



NEW ZEALAND
LAND AND GROUNDWATER
CONFERENCE 2024
22 - 24 OCTOBER - AUCKLAND



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Risk Assessment – Asbestos in Air v Soil Moisture in New Zealand

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Introduction

- Background to BRANZ Tier 1 Criteria, NES-CS and Tier 2 Risk Assessment.
- Why soil moisture?
- Soil moisture and the New Zealand climate.
- Predicted soil moisture and risk.

Risk Assessment - Background

- BRANZ adopted WA Health criteria – A 10-fold reduction from Dutch.

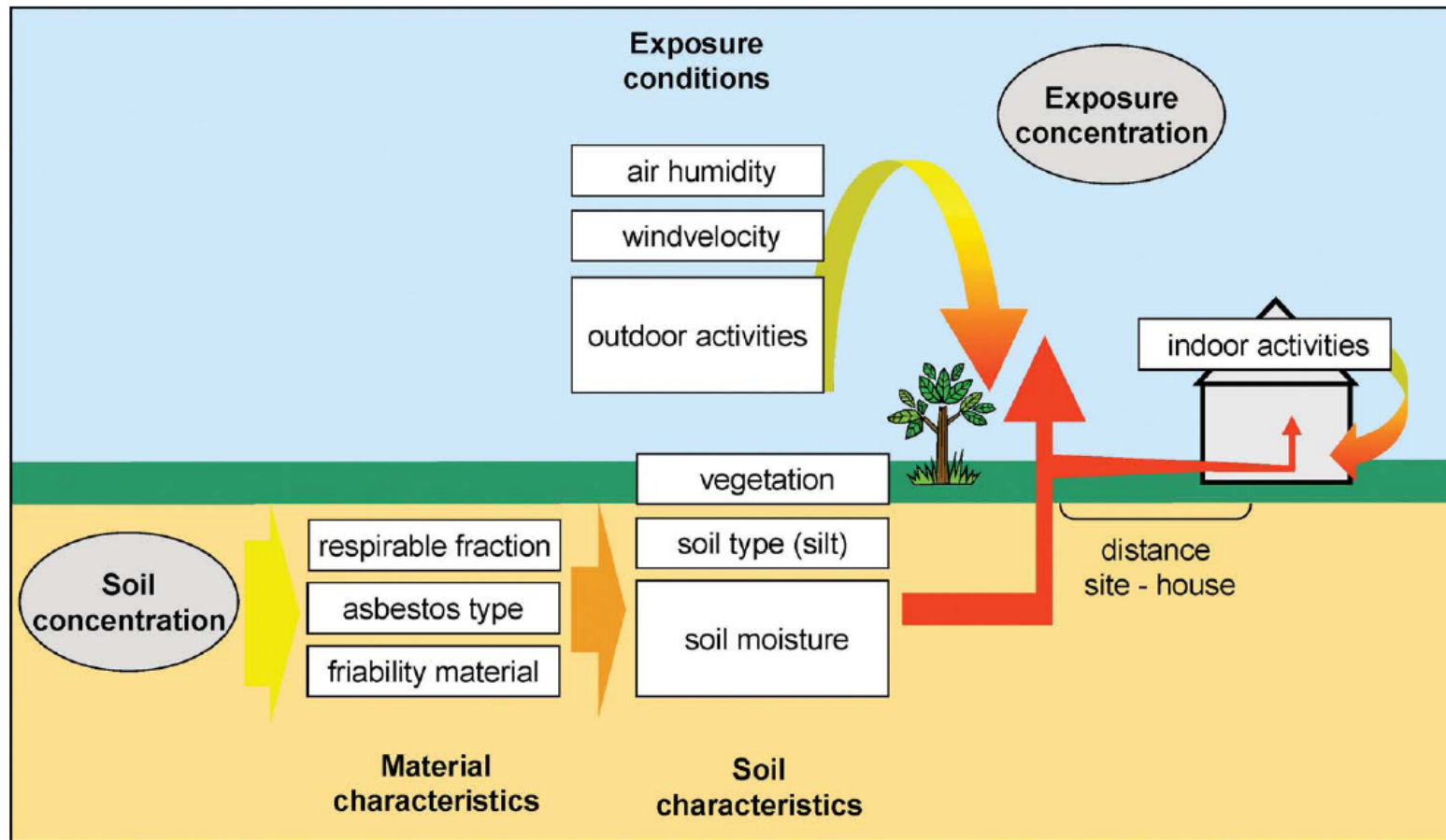
Form of asbestos		Soil guideline values for asbestos (w/w)			
		Residential ¹	High-density residential ²	Recreational ³	Commercial and industrial ⁴
ACM (bonded)		0.01%	0.04%	0.02%	0.05%
FA and/or AF ⁵		0.001%			
All forms of asbestos – surface		No visible asbestos on surface soil ⁶			
Capping requirements for residual contamination above selected soil guideline value					
Depth ⁷	Hard cap	No depth limitation, no controls – except for long-term management			
	Soft cap	≥0.5 m			≥0.2 m

Source: Table 5: Soil guideline values for asbestos in New Zealand, New Zealand Guidelines for Assessing and Managing Asbestos in Soil, BRANZ, 2017

Risk Assessment – NES Applicability

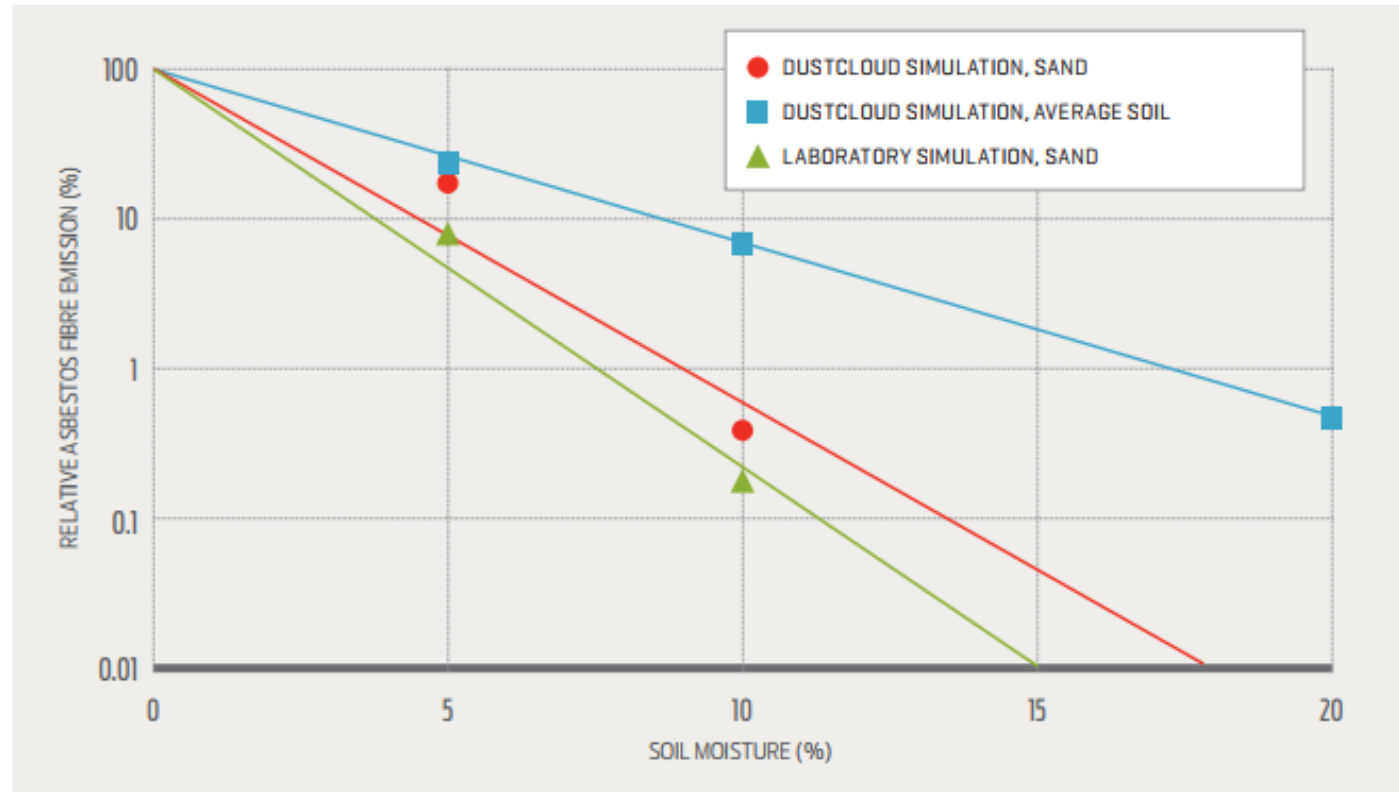
- Tier 2 Risk Assessment for NES-CS purposes has applicability provided:
 - Territorial Authority approval is obtained under either a controlled or restricted discretionary activity consent, provided:
 - Adequacy of the Detailed Site Investigation.
 - The guideline value is selected using CLMG No.2 (Hierarchy and Application in New Zealand of Environmental Guidelines, 2011).

Principles of Risk



Source: Figure 1: Factors that play a role in the emission of asbestos fibres, A tiered approach for the assessment of the human health risks of asbestos in soils. Swartjes and Tromp, 2008

Relative Asbestos Emissions



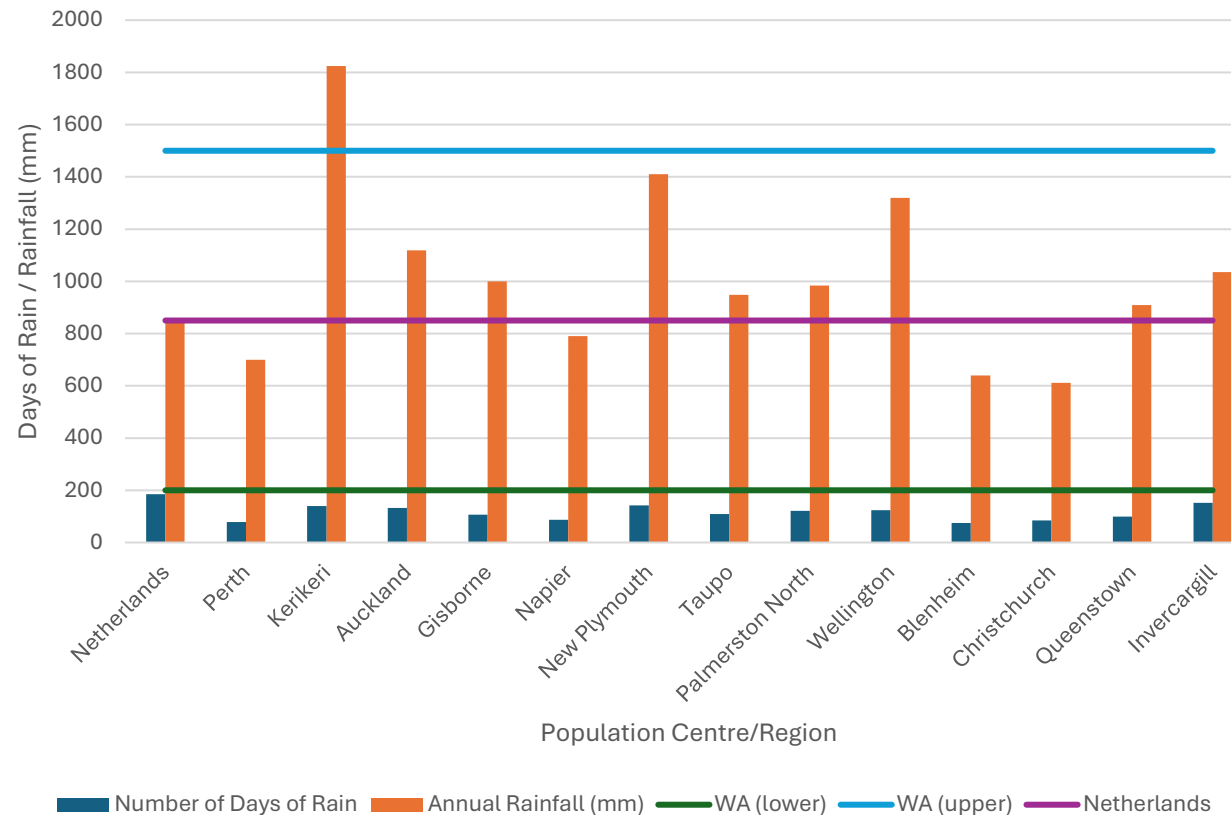
Swartjes & Tromp, 2008, reprinted and adapted with permission of Taylor and Francis, LLC (<http://www.tandfonline.com>).

- Greatest effect observed for additions of 5 and 10% moisture.
- 5 % moisture reduces relative fibre emissions by 50% (clayey sand).
- 10% moisture reduces relative fibre emissions by 90% (clayey sand).
- Applicable to all fibre types.

Figure 15 . Asbestos fibre release in soils with differing moisture/water content.

Source: New Zealand Guidelines for Assessing and Managing Asbestos in Soil, BRANZ, 2017

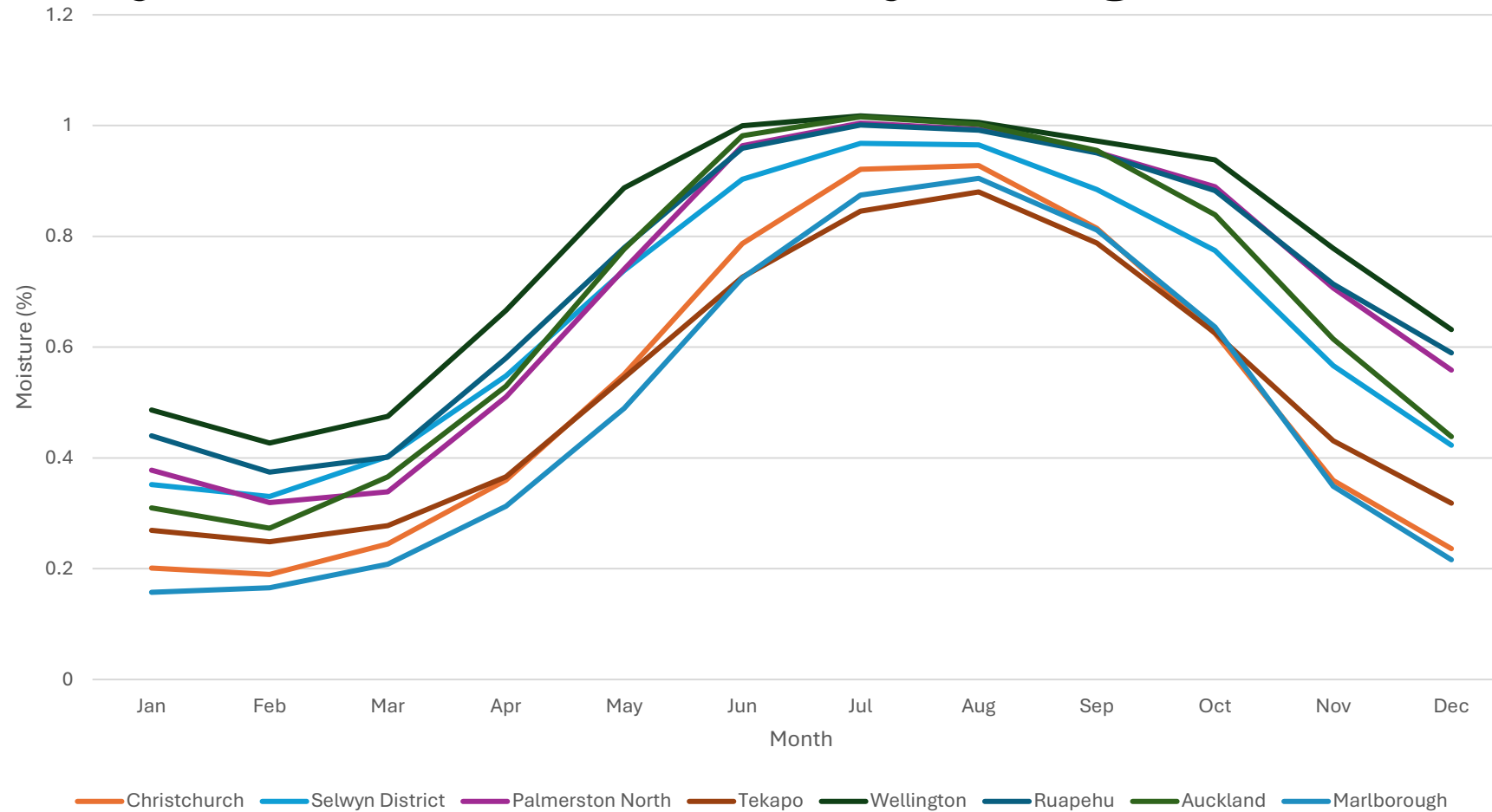
Days of Rain and Rainfall Average Comparison



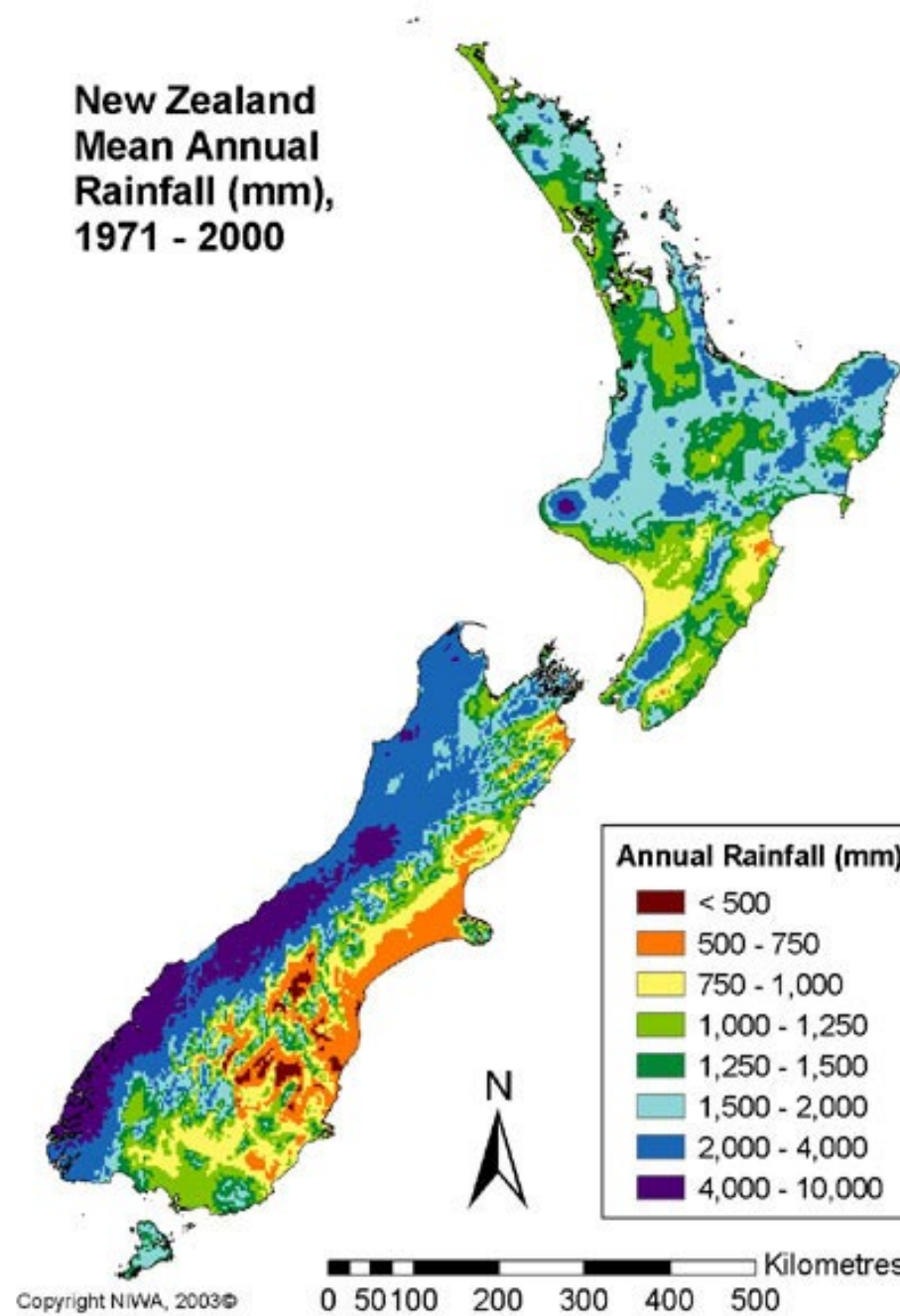
NIWA Predicted Moisture Data

- NIWA's national moisture dataset
 - Virtual Climate Station Network (VCSN) Soil Moisture Deficit (SMD).
 - 5 x 5 km simulated grid - predicted from population centre data.
 - Topsoil moisture indicator – 30 cm profile (plant growth target zone).
 - Based on rainfall and evapo-transpiration rates.
 - Converted from mm to % moisture.

Monthly Soil Moisture by Region



**New Zealand
Mean Annual
Rainfall (mm),
1971 - 2000**



Findings

- 10% moisture = 90% fibre reduction
- Both annual rainfall and number of days of rain are important.
- Simulated moisture - on average, within top 30 cm of surface:
 - NZ never dips below 15% all year round.
 - Canterbury, Marlborough and Hawke's Bay are at or below 20% for 3 months.
 - Wellington never gets drier than 40%.
- Review other mitigating factors (vegetation cover, nature of disturbance, length of exposure etc).

Further Work

- Evaluate surface soil moisture in drier months for correlation to simulated measurements.
- Consider possible long-term influences from climate change.
- Review Tier 1 BRANZ criteria.

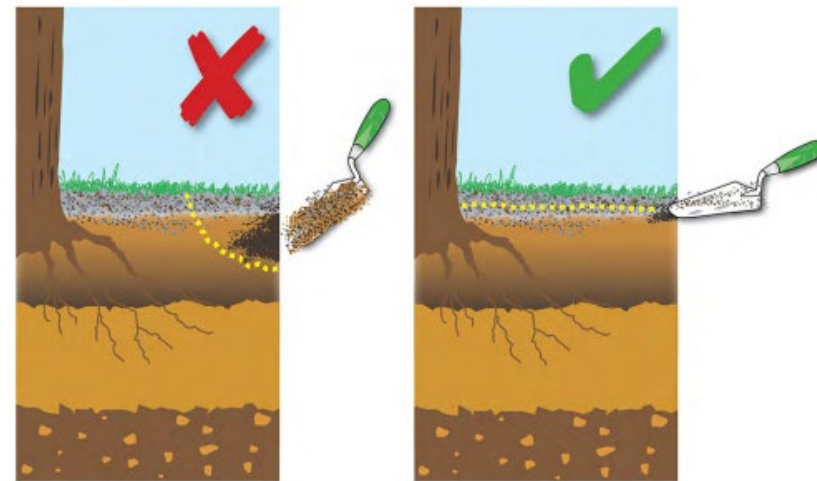


Figure 9 Collecting a representative and targeted surface sample, source: Guidelines for the Assessment, Remediation and Management of Asbestos Contaminated Sites in Western Australia, Department of Health WA, 2021

Conclusions Summary

- Engage with regulators if planning to use risk assessment for NES-CS purposes.
- Collect and review soil moisture data when sampling in dry periods.
- Focus soil moisture evaluation on drier months (December to March).
- Evaluate relevance of current Tier 1 criteria for New Zealand.

References

- Addison, J., Davies, L., Robertson, A. & Willey, R. 1988. The Release of Dispersed Asbestos Fibres from Soil. Edinburgh, United Kingdom: Institute of Occupational Medicine.
- BRANZ Ltd, 2017. New Zealand Guidelines for Assessing and Managing Asbestos in Soil.
- MfE, 2011. Contaminated Land Management Guidelines., Hierarchy and Application in New Zealand of Environmental Guidelines, 2011.
- Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.
- Swartjes, F.A. & Tromp, P.C. 2008. A tiered approach for the assessment of the human health risks of asbestos in soils. Soil and Sediment Contamination, 17, 137–149.