



1 For Requiring Our Greener Earth

March 15, 2010

Cowboy Chemicals

123 FPST Drive

Payne Center OK 74567



Dear Sir:

Our Organization insists that you cancel plans to build such a disastrous facility in the vicinity of our beautiful part of the earth. In fact such a facility should not be built anywhere due to the dangerous and vile nature of the materials that would be used and produced.

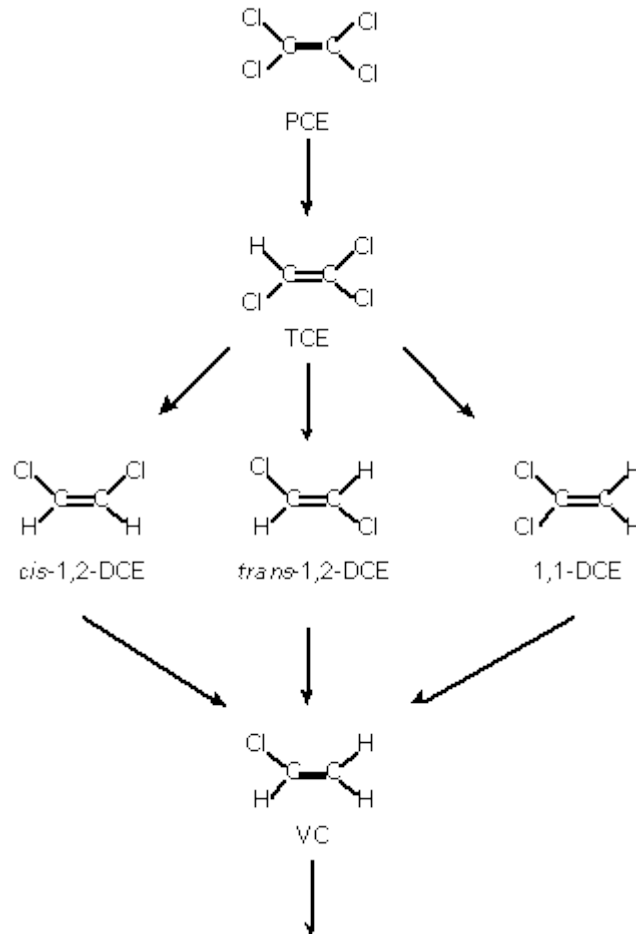
### **VC Environmental Contamination and Remediation**

Reports from several countries recently showed high levels of VC contamination in soil, groundwater, aquifers, and wells near landfill and industrial waste disposal sites that were not located near VC/PVC production facilities. VC concentrations were up to 12 mg/L in some groundwater samples and up to 230 mg/m<sup>3</sup> in landfill gas samples (Table 2). VC can be formed microbially, under anaerobic conditions, from the reductive dehalogenation of the more highly chlorinated chloroethenes: perchloroethylene (PCE), trichloroethene (TCE), and the dichloroethene isomers, cis-1,2-dichloroethene (cis-1,2-DCE), trans-1,2-DCE, and 1,1-DCE (Figure 1) (59-62). PCE and TCE are used as industrial solvents for degreasing and cleaning metal parts and electronic components and in dry cleaning. Careless handling, storage, and disposal, as well as the high chemical stability of these compounds, have made them, and consequently VC, some of the most frequently encountered groundwater contaminants. Although VC may be further degraded to less and nonchlorinated ethenes and possibly finally to carbon dioxide and ethane, this proceeds at a slow rate under highly reducing conditions (63-65); as a consequence, there can be a build-up of VC in landfills and surrounding areas.

**Table 2.** Vinyl chloride found in landfill/waste disposal sites as a gas, in leachate, and in groundwater formed probably from degradation of higher chloroethenes.

Sample	Place of sampling	Measure	Concentrations	Reference
Landfill gas	United States: 2 landfills	Maximum	230 mg/m <sup>3</sup>	(43)
		Average	34 mg/m <sup>3</sup>	
Landfill gas	United Kingdom: landfill	Maximum concentration	11 mg/m <sup>3</sup>	(44)
	Flume, 100 m from boundary due to subsurface migration (1991)		40 mg/m <sup>3</sup>	
Landfill gas	Braunschweig, Germany: landfill	Mean	9 mg/m <sup>3</sup>	(45)
Gas effluents	Berlin, Germany: garbage dump		0.27 mg/m <sup>3</sup>	(46)
Gas	Germany	Average		(47)
	Industrial landfill;		41 mg/m <sup>3</sup> ;	
	Municipal landfill		10 mg/m <sup>3</sup>	
Gas	Germany, landfill	Range	0.03–0.3 mg/m <sup>3</sup>	(48)
Landfill gas	United Kingdom, 7 waste disposal sites	Range	< 0.1–87 mg/m <sup>3</sup>	(49)
Soil air	Germany, solvent waste sites	3 Highest samples of 200	128 mg/m <sup>3</sup> ;	(50)
			47 mg/m <sup>3</sup> ;	
			5 mg/m <sup>3</sup>	
Leachate	Wisconsin: municipal solid waste site (1982)	Range	61 µg/L	(51)
Leachate	U.S. sites established before 1980 (6 chosen sites)	Range	8–61 µg/L	(52)
Groundwater	Germany, contaminated water	Range	< 5–460 µg/L	(53)
		Range	15–1,000 µg/L	
Groundwater (wells)	Germany, solvent waste site	3 Highest samples of 200	1,000 µg/L	(50)
			500 µg/L	
			200 µg/L	
Groundwater	Germany	Maximum	120 µg/L	(54)
Groundwater	Santa Clara Valley, California (near plants manufacturing electronic equipment, which use significant amounts of chlorinated solvents)	Range	50–500 µg/L	(55)
Groundwater	Germany: 136 samples from down-gradient wells of 100 waste disposal sites	Maximum	12,000 µg/L	(56)
		Mean	1,694 µg/L	
Groundwater	Michigan: sand aquifer near industrial site; concentration increased with depth consistent with methane	Maximum	> 5 µg/L at 10m	(57)
			56,400 µg/L at 23m	
Outwash aquifer	Canada: Gloucester landfill (1988)	Range	< 1–40 µg/L	(58)

**Figure 1. Microbial degradation of chlorinated ethenes to form vinyl chloride.**



Several field studies of PCE/TCE-contaminated landfill sites and aquifers (61,66-70) have shown that, under specific conditions, PCE and TCE can be intrinsically biodegraded anaerobically to ethene by indigenous methanogenic, acetogenic, and sulphate-reducing bacteria. Also, under aerobic conditions there is a potential for direct or cometabolic oxidation of DCE and VC. Because each site has individual conditions (e.g., the presence of other solvents such as acetone and methanol), the degradation rates cannot be directly compared. In one study, half-lives of 1-2 years have been estimated for each stage in the reaction chain (e.g., DCE to VC; VC to ethene) (49). In general, except under specific conditions, there is little biodegradation of VC.

As you can see this material should simply be banned from all production.

Sincerely,

A.L.KERMIT, chief scientist F.R.O.G.E.