

ACTIVE RECIRCULATION FOR ENHANCED REDUCTIVE DECHLORINATION OF CHLORINATED VOCS IN GLAUCONITIC SAND ON A BELGIAN SITE

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Content



- ▶ Conceptual Site Model
- ▶ Strategy
- ▶ Pilot
- ▶ Full-Scale



Location



Situation on site

► Polluted area (3 hotspots)

About 40.000 m² till 48 mbgl

About 270.000 m³

► Concentrations (maxima)

PCE 54.000 µg/l

TCE 8.500 µg/l

DCE 19.000 µg/l

VC 57 µg/l

► Nitrate 8 till 14 mg/l

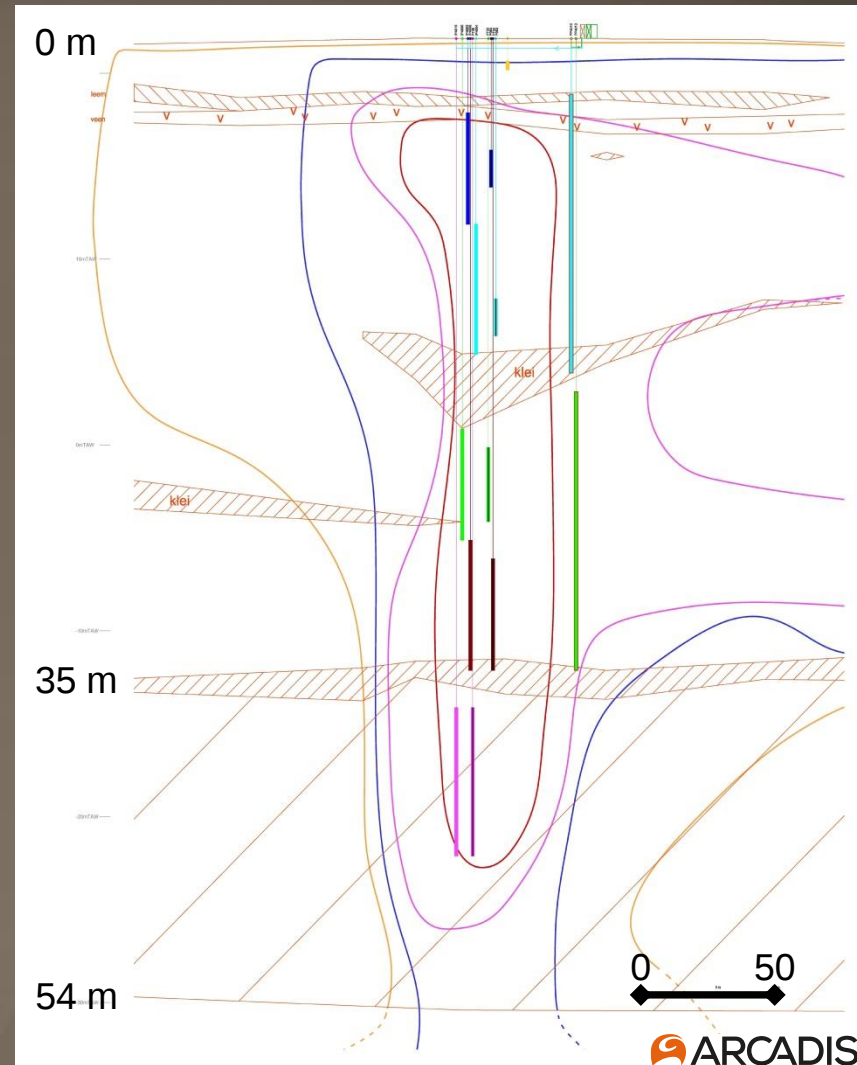
► Sulphate 140 till 180 mg/l

► Iron 10 till 20 mg/l



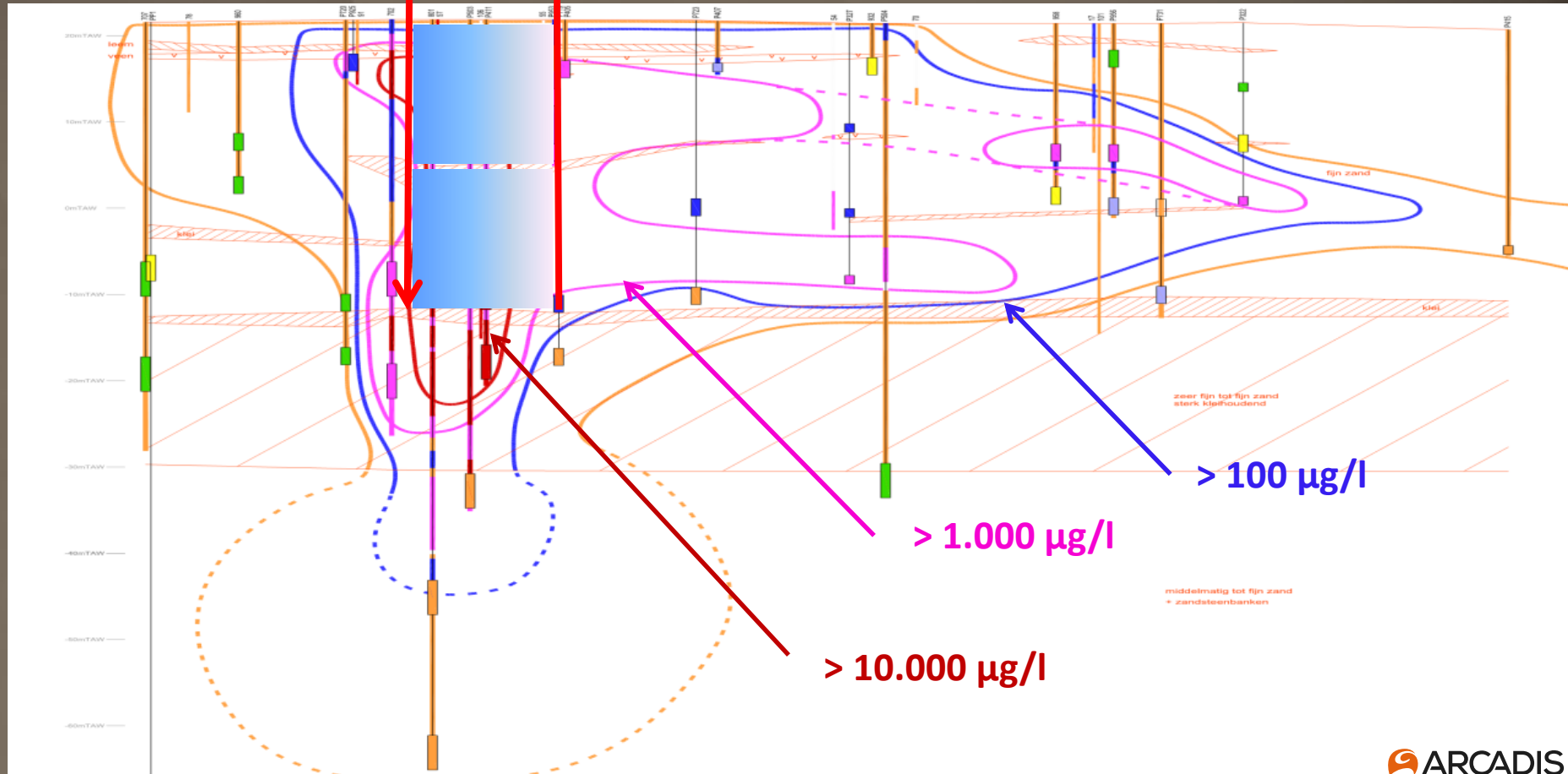
Hydrogeology

- ▶ Geology: heterogeneous glauconitic sand with discontinuous clay layers, $1 \cdot 10^{-5}$ m/s
- ▶ Groundwater: 2 mbgl



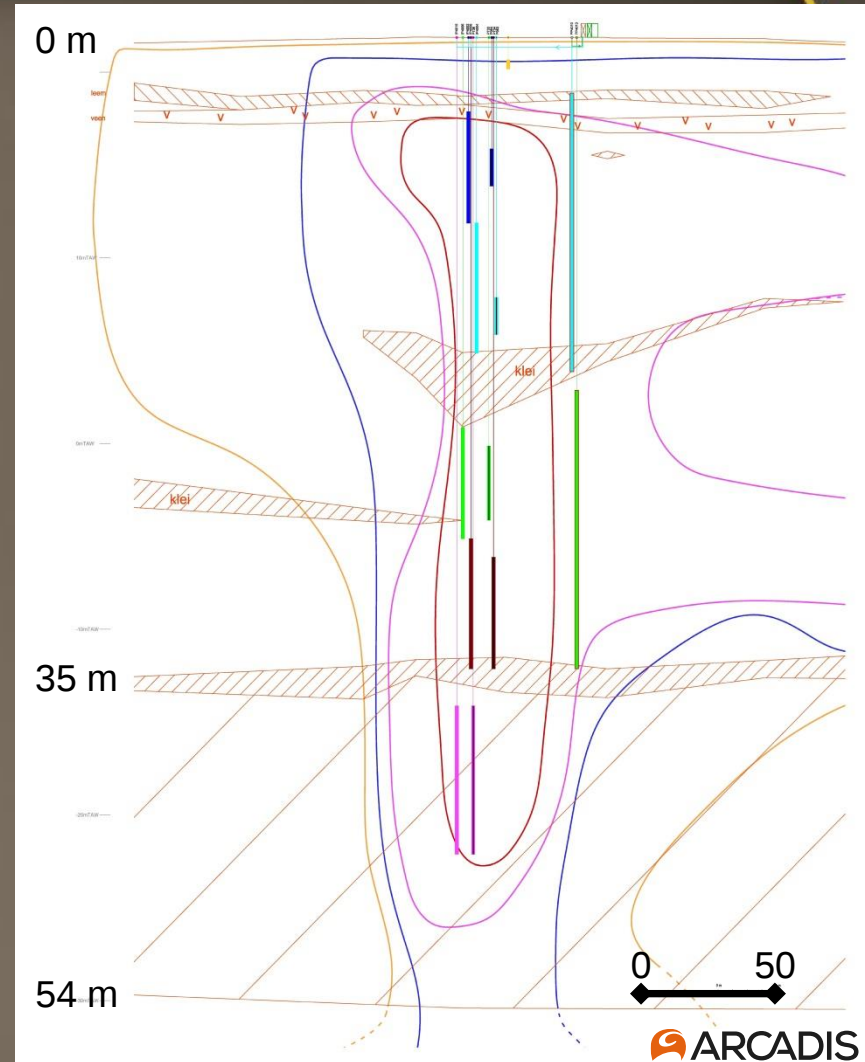
Strategy : Recirculation

100 % Recirculation Unit



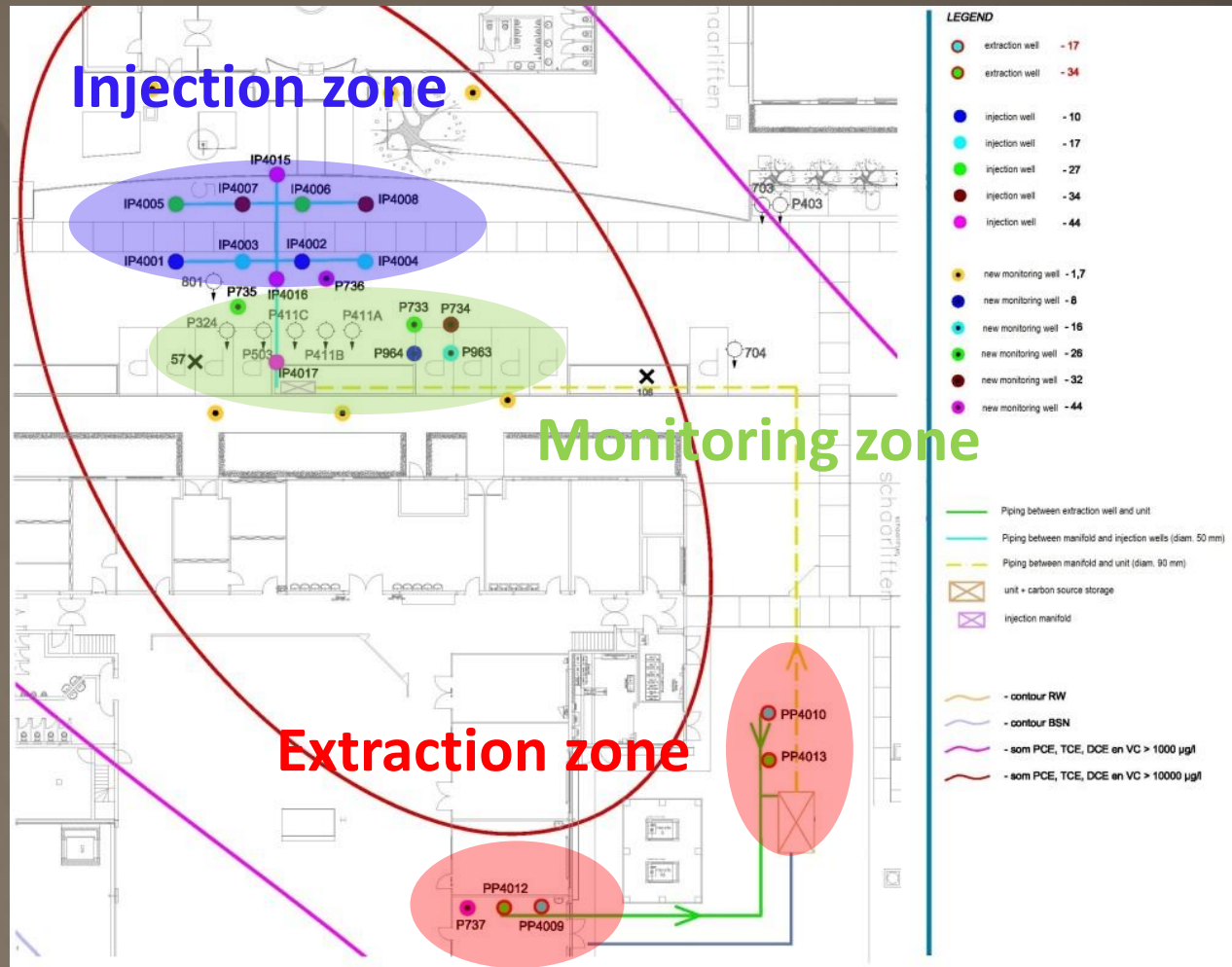
Pilot wells

- **First layer between 2 and 34 mbgl**
In situ Recirculation
4 extraction wells (2 x 17 m, 2 x 34 m)
2 x 4 injection wells (10, 17, 27 en 34 m)
- **Second layer > 36 mbgl**
Injection in vertical wells
3 injection wells (44 m)

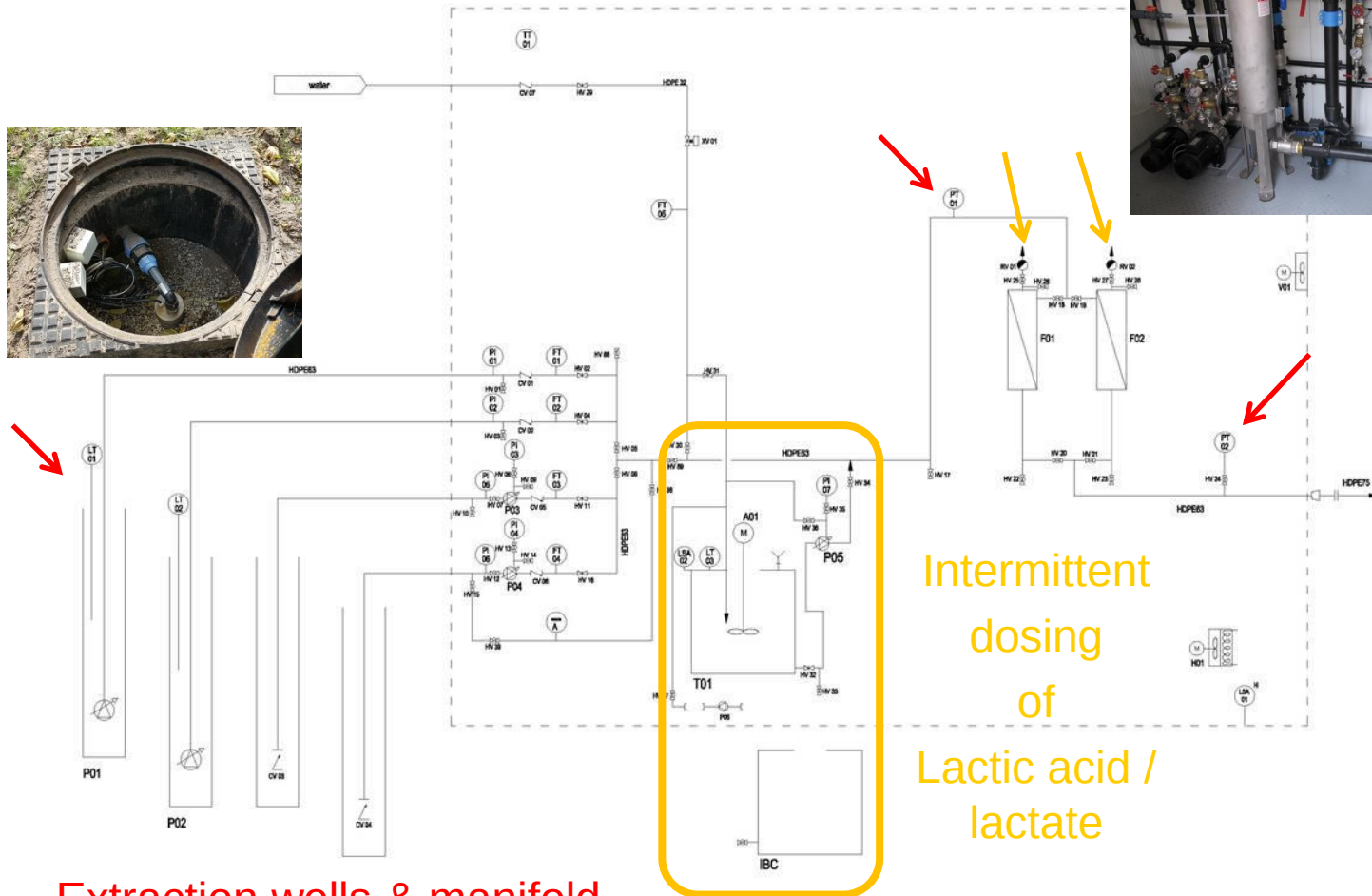


Pilot infrastructure

50 m



Pilot : Recirculation unit



Extraction wells & manifold

Intermittent
dosing
of
Lactic acid /
lactate

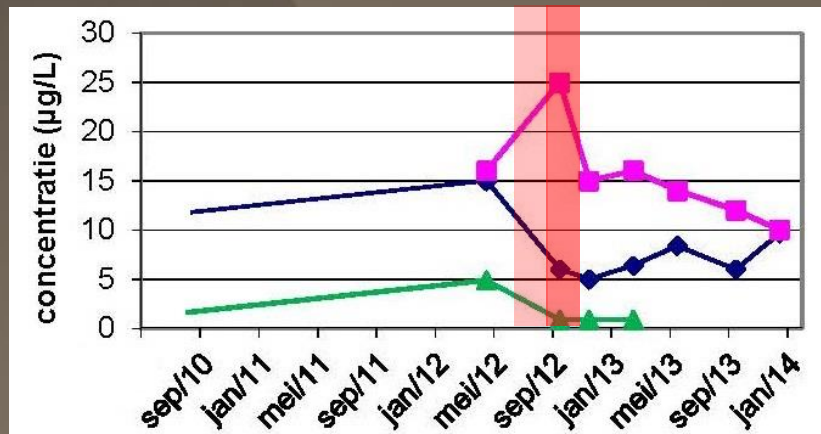


Injection
manifold & wells

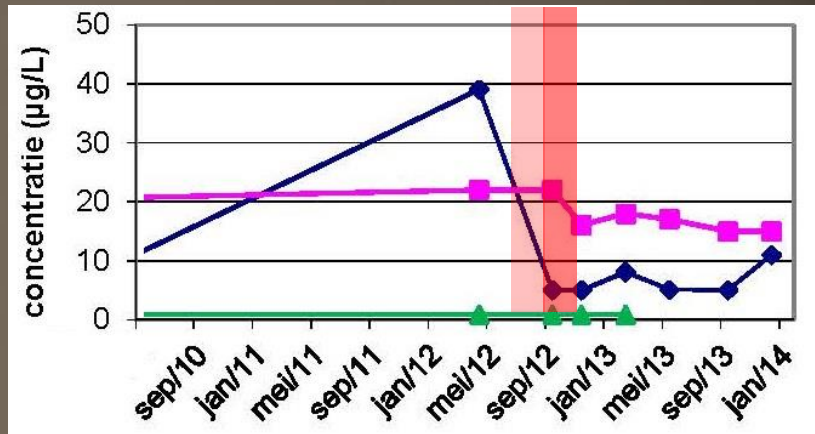


Pilot results

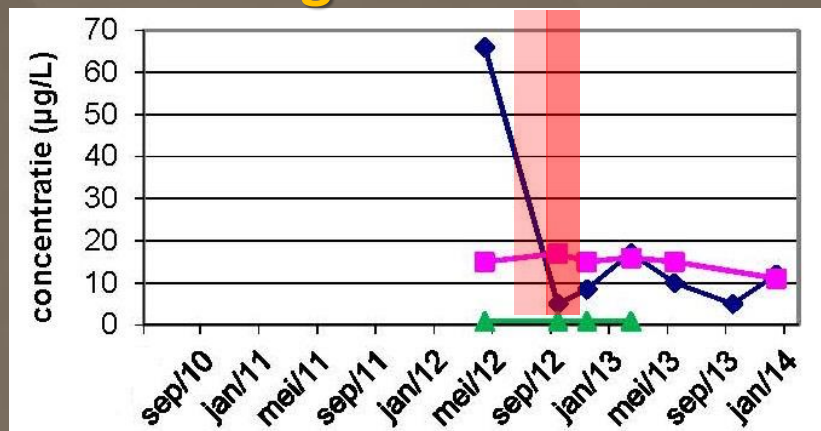
6 – 7 mbgl



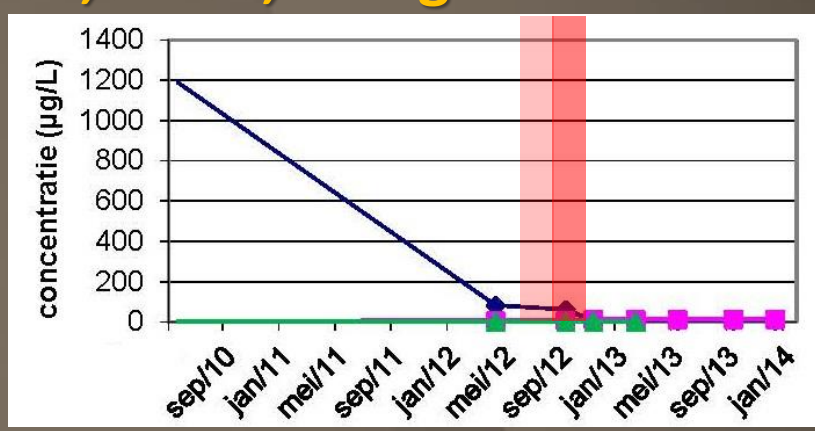
10 – 11,5 mbgl



22 – 26 mbgl



32,5 – 33,5 mbgl

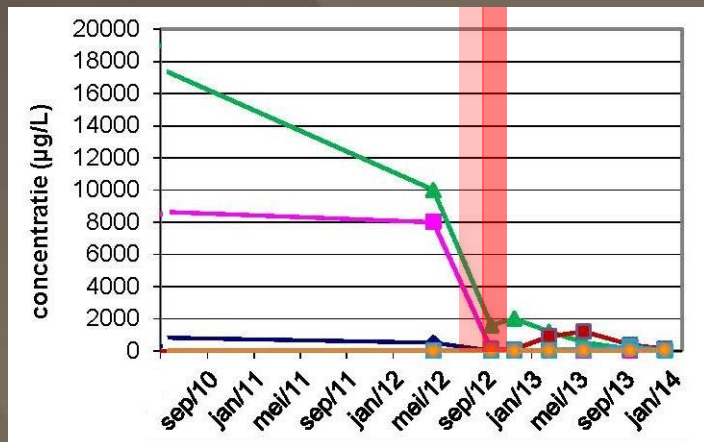


Discontinuous dosing of C-source: 4 kg → 8,5 kg TOC/day

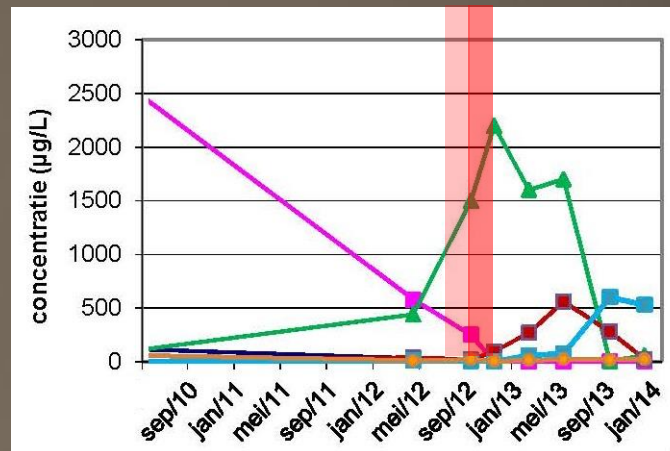


Pilot results

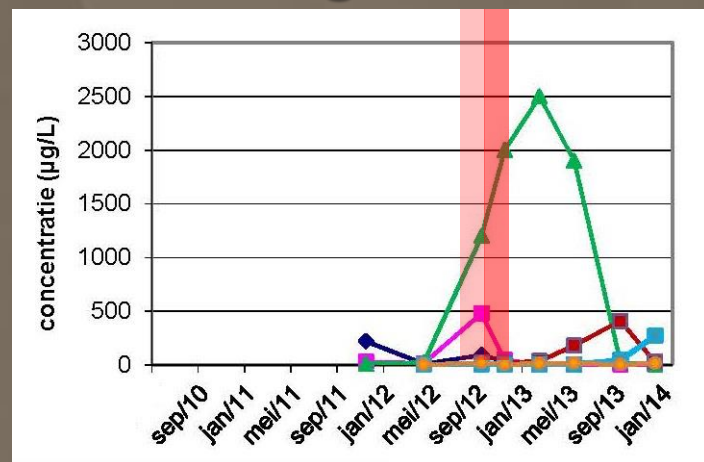
6 – 7 mbgl



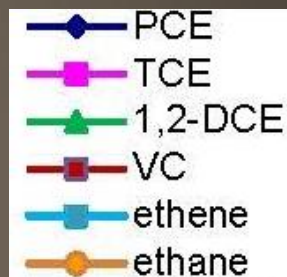
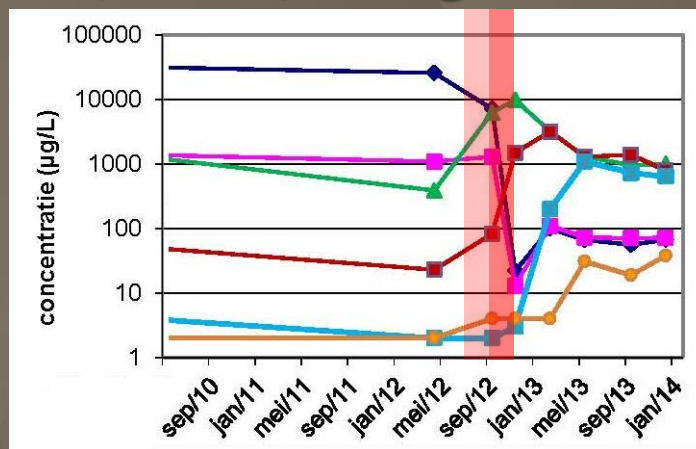
10 – 11,5 mbgl



22 - 26 mbgl

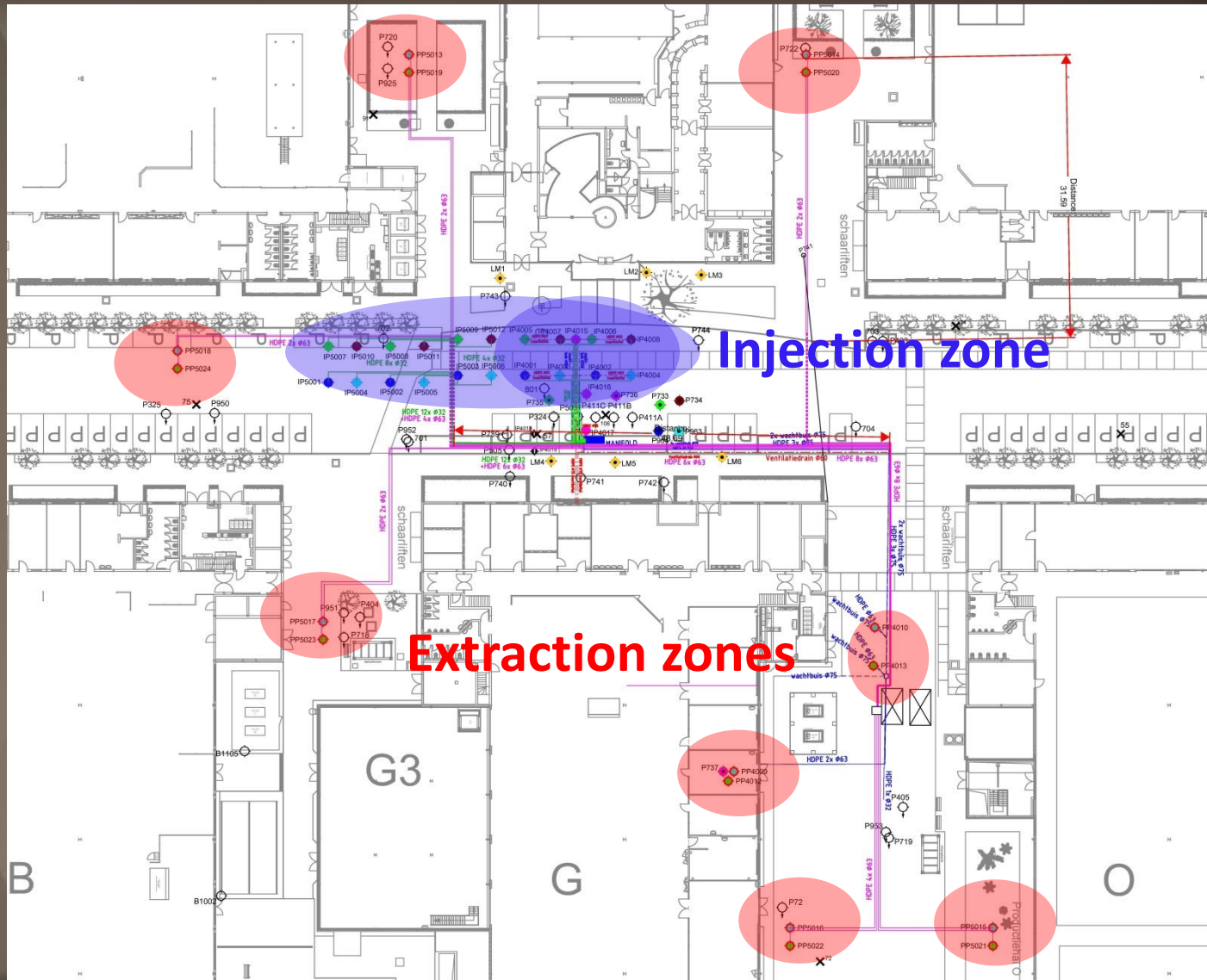


32,5 – 33,5 mbgl

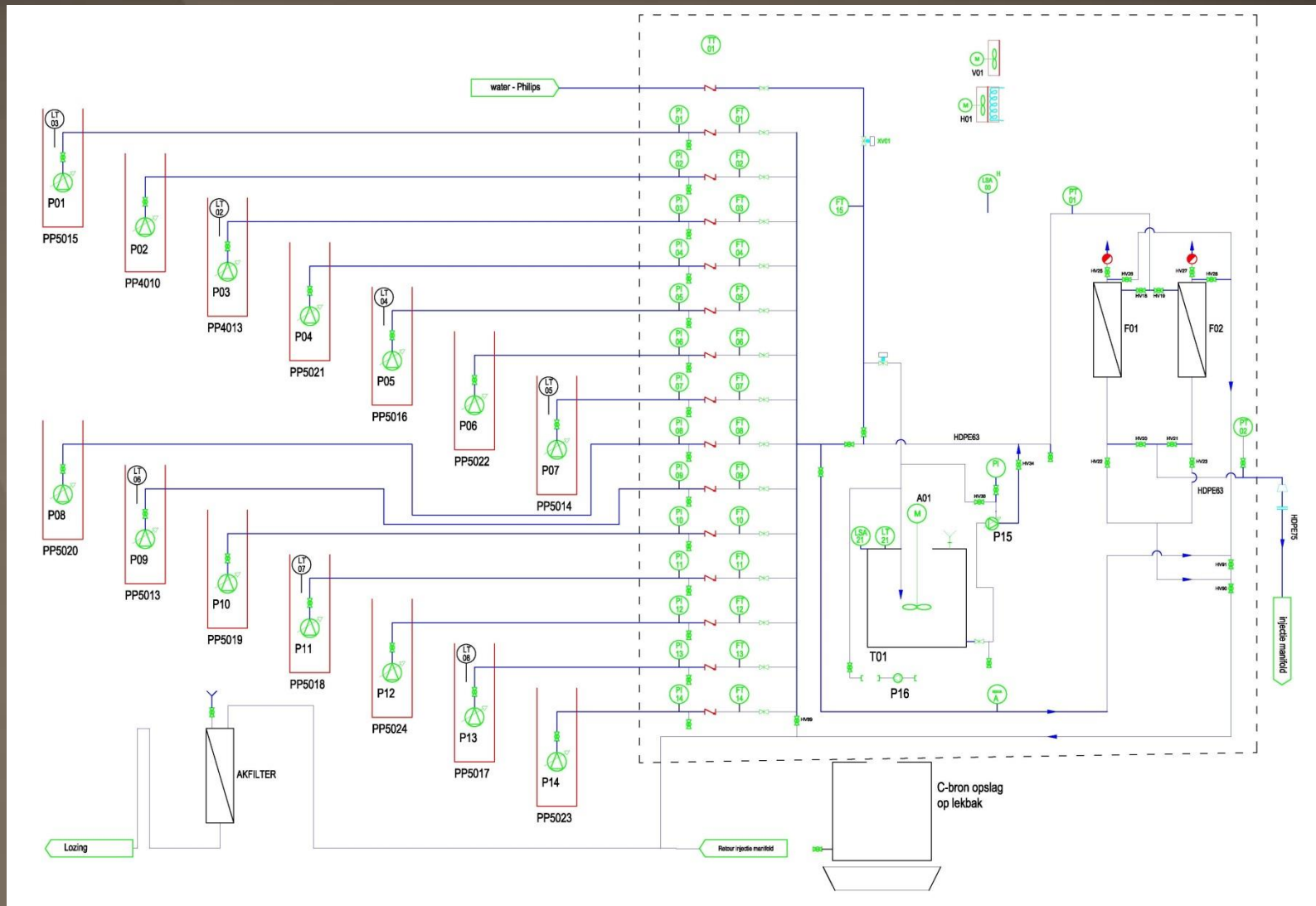


Full scale infrastructure

100 m
50 m



Full scale : recirculation unit

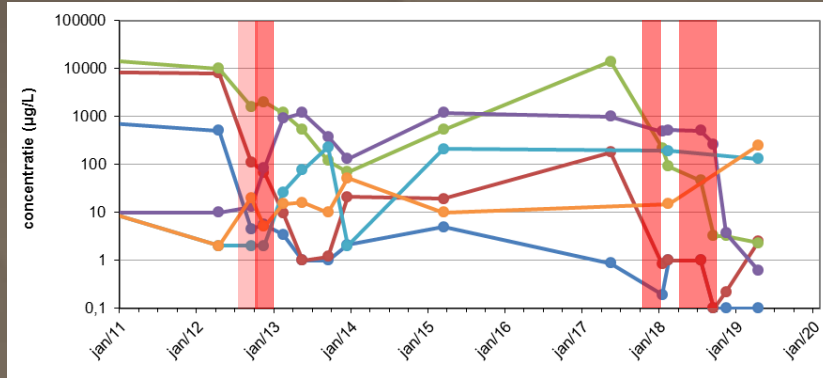


Full scale

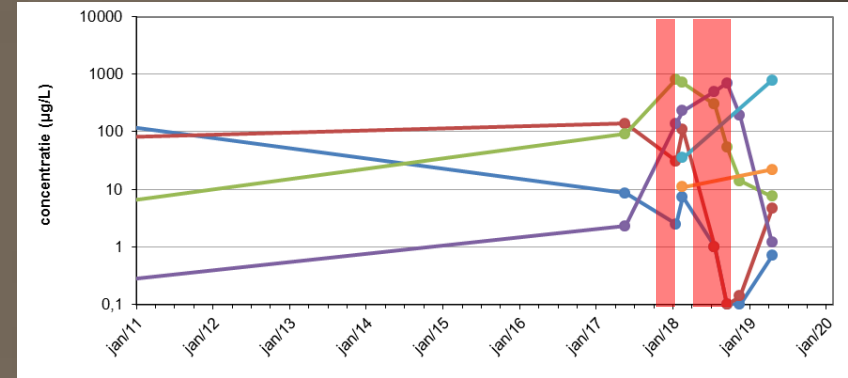


Full scale results

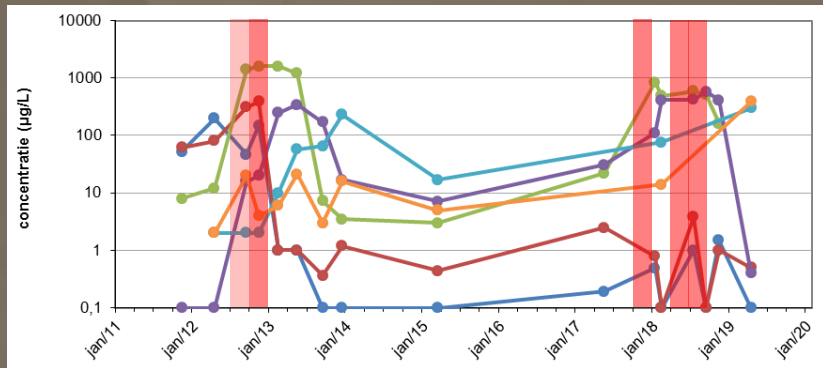
6 – 7 mbgl



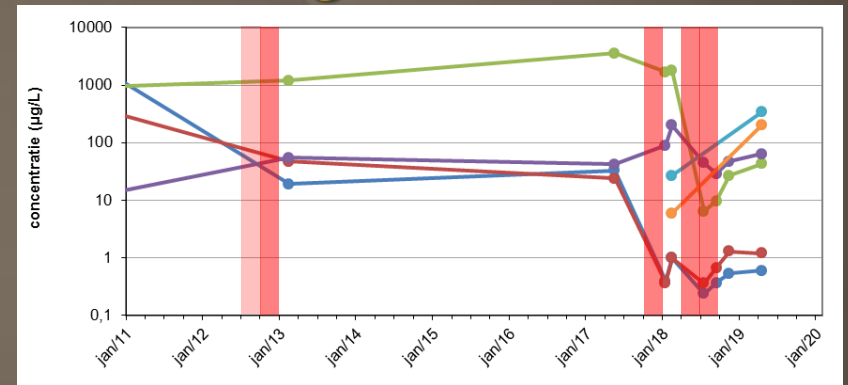
8 – 10 mbgl



22 - 26 mbgl

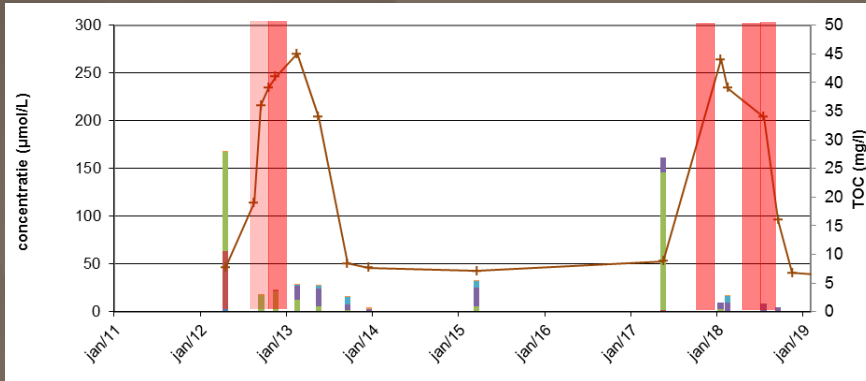


28 – 32 mbgl

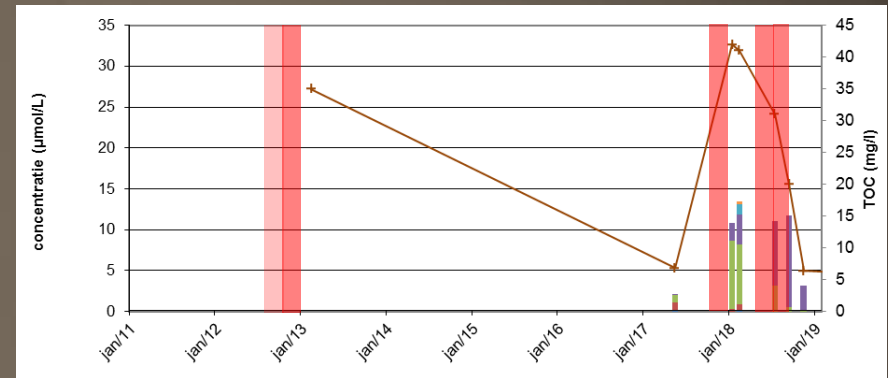


Full scale results

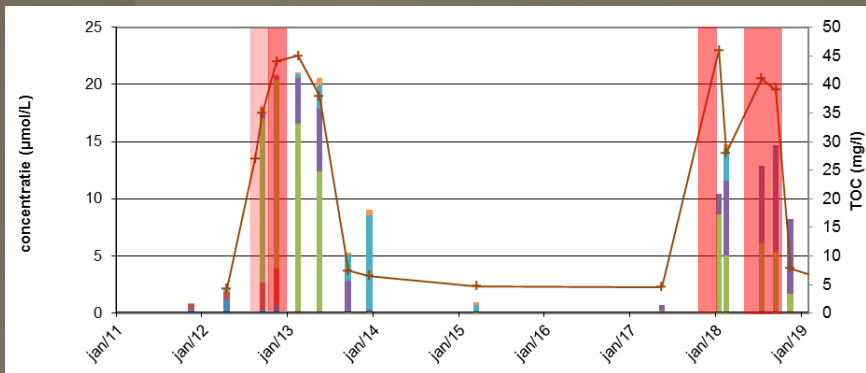
6 – 7 mbgl



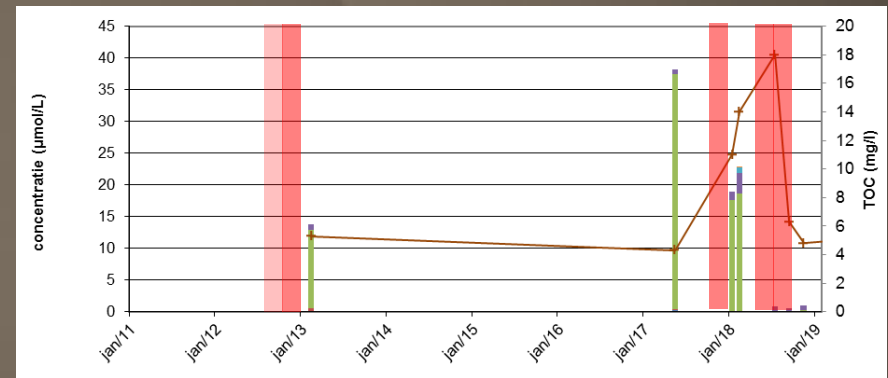
8 – 10 mbgl



22 - 26 mbgl



28 – 32 mbgl



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