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Rapid Assessment of a Large Industrial Manufacturing Site Using WMS-LU Passive Soil-Vapour Samplers

Matthew B. Collyer¹, James E. Blackwell¹, Peter A. Southern¹,
Lange Jorstad²

¹Edge Group Pty Ltd, Level 1, 423 City Rd, South Melbourne, VIC 3030

²Geosyntec Consultants Pty Ltd, PO Box 21, Cronulla, NSW 2230

Australia

matthewc@edgegroup.net.au

Abstract:

Edge Group completed a preliminary assessment (PA) of an active industrial facility to investigate potential soil and/or groundwater impact sources, previously identified in groundwater. Contaminants of concern were PCE, TCE; DCE; VC; volatile TRH; and BTEX-N.

To perform a PA across the Site, while minimising disruption to operations, a passive soil-vapour assessment (PSVA) was completed using small diameter hand drill driven techniques for sampler installation. Soil samples were also collected where possible.

Waterloo Membrane Sampler–Low Uptake (WMS-LU) samplers were selected for the PSVA for the following reasons:

- The low uptake rates were ideal for the clayey Site conditions (minimising potential starvation effects);
- Samplers analysed in Australia using a NATA accredited method; and
- The results provided semi-quantitative data, allowing initial screening against published criteria.

The assessment included deployment of 73 samplers in a combined grid and targeted approach, making this one of the largest single-site deployments of WMS-LU samplers completed to date in Australia.

The soil-vapour and soil results indicated a predominating groundwater source, as limited soil impacts were noted. **Table 1** summarises the results of the PSVA, showing the range of recorded soil-vapour screening criteria exceedances at the Site.

Table 1. Soil-vapour screening criteria exceedances – concentration ranges

Analyte	Units	Screening Criteria	Concentration Range (> criteria)
PCE	μg/m ³	8,000	16,000 – 150,000
TCE		80	110 – 180,000
DCE		300	330 – 150,000
VC		100	110 – 24,000
TRH F1 (C ₆ -C ₁₀ less BTEX)		680,000	850,000 – 11,000,000

The soil-vapour results (contaminant isopleth plots generated by SiREM) correlated with known potential source areas, and also identified impact in two previously unsuspected source areas. The data also provided an indication of the degree of degradation of chlorinated solvent impacts (**Figure 1**).

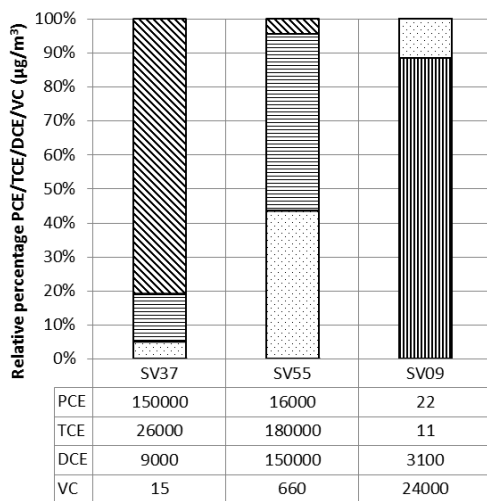


Figure 1. Typical PCE, TCE/DCE and VC dominated soil-vapour results, showing variability in contaminant type/degradation; and example isopleth plot for TCE in soil-vapour (dotted line represents adopted criterion, units in μg/m³) (after SiREM 2015)

The PSVA achieved the following:

- completion of a PA of potential soil and/or groundwater source media;
- rapid site-wide screening while minimising disruption to operations;
- identification of areas of chlorinated solvent and petroleum hydrocarbon soil-vapour impact;
- Soil-vapour results across a wide concentration range in low permeability geology, without starvation effects; and
- Cost saving over traditional methods, while providing a greater data resolution.