APPENDIX F

BASIS FOR ASSESSMENT OF SOILS

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The Contaminated Land Exposure Assessment (CLEA) model

The package consists of four main reports (CLR 7, 8, 9 and 10) and supporting toxicology reviews and SGVs for individual substances. Together, they provide a coherent, consistent approach for assessing risks to human health from contaminated soil.

The development of the CLEA model and the Soil Guideline Values is an on-going programme of work supported by DEFRA, the EA and the Scottish Environmental Protection Agency (SEPA). Future publications will include evolution of the CLEA model as well as further individual toxicology reviews and SGVs to expand the list of substances for which information is already available.

The four reports are published as part of the CLR series of documents (CLR stands for Contaminated Land Reports) and are briefly introduced below.

CLR7   Assessment of Risks to Human Health from Land Contamination: An Overview of the Development of Soil Guideline Values and Related Research. CLR7 serves as an introduction to the other reports in this series. It sets out the legal framework, in particular the statutory definition of contaminated land under Part IIA of the Environmental Protection Act (EPA) 1990; the development and use of Soil Guideline Values; and references to related research.

CLR8   Priority Contaminants for the Assessment of Land. This identifies priority contaminants (or families of contaminants), selected on the basis that they are likely to be present on many current or former sites affected by industrial or

waste management activity in the United Kingdom in sufficient concentrations to cause harm; and that they pose a risk, to either human health, buildings, water resources or ecosystems. It also indicates which contaminants are likely to be associated with particular industries.

CLR9 Contaminants in Soil: Collation of Toxicological Data and Intake Values for Humans. This report sets out the approach to the selection of tolerable daily intakes and Index Doses for contaminants to support the derivation of Soil Guideline Values.

CLR10 The Contaminated Land Exposure Assessment Model (CLEA): Technical Basis and Algorithms. This report describes the conceptual exposure models for each standard land-use that are used to derive the Soil Guideline Values. It sets out the technical basis for modelling exposure and provides a comprehensive reference to all default parameters and algorithms used. A software version of the CLEA model, called CLEA 2002, was included as a CD-ROM with CLR10, this was superseded by the development of the "CLEA UK" software in 2005. As currently in 'BETA' test format, the guidelines calculated using this model are also compared with the CLEA 2002 SSACs and the guidelines defined using the SNIFFER Model (discussed below).

The new Soil Guideline Values are a tool that can be used to assess the risks posed to human health from exposure to soil contamination resulting from land use. They represent 'intervention values', which indicate to an assessor that soil concentrations above this level could pose an unacceptable risk to the health of

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site users and that further investigation and/or remediation is required. SGVs combine both authoritative science and policy judgements.

SGVs have been derived using the CLEA model according to three typical land uses:

- residential (with and without vegetable growing)
- allotments
- commercial / industrial

Where applied appropriately, exceeding a Soil Guideline Value suggests the need for either further investigation and/or remediation.

SGVs can no longer be used in connection with the formal requirements of Part IIA of the Environmental Protection Act 1990 ("the contaminated land regime"). However, they are still considered relevant to many situations where the effect of land contamination on human health is an issue such as in planning applications when judging the need for action to ensure that a new use of land does not pose unacceptable risks to health. The SGVs are used in respect of assessing risks to human health. To date SGVs have been published for the following contaminants:

- Arsenic (SGV1),
- Cadmium (SGV3),
- Chromium (SGV4),
- Inorganic Mercury (SGV5),
- Nickel (SGV7),
- Phenol (SGV8),

- Selenium (SGV9),

- Lead (SGV10),

- Toluene (SGV15) and

- Ethylbenzene (SGV16).

The "CLEA UK" computer model can be used to derive Generic Assessment Criteria (GAC), derive Site-Specific Assessment Criteria (SSAC) and calculate Average Daily Exposure/Health Criteria Value (ADE/HCV) ratios using a methodology that is consistent with current government policy on contaminated land. Additionally, assessment criteria can be derived for contaminants for which no government approved HCVs or SGVs are available.

LQM/CIEH GACs

Tier 1 assessment comprises comparison with a set of generic assessment criteria (GAC's), designed to provide a conservative guideline value, below which concentrations of named contaminants are deemed not to pose a significant risk to Human Health.

In the absence of published SGV's, GAC's published by Land Quality Press, (In association with Land Quality Management and the Chartered Institute of Environmental Health, 2006) have been used.

It should be noted that neither SGV's (which can only be created by the EA) or GACs have a legal standing. The GAC's developed by LQM/CIEH are in line with current published EA guidance and, in the absence of published SGV's, are viewed as suitable for use as Generic Assessment Criteria.

Although significantly different in their respective regulatory standings, SGV's and LQM/CIEH GAC's are identical in application and will be grouped together under the term GAC's.

Toxicological and physiochemical information used in the derivation of the LQM/CIEH GAC's has been developed in line with guidance set out in DEFRA Report CLR 9 (2002), and source documents have been utilized according to a defined hierarchy;

    a. DEFRA / EA

    b. Other UK government / state organisation documents

    c. European institution documents

    d. International organisation documents

    e. Other national (European and non-European) documents

    f. Compilations

    g. Primary literature

This information was subjected to peer review within the LQM/CIEH working group (comprising delegates from consultants and local authority regulators) and is viewed by this company (in the absence of official EA guidance) to be authoritative.

Several standard land-uses and site conditions are defined within the GAC's, all of which are based on a number of assumptions that provide a conservative result within the relatively broad range of sites to which they can be applied.

Assuming the conceptual model defined in the initial assessment of the site is analogous with one of the standard land-uses, a tier 1 assessment can be carried out.

If the conceptual model developed for the site differs from all of the standard land-uses the use of a tier 1 assessment may not be appropriate.

Tier 1 assessments provide a screening value, below which further action is not required.

The presence of contamination at or above the levels presented in the GAC's does not *necessarily* signify that an unacceptable risk to Human Health is present at the site, merely that an unacceptable risk is potentially present, and that further site specific assessment is required.

GAC's are published for individual determinants, and deal exclusively with the risk to human health posed by the named contaminant. No assessment is made of the potential synergistic (either positive or negative) effects of two or more contaminants.