



Ministry for the
Environment
Manatū Mō Te Taiao

Working Towards a Comprehensive Policy Framework for Managing Contaminated Land in New Zealand

A Discussion Paper

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Executive Summary

Since 1997 the Ministry for the Environment has been involved with a number of initiatives relating to contaminated land. Most notably:

- 10 contaminated land guidelines have been developed
- the Contaminated Sites Remediation Fund (CSRF) has been established, allocating \$2.5 million/per year
- contaminated land functions for councils and a definition of contaminated land have been added to the Resource Management Act 1991 (the RMA).

These initiatives have been very successful. The guidelines are widely used by practitioners and are considered by them to be technically robust. The CSRF has assisted in 33 projects, including the remediation of New Zealand's worst contaminated site at Mapua. Approximately 270 tonnes of agrichemicals have been collected and removed from rural properties across New Zealand.

This extensive suite of initiatives is almost entirely the result of the Ministry working in close partnership with local government and industry, to the extent that a number of these initiatives were driven by these groups. However, there are still issues to address, including:

- a widely variable approach to the management of contaminated land at the territorial and regional level
- a lack of nationally consistent methods and numerical values for soil contaminants
- barriers to identifying contaminated land and recording information about contaminated land.

Recognising the success of these previous initiatives, the Ministry wants to continue working together with our stakeholders to develop tools that are useful, technically robust and address these remaining issues. This document forms the basis for a discussion on how to achieve a comprehensive policy framework for managing contaminated land, and we welcome your input.

How to have your say

Anyone can make a submission on this discussion paper. Please include the following information:

- your name, postal address, phone number, fax number and email address (if applicable)
- your submission, with reasons for your views
- any changes you would like made.

For your views to be considered, you must forward your submission to the Ministry for the Environment, PO Box 10-362, Wellington, or by email to standards@mfe.govt.nz, to be received no later than 5.00 pm on 28 February 2007.

1 Introduction

1.1 Purpose

This paper is intended as a basis for discussion on how to achieve a comprehensive policy framework for managing contaminated land. It draws together all the policy measures that make up New Zealand's existing contaminated land policy framework, which include a combination of legislation, regulations, strategies, funds and guidelines. The existing framework is assessed to identify gaps, and then possible solutions – including national environmental standards and best practice guidance – are identified to address the gaps. Suggested priorities are assigned to these solutions to help establish a Ministry work programme that contributes to achieving a comprehensive policy framework.

Discussions between the Ministry and its key contaminated land stakeholders on the solutions identified and their respective priorities will help to inform and confirm the Ministry's contaminated work programme. To stimulate discussion, the paper includes a number of questions on points we are seeking your specific feedback on.

1.2 Background

In 1992 the Australian and New Zealand Environment and Conservation Council (ANZECC) published the *Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites*. These guidelines were the cornerstone policy document for contaminated land in both countries, and the concepts were widely adopted.

In 2001 ANZECC was disestablished and replaced by the Environment Protection and Heritage Council, of which New Zealand is a member, and the National Environment Protection Council (NEPC)¹. The NEPC was given the responsibility of developing a new national policy document for managing contaminated land in Australia. The *National Environment Protection (Assessment of Site Contamination) Measure* (NEPM) was completed in 1999. Although the NEPM is the main policy framework document in Australia, it has not been adopted in New Zealand.

The current New Zealand policy framework for contaminated land is based on a mix of existing measures that includes laws and regulations, guidelines and funding arrangements. These measures provide protection against any new contaminated sites being created, and go some way towards managing the historical legacy of contaminated land.

¹ The NEPC, established in 1995, is an Australian statutory body, of which New Zealand is not a member.

The Ministry for the Environment

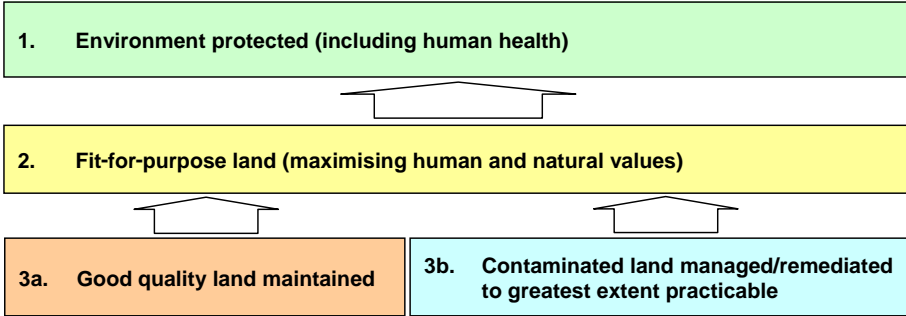
As the Government’s key advisor on the New Zealand environment, the role of the Ministry for the Environment is to provide leadership on contaminated land issues across both central and local government, while day-to-day environmental management is largely the responsibility of regional councils and territorial authorities. The Ministry is responsible for administering the Resource Management Act 1991 (RMA), which is the core piece of legislation relating to contaminated land, and works in partnership with key sectors, organisations and communities to improve our environment.

Although a formal statement of goals and objectives is not proposed for contaminated land in this paper, the Ministry work programme has been informally guided by the outcomes summarised in Figure 1 and described below.

- At the highest level the programme contributes to having the **environment protected** from the effects of contaminated land.
- Our use of land is maximised by having **fit-for-purpose land** – land that is used appropriately, with use restricted if the land is contaminated. This outcome is consistent with our effects-based legislation and risk-based approach to contaminated land management.
- Fit-for-purpose land is achieved by **maintaining good quality land** (avoiding land contamination), and by ensuring **contaminated land is managed/remediated** to the greatest extent practicable.

All of these outcomes are reflected in the Ministry’s past and current contaminated land work programme. It is likely these outcomes will continue to guide any future Ministry work programme.

Figure 1: Hierarchy of contaminated land outcomes



2 Existing Measures

New Zealand’s management of contaminated land is based on a mix of existing measures, from legislation to guidelines and local plans. These measures have been developed by central and local government and industry to ensure no new contaminated sites are created and existing contaminated sites are identified and managed or cleaned up appropriately.

The existing measures aim to protect the environment, including the health and well-being of people and communities, and to provide ways of obtaining information on the presence and effects of contaminated land.

There are seven main pieces of legislation that relate to contaminated land or the effects of contaminated land (see Figure 2). These Acts can be generally grouped by their relevance to contaminated land. The four main areas are:

- prevention of contamination
- contaminated land management, enforcement, remediation and liability (post-1991)
- protection of the environment, including human health, from the effects of contaminated land
- access to information about contaminated land.

Figure 2: Main legislation relating to contaminated land, and relevant areas

Prevention	Management *	Protection of the environment **	Access to information
		Resource Management Act 1991	
Hazardous Substances & New Organisms Act 1996		Health Act 1956	
		Health & Safety in Employment Act 1992	
		Building Act 2004	
		Food Act 1981	
			Local Government Official Information & Meetings Act

* “Management” includes mechanisms to **identify, investigate, record, manage, remediate** and **report** on contaminated land

** The definition of **environment** is from that given in the RMA, which includes “people and their communities”.

A number of Acts appear to overlap, especially for the protection of the environment. Within the environmental area there are five pieces of legislation, although (with the exception of the RMA) most of these Acts have quite separate and distinct functions:

- the Health Act relates to public health nuisance from contaminated land
- the Health and Safety in Employment Act relates to workplace safety
- the Food Act relates to food safety
- the Building Act relates to the suitability of land for proposed buildings.

The RMA, with its emphasis on effects-based management and a holistic definition of the environment, overlaps with most of this legislation.

Under the umbrella of each piece of legislation there are a number of tools, ranging from guidelines and funds to standards. The above Acts and their associated tools are described below. A summary table showing the main contaminated land Acts and their respective roles, agencies, agents and tools is attached as Appendix A.

2.1 Resource Management Act

The RMA provides for the sustainable management of natural and physical resources, and it is the core piece of environmental legislation for controlling the effects of contaminated land on the environment and people. The RMA contains a **definition** of contaminated land, requires **planning controls** for the effects of contaminated land, and defines **functions for local government** in relation to contaminated land.

Contaminated land is defined in section 2 of the RMA as:

Land that has hazardous substances² in or on it and

(a) is more contaminated than an applicable NES,³ or

*(b) has, or is reasonably likely to have, significant adverse effects on the **environment**.*

The RMA defines the environment widely to include ecosystems, people and communities, natural and physical resources, and amenity values. The RMA is designed to protect the environment through local government's control of activities through plans and resource consents. It requires that local government control the discharge of contaminants to land to ensure that no new contaminated sites are created, and controls the effects of contaminated land on the environment.

The RMA provides some clarity for local government in how to manage contaminated land. Sections 30 and 31 give local government the following functions in this respect:

- regional councils – “the investigation of land for the purposes of identifying and monitoring contaminated land”
- territorial authorities – “the prevention or mitigation of any adverse effects of the development, subdivision, or use of contaminated land”.

² The RMA section 2 definition of “**hazardous substance**” includes, but is not limited to, any substance defined in section 2 of the Hazardous Substances and New Organisms Act 1996 as a hazardous substance.

³ (a) does not apply as there are no national environmental standards for contaminants in soil.

Section 43 of the RMA also specifically enables the use of national regulation for the management of contaminated land. Section 43(1)(a)(iv) states that a national environment standard (NES) can prescribe “soil quality in relation to the **discharge** of contaminants”.

Local government and the RMA

The majority of environmental management and regulation is undertaken by local government, consisting of regional councils and territorial authorities (see Box 1). Each council controls the activities in its area through policies and rules in district and regional plans. Business and industry must ensure their activities comply with the requirements of these plans. Resource consents may be required for changes in land use, activities that have the potential to contaminate land, and activities on contaminated land. However, the requirements and the thresholds will vary between districts and between regions.

Because each of these plans is prepared individually, there is a lot of variability between plans in terms of how they address contaminated land. A recent review of contaminated land provisions in district, regional and unitary plans highlighted the extent of this variability (Ministry for the Environment, 2006c). The review showed that:

- 33 percent of plans featured no specific provisions relating to contaminated land
- approximately 40 percent of plans have specific objectives, policies and rules relating to land use or remediation of contaminated land
- of the plans that have specific provisions, there is significant variability in how contaminated land is addressed.

Regional and unitary plans are more consistent in that most address contaminated land in their plans, with 88 percent having specific provisions. However, there is still significant variation in terms of how each plan addresses contaminated land.

Box 1 Local government and its role under the RMA

Regional councils

There are 16 regional councils, including four unitary authorities (which have dual territorial and regional council functions). Regional councils:

- are generally organised along major catchment boundaries
- prepare regional policy statements and regional plans
- regulate discharges to air, water and land
- have the contaminated land function of: *the investigation of land for the purposes of identifying and monitoring contaminated land.*

Territorial authorities

There are 74 district and city councils. They:

- prepare district plans
- regulate land use, subdivision and building control
- have the contaminated land function of: *the prevention or mitigation of any adverse effects of the development, subdivision, or use of contaminated land*
- also have a range of public health responsibilities under other legislation.

Voluntary guidelines

In the past 10 years New Zealand authorities have undertaken a work programme to address the risks from historical contamination, building on the policy foundation established under ANZECC (1992). The result has been a series of contaminated land management guidelines (CLMG) developed by the Ministry for the Environment, in consultation with industry and local government. These provide a theoretical framework to contaminated land management and support local government functions under the RMA.

A number of industry-based guidelines were also developed containing soil guideline values for specific contaminants of concern. These guidelines also contain values for water and air for certain contaminants.

The following guidelines published by the Ministry for the Environment represent a significant component of the existing policy framework.

Industry-based guidelines

- *Health and Environmental Guidelines for Selected Timber Treatment Chemicals* (Ministry for the Environment and Ministry of Health, 1997) – provides guidance on the assessment and management of timber treatment sites, including numerical values for selected timber treatment chemicals. As the first New Zealand contaminated land management guideline, this document also provides generic guidance on sampling strategies and investigation techniques that could be – and in practice have been – applied to all contaminated site types. This guideline also has, by presenting guideline derivation equations and exposure definitions, provided the generic approach that practitioners have used to derive guideline values for other substances or for site-specific situations.
- *Guidelines for Assessing and Managing Contaminated Gasworks Sites in New Zealand* (Ministry for the Environment, 1997) – includes numerical values for hazardous substances associated with gasworks sites.
- *Draft Sampling Protocols and Analytical Methods for Determining Petroleum Products in Soil and Water* (Ministry for the Environment, 1999a).
- *Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand* (Ministry for the Environment 1999b) – includes numerical values for hazardous substances associated with petroleum hydrocarbon sites.
- *Identifying, Investigating and Managing Risks Associated with Former Sheep-dip Sites: A Guide for Local Authorities* (Ministry for the Environment, 2006a) – provides guidance to help local authorities address the potential risks arising from contaminated sheep-dip sites.

The contaminated land management guideline series

- *Contaminated Land Management Guidelines No. 1: Reporting on Contaminated Sites in New Zealand* (Ministry for the Environment, 2003a) – provides guideline reporting forms and checklists.
- *Contaminated Land Management Guidelines No. 2: Hierarchy and Application in New Zealand of Environmental Guideline Values* (Ministry for the Environment, 2003b) – provides guidance on selecting criteria from domestic and international guidelines.

- *Contaminated Land Management Guidelines No. 3: Risk Screening System* (Ministry for the Environment, 2004a) – provides a system for doing a desktop risk screening of contaminated land. The guideline superseded an earlier draft, *Rapid Hazard Assessment System*, published by Ministry for the Environment in 1993.
- *Contaminated Land Management Guidelines No. 4: Classification and Information Management Protocols* (Ministry for the Environment, 2006b) – outlines a consistent method for local government registers and the release of information through relevant legislation (eg, land information memoranda through the Local Government Official Information and Meetings Act 1987 and project information memoranda through the Building Act).
- *Contaminated Land Management Guidelines No. 5: Site Investigation and Analysis of Soils* (Ministry for the Environment, 2004b) – provides best practice for the sampling and analysis of soils on sites where hazardous substances are present or suspected in soils, and guidance on the principles governing the interpretation of the data obtained.

In addition, the following guidelines are widely used to assess the effects of hazardous substances on air, surface water and sediment:

- *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC and ARMCANZ, 2000)
- *Ambient Air Quality Guidelines* (Ministry for the Environment, 2002a).

All of the above guidelines are widely used in New Zealand, at least by regional councils and unitary authorities⁴, and have been found to be technically robust. Although the level of use by territorial authorities has not been surveyed, it is likely to be much more variable.

The Ministry has also supported the development of *Guidelines for the Safe Application of Biosolids to Land in New Zealand* (NZWWA, 2003) through the Sustainable Management Fund. These guidelines are designed to provide a framework for biosolids management that enables their application to land to maximise the benefits and minimise the risks of adverse effects on human health, the environment and the economy. In contrast to the other contaminated site guideline values, plant toxicity or food residue concentrations are often used as the basis for the biosolids guideline values.

Environmental guideline values

Numerical hazardous substances values that are protective of human health and the environment, and the methods used to derive them, are important tools in the assessment of contaminated land. Without these values and methods we would not be able to assess the effect of contaminated land on the environment or on human health.

⁴ The findings of a June 2006 survey of council officers at 14 of the 16 regional and unitary councils indicated that the guidelines were used by most respondents. The contaminated CLMG series was used by 85–100 percent of respondents, while the main industry guidelines (timber treatment, oil industry and gasworks) were used by most (79–83 percent) respondents (Ministry for the Environment, 2006d).

Typically, New Zealand practitioners rely on a mixture of national and international guidelines from which to select numerical values. However, the various New Zealand and international guidelines used contain:

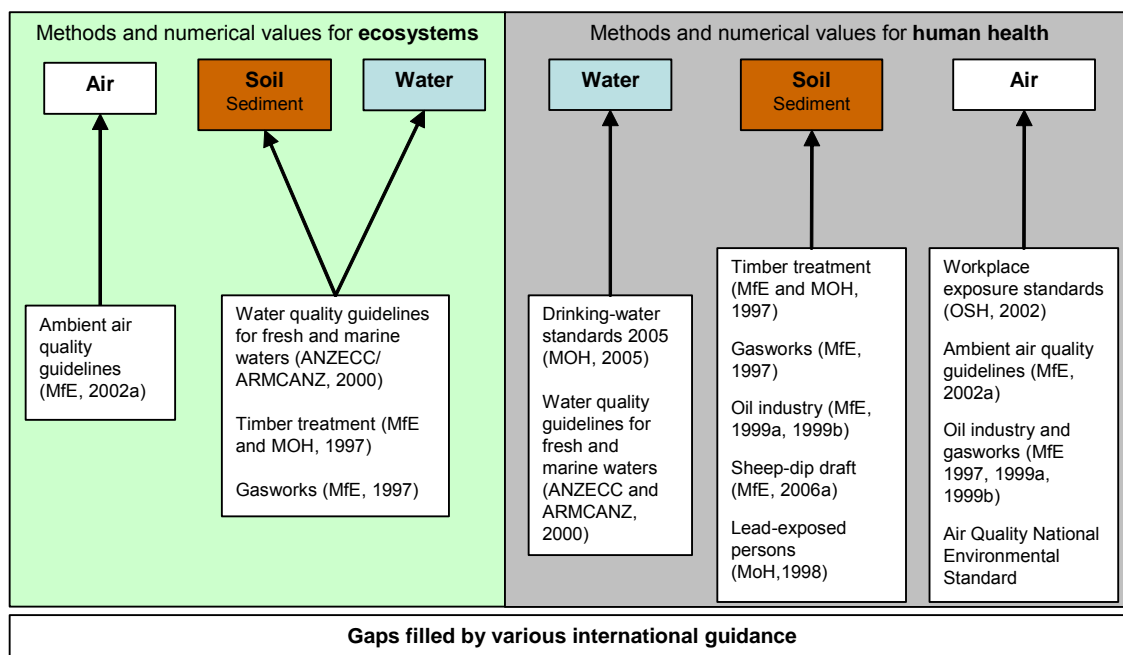
- different terminology (eg, acceptance criteria, trigger values, maximum acceptable values, environmental quality guidelines, intervention levels) (Cavanagh and O'Halloran, 2002)
- different receptors
- different methodologies and assumptions for deriving values, particularly different toxicity values, receptors accepted and exposure pathways considered (Cavanagh and O'Halloran, 2003).

To reduce the confusion created by these differences, the Ministry for the Environment produced a guideline in partnership with local government called *Contaminated Land Management Guidelines No. 2: Hierarchy and Application in New Zealand of Environmental Guideline Values* (Ministry for the Environment, 2003b). CLMG No. 2 provides a best-practice hierarchy for selecting guidelines from the range of New Zealand and international guidelines available. CLMG No. 2 states a preference for New Zealand guideline values over international guidelines, and a preference for risk-based guideline values over threshold values. Based on these preferences, CLMG No. 2 sets out the following hierarchy for selecting guideline values:

1. New Zealand-derived, risk-based guideline values
2. rest-of-the-world-derived risk-based guideline values, with a preference given to those that employ risk assessment methodologies and exposure parameters consistent with what is already used in New Zealand
3. New Zealand-derived threshold values
4. rest-of-the-world-derived threshold values.

Figure 3 shows the purpose for which each of these guidelines is applied (human health or ecosystem) and the media the values are derived for (soil, water or air). Appendix D contains tables from CLMG No. 2 that show the hierarchy of documents containing guideline values for soil and water. Appendix E contains summary information on each of the guidelines identified.

Figure 3: New Zealand guidelines that contain environmental values for the effects of hazardous substances on the environment



Notes: MfE = Ministry for the Environment; MOH = Ministry of Health. For simplicity, this figure excludes the NZFSA Food Standards for produce.

Contaminated Sites Remediation Fund

Since 2003 the Government has made up to \$2 million per year available for the Contaminated Sites Remediation Fund (CSRF).⁵ The funding has been made available in two parts:

- \$1 million per year is allocated to the clean-up of New Zealand’s highest-risk contaminated sites (eg, Mapua)
- \$1 million per year is available as a contestable fund to assist regional councils to investigate and clean up high-risk contaminated sites. To qualify, the sites must pose a known or potential risk to human health and the environment within their regions.

Contaminated sites that are posing or likely to pose a high risk to human health, and that are prime candidates for the CSRF, are those that are:

- located in environmentally or culturally sensitive areas or
- where the landowners do not have the financial resources to undertake the work themselves but want to do something about the problem.

⁵ The fund was originally called the Orphan Sites Remediation Fund. This name is not appropriate since the definition of an “orphan site” rests on a legal liability regime that does not currently exist.

The CSRF plays a key role in encouraging action on contaminated sites, especially where the responsibility for contamination is difficult to establish. Since 2003 the fund has supported 33 projects. Most of these projects (26) have been for assessment and remediation planning rather than actual remediation (seven). The remediation of the former Fruitgrowers Chemical Company property in Mapua, near Nelson, is the largest and most notable of these remediation projects.

There are, however, obstacles to achieving clean-up, such as the size of the fund and the limited financial resources of local government. The budget announcement in May 2006 allocated an additional \$1.7 million per year⁶ to the fund for the next three years (2006–2009).

New Zealand Waste Strategy

The New Zealand Waste Strategy (Ministry for the Environment, 2002b) was developed in partnership with local government in 2002. The strategy provides a series of targets for contaminated land, which guide the activities of central and local government over the next decade. The targets for contaminated land are as follows:

By December 2008, all sites on the Hazardous Activities and Industry List will have been identified and subject to a rapid screening system in accordance with the Ministry's guidelines.

By December 2010, all sites on the Hazardous Activities and Industry List will have been subject to a rapid screening system, in accordance with Ministry guidelines, and a remediation programme will have been developed for those that qualify as high-risk.

By December 2015, all high-risk contaminated sites will have been managed or remediated. A timeframe will have been developed to address the management or remediation of remaining sites.

The targets involve the identification, management and remediation of high-risk contaminated land according to the Ministry's guidelines. Local government is making progress towards achieving these targets.

Agrichemicals collection and disposal

New Zealand has a legacy of unwanted agrichemicals in farm sheds around the country which pose a risk to the environment. Many of these unwanted agrichemicals are persistent organic pollutants (like DDT) which are now banned from use. Under the Stockholm Convention, New Zealand is obliged to remove stockpiled persistent organic compounds (intractable agrichemicals) by 2013.

⁶ GST inclusive.

Since 2003 approximately 270 tonnes of agrichemicals have been collected and removed from rural properties across New Zealand. Of these, over 220 tonnes were “intractable” agrichemicals, requiring high-temperature incineration. So far the programme has cost \$2.5 million. The Ministry for the Environment will continue to work with industry and councils to collect and safely dispose of unwanted agrichemicals stockpiled on farms throughout New Zealand for the next three years. The Ministry for the Environment also intends to assist industry and councils to establish appropriate ongoing collection programmes in each region to ensure that stockpiles of unwanted agrichemical do not build up again.

2.2 HSNO Act and regulations

The Hazardous Substances and New Organisms Act 1996 (HSNO) is administered by the Ministry for the Environment but is implemented by the Environmental Risk Management Authority (ERMA) and enforced by various agencies, including local government and the Department of Labour.

HSNO controls are established to prevent future land contamination. Under the HSNO Act, life-cycle controls on the manufacture, use, storage, and disposal of hazardous substances are set by ERMA through regulations.

The HSNO Act provides for ERMA to establish exposure limits for hazardous substances for the protection of human health and ecological receptors. An exposure limit is defined as the maximum amount of a hazardous substance that can be legally present in a particular environmental medium such as air, water or soil, or deposited on a plant surface (such as plant foliage), although exposure limits may also be set as guideline values (ie, not legally enforceable).

There are two types of exposure limits that may be set for hazardous substances.

- The **tolerable exposure limit (TEL)** is designed to protect humans from the adverse effects of toxic substances. It is the concentration of a substance in an environmental medium that will present a low risk of a toxic effect occurring in people exposed to that substance.
- The **environmental exposure limit (EEL)** is designed to protect organisms other than humans (including plants) from the adverse effects of ecotoxic substances. It is the concentration of a substance in an environmental medium that will present a low risk of adverse environmental effects in non-target areas.

TELs and EELs may be set for new toxic and ecotoxic substances which are assessed under the HSNO Act, and may also be set for existing substances as they are transferred to the HSNO regime, as required by the Hazardous Substances (Classes 6, 8 and 9 Controls) Regulations. Where a legally enforceable TEL or EEL has been set for a substance, it is an offence to use that substance in a way that causes the concentration to exceed the exposure limit set for that specific environmental medium. A limited number of TELs and EELs have been set and are available at www.ermanz.govt.nz.

2.3 Health Act

The Health Act 1956 is the principal health statute. It is administered by the Ministry of Health and enforced by public health agencies and territorial authorities. The Act establishes public health management arrangements for communicable disease, and covers some generic environmental health risks and other miscellaneous issues.

The Health Act is relevant to contaminated land where it provides powers and sets a duty for territorial authorities to abate public health nuisances. Health nuisances are defined by the Act as conditions that are “offensive or likely to be injurious to health”⁷. It is understood that the use of these powers for contaminated land is unusual and that they are only likely to be applied if there is a possibility of immediate harm.

In 1998 the Ministry of Health published *Environmental Case Management of Lead Exposed Persons: Guidelines for Public Health Services* (Ministry of Health, 1998). These guidelines provide practical advice for the investigation and environmental case management of people with elevated levels of lead, and are particularly aimed at risks arising from lead-based paint. The guidelines include recommendations for protecting children from lead in soil, and are principally taken from United States guidance. Guidance is also provided on dust and soil-sampling techniques for residential situations.

2.4 Health and Safety in Employment Act

The objective of the Health and Safety in Employment (HSE) Act 1992 is to promote the prevention of harm to all people at work and others in, or in the vicinity of, places of work. The HSE Act is administered and enforced by the Department of Labour. To support workplace safety the Department of Labour has produced a number of guidelines.

The *Health and Safety Guidelines on the Cleanup of Contaminated Sites* (OSH, 1994) published in 1994 concern the occupational health aspects of site clean-up and focus on the procedures and methods necessary to protect the workers involved. The guidelines complement existing guidelines, such as those published by the Ministry for the Environment.

The *Workplace Exposure Standards* (OSH, 2002), last revised in 2002, assign standards for concentrations in air for approximately 700 substances. The Workplace Exposure Standards (WES) are intended to be used as guidelines for those involved in occupational health practice. Although the WES are called “standards”, they do not have the force of regulation that national environmental standards and food standards have.

Other guidelines published by OSH that contaminated land practitioners, as part of their investigations, should be aware of are:

- *Safe Working in Confined Spaces* (OSH, various dates), a series of information sheets on safety in confined spaces
- *Code of Practice for the Design, Installation and Operation of Underground Petroleum Storage systems* (OSH, 1992), which provides environmental site-sensitivity ratings and processes for carrying out environmental sensitivity and hydro-geological surveys.

⁷ Section 29(a) and (o) of the Health Act 1956.

2.5 Food Act

The Food Act 1981 is administered by the Ministry of Health and implemented by the New Zealand Food Safety Authority (NZFSA). The NZFSA ensures the food New Zealand produces, exports and imports is safe and suitable for domestic and international consumers.

The Food Act 1981 enables the setting of **food standards**. Food Standards Australia New Zealand (FSANZ) develops food standards for both New Zealand and Australia. In New Zealand the NZFSA enforces these standards. It is important to consider food standards when setting soil quality targets for the remediation of land which will be used for food production, although there is no direct (or easily determined) link between food standards and soil contamination.

2.6 Building Act

The Building Act 2004 enables the setting of building regulations in the form of the Building Code. The Act is administered by the Department of Building and Housing and is implemented by territorial authorities.

Clause F1 of the Building Code specifically requires building sites to be assessed to determine the presence and potential threat of any hazardous agents or contaminants⁸. Clause F1 is supported by the *Approved Document for New Zealand Building Code: Hazardous Agents on Site* (Building Industry Authority, 2001). This provides a contaminated land investigation methodology derived from the now outdated *Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites* (ANZECC, 1992).

Also, under the Building Act an owner contemplating building work may apply to a territorial authority for a project information memorandum (PIM) in respect of the work. Like land information memoranda (see below), PIMs must include information on the likely presence of hazardous contaminants.

2.7 Local Government Official Information and Meetings Act

Under the Local Government Official Information and Meetings Act 1987 (LGOIMA), any person may apply in writing to a territorial authority for the issue of a land information memorandum (LIM) containing matters affecting any land in the district of that authority. Territorial authorities are required to disclose everything they know about a parcel of land, including any information they hold about the “likely presence of hazardous contaminants”.

⁸ Clause F1 of the New Zealand Building Code, “Hazardous agents on-site”, is contained in the First Schedule of the Building Regulations 1992.

LIMs and PIMs have become an important mechanism for the release of contaminated land information. People and communities, as well as business and industry, benefit from this information because it allows them to make informed decisions when buying or selling property.

In response to recent uncertainty by councils and landowners over the interpretation of “likely presence of hazardous contaminants”, the Ministry for the Environment released two Crown Law opinions to clarify what should be included on the LIMs for former horticultural land.⁹

2.8 Tax incentives

A June 2005 amendment to the Income Tax Act created a mechanism to facilitate tax deductions for business expenditure on the clean-up of contaminated sites. A key element of the amendment is a provision for business taxpayers to establish site restoration funds. Businesses can choose to divert some of their tax payments into a restoration fund, which will give rise to tax deductions over the operating life of the business. When a taxpayer incurs expenditure to rectify discharges of contaminants, they will be able to apply for a refund from the restoration fund.

The following remediation activities are also now eligible for tax deductions under the amendment:

- expenditure on investigating and testing locations and methods for an activity or improvement that is intended to avoid, remedy or mitigate detrimental effects on the environment from the discharge of contaminants
- expenditure related to monitoring discharges and their effects, and the effectiveness of solutions
- capital expenditure, including the planning and construction of tanks, pipes, impermeable surfaces and machinery, in addition to costs associated with the planting of trees and other vegetation for the purpose of avoiding, remedying or mitigating effects on the environment from the discharge of contaminants.

2.9 International agreements: Stockholm Convention

The Stockholm Convention on Persistent Organic Pollutants aims to protect human health and the environment by banning the production and use of some of the most toxic chemicals known to humankind. The Convention became international law in May 2004, was ratified by New Zealand in September 2004 and entered into force for New Zealand on 23 December that year. Persistent organic pollutants (POPs) are chemical substances that persist in the environment, bioaccumulate through the food chain, and pose a risk of causing adverse effects to human health and the environment.

⁹ These legal opinions can be downloaded from: <http://www.mfe.govt.nz/issues/hazardous/contaminated>

The Ministry for the Environment consulted on a National Implementation Plan during June to August 2006. The Plan sets out how New Zealand proposes to meet Stockholm Convention obligations, such as reducing dioxin releases, completing the phase-out of Polychlorinated biphenyls (PCBs), undertaking the environmentally sound management of POPs wastes such as obsolete chemicals and contaminated soils, and environmental monitoring. New Zealand's final plan is to be submitted to the Stockholm Convention Secretariat by December 2006.

3 Opportunities for Change

In its *Statement of Intent 2006–2009* (Ministry for the Environment, 2006e), the Ministry signalled an ongoing commitment to developing policy for contaminated land; in particular, to “confirm a comprehensive policy framework for managing contaminated land, including national environmental standards”. A number of opportunities are available to the Ministry to deliver on this commitment, and these are discussed below.

3.1 Elements of a contaminated land policy framework

To help identify and prioritise these opportunities, we outline the ideal key elements of a contaminated land framework for New Zealand. These were identified by referring to contaminated land policy in the United Kingdom, Europe, the US and Canada.

The key elements of a contaminated land framework in New Zealand could include:

- a legislative framework that has **definitions, planning controls** and a **liability regime**, and defines **roles** and **responsibilities** for agencies
- measures to **prevent** contamination of land
- mechanisms to **identify, record, investigate, manage, remediate** and **report** on contaminated land
- **protection** of **human health** from the effects of contaminated land
- **protection** of the **environment** from the effects of contaminated land
- access to **information**.

These key elements would contribute towards achieving the outcomes identified in Figure 1.

3.2 Opportunities for change

Opportunities for change were identified by comparing the existing measures described in section 2 with the ideal key elements of a New Zealand contaminated land framework identified above. A priority is assigned to each of these opportunities based on their perceived need and/or urgency.

Table 1 summarises this analysis. Each identified opportunity is then described and discussed in the following sections. A detailed table comparing key elements with existing measures, opportunities and their relative priority is attached in Appendix B.

Table 1: Key elements of a New Zealand contaminated land framework, opportunities for change, and their priority

Element	What is already in place?	Achieved	Opportunities for change	Priority
A legislative framework that has definitions, planning controls, a liability regime and defines roles and responsibilities for agencies	RMA, Health Act, HSNO Act, Food Act, Building Act, OSH No liability regime for pre-1991 sites	Partial	Produce guidance on how agencies establish and agree on working relationships Investigate options for addressing liability barriers	Medium
Measures to prevent contamination of land	RMA and HSNO Act controls; agrichemical collections	Yes	No change identified	In place now
Mechanisms to help identify, record investigate, manage, remediate and report on contaminated land	RMA Industry guidelines, Ministry for the Environment CLMG series Nos. 1–5	Partial	Consider new guidance; review and revise existing guidance Investigate establishing a scheme of accredited auditors Investigate training for practitioners	Low – not a priority
	WasteTRACK		Require tracking of contaminated soil and waste using WasteTRACK	Medium
	Contaminated Sites Remediation Fund (CSRF) RMA definition of contaminated land		Increase size of or modify CSRF Provide added certainty with a NES	High
Protection of human health from the effects of contaminated land	RMA, Health Act, Food Act, OSH, Building Act MfE CLMG Nos. 2 and 3, industry and MOH guidelines; OSH guidelines	Partial	Produce nationally consistent methods for deriving health-based soil contaminant levels Produce a NES that defines management actions	High
Protection of the environment from the effects of contaminated land	RMA Oil industry guidelines; MfE CLMG No. 2; Sheep-dip guidelines; ANZECC guidelines	Partial	Produce nationally consistent methods for deriving ecologically based soil contaminant levels Produce a NES that defines management actions	Low – not a priority
Access to information	LGOIMA, Building Act, MfE CLMG No. 4 (draft); New Zealand Waste Strategy targets	Partial	Produce guidance on management of contaminated land information Establish a collection of national information on contaminated land	Medium

Notes: CLMG = Contaminated Land Management Guidelines; CSRF = Contaminated Sites Remediation Fund; OSH = Occupational Safety and Health; LGOIMA = Local Government Official Information and Meetings Act; RMA = Resource Management Act 1991; NES = national environmental standard; HSNO = Hazardous Substances & New Organisms; MfE = Ministry for the Environment; MOH = Ministry of Health.

Discussion points

1. Are these the ideal key elements for a New Zealand contaminated land framework?
2. Are there any additional opportunities for change that have not been identified here? If so, what are they?
3. Are the priorities that have been assigned to each opportunity appropriate? If not, what are more appropriate priorities?

A nationally consistent method to derive soil guideline values

Numerical values for hazardous substances that are protective of human health and the environment, and the methods used to derive them, are important tools in the assessment of contaminated land. Without these values and methods we would not be able to consistently assess the effect of contaminated land on the environment or on human health.

Typically, New Zealand practitioners have relied on a mixture of national and international guidelines from which to select numerical values for decision-making. However, these guidelines use different methods for deriving numerical values. Although CLMG No. 2 has helped practitioners select appropriate values from this mix, it remains unclear which guideline value to choose for a given assessment, or how a value should be applied to the investigation or management of land. In addition, calculation errors contained in some of the guideline values (eg, timber treatment, oil industry) and inconsistencies between guidelines (eg, gasworks, oil industry), have remained uncorrected and are often still used in assessments.

These issues have contributed to uncertainty for practitioners and local government when investigating, identifying, preventing or mitigating the adverse effects of the development, subdivision or use of contaminated land. Problems arising from this uncertainty have most notably occurred in Auckland, with the residential subdivision of former horticultural areas.

An overarching **national guideline** that sets out a method to derive numerical values for key soil contaminants and how they can be applied to decision-making to protect human health and ecosystems will significantly improve decision-making on contaminated land in New Zealand. The process for developing a guideline, and a component of the guideline, may also be suitable for being applied to the development of a **national environmental standard**.

The rationale for national health-based guidelines

National guidelines have been the main mechanism used by central government to guide and support contaminated land practitioners in industry and local government. The development of an overarching national guideline for contaminated land that consolidates key soil guideline values for the assessment of contaminated land into one document is likely, in itself, to significantly improve contaminated land management. A national guideline would help improve practice by:

- providing a one-stop reference for practitioners on the derivation and use of health-based numerical values
- reducing confusion about what method or value to use, and in what circumstances
- containing numerical values protective of land uses tailored to the New Zealand setting (eg, a lifestyle block)
- increasing consistency in how land is assessed and managed.

Such a guideline should be developed in collaboration with the other relevant government regulatory agencies (Ministry of Health, Ministry of Agriculture and Forestry, ERMA, NZFSA), with specialist advice from local government and industry representatives. The methodologies, receptors, land uses and terminology used should be agreed by these agencies to provide the highest level of endorsement and uptake of the guidelines.

Guidelines, however, are voluntary and local governments are not required to implement them. Although credible guidelines are widely implemented by local government and practitioners, it is unusual for all councils and practitioners to fully subscribe to their contents. Also, the transition time between publishing a guideline and that guideline being widely used may be lengthy. Plans that reference previous guidelines would need to be changed for the guidelines to have full effect in those areas. As an example of the sometime lengthy transition period, of the 18 district plans that contain specific contaminated land rules, 13 still reference the *Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites* (ANZECC, 1992), which has been largely outdated for over six years (Ministry for the Environment, 2006c).

An overarching national guideline could also complement and create a platform for the development of a national environmental standard (NES) for contaminated land. Ideally, the development of a national guideline would form the first step of any process to develop a NES for contaminated land.

The rationale for national environmental standards

National environmental standards are regulations made under sections 43 and 44 of the RMA. Standards can be numerical values, narrative statements, or methodologies in a legally enforceable form.

A NES that provides a method and/or numerical values for soil contaminants would ensure the immediate and consistent use of those methods or values. The key benefits of a NES approach over a national guideline are that a NES:

- overwrites conflicting guidelines and local government plans, avoiding the transition normally associated with the implementation of guidelines
- is considered suitable for setting human-health thresholds, where consistency and certainty are desirable
- ensures that any methods or values it contains are implemented because any requirements are binding on local government.

However, these benefits need to be balanced against any loss of flexibility that can be provided through a guideline-based approach. Some numerical values derived in a national guideline may not suit a NES. For example, soil contaminant values derived for the protection of groundwater may be suitable in a guideline but inappropriate for a NES.

A NES for contaminated land would need to be developed in collaboration with the other relevant government regulatory agencies (Ministry of Health, Ministry of Agriculture and Forestry, ERMA and NZFSA), with technical advice from local government and industry representatives. These agencies would need to agree on the functional application of numerical values and methods.

A **method-based NES** could be used to define what method is to be used to derive numerical values. This method could then be used to derive site-specific numerical values which would assist in the management of a piece of contaminated land (tier 2 assessment). A method-based NES could stand alone or work together with a numerical-value NES.

A **numerical value-based NES** could be used to:

- help define contaminated land according to its definition under the RMA¹⁰
- establish the suitability of land for its intended land use
- act as a remediation or clean-up target
- trigger further investigation, management or remediation.

It is unlikely that numerical values would serve as an absolute remediation requirement (ie, a level that all contaminated land would have to achieve). It is envisaged that risk-based methods would still be able to be used to derive site-specific values, especially where clean-up is not justified or practical.

The agencies would also need to agree on what methodology to use. During previous scoping on possible NES two main options were identified¹¹.

- **A New Zealand-specific NES:** New Zealand-specific methods could be used to derive soil contaminant levels (eg, the Landcare risk assessment method for contaminated sites). The NES could be based on a national list of priority contaminants developed in consultation with key stakeholders. This option has received widespread support from previous technical and policy stakeholder groups.
- **NES based on the Australian National Environment Protection (Assessment of Site Contamination) Measure (NEPM):** adoption of the NEPM soil limits for human health and the environment would have the benefit of more closely aligning Australian and New Zealand contaminated land policy. The adoption of NEPM numbers was discussed during October 2006, but was not supported by local government and industry.

Once an option is agreed, we would need to decide whether the NES should include both human health and ecological soil methods and numerical values. It may be more practical to develop health-based soil values first, leaving the option for ecological soil values to be added. Human health-based soil levels are relatively straightforward to derive because there is only one target species (humans), and large databases from epidemiological and toxicological studies worldwide can be accessed. Ecological soil levels are much less straightforward due to a number of technical and policy-related issues.

Discussion points

4. Is a national guideline progressing to a NES the most appropriate way to develop nationally consistent soil contaminant levels?
5. If a NES is considered appropriate, what should the NES contain (numerical values, methods, etc), and what should its function be?
6. If a NES for contaminated land includes soil contaminant levels, what should these levels be used for?
7. Should the guideline and NES criteria include ecological as well as human-health criteria?

¹⁰ If a NES is developed for contaminants in soil, the NES soil levels are unlikely to be the sole determinant of whether land is “contaminated”. Where contaminants are not listed in the NES, or if ecological levels are not included, the existing mix of guidelines would need to continue to be used to establish whether the land “has, or is reasonably likely to have, significant adverse effects on the environment”.

¹¹ Note that these and other methodologies would be revisited and reassessed by any future advisory group.

Develop a roles and responsibilities protocol

Although the roles and responsibilities of local government have been clarified by recent amendments to the RMA, there is still uncertainty as to how the main agencies (territorial authorities, regional councils, public health agencies) should work together on a day-to-day basis. This uncertainty may lead to disputes between agencies, and roles and responsibilities not being filled or undertaken.

To clarify roles and responsibilities relating to contaminated land, the Ministry for the Environment could by developing guidance for how local government can best fulfil their respective functions. This guidance could build upon the new RMA contaminated land functions by:

- providing recommended roles regional councils, territorial authorities, unitary authorities health agencies and potentially landowners will have at the key decision points (e.g. identification, investigations, remediation, management, etc)
- identifying and describing best practice for these roles.

Any guidance would be developed in consultation with local government and public health, and would recognise existing practice and successful alternative roles and responsibility frameworks.

Discussion points

8. Are local authorities in your region/district aware of their new responsibilities placed on them by the RMA amendments? If so, are they acting on them?
9. How well do the main agencies work together on contaminated land management in your region/district?
10. What could be done to improve the way the main agencies work together?

Tracking contaminated soil and wastes

Where contaminated land is disturbed and contaminated soil or waste is disposed off-site it is important this material is safely transported to an approved disposal or treatment facility. The inappropriate off-site disposal of contaminated soil and waste can simply result in the creation of more contaminated land.

An online tracking system, WasteTRACK, is being adopted by liquid waste contractors through their industry code of practice and is progressively being required through amendments to territorial authority trade waste bylaws. The liquid waste contractors have already seen the benefits of using WasteTRACK, such as improving business practices, tracking seasonal variations in waste generation, and planning business workloads and maintenance.

Although WasteTRACK is only being used for the liquid waste industry, it is planned to require this system for the transport of all hazardous waste, including solid hazardous waste. This should include the transport of soil or waste from contaminated land. The most appropriate mechanism for requiring WasteTRACK nationally has been identified as group standards under the HSNO Act. The Ministry is currently preparing to draft group standards for hazardous waste with industry.

Further information on WasteTRACK is attached in Appendix F and on the WasteTRACK website¹².

New guidelines and revising existing guidelines

There are many existing contaminated land guidelines (see section 2). To remain credible and useful to practitioners, these guidelines need to be regularly revisited and, if necessary, revised as more information becomes available or as policy changes. There are also opportunities for new guidelines to fill gaps in the policy framework.

The Ministry can continue to develop further guidelines on specific types of contamination. The sheep-dip guidelines have recently been completed. In addition, our stakeholders have suggested a number of other possibilities for further guidance, including:

- roles and responsibilities (see section above)
- clean-up technologies and methods
- remediation by natural attenuation
- horticultural guidelines.

If a NES or overarching national guideline were to be developed, the existing industry guidelines would also need to be reviewed. This review could be as simple as pulling conflicting numerical values and derivation details out of the documents while maintaining the useful generic and industry-specific sections¹³.

Support could also be provided for industry groups who wish to revise existing guidance. Representatives from the oil industry have signalled to the Ministry that they would like to review the *Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand*, one of the most widely used industry-based guidelines.

Discussion points

11. Which (if any) of the guidelines need to be revised?
12. Considering the guidance already developed, is there a need for further guidance? If so, what additional guidance should be developed?

¹² www.wastetrack.co.nz

¹³ This review may be more complex for the oil industry guidelines because the numerical values depend on soil type.

Liability regime

Liability is managed under the RMA by the requirement to avoid, remedy or mitigate any adverse effects on the environment. However, there is no clear liability for pre-1991 sites. Generally, in these cases, the buyer of the land becomes liable by default for any contamination present on the land (*caveat emptor*, or buyer beware). The degree to which this issue is posing a barrier to the clean-up of contaminated land is unclear, although feedback from local government suggests that it does pose a barrier in some situations.

The Ministry can work with central government agencies to investigate an appropriate pre-1991 liability regime for contaminated land. Liability regimes that could be applied include:

- the owner/occupier is liable
- a hierarchy of liable parties (from polluter to owner/occupier)¹⁴
- no hierarchy.

If establishing a liability regime is not favoured, the Contaminated Sites Remediation Fund should be specifically identified as the mechanism to deal with any equity and liability barriers to clean-up created by not having a liability regime. Modifications may need to be made to the Fund to specifically address these barriers.

Before any liability regime is investigated it is important to clearly establish the degree to which this issue is posing a barrier to the clean-up of contaminated land. The collection of national information on contaminated land, as discussed below, would enable a more informed investigation and recommendations to Government.

Discussion points

13. How significant a barrier is the absence of a historical liability regime?
14. Which liability regime is considered the best fit?
15. If no liability regime is established, what modifications (if any) would need to be made to the Contaminated Sites Remediation Fund?

Contaminated Sites Remediation Fund

The Contaminated Sites Remediation Fund continues to be a successful policy initiative directly contributing to real on-the-ground actions. However, its success is limited by the Fund's size. Although the Fund has been successful and has recently been expanded, it is still not large enough to provide the assistance needed for many large-scale clean-up projects.

¹⁴ International examples of hierarchical liability regimes are found in:

- the UK: see www.defra.gov.uk and search for *Defra Circular 01/2006* (Defra, 2006)
- NSW, Australia: see www.environment.nsw.gov.au/clm/index.htm

Accreditation of practitioners

There is no requirement for contaminated land practitioners, or most other environmental specialists in New Zealand for that matter, to be accredited, nor is there a specific contaminated land accreditation system.

The existing suite of industry-based guidelines and the Contaminated Land Management Guidelines series have established a benchmark for contaminated land practitioners and a basis for local government audit of investigations (especially CLMG No. 1). However, a requirement for practitioners to be accredited may introduce an additional level of consistency and quality assurance to contaminated land investigations. Accreditation systems are used extensively internationally; for example, several accreditation schemes are running in Australia, which require review of investigations by accredited auditors¹⁵.

However, before any accreditation system is established its benefits would need to be assessed against the additional costs of set-up, administration and liability insurance, and the barriers these increased costs could add to the investigation and clean-up of land.

Discussion points

16. Is an accreditation system a necessary component of a contaminated land policy framework?
17. If so, what additional benefits would an accreditation system bring, how could it work, and how would it be administered?

Providing training

Local governments often do not have the capability to discharge their responsibilities for contaminated land under the RMA effectively, and this lack is presenting a barrier to the identification, investigation, management and remediation of contaminated land. To improve the capability of local government in this area, the Ministry could contribute to improving the competence of staff through training. Initiatives might include:

- providing training directly
- better linking existing training providers with local authority officers and private sector practitioners
- encouraging, or even assisting, local government to provide training to staff working with contaminated land.

¹⁵ New South Wales (www.environment.nsw.gov.au/clm/auditorscheme.htm); Victoria, South Australia (http://www.epa.sa.gov.au/pdfs/expl_ep_site.pdf) and Western Australia.

Discussion points

18. Does a lack of capability in local government form a significant barrier to the effective management of contaminated land? If so, how could local government capability in this area be improved?
19. Does a lack of capability within the consulting community form a significant barrier to effective management of contaminated land? If so, how could capability in this area be improved?

National information

At a national level, we do not have a clear understanding of the extent of contaminated land requiring management or remediation. A 1992 desktop assessment of the number of contaminated sites estimated (with a ± 50 percent margin of error) that there were 7,200 land-use sites (sites with potentially contaminating land uses). Approximately 1,580 sites were high-risk contaminated land (Worley Consultants Ltd, 1992). Since then, work by regional councils has established that there are many more than 7,200 sites with historical or current land uses with the potential to contaminate, but it is unclear how many of these might present a high risk.

The Ministry could collect national information on contaminated land. It is envisaged this would involve collecting summary data from existing local government registers. National information would not contain property-specific information, but would be a national overview only. The collection and administration of property-specific information would remain with local government.

National information would provide a useful overall picture of the state of contaminated land, enabling:

- better prioritisation of actions (eg, identifying priority sites for funding)
- national reporting on the effectiveness of contaminated land policy (eg, periodically assessing changes in the number and severity of contaminated sites, or land that has been investigated, managed and remediated)
- improved policy development (eg, information on numbers of pre-1991 contaminated sites would be useful to tailor options for liability regimes or modify other policy measures such as the CSRF).

However, national information is only as good as the local information that is available, and the collection of accurate local information about contaminants on land is hampered by several factors, including the following:

- councils use different systems to classify information about land or potentially contaminated land, which significantly complicates collecting national information
- councils put varying levels of effort into identifying contaminated or potentially contaminated land, which can result in a wide unexplained variance between regions of the number of contaminated sites
- councils may apply different thresholds to define contaminated land

- landowners/occupiers are not compelled to report land contamination to councils. This is especially an issue for establishing the location of historical sheep-dip sites, where there are large numbers of sites and a decreasing awareness of their exact locations as the original landowners/occupiers sell or retire
- the lack of expertise by some contaminated land investigators, inconsistent standards of site assessment and the lack of consistency in reporting mean that a site may not be correctly identified as contaminated, or may be identified as presenting more risk than it really does.

CLMG No. 4 *Classification and Information Management Protocols* (Ministry for the Environment, 2006b) may partially address some of these barriers by promoting best practice among local authorities for identifying and classifying sites. If this guideline is widely implemented by local authorities, and supported by a model contaminated land information database¹⁶, the periodic national collation of data on contaminated sites should be a relatively simple task. CLMG No. 1 *Reporting on Contaminated Sites in New Zealand* (Ministry for the Environment, 2003a) and CLMG No. 5 *Site Investigation and Analysis of Soils* (Ministry for the Environment, 2004b) have tried to address some of the investigation and reporting issues, although uptake has been variable among territorial authorities and practitioners.

Therefore, before any information is collated the Ministry should first concentrate efforts on encouraging and supporting local government implementation of CLMG No. 4. While not addressing all of the barriers to the collection of accurate information, the widespread adoption of this guideline and the use of a supporting information management database are considered important first steps towards collecting accurate information about contaminants on land.

Discussion points

20. Should national information on contaminated land in New Zealand be collected and reported? If not, why not?
21. How could the implementation of CLMG No. 4 be supported?

Other national environmental standards

This paper discusses the possibility of a NES being used to set numerical values for soil contaminants and methods to derive these values. However, the RMA enables standards to be applied in a range of other ways, and there needs to be further discussion and debate about the potential for a NES to be applied to other contaminated land issues. For example, a NES could be used to introduce a level of consistency to district plan requirements.

¹⁶ A contaminated land information management database is a database that contains and sorts information about contamination on land within a region or a district. It is envisaged that a database supporting CLMG No. 4 could be developed by adopting and/or modifying an existing database.

To enable readers to explore these possibilities with a view to discussing or suggesting other ways a NES could be applied to contaminated land management, we have included the following suggestions and links. Section 43 of the RMA (see Appendix G) sets out what a NES can include.

The following examples show how NES have been, or are proposed to be, used¹⁷:

- prohibit specified activities
- require consents for specified activities
- restrict the granting of resource consents
- restrict the setting of permitted activities
- in design standards
- require monitoring and reporting by councils.

Examples of these types of standards can be found on the Ministry's NES web pages¹⁸.

Discussion points

22. To what other issues could a NES be applied to improve contaminated land management?
23. How would your suggested NES improve contaminated land management?

Emerging issues and research

The work on an overarching policy framework and the development of many of the opportunities identified above can be informed by other emerging initiatives. For example:

- a national working group on levels of cadmium in soils from fertiliser use has been established to advise government
- Environment Waikato recently convened a workshop of scientists, regulatory staff and policy advisers to discuss polycyclic aromatic hydrocarbons in urban areas of New Zealand.

Further research can be co-ordinated to fill information gaps in necessary areas.

Discussion points

24. Are there any key additional research areas that should be identified?

¹⁷ Note that standards are not limited to these types.

¹⁸ www.mfe.govt.nz/laws/standards/index.html

4 Next Steps

This paper provides an overview of the existing policy framework for contaminated land and identifies key opportunities to develop the framework further.

The current legislative framework provides a sound basis for ensuring that no new contaminated sites are created. There is no need to develop specific legislation to protect against risk to the environment from contaminated land on top of what is already in place under the existing legislation. However, some key opportunities have been identified relating to nationally consistent soil levels, national information, funding of remediation and best practice guidance. The opportunities identified as high and medium priority in Table 1 are considered important to be included in any short- to medium-term (one to three years) work programme. The low-priority areas identified are not considered significant enough to be included in the medium term.

The high-priority and medium-priority issues are discussed in more detail below, and Table 2 outlines key priorities and timeframes for the Ministry's contaminated land work programme.

4.1 High priority

High-priority issues that can be initiated or addressed in the short to medium term (one to two years) are:

- the lack of nationally consistent soil values
- the continuing need for the Contaminated Sites Remediation Fund.

Development of nationally consistent numerical values and methods for contaminated land will fill an urgent gap in the existing policy framework. A national overarching guideline combined with some type of supporting NES is expected to help local government provide for better protection of human health through nationally consistent methods and soil contaminant values.

The Contaminated Sites Remediation Fund continues to be a successful policy initiative, directly contributing to real on-the-ground actions. The Ministry should build on the success of this Fund by further promoting it and seeking additional funding so that more ambitious projects are possible.

4.2 Medium priority

Medium-priority opportunities that can be addressed in the medium term (two or more years) are:

- guidance on roles and responsibilities
- lack of national information on the amount and status of contaminated land
- absence of a pre-1991 liability regime
- the requirement to use WasteTRACK to track the disposal and transport of contaminated soil and waste
- support for industry-initiated guideline revisions.

The absence of a pre-1991 liability regime is another clear gap in the policy framework. An obvious solution is to establish such a liability regime. However, policy initiatives focused on action to clean up contaminated sites (eg, an expanded and modified CSRF) may be a better and more achievable strategy.

The collection of national information is important to enable the Ministry to measure and report on the success of its policy initiatives and to develop smarter and better-targeted policy in the future. However, before information is collated, CLMG No. 4 needs to be widely and consistently implemented by local government.

Guidance on roles and responsibilities can further clarify agency roles and could be delivered relatively quickly and easily.

WasteTRACK is an existing Ministry-owned tracking tool that can be usefully required for the transport, disposal and treatment of solid hazardous waste, including contaminated soil and waste from contaminated land remediation.

Support could also be provided for industry groups who wish to revise existing guidance (eg, an industry-led revision of the oil industry guidelines).

Table 2: Proposed key priorities and timeframes for the contaminated land work programme 2006–2009

Opportunity for change	Priority	Timeframe
Develop a national guideline and NES for contaminated land, providing human health-based soil levels derived using a New Zealand-based methodology	High	2006–2008
Continue to seek additional funding for the CSRF to enable the fund to contribute to larger remediation projects	High	2006–2009
Require the use of the WasteTRACK system to track the transport and disposal of contaminated soil and waste	Medium	2008/2009
Work closely with local government through workshops, advice and technical support to ensure the widespread uptake and implementation of CLMG No. 4	Medium	2007/2008
Work with local government to develop guidelines on how local government establishes and agrees on working relationships	Medium	2007/2008
Provide support for industry-initiated revisions of existing guidelines (eg, oil industry guidelines)	Medium	2007/2008
Collect national information on contaminated land	Medium	2008/2009
Investigate options for addressing pre-1991 liability barriers, including establishing a liability regime or a modified Contaminated Sites Remediation Fund. Prepare a report and recommendations to government.	Medium	2008/2009

Appendix A: Main Contaminated Land Legislation

Legislation	Relevance to contaminated sites	Agency/agencies responsible	Agents	Tools used	
				Regulatory	Non-regulatory
Resource Management Act 1991	Prevention of contamination, protection of the environment, human health management and remediation of contaminated sites and liability	Ministry for the Environment Territorial authorities – use, development subdivision Regional councils – investigations	Council officers	Regional policy statements Regional and district plans Resource consents Enforcement provisions	Contaminated sites fund Industry guidelines Contaminated land management guidelines Council strategies Central government-led interventions (Mapua, Tui) International obligations (Stockholm Convention)
Hazardous Substances and New Organisms Act	Prevention of contamination: controls on how hazardous substances are contained, labelled, stored, used, transported or disposed of	Environmental Risk Management Authority Territorial authorities Regional councils	Hazardous waste officers	Tolerable exposure limits Environmental exposure limits Enforcement provisions	
Health Act	Protection of human health; duty to abate public nuisance	Ministry of Health Public health agencies Territorial authorities	Medical officers of health Public health officers Environmental health officers	Power to enter premises to abate public health nuisance	Environmental case management of lead-exposed persons: guidelines for public health services
Health and Safety in Employment Act 1992	Protection of human health; protects the health and safety of people in the workplace	Department of Labour	OSH inspectors		Workplace exposure standards (guidelines) Health and safety guidelines on the clean-up of contaminated sites Safe working in confined spaces Code of practice for the design, installation and operation of underground petroleum storage systems
Building Act 2004 – Building regulations	Requires building sites to be assessed to determine the presence and potential threat of any hazardous agents or contaminants	Department of Building and Housing Territorial authorities	Building inspectors	Building regulations (Building Code) Project information memoranda	

Legislation	Relevance to contaminated sites	Agency/agencies responsible	Agents	Tools used	
				Regulatory	Non-regulatory
Food Act 1981	Ensures that the food New Zealand produces, exports and imports is safe and suitable for domestic and international consumers	New Zealand Food Safety Authority Territorial authorities Public health units Food Standards Australia New Zealand	Environmental health officers Public health officers	Food Standards	
Local Government Official Information and Meetings Act	Requires information on contamination to be included in any land information memoranda	Department of Internal Affairs Territorial authorities	Council officers	Land information memoranda	

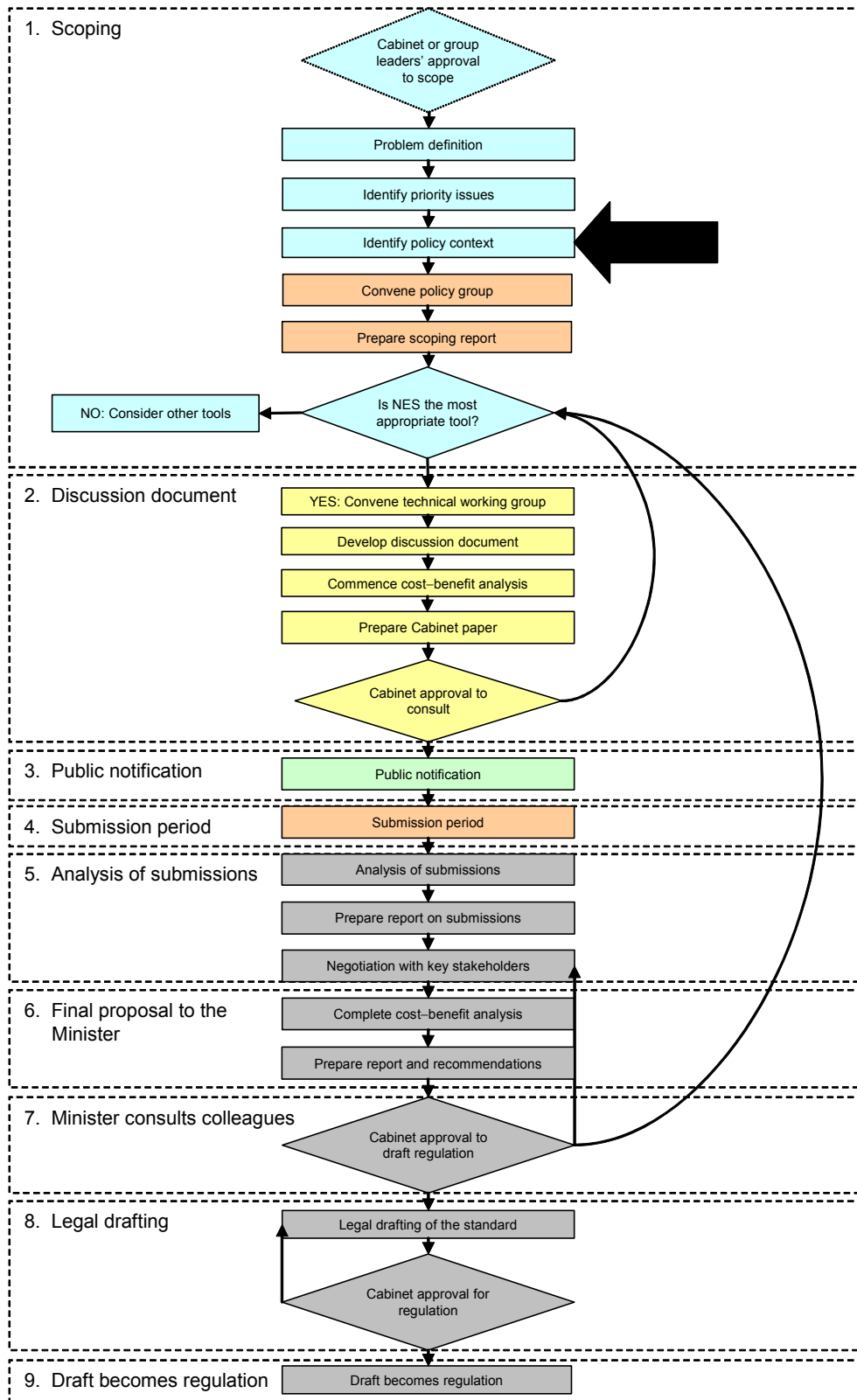
Appendix B: Comparison of Key Elements with Existing Measures

Element	Sub-element	Who is responsible?	What is already in place?	Opportunities for change
A legislative framework that has planning controls , a liability regime and defines roles and responsibilities for agencies	Clear roles and responsibilities for local government	Ministry for the Environment (drafting legislation, guidance) Local government (agreement on inter-agency roles and responsibilities)	RMA Amendment Act 2005 included clarification of roles and responsibilities for regional councils and territorial authorities in identifying and controlling the effects of contaminated land	Guidance on how agencies establish and agree on working relationships
	Planning control mechanisms	Ministry for the Environment (drafting legislation and regulation) Territorial authorities and regional councils (implementation of legislation and regulation)	RMA sections 30 and 31 provide a clear role for territorial authorities in contaminated land. Local government controls land use through planning functions, including developing regional policy statements, regional plans, and district plans	No change identified
	Clear liability framework	Ministry for the Environment (drafting legislation) Treasury (policy advice to Ministry for the Environment)	The RMA includes a liability regime for land purchased after 1991. No clear liability for pre-1991 sites currently exists.	Investigate options for addressing liability barriers
Measures to prevent contamination of land	Measures to prevent contamination	Ministry for the Environment and ERMA Local government (plans, consents)	RMA discharge and land-use provisions; local government discharge and land-use controls (plans, consents, enforcement) Agrichemical collections HSNO controls	No change identified
Mechanisms to help identify , investigate , manage , remediate and report on contaminated land	A clear definition of contaminated land	Ministry for the Environment (drafting legislation, regulation)	RMA Amendment Act 2005 included a definition of contaminated land	A national environmental standard will provide added certainty
	Consistent reporting on investigations, remediation and validation	Ministry for the Environment (developing national guidance) Regional councils (informal auditing of reports)	Guideline reporting forms and checklists are provided in CLMG No. 1: <i>Reporting on Contaminated Sites in New Zealand</i>	No change identified
	Sampling and analysis protocols	Ministry for the Environment (development of guidelines)	The Ministry has published CLMG No. 5: <i>Site Investigation and Analysis of Soils</i>	No change identified
	Competent and experienced practitioners	Ministry for the Environment (regulation) Accredited auditors (eg, consultants)	Ministry for the Environment CLMG No. 1: <i>Reporting on Contaminated Sites in New Zealand</i> helps local government to audit contaminated land reports.	Investigate establishing a scheme of accredited auditors Training for practitioners

Element	Sub-element	Who is responsible?	What is already in place?	Opportunities for change
Mechanisms to help identify, investigate, manage, remediate and report on contaminated land (continued)	Mechanisms to assist the clean-up of contaminated land	Ministry for the Environment (administration of funding)	The Contaminated Sites Remediation Fund (currently provides up to \$1.5 million per year) There is direct funding to clean up New Zealand's worst contaminated sites at Mapua and Tui Mine.	Increase/modify the CSRF to allow funding of more large-scale clean-up projects.
Protection of human health and the environment from the effects of contaminated land	Nationally consistent methods for deriving health and ecologically based soil contaminant levels	Ministry for the Environment, ERMA, Ministry of Health (regulations and guidance) Territorial authorities and regional councils (implementation of regulations)	The RMA definition of contaminated land supported by CLMG No. 2: <i>Hierarchy and Application in New Zealand of Environmental Guideline Values</i> , and CLMG No. 3: <i>Risk Screening System</i> Timber treatment, oil industry, sheep-dip and gasworks guidelines for a range of contaminants. Other guidelines (eg, Ministry of Health guidelines for lead) are also used.	NES for soil contaminant levels that trigger investigation, define land-use suitability, and provide a clean-up threshold Revision of existing guidance, where required
	Protection of health, safety, and the environment during site assessment and remediation	Territorial authorities and regional councils (resource consents) Department of Labour (workplace inspections)	Code of practice for the wood-preserving industry; OSH guidelines and the Ministry's timber treatment guidelines and oil industry guidelines	The Ministry could update existing New Zealand industry guidelines
Access to information	Management and reporting of contaminated land information	Territorial authorities and regional councils (maintaining registers and information release) Ministry for the Environment (information release) Central government agencies who administer Crown-owned land (eg, LINZ)	Ministry for the Environment CLMG No. 4: <i>Classification and Information Management Protocols</i> (draft) Land information memoranda through LGOIMA, and project information memoranda through the Building Act. Central government agencies provide official information to the public through the Official Information Act 1982.	Complete and support implementation of CLMG No. 4
	National Information on contaminated land	Ministry for the Environment	NZ Waste Strategy targets: Ministry for the Environment measures progress towards these targets, which include contaminated land targets.	Collection of national information on contaminated land

Appendix C: Detailed Process Diagram

Figure C1: Proposed NES development process for contaminated land



Appendix D: Hierarchy of Documents Containing Guideline Values for Soil, Surface Water, Groundwater and Sediment

Table D1: Hierarchy of documents containing guideline values for soil^a

Basis of protection	Reference document	Grouping
Human health only ^b	<i>Health and Environmental Guidelines for Selected Timber Treatment Chemicals</i> (Ministry for the Environment and Ministry of Health, 1997) <i>Guidelines for Assessing and Managing Contaminated Gasworks Sites in New Zealand</i> (Ministry for the Environment, 1997) <i>Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand</i> (Ministry for the Environment, 1999b)	NZRB
	<i>Guideline on the Investigation Levels for Soil and Groundwater</i> (NEPC, 1999) (health investigation levels, residential land use only). <i>Assessment of Risks to Human Health from Land Contamination</i> (Defra and EA, 2002) <i>Soil Screening Guidance: Technical Background Document</i> (US EPA, 1996a) and <i>User's Guide</i> (US EPA, 1996b); <i>Supplemental Guidance for Developing Soil Screening Levels at Superfund Sites</i> (US EPA, 2001) <i>Region 6: Human Health Medium- Specific Screening Levels</i> (US EPA, 2002a) <i>Region 9: Preliminary Remediation Goals</i> (US EPA, 2002b)	IRB ^c
	<i>Guideline on the Investigation Levels for Soil and Groundwater</i> (NEPC, 1999) (all land uses except residential)	ITB
Human health and ecological receptors	<i>Canadian Environmental Quality Guidelines</i> (CCME, 2002) <i>Circular on Target Values and Intervention Values for Soil Remediation</i> (Ministry of Housing, Spatial Planning and the Environment, 2000) ^d	IRB
Ecological receptors only	<i>Ecological Soil Screening Level Guidance</i> (US EPA, 2000)	IRB
	<i>Guideline on the Investigation Levels for Soil and Groundwater</i> (NEPC, 1999) (ecological investigation levels)	ITB
Groundwater	<i>Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand</i> (Ministry for the Environment, 1999b)	NZRB
	<i>Soil Screening Guidance</i> ^e (US EPA, 1996a and b)	IRB

NZRB = New Zealand risk-based; IRB = international risk-based; NZTB = New Zealand threshold based; ITB = international threshold based.

- No hierarchy is established for the documents within each category.
- The underlying premise in existing New Zealand industry-based guidelines is that protection of on-site ecosystems is only required to the extent necessary to facilitate the use of the land (ie, plant growth and livestock). These guidelines have been classed as protecting human health only, as they do not consider the full extent of the protection of ecosystems, as do the Canadian and Dutch documents.
- UK, Canadian and Dutch criteria are the only criteria (other than New Zealand) that include produce consumption.
- Although Dutch criteria for human-health protection are based on a residential land-use scenario, the majority of intervention values are based on protection of the ecosystem because these were lower than values derived for protection of human health. As a result, these values have a wider applicability than just to a residential land-use scenario.
- US EPA Region 6 and Region 9 guidance documents also provide groundwater values. However, these values originate from US EPA, 1996a.

Table D2: Hierarchy of documents containing guideline values for surface water, groundwater and sediment

Basis of protection	Reference document	Grouping
Human health	<i>Drinking-water Standards for New Zealand</i> (Ministry of Health, 2005)	NZRB
	<i>Australian and New Zealand Guidelines for Fresh and Marine Water Quality</i> (ANZECC and ARMCANZ, 2000) ¹ <i>Canadian Environmental Quality Guidelines</i> (CCME, 2002) <i>Circular on Target Values and Intervention Values for Soil Remediation</i> (Ministry of Housing, Spatial Planning and the Environment, 2000)	IRB
Ecosystems	<i>Australian and New Zealand Guidelines for Fresh and Marine Water Quality</i> (ANZECC and ARMCANZ, 2000) ¹	NZRB
	<i>Canadian Environmental Quality Guidelines</i> (CCME, 2002)	IRB
Agriculture, recreational use ²	<i>Health and Environmental Guidelines for Selected Timber Treatment Chemicals</i> (Ministry for the Environment and Ministry of Health, 1997) <i>Guidelines for Assessing and Managing Contaminated Gasworks Sites in New Zealand</i> (Ministry for the Environment, 1997) <i>Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand</i> (Ministry for the Environment, 1999b)	NZRB
	<i>Australian and New Zealand Guidelines for Fresh and Marine Water Quality</i> (ANZECC and ARMCANZ, 2000) ¹	IRB
Sediment	<i>Circular on Target Values and Intervention Values for Soil Remediation</i> (Ministry of Housing, Spatial Planning and the Environment, 2000) Incidence of adverse biological effects within ranges of chemical concentrations in marine and estuarine sediments (Long et al, 1995)	IRB

NZRB = New Zealand risk-based; IRB = international risk-based; ITB = international threshold-based.

- 1 The *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* is grouped as an international risk-based document for human health, agriculture and recreational use because these sections use Australian-specific data. In contrast, New Zealand ecotoxicity data have been used to derive values for protecting ecosystems. Hence these values are termed New Zealand risk-based.
- 2 These values are not included in the environmental guideline value database. However, they are mentioned in this table to indicate that these values do exist. Readers should refer to the original documents to ascertain the basis of their derivation.

Appendix E: New Zealand Guideline Values for Soil, Surface Water, Groundwater and Sediment

Soil (sediment)

Timber treatment (Ministry for the Environment and Ministry of Health, 1997)

Media: Soil, water
Contaminants: Arsenic, boron, chromium III and VI, copper, PCPs
Acceptable risk level: 10^{-5}
Protective of: Human health, stock health, plant life
Land uses: Agricultural, residential, industrial/unpaved

Gasworks (Ministry for the Environment, 1997)

Media: Soil, water, air
Contaminants: Phenol, creosol, total petroleum hydrocarbons (TPH), BTEX, PAH, cyanide (free, complex)
Acceptable risk level: 10^{-5}
Protective of: Human health, plant life, groundwater uses
Land uses: Residential (50%, 10%, high density), agricultural/horticultural, commercial/industrial, parkland/recreational

Oil industry (Ministry for the Environment, 1999b)

Media: Soil, water, air
Contaminants: Total petroleum hydrocarbons (TPH), BTEX, PAH
Acceptable risk level: 10^{-5}
Protective of: Human health, groundwater uses
Land uses: Residential, commercial/industrial, agricultural

Sheep dips – draft (Ministry for the Environment, 2006a)

Media: Soil, water
Contaminants: Arsenic, dieldrin, lindane, Σ DDTs
Acceptable risk level: 10^{-5}
Protective of: Human health
Land uses: Lifestyle block, standard residential, high-density urban residential, parks/recreation, commercial/industrial (unpaved)

Lead-exposed persons (Ministry of Health, 1998)

Media: Soil
Contaminants: Lead
Acceptable risk level: NA
Protective of: Human health
Land uses: Residential

Water

Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC and ARMCANZ, 2000)

Media: Water, sediment
Contaminants: 81 contaminants
Acceptable risk level: NA
Protective of: Ecosystem health, stock health, human health
Land uses: NA

Drinking-water Standards for New Zealand, 2005 (Ministry of Health, 2005)

Media: Water
Contaminants: Approximately 140 contaminants
Acceptable risk level: 10^{-5}
Protective of: Human health
Land uses: NA

Gasworks (Ministry for the Environment, 1997)

Media: Soil, water, air
Contaminants: Phenol, creosol, total petroleum hydrocarbons (TPH), BTEX, PAH, cyanide (free, complex)
Acceptable risk level: 10^{-5}
Protective of: Human health, plant life, groundwater uses
Land uses: Residential (50%, 10%, high density), agricultural/horticultural, commercial/industrial, parkland/recreational

Oil industry (Ministry for the Environment, 1999b)

Media: Soil, water, air
Contaminants: Total petroleum hydrocarbons (TPH), BTEX, PAH
Acceptable risk level: 10^{-5}
Protective of: Human health, groundwater uses
Land uses: Residential, commercial/industrial, agricultural

Air

Ambient Air Quality Guidelines (Ministry for the Environment, 2002a)

Media: Air
Contaminants: Carbon monoxide, fine particles (PM₁₀), nitrogen dioxide, sulphur dioxide, ozone, hydrogen sulphide, lead, benzene, 1,3-butadiene, formaldehyde, acetaldehyde, benzo(a)pyrene, mercury (inorganic), mercury (organic), chromium VI, chromium metal & chromium III, arsenic (inorganic), arsine
Acceptable risk level: Various
Protective of: Human health,
Land uses: Agricultural, residential, industrial / unpaved

Gasworks (Ministry for the Environment, 1997)

Media: Soil, water, air
Contaminants: Phenol, creosol, Total petroleum hydrocarbons (TPH), BTEX, PAH, cyanide (free, complex)
Acceptable risk level: 10^{-5}
Protective of: Human health, plant life, groundwater uses
Land uses: Residential (50%, 10%, high density), agricultural/horticultural, commercial/industrial, parkland/recreational

Oil industry (Ministry for the Environment, 1999b)

Media: Soil, water, air
Contaminants: Total petroleum hydrocarbons (TPH), BTEX, PAH
Acceptable risk level: 10^{-5}
Protective of: Human health, groundwater uses
Land uses: Residential, commercial/industrial, agricultural

Appendix F: WasteTRACK

During the preparation of the Ministry for the Environment's *Policy Framework to Reduce and Safely Manage Hazardous Waste in New Zealand* it was identified that a gap existed in the tracking of priority hazardous waste from point of generation to final disposal. The Ministry for the Environment, in partnership with the New Zealand Water and Waste Association (NZWWA) and the liquid waste contractors, subsequently successfully trialled a tracking system, and in March 2006 the Ministry purchased a licence for the tracking system (WasteTRACK) from the Western Australian government. The Ministry's policy framework was updated in June 2006 and WasteTRACK is an element under development to fill this gap in the policy framework.

WasteTRACK is an online tracking system that is designed to:

- ensure the safe transportation of wastes to an approved treatment/disposal facility
- provide independent verification that the waste has been disposed of appropriately
- monitor and track waste to prevent unauthorised discharge into the natural environment
- collate information to help central and local government to identify priority waste management issues and to assist with developing good policy
- provide an even and competitive system for companies in the broader waste management industry
- increase industry and community awareness of the proper treatment of hazardous waste.

Appendix G: Section 43 of the Resource Management Act

43. Regulations prescribing national environmental standards –

- (1) The Governor-General may, by Order in Council, make **regulations**, to be known as **national environmental standards**, that prescribe any or all of the following technical standards, methods, or requirements:
 - (a) standards for the matters referred to in section 9, [[section 11,]] section 12, section 13, section 14, or section 15, including, but not limited to –
 - (i) **contaminants**:
 - (ii) **water** quality, level, or flow:
 - (iii) **air** quality:
 - (iv) **soil** quality in relation to the **discharge** of contaminants:
 - (b) standards for **noise**:
 - (c) standards, methods, or requirements for monitoring.
- (2) The regulations may include:
 - (a) qualitative or quantitative standards:
 - (b) standards for any discharge or the ambient **environment**:
 - (c) methods for classifying a natural or physical resource:
 - (d) methods, processes, or technology to implement standards:
 - (e) exemptions from standards:
 - (f) transitional provisions for standards, methods, or requirements.
- (3) Section 360(2) applies to all regulations made under this section.]

References

- ANZECC (Australian and New Zealand Environment and Conservation Council). 1992. *Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites*. ANZECC: Canberra, Australia.
- ANZECC and ARMCANZ (Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand). 2000. *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*. National Water Quality Management Strategy Paper No. 4, Vol. 1 (2nd revision). ANZECC: Canberra, Australia.
- Building Industry Authority. 2001. *Approved Document for New Zealand Building Code: Hazardous Agents on Site*. Published by Scenario Communications Ltd on behalf of the Building Industry Authority: Wellington.
- Cavanagh J E, O'Halloran K. 2002. Overview of international soil criteria and derivation of numeric values. In: *Conference Proceedings for the 14th Annual WASTMINZ Conference*, 6–8 November.
- Cavanagh J E, O'Halloran K. 2003. *International Legislative Frameworks for Managing Contaminated Land: Derivation and Application of Numeric Values*. Landcare Research Contract report LC0203/110. Landcare: Lincoln.
- CCME (Canadian Councils for Ministers for the Environment). 2002. *Canadian Environmental Quality Guidelines*. Available at: http://www.ccme.ca/publications/can_guidelines.html.
- Defra (Department for Environment, Food and Rural Affairs). 2006. *Defra Circular 01/2006 Environmental Protection Act 1990: Part 2 Contaminated Land September 2006*. Department for Environment, Food and Rural Affairs: London, United Kingdom.
- DEFRA and EA (Department of Environment, Food and Rural Affairs and Environment Agency). 2002. *Assessment of Risks to Human Health from Land Contamination: An overview of the development of soil guideline values and related research*. Report CLR 7. Bristol, UK: Environment Agency.
- Long E R, MacDonald D D, Smith S L, et al. 1995. Incidence of adverse biological effects within ranges of chemical concentrations in marine and estuarine sediments. *Environmental Management* 19(1): 81–97.
- Ministry for the Environment. 1997. *Guidelines for Assessing and Managing Contaminated Gasworks Sites in New Zealand*. Ministry for the Environment: Wellington.
- Ministry for the Environment. 1998. *Environmental Guidelines for Water Discharges from Petroleum Industry Sites in New Zealand*. Ministry for the Environment: Wellington.
- Ministry for the Environment. 1999a. *Draft Sampling Protocols and Analytical Methods for Determining Petroleum Products in Soil and Water*. Ministry for the Environment: Wellington.
- Ministry for the Environment. 1999b. *Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand*. Ministry for the Environment: Wellington.
- Ministry for the Environment. 2002a. *Ambient Air Quality Guidelines*. Ministry for the Environment: Wellington.
- Ministry for the Environment. 2002b. *The New Zealand Waste Strategy*. Ministry for the Environment: Wellington.
- Ministry for the Environment. 2003a. *Contaminated Land Management Guidelines No. 1: Reporting on Contaminated Sites in New Zealand*. Ministry for the Environment: Wellington.
- Ministry for the Environment. 2003b. *Contaminated Land Management Guidelines No. 2: Hierarchy and Application in New Zealand of Environmental Guideline Values*. Ministry for the Environment: Wellington.
- Ministry for the Environment. 2004a. *Contaminated Land Management Guidelines No. 3: Risk Screening Systems*. Ministry for the Environment: Wellington.

- Ministry for the Environment. 2004b. *Contaminated Land Management Guidelines No. 5: Site Investigation and Analysis of Soils*. Ministry for the Environment: Wellington.
- Ministry for the Environment. 2006a. *Identifying, Investigating and Managing Risks Associated with Former Sheep-dip Sites: A Guide for Local Authorities*. Ministry for the Environment: Wellington.
- Ministry for the Environment. 2006b. *Contaminated Land Management Guidelines No. 4: Classification and Information Management Protocols*. Ministry for the Environment: Wellington.
- Ministry for the Environment. 2006c. “*Contaminated Land*” *Review of District, Regional and Unitary Plans*. In press.
- Ministry for the Environment. 2006d. *Results of a Survey on the Level of Uptake of the Ministry for the Environment Contaminated Land Guidelines by Regional and Unitary Councils*. Unpublished report by the Ministry for the Environment.
- Ministry for the Environment. 2006e. *Statement of Intent 2006–2009*. Ministry for the Environment: Wellington.
- Ministry for the Environment and Ministry of Health. 1997. *Health and Environmental Guidelines for Selected Timber Treatment Chemicals*. Ministry for the Environment and Ministry of Health: Wellington.
- Ministry of Health. 1998. *The Environmental Case Management of Lead Exposed Persons: Guidelines for Public Health Services*. Wellington: Ministry of Health.
- Ministry of Health. 2005. *Drinking-water Standards for New Zealand, 2005*. Ministry of Health: Wellington.
- Ministry of Housing, Spatial Planning and the Environment. 2000. *Circular on Target Values and Intervention Values for Soil Remediation*. Bilthoven, The Netherlands: Ministry of Housing, Spatial Planning and the Environment. Available at: <http://www.vrom.nl/international>.
- NEPC. 1999. Schedule B(1). *Guideline on the investigation levels for soil and groundwater. National Environmental Protection (Assessment of Site Contamination) Measure 1999*. Canberra, Australia: National Environmental Protection Council. Available at: <http://www.ephc.gov.au>.
- NZWWA (New Zealand Water and Wastes Association). 2003. *Guidelines for the Safe Application of Biosolids to Land in New Zealand*. New Zealand Water and Wastes Association: Wellington.
- OSH (Occupational Safety and Health Service), Department of Labour. *Safe Working in Confined Spaces*. Series of information sheets issued by the Occupational Safety and Health Service, Department of Labour: Wellington.
- OSH (Occupational Safety and Health Service), Department of Labour. 1992. *Code of Practice for the Design, Installation and Operation of Underground Petroleum Storage Systems*. Occupational Safety and Health Service, Department of Labour: Wellington.
- OSH (Occupational Safety and Health Service), Department of Labour. 1994. *Health and Safety Guidelines on the Cleanup of Contaminated Sites*. Occupational Safety and Health Service, Department of Labour: Wellington.
- OSH (Occupational Safety and Health Service), Department of Labour. 1999. *Guidelines for the Management and Removal of Asbestos*. Occupational Safety and Health Service, Department of Labour: Wellington.
- OSH (Occupational Safety and Health Service), Department of Labour. 2002. *Workplace Exposure Standards – Effective from 2002*. Occupational Safety and Health Service, Department of Labour: Wellington.
- US EPA. 1996a. *Soil Screening Guidance: Technical background document*. Washington DC: United States Environmental Protection Agency. Available at: <http://www.epa.gov/superfund/resources/soil/index.htm>.
- US EPA. 1996b. *Soil Screening Guidance: User’s guide*. Washington DC: United States Environmental Protection Agency. Available at: <http://www.epa.gov/superfund/resources/soil/index.htm>.

US EPA. 2000. *Ecological Soil Screening Level Guidance* (draft). Washington DC: United States Environmental Protection Agency. Available at: <http://www.epa.gov/superfund/programs/risk/ecorisk/ecossl.htm>.

US EPA. 2001. *Supplemental Guidance for Developing Soil Screening Levels at Superfund Sites* (peer review draft). Washington DC: United States Environmental Protection Agency. Available at: <http://www.epa.gov/superfund/resources/soil/index.htm>.

US EPA. 2002a. *EPA Region 6 Human Health Medium-Specific Screening Levels*. Washington DC: United States Environmental Protection Agency, Region 6. Available at: <http://www.epa.gov/region6>.

US EPA. 2002b. *Preliminary Remediation Goals*. Washington DC: United States Environmental Protection Agency Region 9. Available at: <http://www.epa.gov/region09>.

Worley Consultants Limited 1992. *Potentially Contaminated Sites in New Zealand: A Broad Scale Assessment*. Prepared for the Ministry for the Environment by Worley Consultants Limited, Auckland.

All cited Ministry for the Environment publications, with the exception of Ministry for the Environment 2006c and e, can be downloaded from: <http://www.mfe.govt.nz/publications/>