

MEMORANDUM

1/29/87

SUBJECT: Groundwater Concentrations -- Revised Table

FROM: Annett Nold

TO: Pat Kennedy

cc: Russ Kinerson  
Lynn Delpire  
Greg Schweer

The attached table of 70-year average concentrations was prepared with the support of GSC using methods within SESOIL and AT123D. The concentrations refer to drinking water from a well 200 meters downgradient from a landfill edge, screened at a depth of 20 meters below the water table. The depth from land surface to ground water is 8 meters. The landfill area is one hectare. The rate of disposal to the landfill is 1000 kg/yr for 10 years duration. Assessors would need to rescale for other loadings. A summary of major assumptions for climates and soils is attached. Further description of the scenarios is to be reported in GSC, 1987, "Groundwater Scenarios for Screening-Level Assessments of Compounds Released to Land." The concentration table was prepared with the use of results to date from the simulations GSC has conducted. Because of the request to estimate maximal 70-year average concentrations, I have made some estimates for the high Koc cases needing extension beyond 100 years, and also for several low Koc cases for which the concentration time resolution to date was insufficient.

The attached graph shows the dependence of the 70-year concentration averages on Koc for two representative environments, for low volatility ( $H=1.E-5$ ). The Wichita case has slower transport (both lower water flux and higher organic carbon) than the Boston case. The environmental parameters were chosen to be broadly applicable in an attempt to span common cases, and are not restricted just to these locations. For lower Koc values, the Wichita case has the higher concentrations due essentially to the lower dilution. However, the curves cross for higher Koc as the effects of adsorption increase. It should be

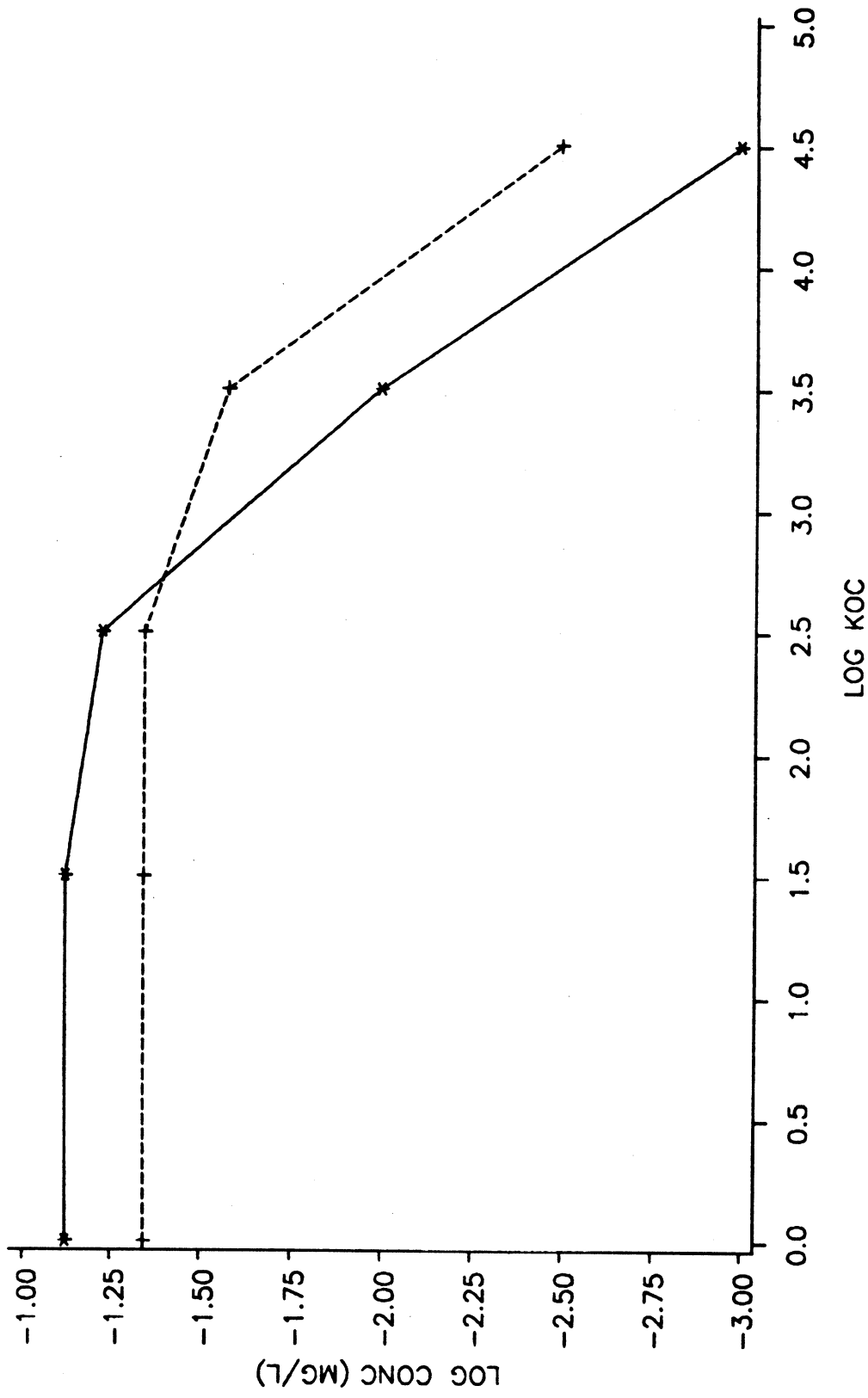
noted that for the lower Koc cases, essentially all of the compound released in 10 years passes the well within the 70 year lifetime window. However, for higher Koc, the time of release to groundwater extends over many more years. For moderate Koc, the lifetime exposure to a persistent compound can be close to the low Koc situation. However, the slower migration (for log Koc=2.5, for example) would provide more opportunity for degradation processes. For landfills with appreciable sludge content, concentrations for moderate to high Koc compounds would be lowered.

The combinations of Koc and H were restricted to nine pairs rather than a matrix of fifteen for the following reasons. For compounds with low Koc, the higher water solubilities would lead to H below 0.1 unless vapor pressure has improbably high values. For compounds with high Koc, both the water solubilities and vapor pressures often have low values with high percentage uncertainties associated. This can lead to large uncertainty in H, as with dioxins, for example. Furthermore, localized saturation of soil moisture and air can restrict mobility even when H indicates volatilization from a dilute solution.

GROUNDWATER CONCENTRATIONS - Revised Max 70-yr Averages

Log K <sub>OC</sub>	Henry = 10 <sup>-5</sup> atm-M <sup>3</sup> /Mole	Henry = 10 <sup>-3</sup> atm-M <sup>3</sup> /Mole	Henry = 10 <sup>-1</sup> atm-M <sup>3</sup> /Mole
	Boston mg/L	Boston mg/L	Boston mg/L
	Wichita mg/L	Wichita mg/L	Wichita mg/L
0.0	4.52 E-2		
	7.55 E-2		
1.5	4.52 E-2	3.21 E-2	
	7.55 E-2	5.98 E-2	
2.5	4.52 E-2	3.38 E-2	8.44 E-4
	5.95 E-2	5.14 E-2	1.38 E-3
3.5	2.67 E-2	2.40 E-2	
	1.01 E-2	9.87 E-3	
	t>100 Yr (7.06 E-3 for Yr 26 to 95)	t>100 Yr (6.95 E-3 for Yr 26 to 95)	
4.5	3.21 E-3		
	t>>100 Yr (1.65 E-3 for Yr 26 to 95)		
	1.02 E-3		
	t>>100 Yr (7.14 E-5 for Yr 26 to 95)		

GROUNDWATER CONCENTRATIONS -- 70 YEAR MEANS



Dependence on Koc for two environments  
Release: 1000 kg/yr for 10 years

CLIMATES AND SOILS

<u>Climatic Data</u>	Boston	Wichita
Mean annual precip (cm.)	108 cm	77.6 cm
Derived mean annual recharge	82.6	49.8 cm

<u>Soil Data</u>	Boston	Wichita
Name	Canton Sandy Loam	Blanket Silt Loam

Organic carbon %

cover layer	0.5%	2.0%
cell (mid)	0.5%	2.0%
vadose (lower)	0.05%	0.2%
Note aquifer oc:	0.005%	0.02%

GROUNDWATER                      PARAMETERS

	<u>Boston</u>	<u>Wichita</u>
Hydraulic conductivity (m/hr)	2.0	2.0
Effective porosity	0.30	0.30
Hydraulic gradient	0.01	0.006
Dispersivities: longitudinal (m)	30	30
transverse (m)	10	10
vertical (m)	10	10