Contaminated Land in England
Update on guideline values

Presented by: Morwenna Carrington
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Overview

- Introduction to contaminated land in the UK
- European and domestic frameworks
- National Planning Policy Framework
- Revised Part 2A Statutory Guidance
- Normal background concentrations
- Development of new Category 4 Screening Levels
- Peer review and next steps
The UK is divided into:

- England
- Wales
- Scotland
- Northern Ireland

- Environmental Protection is a devolved issue and different regimes exist in each territory
## European Legislation

<table>
<thead>
<tr>
<th>Environmental Quality Standards</th>
<th>Integrated Pollution Prevention &amp; Control (IPPC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Groundwater Directive</td>
<td>Landfill Directive</td>
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<tr>
<td>Mining Waste Directive</td>
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Department for Environment, Food & Rural Affairs
Domestic Legislation

- Redevelopment:
  - Town and Country Planning Act 1990

- Historical contamination:
  - Part 2A of Environmental Protection Act 1990 (as inserted by Environment Act 1995)
  - Contaminated Land (England) Regulations 2006 (as amended)

- Prevention of New contamination:
  - Environmental Damage (Prevention and Remediation) Regulations 2009
  - Groundwater (England and Wales) Regulations 2012
  - Environmental Permitting (England and Wales) Regulations 2010
120. To prevent unacceptable risks from pollution and land instability, planning policies and decisions should ensure that new development is appropriate for its location. The effects (including cumulative effects) of pollution on health, the natural environment or general amenity, and the potential sensitivity of the area or proposed development to adverse effects from pollution, should be taken into account. Where a site is affected by contamination or land stability issues, responsibility for securing a safe development rests with the developer and/or landowner.

121. Planning policies and decisions should also ensure that:

● the site is suitable for its new use taking account of ground conditions and land instability, including from natural hazards or former activities such as mining, pollution arising from previous uses and any proposals for mitigation including land remediation or impacts on the natural environment arising from that remediation;

● after remediation, as a minimum, land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990; and

● adequate site investigation information, prepared by a competent person, is presented.
Definition of Contaminated Land under Part 2A:

“Contaminated land is any land which appears to the local authority in whose area it is situated to be in such 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) Significant Pollution of controlled water is being, or is likely to be, caused”

Radioactively contaminated land is dealt with separately.
Summary of Category 1-4 System

Point above which land is “contaminated land” under Part 2A.

- Likely de facto minimum standard chosen by developers
- New Category 4 screening levels
- Current SGVs and GACs

Risk

Category

1

Contaminated land

2

3

Not contaminated land

Amount of Land
Statutory Guidance & “normal levels”

- may result from the natural presence of contaminants at levels that might be considered typical in a given area, and have not been shown to pose an unacceptable risk to health or the environment

- **ISO soil background content guidance**: Content of a substance in a soil resulting from both natural geological and pedological processes and including diffuse source inputs (BS EN ISO 19258:2011)
Normal Background Concentrations (NBCs)

- Defra R&D project – conducted by British Geological Survey (BGS) & published October 2012

- Statutory Guidance states that:
  - "The Part 2A regime....is not intended to apply to land with levels of contaminants in soil that are commonplace and widespread throughout England or parts of it...”
  - “Normal levels of contaminants should not be considered to cause land to qualify as contaminated land, unless there is a particular reason to consider otherwise.”
NBC Project Outputs

- Outputs of the project include Technical Guidance Sheets (and Supplementary Information) containing NBCs for:
  - Arsenic (As)
  - Benzo(a)pyrene (BaP)
  - Cadmium (Cd)
  - Copper (Cu)
  - Mercury (Hg)
  - Nickel (Ni)
  - Lead (Pb)

- A Normal Background Concentration for Asbestos was not established due to insufficient information.
Arseonic domains in England

Ironstone NBC: 220 mg/kg
Mineralisation NBC: 290 mg/kg
Principal NBC: 32 mg/kg
Benzo(a)pyrene (BaP) domains in England

- Urban NBC: 3.6 mg/kg
- Principal NBC: 0.5 mg/kg
Cadmium domains

Cadmium (Cd) domains in England

Urban NBC 2.1 mg/kg
Mineralisation Group 1 NBC 17 mg/kg
Mineralisation Group 2 NBC 2.9 mg/kg
Chalk South NBC 2.5 mg/kg
Principal NBC 1.0 mg/kg
Soil Guideline Values and Generic Assessment Criteria

• Local authorities may use GACs and other technical tools to inform certain decisions provided:
  – They understand how they were derived and how they can be used appropriately
  – They have been produced in an objective, scientifically robust and expert manner by reputable organisations
  – They are only used in accordance with Part 2A and the guidance

• New technical tools and advice may be developed to help regulators and others apply and conform to this Guidance

• Tools might be developed to help assessors apply the Category 1-4 approach in relation to specific substances or situations. For example, this might include the development of generic screening levels to help assessors decide when land might be assumed to be in Category 4
Impact Assessment

• “The new statutory guidance will bring about a situation where the current SGV/GACs are replaced with more pragmatic (but still strongly precautionary) Category 4 Screening Levels (C4SLs) which will provide a higher simple test for deciding that land is suitable for use and definitely not contaminated land”

• “In the many consultation meetings held in developing the Category 1-4 system, all the developers, landowners and consultants we spoke to were strongly of the view that they would want to ensure their land is safely within Category 4 (even though in theory they could remediate to a level within Category 3 and still satisfy Part 2A and planning rules)”
What are Category 4 Screening Levels?

- C4SLs:
  - Are intended as generic screening values to help show when land is within Category 4
  - Describe a level of risk that whilst above ‘minimal’ is still ‘low’
  - Provide a ‘higher simple test’ for deciding that land is suitable for use and definitely not contaminated land under Part 2A
Steering Group

Cross-Government Agency Steering Group

- Defra
- DCLG
- Welsh Government
- Environment Agency
- Natural Resources Wales
- Public Health England (formerly Health Protection Agency)
- Food Standards Agency
- Homes and Communities Agency
Work packages

1. Design of methodology (model) for determining Category 4 Screening Levels

2. Develop methodology using at least 2 test substances
   - Cadmium
   - Benzo(a)pyrene

3. Determine Category 4 Screening Levels for an initial suite of 6 substances
   - Benzene
   - Arsenic
   - Chromium VI
   - Lead
Public Open Space

- Scenario 2, POS_{resi} - Grassed Area Close to Housing

- Scenario 2, POS_{park} – Park Type Open Space
The CLEA paradigm

- CLEA fit for purpose: to determine minimal risk values
- What modifications can be made to derive C4SLs?

Measured Concentrations

Is $C_s > SGV$?

CLEA model

% increase in incidence of cancer above background

Dose of BaP (mg/kg/d)

HCV

Exposure Parameters
Contaminated land Exposure Assessment (CLEA)
Overview of approach

- Retained and used the CLEA framework, modified according to considerations of the underlying assumptions and science, within the context of Defra’s policy background.

- Modifications relating to:
  - exposure modelling;
  - toxicological parameters and the setting of toxicological criteria at a higher than minimal risk (defined as a ‘low level of toxicological concern’ or LLTC);
  - consideration of uncertainty; and
  - considerations in the setting and use of C4SLs.
Developed framework to derive C4SL

1. Toxicological assessment

2. Derive LLTCs (mg kg\(^{-1}\) bw day\(^{-1}\))

3. Make (and justify) relevant modifications to CLEA

4. Use modified CLEA and LLTCs to derive pC4SLs

5. Use CLEA probabilistically to explore probability of exceeding LLTC when representative concentration = pC4SL

6a. Take account of uncertainties affecting the toxicological assessment

6b. Take account of sources of variability and uncertainty that are not quantified by probabilistic modelling.

6c. Take account of other relevant scientific considerations, including background concentrations, other routes of exposure, and epidemiological evidence

6d. Take account of any social or economic considerations that are thought relevant to setting an appropriate level of precaution

7. Is the pC4SL appropriately precautionary?

   yes

STOP
C4SLs suitable for use (final C4SLs)

   no
Further considerations

• May need to consider wider context when setting the C4SL for a particular substance, e.g.:
  – Background soil concentrations
  – Background exposure from non-soil sources
  – Epidemiological evidence
  – Socio-economic considerations, e.g. the cost and proportionality in setting C4SLs so low as to always be exceeded

• Sense check on whether there could be odour, phytotoxicity or visual acceptability issues or acute risks at the C4SL
## Provisional C4SLs

<table>
<thead>
<tr>
<th>Substance</th>
<th>pC4SL with changes to exposure parameters and LLTC (mg.kg(^{-1}))</th>
<th>Residential</th>
<th>Allotments</th>
<th>Commercial</th>
<th>POS(_{\text{resi}})</th>
<th>POS(_{\text{park}})</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(SGV or GAC shown in brackets for comparison)</td>
<td>With home grown prod.</td>
<td>Without home grown prod.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arsenic</td>
<td></td>
<td>37 (32)</td>
<td>40</td>
<td>49 (43)</td>
<td>640 (640)</td>
<td>79</td>
</tr>
<tr>
<td>Benzene</td>
<td></td>
<td>0.87 (0.33)</td>
<td>3.3</td>
<td>0.18 (0.07)</td>
<td>98 (95)</td>
<td>140</td>
</tr>
<tr>
<td>Benzo(a)pyrene (as a surrogate marker for genotoxic PAHs)</td>
<td></td>
<td>5.0 (1.0)</td>
<td>5.3</td>
<td>5.7 (2.1)</td>
<td>76 (14)</td>
<td>10</td>
</tr>
<tr>
<td>Cadmium</td>
<td></td>
<td>26 (10)</td>
<td>149</td>
<td>4.9 (1.8)</td>
<td>410 (230)</td>
<td>220</td>
</tr>
<tr>
<td>Chromium (VI)</td>
<td></td>
<td>21 (4.3)</td>
<td>21</td>
<td>170 (2.1)</td>
<td>49 (35)</td>
<td>23</td>
</tr>
<tr>
<td>Lead</td>
<td></td>
<td>86 – 210 (450*)</td>
<td>130 - 330 (450*)</td>
<td>34 – 84 (450*)</td>
<td>1100 – 6000 (750*)</td>
<td>270 - 760</td>
</tr>
</tbody>
</table>

GAC from Nathanail et al., 2009 shown

* Former SGV now withdrawn
Peer review

• Defra uses peer review of selected evidence proposals and outputs to help ensure the evidence it funds is good quality and fit-for-purpose

• Toxicology methodology (development of Low Level of Toxicological Concern) considered by the Committee on Toxicology on 14 May 2013

• Use of Excess Lifetime Cancer Risk greater than 1:100,000 considered by Committee on Carcinogenicity 19 September 2013

• Final reports currently going through peer review process
Committee on Toxicity

• Draft minutes and recommendations from Committee on Toxicity published 11 June 2013
  – “broad approach was reasonable”
  – “Members agreed that the report was good”

• ENDS article published 25 June 2013
  – “The COT did not identify any fundamental problems with the LLTC methodology, and it endorsed the broad approach.”
Next steps & publication

• Publication on Defra website ("the 12-week publication window should commence from the end of the peer review process") of:
  – Final reports
  – Minutes from COT and COC meetings
  – Anonymised stakeholder comments and feedback
  – Policy view (e.g. companion document) from Defra

  – Other Government Departments and Agencies may provide their own comments
Questions?