Chlorinated Compounds (Rio Grande do Sul, Brazil)

Vapor Intrusion Potential Control combined with ISCR Pilot Test at Industrial Site Impacted by Authors: Sidney Aluani (saluani@sgw.com.br), Fabíola Tomiatti, Cristina Spilborghs, Eduardo Pujol, Natália Nascimento (SGW Services, São Paulo, SP, Brazil), Jim Mueller (Provectus Environmental Products, - Freeport, IL, USA)

Background / Objectives

Industrial plant located in Rio Grande do Sul, Brazil, which operated for over 50 years manufacturing tractors and diesel engines.

Occurrence of a TCE plume was observed in the order of **150,000 ppb**, with **100m² in** area and 8m depth, originated from the operation of a degreasing machine.





With shallow groundwater table (~1 m) the site has complex geology consisting of consolidated and unconsolidated sediments with predominance of **silty** texture, with great variation in the degree of compaction and confining characteristics in some portions of the site.



The objective of the pilot test was to evaluate the effectiveness of ISCR technology application to reduce TCE concentrations and, subsequently, a vapor extraction system was installed in order to minimize the potential of vapor intrusion due to the **remediation process**.

Approach / Activities



In order to minimize the potential of vapor intrusion and avoid additional vapor mass resulting from the injection, a vapor extraction system (SVE) was installed 2 months after the pilot test injections.



Well Profile VOC CONCENTRATIONS (< 100 101 a 250 251 a 500 501 Contaminated area under CI-04 Former degreasing machine a Sub slab vapor monitoring we Existing water monitoring wells Monitoring well installed and used in the pilot test Survey carried out Pilot Injection Test Points Landfill: surface layer of stones followed b clay (20% sand) dark reddish brown/light r Clay silty sediment (5% sand), colored of gray and ocher, with concretions Very compact clayey (sandless) silty sediment reddish brown to light red Clay silty sediment (10% s ← (0) VOC concentration (ppm) Water level (m) Soil sample collection for che Injection points - section Schematic representation of injection z Installed extraction wells 10m influence radius

In October 2020, an ISCR pilot test was conducted with injection of **2 ton of** remedial agent (Provect-IR) through 4 points. The injection interval was 1 to 4 m deep and prioritized the **shallow aquifer** and the **plume's hotspot**. In this region, high Quaternary Sediments Dark gray to ocher colored clayey sand sediment, plastic texture
CONCENTRATIONS OF TCE were found in the vapor **phase** due to the high concentrations in groundwater.

It was observed in the months following the pilot test injections that the concentration of trichloroethene in groundwater was significantly reduced (reduction of 99%).

Sub slab vapor results a clear effect of the rem action through the incre the chlorinated compo concentrations (TCE a daughter-products) in tl phase in the first month



Despite the existence of concentrations above the reference, the potential risks to human health were controlled by the action of the SVE system, whose



Results / Lessons Learned



ts shows	CVOC Sub Slab Concentrations (µg/m ³) - Pilot Test Area					
mediation	450000		Pilot Test (IS		SVE Start Up	
rease of	350000 300000 250000					
ounds	200000 200000 150000					
and	100000					
the vapor	0	May-18	Nov-19	↓ ↓ Nov-20 PMG-06	May-21	Sep-21
th.	 vinyl chloride cis-1,2-Dichloroethene trichloroethene tetrachloroethene 	8,7 15230,6 51951,2 118,7	92,7 41185,6 117789 456,9	2292 131301 292323,9 1148,5	2 2375,5 2070,2 20,1	0 932,9 551,1 4,54

preliminary results after 6 months of operation indicated a significant reduction in vapor, besides the fact that the SVE operation itself prevents vapor intrusion.

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