

Schedule B5

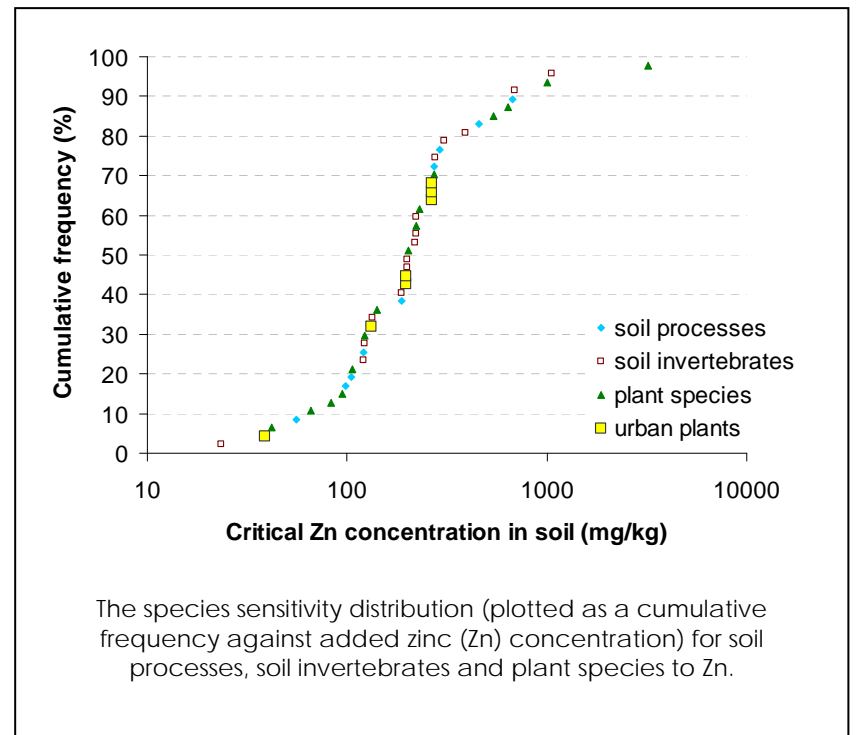
Ecological risk assessments

protecting terrestrial ecosystems

- Terrestrial ecosystems include soil processes, soil flora and fauna, and terrestrial invertebrates and vertebrates.
- The derivation of EILs for protection of terrestrial ecosystems involves consideration of complex variables including the wide range of species exposed to soil, their toxicity response, and the physicochemical properties of site soils and target contaminants.
- The NEPM recognised the need for ecosystem protection, however, the science was poorly developed at the time and interim urban EILs, based largely on phytotoxicity effects, were adopted.

new methodology

- based on a species sensitivity distribution (SSD) approach, similar to that used in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000.
- toxicity data (one value per species or soil process) are plotted as a cumulative frequency distribution against the concentration at which the effect occurs. A statistical distribution is then fitted to the data from which the concentration required to protect a given percentage of species can be estimated
- Differing levels of protection can be applied to generic land-use settings
- uses lowest observed effect concentration (LOEC) or EC30 toxicity data (the concentration which affects 30% of a test population after a specified exposure time).
- includes the ability to account for decreased contaminant bioavailability over time (by the application of ageing factors) and the potential for biomagnification of the contaminant.



EILs have been derived for eight contaminants in three land-use settings

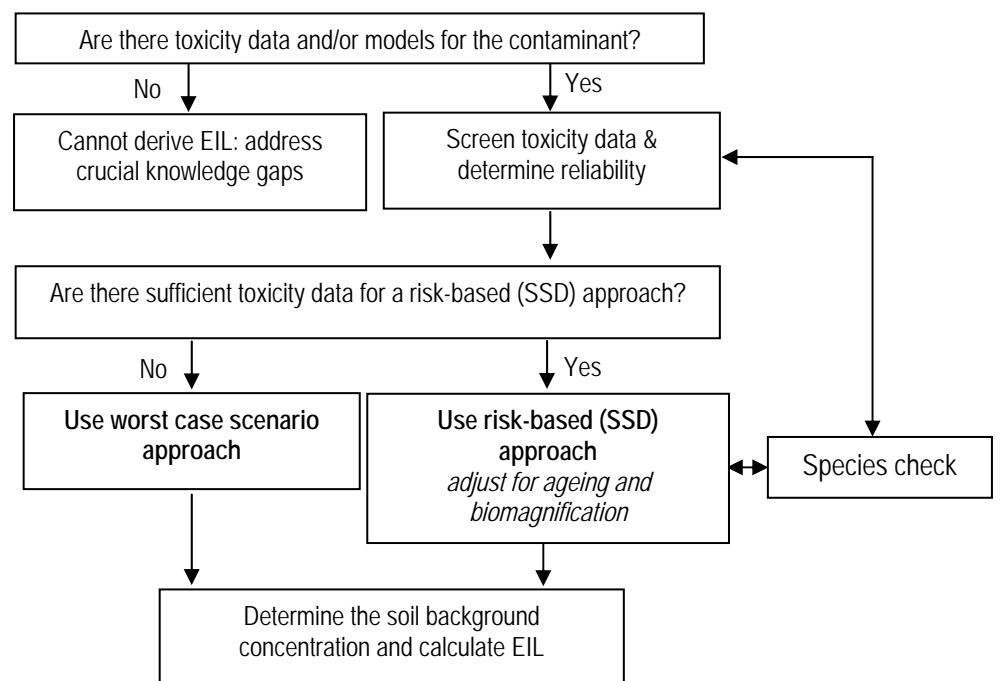
Contaminant	Age of contam.	Added contaminant limits (mg added/kg soil) for various land uses		
		National parks & areas with high ecological value	Urban residential/public open space	Commercial & industrial
Zinc ¹	fresh	7 – 130	25 – 500	45 – 800
	aged	15 – 280	70 – 1300	100 – 2000
Arsenic ²	fresh	20	50	80
	aged	40	100	160
Naphthalene ²	fresh	10	170	370
DDT ²	fresh	3	170	640
Chromium (III) ¹	fresh	25 – 50	75 – 160	120 – 270
	aged	60 – 130	190 – 400	310 – 660
Copper ¹	fresh	15 – 60	30 – 120	45 – 200
	aged	20 – 80	60 – 230	85 – 340
Lead ¹	fresh	110	270	440
	aged	470	1100	1800
Nickel ¹	fresh	1 – 25	10 – 170	20 – 350
	aged	5 – 95	30 – 560	55 – 960

1. The values presented for zinc, chromium (III), lead and nickel are added contaminant limits (ACLs). Where the ACL is presented as a range, the value to be used depends on the physicochemical properties of the site soil. Depending on the metals of interest, representative measurements of the soil cation exchange capacity, pH and/or clay content are required. The site-specific EIL is calculated from:

$$EIL = ACL + \text{ambient background concentration}$$

2. The values presented for arsenic, naphthalene and DDT are total concentrations and the site EIL is taken directly from the table.

Methodology to derive Ecological Investigation Levels



Percentage of species and soil processes to be protected for different land-uses depending on the contaminant bio-magnification potential

Land-use	Standard % species protection	Biomagnification % species protection
National parks and areas with high ecological value	99	99
Urban residential and public open space	80	85
Commercial and industrial	60	65