



# Ivey-Sol® 103 Successfully Treats Free-Phase Impacted Shale Via On-Site Washing

## CASE SUMMARY

**Undisclosed Site, Ontario, 2008**

Environmental investigation of a grass-covered area uncovered free phase petroleum in fractured, weathered shale. A pilot project was undertaken by **Terratechnik Ltd.** to excavate the shale and treat it by washing with a non-ionic surfactant, Ivey-Sol® 103.

### Ivey-Sol Benefits

- Operates below the critical micelle concentration facilitating low application rates
- Strongly enhances the solubility of hydrophobic compounds
- Does not cause emulsification of oils
- Does not foul traditional wastewater treatment systems (i.e. organoclays, GAC, etc.)
- Unlike ionic surfactants Ivey-Sol® does not disperse in the aqueous phase
- There are various formulations (103, 106, 108) designed for specific types of contaminants



### Pilot Study

Washing was first conducted using just water, as a baseline for washing efficiency. Washing time was the only variable. Results are reported qualitatively.

Wash Solution	Total Time	Ratio Material: Wash-Solution (V:V)	Visual Observations of Treated Shale
H2O	< 1 min	0.05	Free Product, Sheen and Strong Odour
H2O	2 min	0.10	Free Product, Sheen and Strong Odour
H2O	3 min	0.15	Sheen and Strong Odour
H2O	5 min	0.25	Sheen and Strong Odour
H2O	8 min	0.40	Sheen and Strong Odour

Based on the results of washing with only water, it appeared that the addition of a surfactant to facilitate the desorption of the contaminant was necessary. The shale was subsequently washed using various





concentrations of Ivey-Sol 103 to determine the most efficient combination of washing time and surfactant concentration.

The results are reported below:

Wash Solution	Conc. (ml/L)	Total Time	Ratio Material: Wash-Solution (V:V)	Visual Observations of Treated Shale
Ivey-Sol® 103	1	1 min	0.05	Free Product, Sheen and Strong Odour
Ivey-Sol® 103	1	3 min	0.15	Sheen and Strong Odour
Ivey-Sol® 103	1	5 min	0.25	Sheen and Moderate Odour
Ivey-Sol® 103	4	1 min	0.05	Sheen and Strong Odour
Ivey-Sol® 103	4	3 min	0.15	No Sheen, Slight Odour
<b>Ivey-Sol® 103</b>	<b>4</b>	<b>5 min</b>	<b>0.25</b>	<b>No Sheen, No Odour</b>
Ivey-Sol® 103	8	1 min	0.05	Sheen and Strong Odour
<b>Ivey-Sol® 103</b>	<b>8</b>	<b>3 min</b>	<b>0.15</b>	<b>No Sheen, No Odour</b>
<b>Ivey-Sol® 103</b>	<b>8</b>	<b>5 min</b>	<b>0.25</b>	<b>No Sheen, No Odour</b>

After several iterations, it was found that the most efficient combination was a surfactant concentration of between 0.4% to 0.8% and washing for 3-5 minutes per cubic metre of shale.

### Conclusions

Using low concentrations of Ivey-Sol® solution, free product was successfully removed from shale. Soil/shale washing with Ivey-Sol is a cost-effective technology for on-site treatment of impacted soils.

Based on the parameters above, projected treatment price for a small scale project (< 2,000 tonnes) would be \$35 per tonne, which is currently less expensive than disposing of the impacted material at a landfill and replacement with clean fill. Obviously, with larger projects, the economies of scale will drive the price down even lower.

**Canada Colors & Chemicals (CCC)** is the exclusive distributor of Ivey-Sol® products in Canada as well as many other remediation products. **Terratechnik Environmental Ltd** holds MOE issued Certificates of Approval for the application of Ivey-Sol® products along with a wealth of remediation experience. Please call Leonard Chan of CCC at 416-346-5130 to discuss specific approaches and products suitable to your needs.

