

US EPA ARCHIVE DOCUMENT

a) **Appendix H**

b) **Table I E-Fate and Transport Criteria : PERSISTENCE**

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d) (The tendency of a chemical substance to persist (survive) in the environment without transformation into another chemical form.)

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f) PERSISTENCE		
g)		
h) <u>Measure (Potential Utility)</u>	i) <u>Comment</u>	j) <u>Regulatory Endpoint</u>
k) Hydrolysis Half Life	l) Degradation in water. Measured at pH 5, 7 and 9 (acidic, neutral and alkaline) at 25° C using ¹⁴ C material.	m) Half-life > 25 weeks n)
o) Aerobic and anaerobic soil metabolism	p) Degradation due to the biological and physical/chemical properties of the soil. Uses radiolabeled material, the specific metabolites are identified and persistent ones could require additional toxicology, ecotoxicity and E-fate safety evaluations. q)	r) Half-life >2-3 weeks s)
t) Photolysis	u) Degradation due to sunlight. Done in either soil or aqueous environment with radiolabeled chemical substance.	v) Half-life > 1 week (but this criterion is only important while the pesticide is on the surface

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y) Table II E-Fate and Transport Criteria : MOBILITY

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aa) (Ability to move in air and/or potentially leach into ground water. This potential is altered by the compounds persistence)

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dd)	ee) MOBILITY	ff)
gg) Measure (Potential Utility) jj) Volatility, Henry's Law Constant	hh) Comment kk) Calculated by the ratio of the chemical's vapor pressure to its solubility in water. Indicator of volatilization potential when pesticide is dissolved in water.	ii) Regulatory Endpoint ll) $< 10^{-2}$ atm-m ³ /mol
mm) K_d , K_{oc} nn) K_d is soil specific. oo) pp) K_{oc} is normalized to % organic carbon (oc) in soil, the component most responsible for sorption	qq) Tendency of a chemical to be sorbed to soil	rr) K_d , < 5 and usually less than 1 to 2 ss) Can vary widely depending on the soil type. tt) $K_{oc} < 300-500$
uu) Ground Water Ubiquitous Score or (GUS)	vv) Empirical evaluation $GUS = \log \text{soil } 1/2 \text{ life} \times (4 - \log K_{oc})$. ww) (Log soil half life)	xx) < 1.8 is improbable leacher, 1.8 - 2.8 is transitional zone and > 2.8 is a probable leacher.
yy) Aged Soil Column Leaching	zz) Lab experiment to estimate the leaching potential of parent and significant soil metabolite(s) in various soil types.	aaa) No quantitative trigger. Presence of parent and/or metabolites in the column leachate indicates potential to contaminate ground water

bbb) Terrestrial Field Dissipation Studies	ccc) The rate of dissipation of the pesticide after application. Measures soil degradation in the environment (various soils). Expensive, long term and involved	ddd) half life 2-3 weeks considered persistent, and detection at 90cm (30inch) -indicates leaching
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fff) **Table III E-Fate and Transport Criteria : BIOACCUMULATION¹**

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hhh) (The capacity of a chemical to accumulate (be stored in the tissue) in an organism as a result of uptake from all environmental source.)

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jjj) BIOACCUMULATION kkk)		
lll) Measure (Potential Utility)	mmm) Comment	nnn) Regulatory Endpoint
ooo) Octanol Water Partition Coefficient (K_{ow})	ppp) Ability of a chemical substance to partition between an aqueous and lipid phase. Classic and easy measure which is used as an indication of a chemical's potential for bioconcentration by aquatic organisms.	qqq) $\log K_{ow} > 3$ substance having propensity to accumulate in fat. rrr)
sss) Bioaccumulation Factor (BCF)	ttt) Used to help assess risks to fish and to non-target organisms (including humans) above them in the food chain. During an accumulation test, at any time during the uptake phase, the concentration of test substance (in ppm) in/on fish or specified tissues thereof, divided by the concentration of the chemical in the surrounding medium = BCF. BCF tests are required for chemicals that have $\log K_{ow}$ values >3.0 . Remediation required if EPA water branch finds your pesticide or chemical at certain levels in fish during random sampling.	uuu) $BCF > 1000$

vvv) Animal metabolism	www) This is part of mammalian toxicology but information on metabolism and excretion can be useful to flag potential for bioaccumulation. Uses radiolabeled material. Excretion of 90%+ of all compound in the first 24hrs is desirable.	xxx)
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- zzz) 1. The bioaccumulation potential is considered significant if the substance has a log K_{ow} of 3 and triggers a fish bioaccumulation test.
- aaaa)

Literature References for Persistence, Bioaccumulation, and Mobility Tables

bbbb)

cccc) EPA Draft Waste Min: Where to Begin? Recommendations of the Waste Minimization Prioritization Team on Risk-based Tools for Identifying Priority Chemicals and Wastes, Appendix C. July 1996.

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eeee) Hoppin, P.J., Liroff, R.A. and Miller, M.M. July 1996. WWF Report: Reducing Reliance on Pesticides in Great Lakes Basin. *Agriculture*, p. 99-101

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gggg) Veith et al. 1979. *J. Fish Res. Board Canada*, 36: p. 1040-1048

hhhh)

iiii) Wiley, John, Hutson, D.H. and Roberts, T.R. et.al. 1990. Progress in Pesticide Biochemistry and Toxicology. *Environmental Fate of Pesticides*. Vol. 7: 13-25

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