UK vs. NZ - CONTAMINATED LAND MANAGEMENT PRACTICES

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Introduction

Worldwide practices in assessing and managing contaminated land have evolved rapidly over the last ten to fifteen years. This paper provides a broad comparison between the contaminated land management framework in the UK and New Zealand, based on work experience in both countries. The discussion only relates to existing contaminated land and measures to prevent new contaminated land are not discussed.

Contaminated land is inherently complex and difficult to quantify. Even forming a definition of what constitutes 'contaminated' land can run into philosophical difficulties. At the other end of the 'equation', merely obtaining soil samples that are representative of ground conditions is a complex process in itself. Countries around the world have struggled to provide a contaminated land framework that allows the 'philosophical' policy decisions to be implemented in a consistent and clear manner.

A Brief Legislative History

Global awareness of the potential effects of contaminated land increased significantly during the 1980s. This was in a large part due to highly publicised international incidents such as Love Canal in the United States in the late 1970s and Lekkerkerk in the Netherlands in the 1980s (Pearce, 1992).

During the 1960s and 1970s, a number of pieces of legislation were introduced in New Zealand which included components of environmental protection e.g. the Water and Soil Conservation Act 1967 and the Clean Air Act 1972. However, none of these specifically addressed existing contaminated land. In the 1980s, New Zealand's central and local government was significantly restructured (MfE, 1997a). As a part of this reform, local authorities became responsible for environmental management, subject to national policy objectives and methods. At the same time, the number of regional and local government bodies was reduced from 625 to 94, replacing entities such as the harbour boards, drainage boards and catchment boards with the current council structure (MfE, 1997a).

In 1986, the Environment Act established the Ministry for the Environment (MfE) and set out various environmental management philosophies. The concept of 'sustainability' was introduced at this stage. In the late 1980s, it was recognised that New Zealand's environmental legislation was very piecemeal and a single set of principles and management system was required (MfE, 1997a).

The Resource Management Act (RMA) was passed in 1991. The RMA repealed 78 statutes and regulations, and amended numerous others, with the intention of providing a single piece of legislation for the management of land, water, soil and air (EDS 2007). The 2005 amendment to the act defined contaminated land for the first time in New Zealand legislation. The RMA is currently the core of legislation relating to contaminated land in New Zealand.

Other legislation in New Zealand with components relating to existing contaminated land includes:

- the Health Act 1956 – required abatement of public 'nuisances' to health;
- the Building Act 2004 – includes a clause requiring assessment of affects of contamination on buildings and occupants; and
- the Income Tax Act 2005 Amendment – introduced tax breaks for certain remedial activities.

The UK has been through a similar process of reform in terms of environmental management policy, although contaminated land was identified as a specific issue earlier than in New Zealand. The Inter-Departmental Committee on the Redevelopment of Contaminated Land (ICRCL) was set up in 1976 and consisted of representatives from various Government Departments. Its role was to develop and co-ordinate advice on human health hazards arising from the re-use of contaminated land and to co-ordinate advice on remedial measures (DEFRA, 2007). The ICRCL contaminated land guidelines, produced in 1987, were an early attempt to provide a systematic approach for the assessment of contaminated sites (ICRCL, 1987). The guidelines gave 'threshold' values for a limited number of contaminants, above which further investigation was considered warranted.

In 1990, the Environmental Protection Act was introduced in the UK. The act was mainly focused on preventing new contaminated land being created. It wasn't until the Environment Act was introduced in 1995 that contaminated land was specifically addressed. Section 57 of the 1995 legislation introduced Part IIA of the Environmental Protection Act 1990 (Part IIA), although it actually come into force until April 2000. Part IIA forms the core of the UK contaminated land regime.

Other important 'contaminated land' legislation or regulatory instruments in the UK include:

- Planning Policy Statement 23 – requires that a development site is 'suitable' for its intended use and there is no 'unacceptable risk' relating to contamination;
- the Water Resources Act 1991 – giving the Environment Agency (EA) powers to prevent and remedy 'pollution' of 'controlled waters' from contaminated land; and
- the Finance Act 1996 – introduced a tax on the disposal of wastes, including contaminated soil. An exemption is provided for certain remediation projects as an incentive to redevelop contaminated land sites.

Elements of a Contaminated Land Management Framework

This section discusses some of the important elements of a contaminated land management framework and compares New Zealand with the UK in each case.

Definitions

A definition of what constitutes 'contaminated land' is a key to any management framework. Any definition of contaminated land will inevitably include subjective terms that cannot easily be quantified. However, without such a definition as a starting point, the required subjective judgments are even less likely to be applied consistently.

In the UK, contaminated land is defined in Part IIA as:

"any land which appears to the local authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land, that:

(a) significant harm is being caused or there is a significant possibility of such harm being caused; or

(b) pollution of controlled waters is being, or is likely to be, caused."

Detailed (and complex) statutory guidance is provided in an attempt to help define the key terms. In addition to a definition for 'significant harm', the 'suitable for use', 'significant pollutant linkage' and 'unacceptable risk' concepts are introduced (DEFRA, 2006a). One of the aims of the 'suitable for use' approach is to prevent land being remediated unnecessarily i.e. where the risks posed by the contamination for the current (or likely future) site use are not actually significant. The concept of 'unacceptable risk' is an attempt to define whether the associated risks are significant or not.

For a 'significant pollutant linkage' to be present requires three components: a source of contamination; a relevant receptor; and a 'pathway' that is allowing or could allow 'significant harm' to occur. This is a key concept as it forms the core of risk-based assessment. Without all three components of the pollutant linkage, a site cannot be judged to be 'contaminated' as no risk exists. An interesting application of this is that qualitative risk assessment can sometimes adequately demonstrate that a site is not 'contaminated' due to incomplete contaminant pathways, even where apparently significant 'contamination' is present.

The Part IIA contaminated land definition has caused some problems in relation to groundwater contamination. Currently, there are no tests of significance for the very broad definitions of 'pollution' and 'controlled waters' in part (b) of the definition. As it stands, sites can technically be classified contaminated land if any water body is found to have been altered by site activities e.g. containing trace concentrations of any site derived contaminant. This has been recognised by the authorities with an amendment proposed to the definition to include the word 'significant' before 'pollution' (DEFRA, 2004). This has yet to be implemented in England, although Scotland and Wales already have amendments in place.

In New Zealand, a statutory definition for contaminated land wasn't introduced until the RMA was amended in 2005. The definition is:

"land of one of the following kinds:

(a) if there is an applicable national environmental standard on contaminants in soil, the land is more contaminated than the standard allows; or

(b) if there is no applicable national environmental standard on contaminants in soil, the land has a hazardous substance in or on it that –

(i) has significant adverse effects on the environment; or

(ii) is reasonably likely to have significant adverse effects on the environment."

Currently, in the absence of national environmental standards, part (b) will apply. The statutory definition of 'environment' is very broad and also includes, for example, social, economic, aesthetic and cultural conditions. This is different to the UK where the receptors

that can be assessed in determining if land is contaminated are much narrower, and essentially restricted to people, property and certain 'valued' ecosystems. However, in practice in New Zealand the environment is generally people and ecosystems.

As the definitions stand in both the UK and New Zealand, site specific conditions may be taken into account when determining whether a site is designated as contaminated. For example, a site may avoid being designated 'contaminated' by reducing exposure through site management and preventing a "significant possibility" of "significant harm" (in the UK) or reduce the "likelihood" of significant adverse effects in New Zealand.

However, if a national environmental standard is introduced in New Zealand, part (a) of the definition could potentially result in sites being designated 'contaminated' even where significant adverse effects are not likely. Any environmental standard (either numerical value or methodology) is likely to be conservatively protective of health when applied to a specific site. However, this does not typically imply that any concentrations above the standard will definitely be causing an 'adverse effect', only that there **may** be such an effect. Therefore, a slight exceedance of the national standard will not necessarily demonstrate that the site is having a 'significant adverse effect' on the environment i.e. which is the definition of contaminated land currently being applied. Similarly, if an environmental standard exists and is exceeded, land would be designated contaminated under part (a) of the definition, even if site specific factors or management actions mean there are no likely adverse effects.

The Technical Framework

A statutory definition is a starting point for assessing contaminated land. However, to translate the 'policy' into decisions on individual sites, a technical framework is required. Such a framework attempts to quantify the terms such as 'significant adverse effects' and 'significant harm'.

In the UK, the *Model Procedures for the Management of Land Contamination – CLR 11* was produced in 2004 (DEFRA/EA, 2004). The intention of the document was to 'provide the technical framework for decision making on contaminated land'. The document provides a generic process for risk assessment, with links to relevant information and tools provided for each stage of the process. Similar processes are also provided for the subsequent selection and implementation of remediation options. The document is around 200 pages long and has a complex set of cross referencing. For example, while following through the suggested methodologies, the reader is referred to well over 100 separate technical documents on various aspects of risk assessment or remediation, in addition to the generic guidance in the documents itself. In practice, the document is used as a general reference in the UK rather than a strict methodology.

The Contaminated Land Exposure Assessment Model (CLEA) for soil is intended to be the main tool for assessing risk to human health in the UK. The CLEA model was specifically developed with the intention of enabling local authorities to determine whether land was 'contaminated' under Part IIA, in relation to human health effects (DEFRA, 2006b). The CLEA model is non-statutory guidance and only relates to the human health effects of contaminated soil i.e. it does not address risk to groundwater resources or other receptors. The model was first introduced in 2002 to allow soil guideline values (SGVs) to be derived. However, the CLEA software at that stage only allowed assessments for a limited number of contaminants and for a small number of generic site use scenarios (DEFRA, 2006b). This version has now been withdrawn. In 2005, a new 'beta' version of the CLEA model was

introduced that allowed more flexibility. The latest model allows generic criteria to be derived using default library values, or site specific criteria to be derived by altering contaminant data (e.g. physico-chemical and toxicological parameters), building types or soil types.

However, the ongoing 'introduction' of the CLEA model has not been smooth. To date, only ten SGVs have been published. In fact, a bulletin issued last year by the EA states that no more toxicological or SGV reports will be published until a review of the underlying assumptions for the CLEA model is completed (EA, 2006). In addition, in 2005 a statement was issued which advised caution on applying the SGVs to determine whether land was contaminated under Part IIA (DEFRA, 2005). The statement included the following:

> *"…it should be a matter for careful consideration by local authorities whether concentrations of substances in soil equal to, or not significantly greater than, an SGV would meet the legal test … it is apparent that there is a wide body of opinion that such concentrations would not necessarily satisfy that legal test"*

The problem identified was that the SGVs essentially provide an 'acceptable' level of soil contamination, but do not necessarily indicate that concentrations at or just above the SGV will be 'unnacceptable' in the legal context. Exceedance of SGVs only indicates that further assessment or remedial action **may** be required (DEFRA, 2005). This appears to call into question whether the CLEA model can achieve one of its the key objectives i.e. to determine whether land is 'contaminated' under Part IIA.

Risks to 'controlled waters' (which include groundwater and surface water bodies) are assessed under a separate methodology in the UK. The *Remedial Targets Methodology* provides a framework for deriving site specific remedial targets for soil and groundwater to protect the aquatic environment (EA, 2006). This document replaces and updates the old 'R&D P20' methodology (EA, 1999). The series of assessment 'levels' are used to screen sites: ranging from comparing estimates of pore water concentrations directly with compliance criteria (Level 1); through to levels 3 and 4 where dilution and various forms of attenuation are taken into account between the source and receptor. The document provides guidance on selecting compliance points, target criteria and also provides two software packages to assist with the contaminant transport modeling aspects. In comparison to the CLEA model, this methodology appears to be relatively widely accepted and functioning effectively in the UK. A similar methodology guiding assessment of risk to water would have value in New Zealand.

There is currently no clear framework for assessing risk to ecological receptors in the UK. The EA has assessed various overseas practices and recommended that the European Commission approach is adopted (EA, 2004). In the interim, a variety of guidelines and assessment practices are being used.

In New Zealand, there is currently no overriding statutory guidance on the technical framework or methods to be used in assessing environmental risk or whether land is 'contaminated' under the RMA definition. However, there are a range of guideline documents that are commonly being used to assess contaminated land. These include a number of non-statutory 'risk-based' guidelines that have been produced by the central government, after consultation with industry and local government e.g. the 'timber treatment', 'gasworks', 'hydrocarbon' and 'sheep dip' guidelines. The documents provide soil guideline values for a limited number of contaminants and a range of generic site uses and receptors.

Guideline values for groundwater and air are also provided for a few contaminants and pathways.

Other commonly used guidelines include:

- the 'ANZECC' guidelines which provide guideline values for surface water and sediment for human health (e.g. recreational water use), food production and aquatic ecosystem receptors (ANZECC/ARMCANZ 2000);

- the New Zealand Drinking Water Standards (MoH, 2005); and

- the Ambient Air Quality Guidelines (MfE, 2002).

However, the New Zealand guidelines generally only cover a limited number of contaminants and practitioners often have to rely on international guideline values. In addition, even amongst the New Zealand guidelines, there are significant variations in the terminology used, derivation methods and basic input assumptions. In some cases, conflicting guideline values are produced for the same compound e.g. the hydrocarbon guideline value for benzo(a)pyrene in a residential setting (10% home grown produce) is 0.27 mg/kg (MfE, 1999), with a corresponding gasworks guideline value of 1 mg/kg (MfE, 1997b).

The Contaminated Land Management Guidelines No. 2 (MfE, 2003) provides a suggested hierarchy of selection for the various guidelines, with New Zealand risk-based guidelines preferred in the first instance. However, there is currently no statutory guidance in New Zealand on how the various guidelines may relate to the 'significant adverse effects' phrase contained in the legal definition of contaminated land. As noted above, the initial attempt to use the CLEA model in the UK to determine if land is contaminated under Part IIA is running into difficulties.

New Zealand has no equivalent of the UK framework for assessing risk to groundwater and surface water from site derived contamination (EA, 2006). Consequently, there is currently a wide variety of practices being undertaken to assess whether a site is adversely affecting water resources in New Zealand.

In terms of assessing risk to ecological receptors, only limited guidance is available from the New Zealand guidelines. The ANZECC guidelines include aquatic ecosystems as a receptor for water and sediment contamination (ANZECC/ARMCANZ, 2000) and the timber treatment and gasworks guidelines both assess the potential effects of some soil contaminants on plants (MfE/MoH, 1997) (MfE, 1997b).

Drivers to Investigate and Remediate

In the UK, one of the stated aims of the Part IIA legislation is the 'identification and remediation of contaminated land' (DEFRA, 2006a). The local authorities have a specific requirement to identify contaminated sites in their jurisdiction. However, in reality, the large majority of land being investigated and/or remediated in the UK is being triggered by the planning process during redevelopment. A developer must satisfy the local authority that the site is 'suitable for use' and that there is no 'unacceptable risk' due to contamination. Although the initial trigger for investigation is the planning process, the planning guidance refers specifically to Part IIA, and the subsequent risk assessment occurs under that regime.

The development pressure on land in the UK is significantly higher than New Zealand, due to the greater population density, higher land values and less 'greenfield' land being available for development. There is, therefore, a stronger incentive to redevelop contaminated land in the UK. In fact, one of the policies of the current UK government is that 60% of new housing development should be on 'brownfield' land.

In 2005, the RMA was amended to include a specific requirement of regional councils in New Zealand to identify and monitor contaminated land. However, similar to the UK, the majority of contaminated land currently being investigated is triggered by land use or subdivision consent requirements during redevelopment.

Liability

One of the clear differences between the UK and New Zealand framework is the lack of a liability regime for contaminated land in the latter. In the UK, the Part IIA legislation clearly outlines a hierarchy of liability, with the principle of 'polluter pays' underlying the regime (DEFRA, 2006). The UK liability hierarchy may be summarised as follows:

1. The polluter – if a person or company can be found that caused the contamination, then they are liable in the first instance.

2. The owner – if the polluter cannot be found after 'reasonable inquiry', the owner will become liable by default.

An example of the differences between the regimes is illustrated by a hypothetical site where a member of the public discovers that their house is situated on a historic landfill. In New Zealand, the owner is liable for the costs of investigation or remediation that might be required under the RMA or other legislation. In the UK, if the former landfill operator can be found (e.g. the local authority), that entity would be liable in the first instance. Despite the 'buyer beware' situation in New Zealand, environmental due diligence is still not standard practice here as it is in the UK, particularly for commercial property transactions. Recent consultation by the MfE found that a significant number of submitters favored introducing a hierarchical or polluter pays regime (MfE, 2007).

Regulation/Enforcement

The regulatory roles in the UK are fairly well defined. The primary regulators under Part IIA rests are the local authorities (DEFRA, 2006). Under Part IIA, the EA may provide site specific guidance to the local authority on contaminated land. However, where the site is assessed during the planning process (i.e. the majority of sites), the EA may only provide advice on risk to controlled waters such as groundwater and surface water (EA, 2003). Where pollution of water is involved (or certain other types of contaminated sites), the EA may becoming the enforcing authority.

The Part IIA legislation provides a mechanism for the relevant enforcing authority to ensure that land identified as contaminated is remediated. A remediation notice can be served on the liable party, or the enforcing authority can carry out the remediation itself and seek costs. However, as discussed above, this process has been carried out only rarely and the majority of contaminated sites in the UK are assessed via the planning process in a more 'voluntary' context.

In New Zealand, the 2005 amendment to the RMA clarified the regulatory authority roles. The territorial authorities are the enforcing authority for contaminated land during redevelopment of land, or where an ongoing use is subject to some form of land use regulation. The regional councils have a duty to investigate land to identify contaminated land, separately to whether that land is subject to other regulatory requirements. In addition, the regional councils are the enforcing authority where pollution of water is involved.

In New Zealand, Section 15(1) of the RMA prohibits the discharge of contaminants unless there is a specific authorisation for it. This is the section of the act used to prosecute non-compliant contaminated sites. The act provides a hierarchy of enforcement actions, from an 'abatement notice' through to actual prosecution with large associated fines and possible imprisonment.

In both the UK and New Zealand, only a limited number of sites in 'continued use' are being identified (or ruled out) as contaminated land. For example, only five remediation notices were served under Part IIA between 2000 and the end of 2006 in the UK. Although, remediation was 'secured' without serving a notice at 189 Part IIA sites over the same period (DEFRA, 2007a). This is a still a small fraction of the sites that are assessed via the planning process.

What Is Happening 'On The Ground'?

In the UK, there's appears to be a gap between the policy intentions and what is actually happening on a day to day basis. Despite this, the situation has improved significantly over the last ten years. In the late 1990s, guideline values such as ICRCL and Dutch Intervention values were being widely used by industry and regulatory authorities to assess contaminated land. The guideline values were repeatedly used as targets for remediation, often without good scientific justification or understanding of what the numbers represented. At the same time in New Zealand, the risk based industry guidelines, such as the hydrocarbon and gasworks guidelines, were being introduced and becoming widely accepted.

The ICRCL and Dutch guidelines are no longer accepted by regulatory authorities in the UK. However, the CLEA methodology has not yet become the accepted method for assessing risks to human health. There is ongoing confusion and controversy amongst both regulators and practitioners regarding the CLEA model. One of the key problems has been the limited number of contaminants with either published SGVs (currently ten) or toxicological reports available (currently 23). To fill this gap, practitioners have been forced use international guidelines or derive their own. For example, by early 2005 a number of UK companies had derived sets of generic screening criteria using the RBCA (or similar) model with the CLEA assumptions and inputs (where available). Criteria were derived for a wide range of potential contaminants and a number of different site scenarios (e.g. depth of contamination, soil type, soil pH and site use). This type of 'in-house' screening criteria is currently being accepted by regulatory authorities in the absence of published CLEA SGVs.

Similarly, a commercially available document titled *Generic Assessment Criteria for Human Health Risk Assessment* was released at the end of last year (LQM/CIEH, 2006). Criteria were derived using the latest CLEA model for a range of contaminants including four polycyclic aromatic hydrocarbons, four metals, petroleum hydrocarbons and a number of chlorinated solvents.

The generic assessment criteria appear to be becoming widely accepted by the industry and regulatory authorities in the UK. The current situation has evolved out of necessity and will be superceded when (and if) a further update of the CLEA model is released.

In New Zealand, the situation has really not evolved significantly from the late 1990s. Risk based guidelines are generally being applied. However, as discussed above, guidelines derived in New Zealand are not available for the full range of typical contaminants and are not always consistent. Practitioners are being forced to use overseas guidelines that are not always directly applicable to New Zealand sites. The recent MfE consultation found that most submitters wanted better guidance, including updates of the current guidelines (MfE, 2007).

In both countries, there is an ongoing problem of lack environmental expertise, particularly in local authorities. In many cases, small councils without adequate training are being asked to make decisions on complex environmental situations. This one of the core challenges of any contaminated land management framework: providing a clear decision framework for the local authorities. The authority is often in a very difficult position, with a duty to protect the 'environment' on one hand, and the potential to cause significant loss on the other e.g. preventing development or loss of property value due to 'blight'. Balancing 'protection' versus 'cost' is an inherent challenge when dealing with contaminated land.

Conclusions

Contaminated land is inherently complex. Governments around the world have struggled to provide a clear framework to assess and control the effects of contaminated sites.

When I arrived in the UK in the late 1990s, it felt like a step backwards (relative to New Zealand) in terms of the contaminated land assessment framework. There has, however, been steady progress in the UK since then. The Part IIA legislation provides a statutory definition for contaminated land, and mechanisms to identify and remediate such land. There is a large amount of associated technical guidance to assist in the application of the Part IIA policies. However, there appears to be a gap between the policy intentions and what is actually happening on a day to day basis in the UK. There is still not an accepted standard method for assessing risks to the environment from contaminated land.

In New Zealand, the RMA provides the core piece of legislation in terms of assessing risks associated with contaminated land. However, having recently returned to New Zealand from the UK, it appears that we haven't really moved on much since the 1990s when the original series of risk-based guidelines were introduced. In addition, guidelines derived in New Zealand are not available for the full range of typical contaminants and are not always consistent.

In both countries, there is still a large variation in the level of understanding and assessment methods of contaminated land, both by regulators and practitioners.

The key question is how far each country has moved towards a practical and sustainable framework for contaminated land management. It may be argued that, although New Zealand had an early lead, the UK has now caught up. Where the finish line may be is another matter entirely.

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