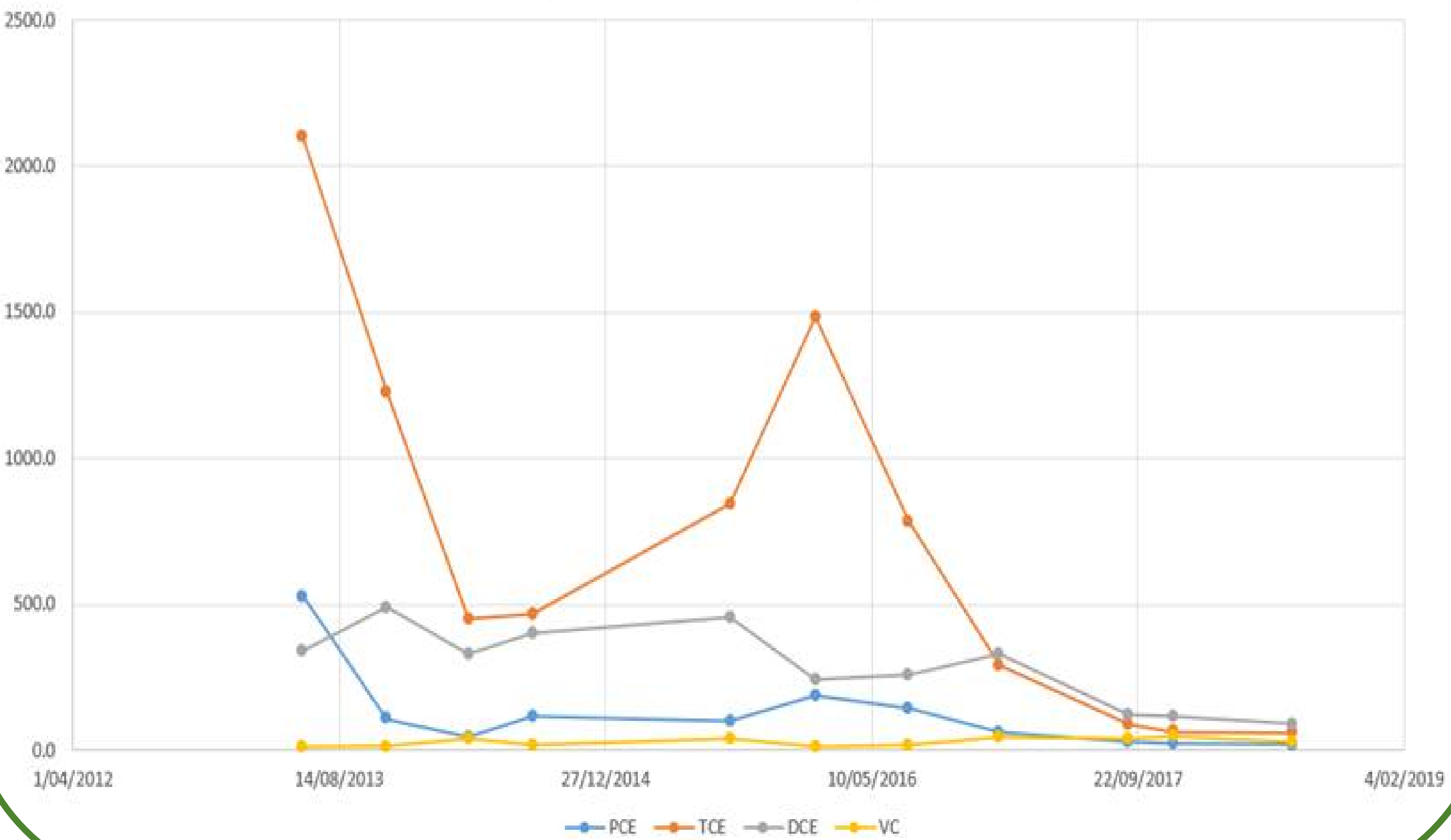
NOD 2 g/kg - ROI 2,5 m - Injection rates till 1.000 l/hr
A treatment efficiency of 86 % was obtained for TCE



Fullscale treatment between 2013 and 2018

2 injection rounds of Modified Fenton's at 10 mbgl (50 wells) (in June 2013 and June 2014)
Airsparging at 15 mbgl (14 wells) and at 10 mbgl (14 wells), soil vapour extraction at 4,5 mbgl (20 wells) (between august 2014 and July 2018)
Remediation target is reached after 2 injection rounds and 3,5 years of airsparging and soil vapour extraction.

Evolution average concentrations (µg/l) at 10 mbgl



Situation begin 2019 (6 months after active remediation)

	Remediation target	Site (start 2013)	Neighbour (start 2004)
PCE	40 µg/l	22,9 µg/l	250 µg/l
TCE	70 µg/l	45,8 µg/l	120 µg/l
DCE	50 µg/l	108,2 µg/l	1.200 µg/l
VC	5 µg/l	22,8 µg/l	10 µg/l