

# TPS-1 Thermal Phase Separation Unit

M-I Swaco

## Performance Claim

*The TPS-1 Thermal Phase Separation Unit has been shown capable of reducing polychlorinated biphenyls (PCB) in soil with concentrations averaging as high as 283 mg/kg to the CCME requirements for Parkland/Residential land usage of 5 mg/kg, while satisfying the air and water emissions criteria identified in Table 1.*

Table 1: TPS-1 Air and Water Emission Criteria

PARAMETERS	AIR	WATER
Polychlorinated Biphenyls	< 1 $\mu\text{g}/\text{m}^3$	< 5 $\mu\text{g}/\text{L}$
Polynuclear Aromatic Hydrocarbons	< 5 $\mu\text{g}/\text{m}^3$	
Particulates	< 20 $\text{mg}/\text{m}^3$	
Carbon Monoxide	< 55 $\text{mg}/\text{m}^3$	
BOD <sub>5</sub>		< 300 $\text{mg}/\text{L}$
Oil & Grease		< 15 $\text{mg}/\text{L}$
Dioxin/Furans	< 0.5 $\text{ng}/\text{m}^3$	< 0.6 $\text{ng}/\text{L}$

## Technology Description

The Thermal Phase Separation Process is a closed-loop, two-stage controlled thermal treatment and condensation/separation process designed by SCC Environmental to remove chlorinated and non-chlorinated contaminants such as: polychlorinated biphenyls (PCB's), pentachlorophenol, polyaromatic hydrocarbons, chlorobenzenes, pesticides and insecticides; from soils and sludges. A simplified schematic of the Thermal Phase Separation Process is shown in Figure 1. The first stage consists of volatilizing the organics from the soil through the application of indirect heat generated by the combustion of propane or natural gas. There is no contact between the contaminated soil and the heating flame. The second stage involves condensing the gases and separating the resulting condensate into oil, water and sludge fractions. The water fraction is treated by sand filtration and activated carbon adsorption for reuse in the process cooling stage. Extracted contaminants can be sent to safe reuse, recycling or disposal facilities.

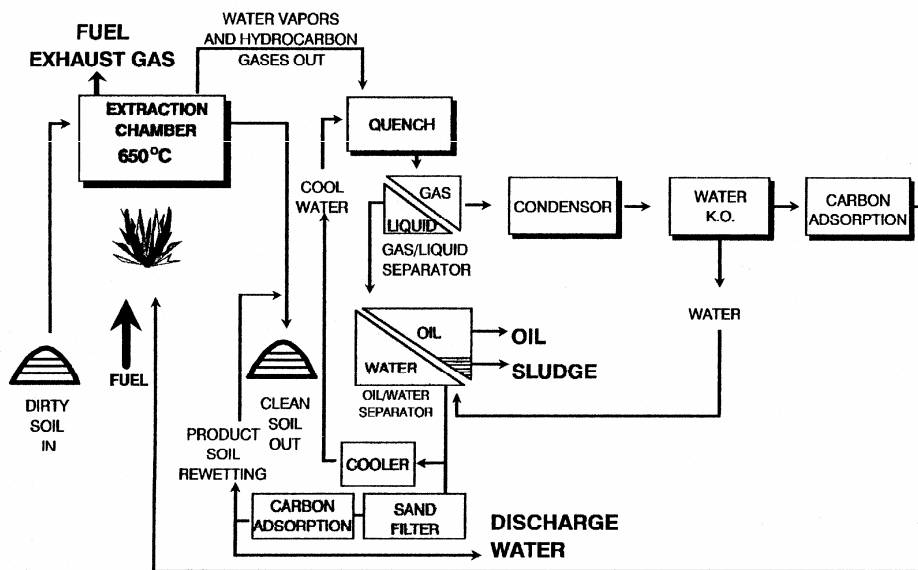


Figure 1. TPS-1 Thermal Phase Separation Process

## Technology Application and Performance Conditions

Demonstration tests of the TPS-1 were conducted on PCB contaminated soils at Cremona, Alberta and Makinsons, Newfoundland. The average operating conditions in effect during the performance tests are shown in Table 2.

Table 2: TPS-1 Demonstration Tests - Operating Conditions

Parameter	Cremona	Makinsons
Feed rate (tonnes/hr) dry	1.06	4.43
Soil moisture content (%)	10.7	12.5
PCB content (mg/kg) dry	283	169

## Verification

Water Technology International Corporation (WTI) conducted the verification of this performance claim using data and information presented in an Environment Canada report prepared under the Demonstration of Site Remediation (DSERT) program in 1994. The data sets analysed for the claim verification were obtained from the two field demonstration tests described in Table 2. The sampling protocols used in these tests were based on Sampling Method - Environment Canada Reference Method (EPS 1/RM/2). During the tests, which were done in triplicate, samples were obtained from the feed soils, treated soils, stack emissions, waters, oils, and sludges. One-tailed hypothesis statistical analysis



testing at a 95% confidence level was used to establish the validity of each emission criteria of the performance claim.

### **What is the ETV Program?**

The Environmental Technology Verification (ETV) Program is a joint Environment Canada - Industry Canada initiative delivered by ETV Canada. The ETV Program is designed to support Canada's environment industry by providing credible and independent verification of technology performance claims.

### **For more information on the TPS-1 Thermal**

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### **Limitation of Verification**

ETV Canada and the Verification Entity believe that the vendor's technology can achieve the performance levels set out in this Technology Fact Sheet, the Verification Certificate, and the Verification Report. This belief is based on independent analyses of information and declarations provided by the vendor and of independently generated data, using verification protocols authorized for the ETV Program. No additional bench or field tests were carried out to corroborate the data provided. The verification is also based on a use of the technology in accordance with the specified operating conditions.





The Government of Canada, ETV Canada and the Verification Entity make no express or implied guarantee or warranty as to the performance of the vendor's technology. Nor do they guarantee or warrant the vendor's technology to be free from any defects in workmanship, or the integrity or safety of the technology as a whole.

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