

Risk assessment is the process of establishing whether a risk exists from a contaminated site or water body either to people or to the environment. It also looks at the extent of the risk, and so helps in determining what should be done about it.

Typically, contaminated sites may contain historical residues left by industry, chemical spills, pesticide use, former occupation by service stations, refineries and chemical plants, or heavy metals which may also be naturally present in the environment.

Assessment strategy

When a site is suspected of being contaminated the first step is usually to examine its history to establish what activities took place there in the past and present and thus, what contaminants are likely to have been released into its soil or water. This helps to identify the potential hazard.

It is also important to consider off-site contamination as nearby sites may have been affected by decades of emissions of contaminated dust, surface runoff or groundwater.

An assessment strategy is then prepared which sets out a program of testing designed to answer questions about what contaminants are present, their levels and distribution. This also explores current and likely future uses of the site to determine who might be exposed and to what degree.

Sampling and testing of soil and water - and sometimes of living organisms in them - then proceed to establish what contaminants are present and their levels.

Human health assessment

The most important form of risk assessment to be carried out is for human health and safety. This establishes:

- the levels of different contaminants in the site's soil, vegetation including vegetable crops, and water
- the doses of these contaminants likely to harm health
- current and future human land uses and activities at the site.

The combination of these factors helps environmental remediation experts to establish the various pathways by which people might be exposed to the contaminants - for example by drinking contaminated water, eating food, inhaling dust, absorbing chemicals through the skin or, in the case of babies, actually eating soil.

Seek to estimate possible impacts of contamination based on the amount of contaminants present and their known toxic effects

By modelling both contaminant levels and exposure pathways, health experts and those involved with site assessment and remediation can calculate the likely exposure levels that individuals using the site or living nearby will face. These are compared with the maximum allowable daily intake of various contaminants set in Australia's National Environmental Protection Measures (NEPM) for the health and safety of both children and adults.

Based on these a plan can be developed to remediate the site or manage it in ways that minimise the risk to current and future users.

Environmental risk assessment

Environmental risk assessment is similar to human health risk assessment but instead focuses on possible effects of contamination on the urban environment, on natural ecosystems and their plants and animals.

Soil, surface water and groundwater are tested for various contaminants which local history indicates as likely to be present, and levels established. In the case of groundwater, the concentrations of contaminants must also be determined in any surface or other water body into which it discharges – such as a river, lake or wetland – and how that water is used.

Plants and animals may also be examined for signs of ill health resulting from exposure to contaminants, or traces of the contaminants themselves.

Predicting risks

Both human and environmental risk assessment are predictive, meaning that they seek to estimate possible impacts of contamination based on the amount of contaminants present, their known toxic effects on humans, animals or plants, and the likely exposure pathways by which they might reach them.

In all cases the object is to establish the likely daily intake of contaminant and determine whether it is at a low, and safe, level or whether it is likely to exceed internationally and nationally accepted standards.

Clean-up, or remediation, planning can then be based on reducing this risk.

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CRC CARE is a partnership of organisations providing research, technologies and knowledge in assessing, preventing and remediating contamination of soil, water and air.

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