Progress with the development of the new Category 4 Screening Levels

CONTAMINATED LAND: APPLICATIONS IN REAL ENVIRONMENTS

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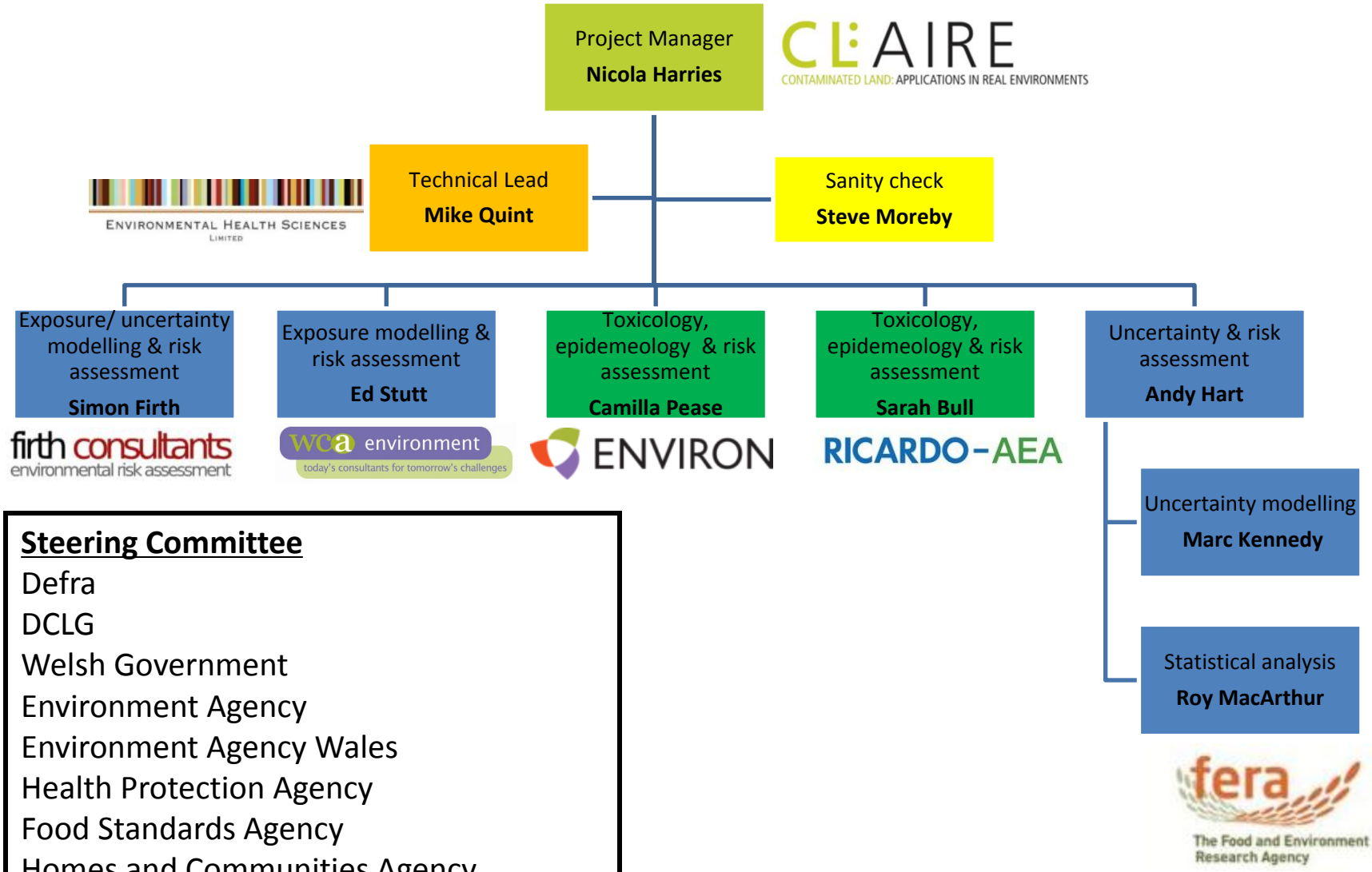
Introduction

- Project team
- Project objectives
- What are C4SLs?
- Work conducted in Work Package 1
- Proposed methodology for deriving C4SLs

Project Team



Steering Committee

Defra
DCLG
Welsh Government
Environment Agency
Environment Agency Wales
Health Protection Agency
Food Standards Agency
Homes and Communities Agency

Project Objectives

- To develop a methodology to derive C4SLs for 4 generic land-uses:
  - Residential
  - Allotments
  - Commercial
  - Public Open Space

WP1

- To derive C4SLs for 6 substances:
  - Benzo(a)pyrene
  - Cadmium

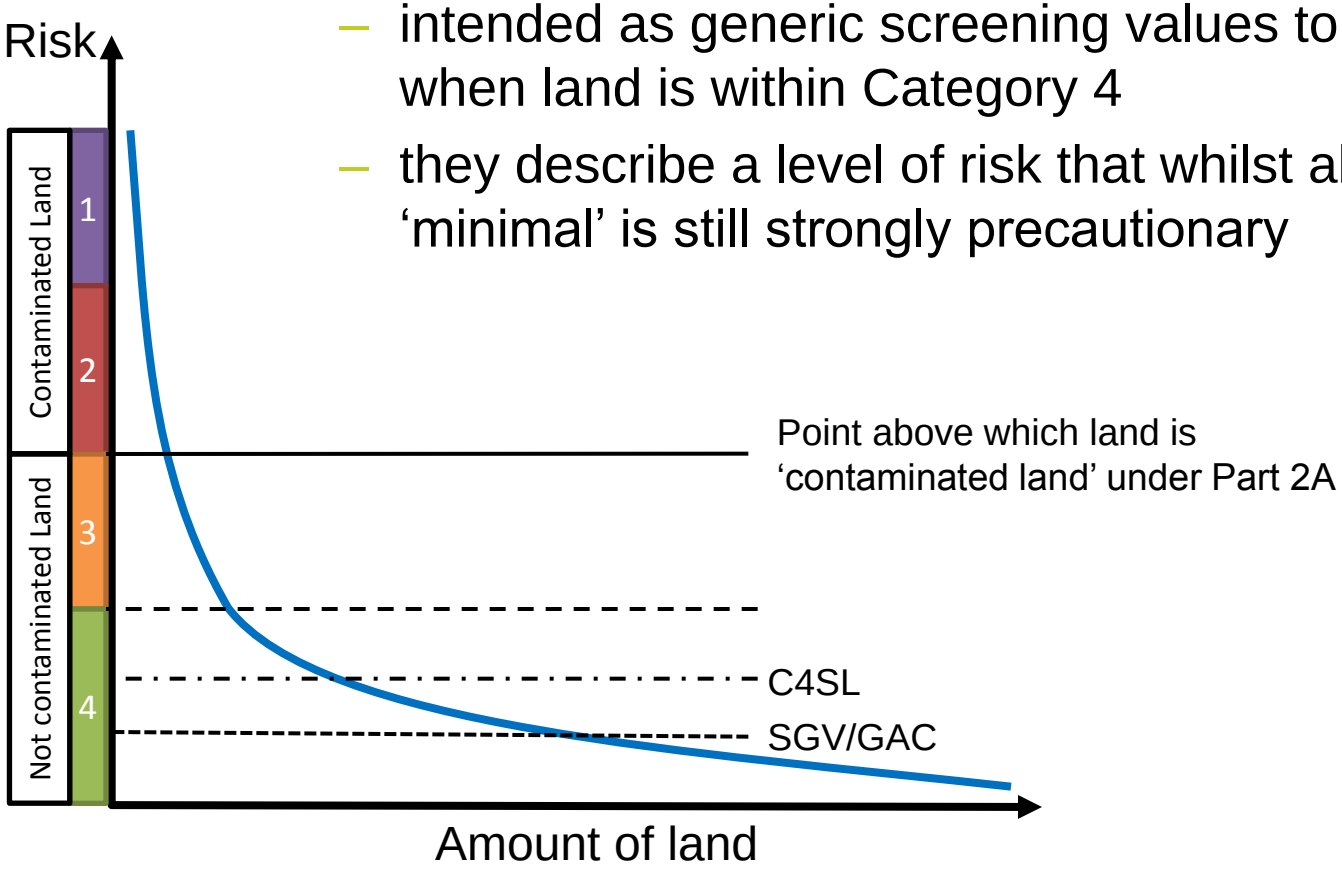
WP2

  - Arsenic
  - Benzene
  - Hexavalent chromium
  - Lead

WP3

What are C4SLs?

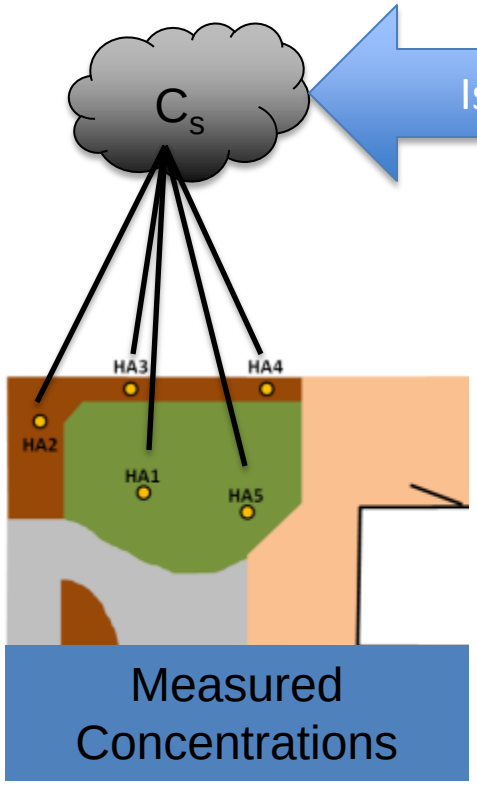
- Category 4 land
  - Land that is definitely not contaminated land
  - Land where there is no risk or where the level of risk posed is low
    - C4SLs are
      - intended as generic screening values to help show when land is within Category 4
      - they describe a level of risk that whilst above ‘minimal’ is still strongly precautionary



Approach to WP1

1. Critical review of CLEA:
   - Exposure modelling aspects
   - Toxicological aspects
2. Development of framework
   - Proposed modifications to existing CLEA framework
3. Preparation of draft WP1 report for Steering Committee Review
4. Stakeholder workshop
   - Presented proposed modifications
   - Collated feedback
5. Finalisation of WP1 report
   - Taking on board comments received from Steering Committee/Stakeholders

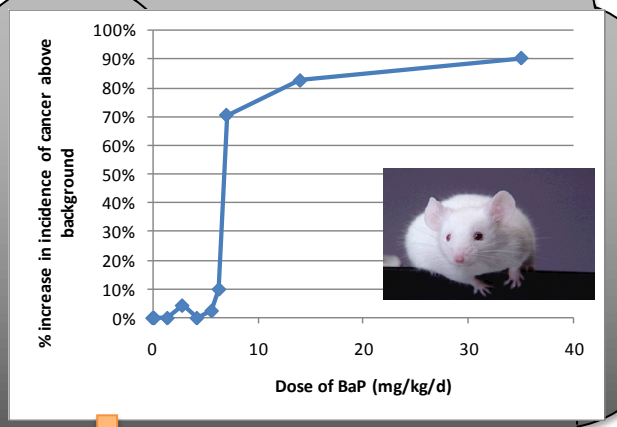
The CLEA paradigm



Measured Concentrations

Is C_s > SGV?

SGV



HCV

CLEA model

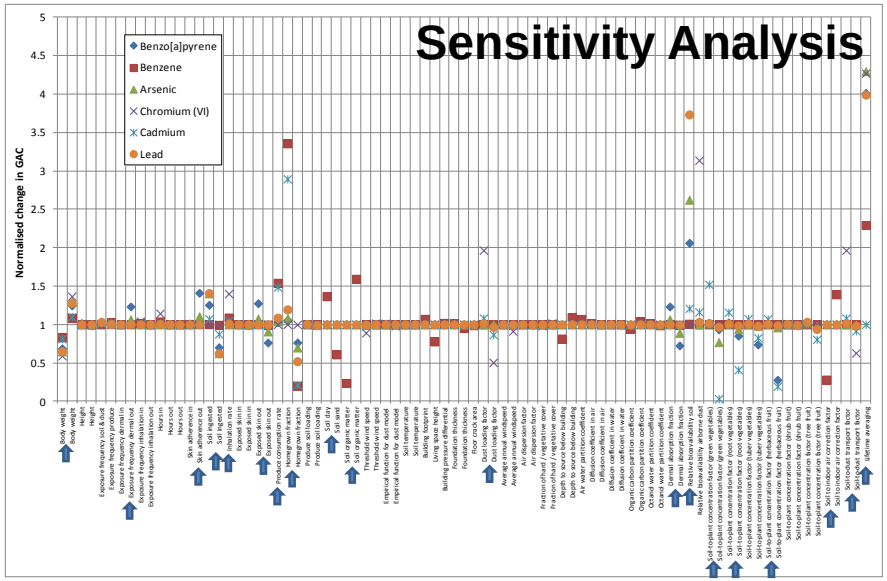
Environment Agency

Exposure Parameters

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

Exposure Modelling

- Critical review of uncertainties in CLEA model
  - CSM
  - Algorithms
  - Parameter values
- What is level of precaution in each key parameter?
  - Is it central tendency or upper percentile?



- Proposed modifications:
  - Updating parameter values with new data where available
  - Adjusting some parameter values to better reflect reasonable maximum exposure
  - Eliminating unit conversion conservatism

Exposure Modelling

- Updating parameter values, e.g.
  - Produce consumption rates
  - Respiration volume
- Reasonable maximum exposure
  - e.g. Dermal contact
  - Child assumed to wear shorts + T shirt and get filthy in garden 365 d/yr
  - Propose to use CT estimate for soil adherence in combination with worst case skin area, 170 d/yr

- Receptor specific intake values
  - Currently, HCV_{inh} benzene = AQO (5 ug/m^3) x 20 m^3/d / 70kg
  - Applied to a 13 kg child who breathes 8.8 m^3/d (average AC 1-6)
  - Results in an acceptable indoor air conc of 1.5 ug/m^3 (<AQO)
  - Calc receptor-specific $LLTC_{inh}$, i.e. based on child for resi land use

Toxicity Assessment

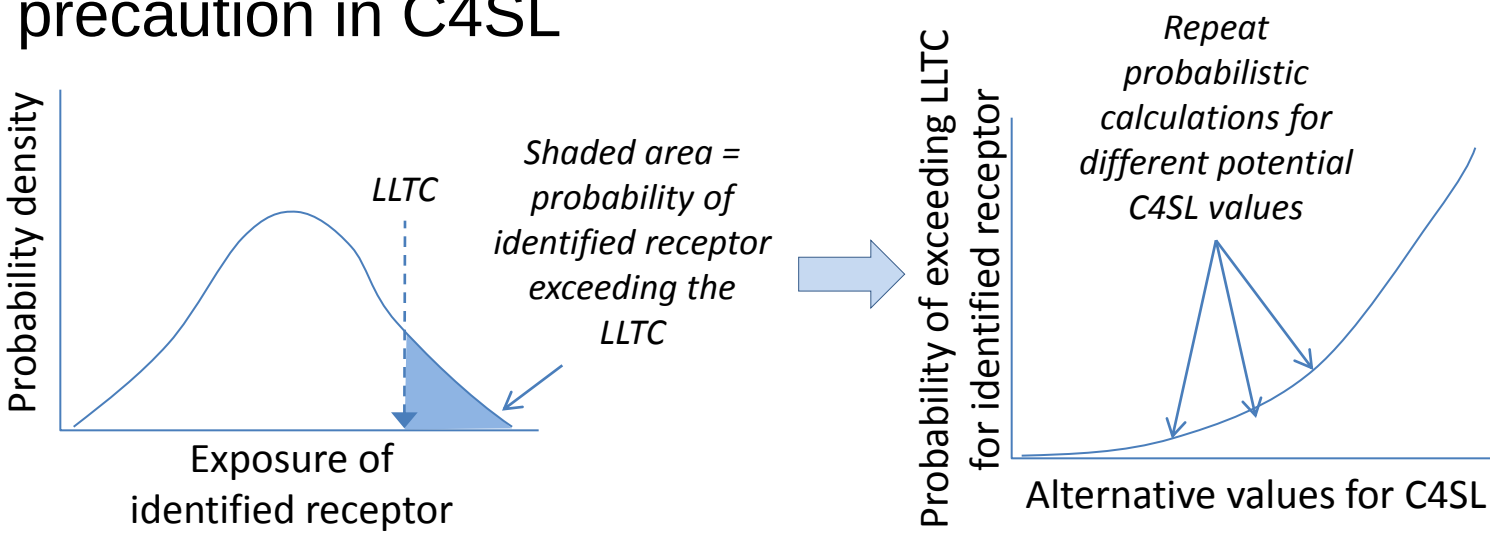
- SGV = soil concentration at which estimated exposure to critical receptor = HCV
- HCV describe a level of risk at which substances might pose either **no appreciable risk** or a **minimal risk** to human health
- HCV derived using protocol in CLEA SR2:
  - Threshold substances
    - HCV = Point of departure / Uncertainty Factor (UF) (Variable)
    - Point of departure (POD) = NOAEL, LOAEL or BMDL
  - Non threshold genotoxic carcinogens
    - Animal data HCV = POD ($BMDL_{10}$) / UF (10,000)
    - Human epidemiological data HCV = dose that results in ELCR of 1 in 100,000

Toxicity Assessment

- C4SLs describe a higher level of risk than SGVs
- C4SL = soil concentration at which estimated exposure to critical receptor = Low Level of Toxicological Concern (LLTC)
- LLTC derived using similar framework to SR2 but with reinforcement/modification in certain areas:
  - Use of BMD modelling to set POD where possible
  - Avoid the use of default UFs – use scientifically based chemical specific adjustment factors/margins, where possible
  - Consider moving above ELCR of 1 in 100,000 (e.g. 2 in 100,000) for carcinogens with human epidemiological data

Setting the C4SL

- C4SL = soil concentration at which estimated average daily exposure = LLTC
- Use probabilistic modelling/qualitative uncertainty assessment to ensure there is sufficient level of precaution in C4SL



- Consider other lines of evidence, e.g.
  - Background exposure/concentrations
  - Degree of precaution in LLTC

Take home messages

- This is work in progress – nothing is finalised!
- The intention is that C4SLs describe a level of risk that whilst higher than SGVs is still suitably protective
  - Subject to them being used appropriately
- Existing CLEA model will be used to derive C4SLs
  - But behind the scenes probabilistic modelling will be conducted in WP2 (& WP3) to help finalise a suitable set of parameter values
- C4SLs will be used in GQRA in the same way as SGVs
  - But work is progressing on how site measurement uncertainty is best considered

Thank you

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