

Soil Guideline Values in the UK

A brief overview of the position at January 2007

1. BACKGROUND

1.1 This briefing note is intended for a broad audience, but aimed primarily at those with limited experience in the investigation and assessment of contaminated land. It has therefore been kept as short as possible. Those seeking more detail should refer to the documents on the, *References and further Reading*, list at the end of the note.

1.2 In 2002 the Government published the new, Contaminated Land Exposure Assessment Model¹ (CLEA). This provided a means of calculating a concentration in soil which certain substances should not exceed if they were to be considered safe in a particular exposure scenario. CLEA's high risk exposure scenario (the CLEA conceptual model), was broadly as follows:

The critical receptor is assumed to be a young female child with the duration of exposure the first six years of life. The girl is assumed to spend all her time in or close to the home and her consumption rate of home grown garden produce 365 days per year after the first year (which is estimated as 250 days).

1.3 For commercial and industrial uses:

A female was again chosen as the critical receptor, with exposure duration considered over a working lifetime (age 16-59 = 44 years exposure). It is assumed work takes place in a permanent single storey building where employees spend most of their time indoors involved in office-based or relatively light physical work. It also assumes that a certain proportion of contaminated soil will be tracked into the workplace from the adjacent ground and that she will be exposed to soil and dust every day of her 44 year working life.

1.4 At the same time toxicological data² for 8 substances³ was published together with soil guideline values⁴ (SGVs) for 7 substances⁵.

1.5 The toxicological data series are specialised documents which aim to derive what is known as, 'Index Doses', for specified substances, which are needed to calculate SGVs using the CLEA model. Another more detailed document⁶ offers a general discussion on the science of human toxicology and it is necessary to read and become familiar with this to be in any position to begin to understand the complexity of the issues involved.

1.6 It has always been my view that no-one other than an expert in human toxicology with a unique and detailed understanding of the chemical compounds of primary concern, their possible impact on human health in their various forms, their reactivity in soil over periods of weathering and other physical, chemical and biological processes, together with an in- depth understanding of the model itself (including its many limitations) should even consider attempting to derive a soil guideline value. As I have learned more about these processes over the years, I have become firmer of this view.

1.7 It should be born in mind that this very earliest of CLEA guidance totalled over 500 A4 pages, so to read and understand all of this, along with Part IIA and the statutory guidance, required not only a notable intellectual ability in this unusually complex field, but also a significant commitment on behalf of the individual, and their employers.

1.8 The volume of paperwork has multiplied manifold since then.

1.9 The soil guideline values are described as, “intervention values”, ie the concentration above which the land might present an unacceptable long term (chronic) exposure risk. They are not remediation, target or clean up values, though it is suggested they may be used to ‘inform’ such decisions. They are of no value where acute risks may exist.

1.10 At this point, two years after the introduction of Part IIA, we now had generic SGVs for seven substances. Even though these were severely limited in their use (I have not detailed their limitations here for the sake of brevity) they were better than nothing. Indeed the guidance emphasised that they could be used to determine whether or not land affected by contamination was *contaminated land* by statutory definition.

Where a soil guideline value has been published for a particular contaminant, a local authority may consider its use in making a determination under Part IIA.

1.11 Prior to the publication of CLEA in the UK we had been working with a set of numbers known as the ICRCL⁷ trigger values. There were two values for some chemicals⁸, known respectively as the, threshold trigger value, and the action trigger value. There were also threshold values only, for a further 11 chemicals⁹. These numbers related strictly to the development of contaminated sites and were not all concerned with human health.

1.12 Below the threshold trigger value, no action was deemed necessary and the proposed development could proceed. Above the action value some action was always required to ameliorate the risk. The two values would therefore bound the region where professional judgement should be used to decide whether action was required and what form it should take.

1.13 When the new contaminated land regime¹⁰ came into force it was decided that the ICRCL numbers would not be appropriate to help decide whether land affected by contamination would fall within the new statutory definition of *contaminated land*,

ie whether the contamination could result in a, 'significant pollutant linkage', with the new list of defined receptors.

1.14 A note from DEFRA in December 2002¹¹ following CLEA's publication made a statement to the effect:

The new SGVs are now considered to represent the key instruments for generic assessment of human health risks from land contamination.

1.15 As such ICRCL 59/83 was formally withdrawn.

1.16 A second note, also in December 2002¹² explained in a little more detail why this decision had been made, and made clear that that particular ICRCL document⁷ and the numbers within tables 3 and 4 should no longer be used for the assessment of contaminated land.

1.17 This would have been fine if contaminated land authorities had -

a) the confidence to use generic SGVs to determine land as *contaminated land*, and

b) a full list of SGVs for the substances deemed to be of primary concern¹³

1.18 Unfortunately only 7 SGVs existed at that time (and there are still only 10 to date) and even their use was severely restricted.

1.19 CLR7¹⁴, a key document in the CLEA package, explained the broad issues relating to the assessment of contaminated land, and use of the CLEA model, and generic SGVs in particular. A small selection of important statements on the difficulties and uncertainties in the process include:

The fate and transport of chemicals in the soil environment involves physical, chemical and biological processes. More than a century of research has uncovered the principles of how contaminants behave in soil systems, but detailed predictive models of such soil contaminant systems are still in early development.....

Modelling human exposure to contaminants in soil is a highly complex process. Quantifying risk and exposure gives rise to several areas of uncertainty and variability. At the highest level, scenario uncertainty is an inevitable consequence of designing a conceptual exposure model that is applicable to a wide range of circumstances. The conceptual models in CLEA incorporate a precautionary element to allow for a reasonable range of possible activities; for example, a substantial minority of people grow and eat their own vegetables, so any generic assessment criteria such as SGVs must take these circumstances into account.

Scenario uncertainty is a big factor in exposure modelling, but other types of uncertainty and variability are also important and can be tackled in different ways. The traditional approach to modelling is deterministic, in that a single value is assigned to each variable. Many of these values are assigned on the basis of either average or conservative measurements and by professional judgement.

1.20 I could go on at length (and often have) about the problems that trying to offer up a single number, above which there will be a problem, below which there will not, must inevitably cause. Quite clearly a broad range of concentrations are required that the experienced practitioner can utilise for the particular exposure scenario under consideration, not surprisingly many have suggested something similar to the old ICRL model would be ideal. We have not got this however, therefore enforcement officers the length and breadth of the UK began to take the guidance at its word, ie -

Where a soil guideline value has been published for a particular contaminant a local authority may consider its use in making a determination under Part IIA.

1.21 And perhaps more significantly in, Town & Country Planning -

Where remediation is found necessary, remedial objectives should be set that ensure achievement of a standard clearly below the appropriate soil guideline value ...

1.22 Needless to say that as the SGVs are so very conservative and clearly inappropriate in, I would suggest, the vast majority of circumstances, this has resulted in an outcry from those at the receiving end of such draconian action.

1.23 As a result in September last year a note was issued from DEFRA¹⁵ which stated (paraphrased) -

..... it should be a matter for careful consideration by authorities whether concentrations of substances close to an SGV would meet the legal test. From discussions within the SGV Task Force (SGVTF) it is apparent that there is a wide body of opinion that such concentrations would not necessary satisfy that legal test (that is the legal test specified under the contaminated land regime¹⁰).

1.24 It goes on to point out that this is even the case where the site circumstances fit the CLEA conceptual model.

1.25 At this point the use of SGVs was almost universally abandoned until the SGVTF could decide at what degree above an SGV would the, "unacceptable intake", test be satisfied. The note finished by saying, "The need for urgency ... is fully recognised ...".

2. THE “WAY FORWARD”

2.1 One year and 3 months later, DEFRA wrote¹⁶ to the Chair of the SGVTF explaining, “The Way Forward”. Unfortunately when discussing the effects of various, changes, the letter says:

It would not be appropriate to regard these as “final” or (even) proposed, nor therefore to use them in decision-making on the basis that they have appeared in print.

2.2 So what does the new “Way Forward” suggest we do, or might do, maybe, one day?

2.3 The document¹⁷ comprises three parts:

- * The main body, explaining the way forward as seen by the authors (and DEFRA)
- * Annex A, initial analysis of the proposals
- * Annex B, Exposure modelling using the CLEA model (this was done by the Environment Agency to support the overall process)

2.4 In addition a short paper¹⁸ has been produced by the Association of Geotechnical Specialists (AGS) which looks at issues of scale.

2.5 Needless to say these are, by and large, wordy and necessarily difficult documents. I will try to condense the issues into a series of concise parts. Please note that all pollutant linkages, risks etc referred to, relate only to human health, and the comments in parenthesis are mine.

THE PROLOGUE:

2.6 “Nothing yet produced provides any absolute measurable criteria as to when land with contamination becomes *contaminated land* by statutory definition, therefore local authorities have to make a judgement call in each case.”

“Local authorities have been told they can use relevant SGVs for this purpose.”

“There is an overall perception that some, if not all, of the published SGVs represent an overly stringent benchmark”, and it is also considered, “impractical (impossible some would suggest) to consider on a case by case basis, fundamental matters of science.” (ie is working out your own SGVs).

“It may not be possible to provide generic SGVs for all the contaminants listed in CLR8¹³, and others (contaminants) which may be identified as important on some sites.”

2.7 At the end of this process the document states that the outputs must:

- * Comply with the law¹⁹
- * Be proportionate to risk, sustainable and internationally acceptable
- * Help deliver consistency and transparency
- * Accept that generic SGVs may not always be possible
- * Accept that where they are, issues of uncertainty must be made clear
- * Demonstrate that SGVs are 'adjustable', and
- * Explain how clever and experienced you need to be to do all this

2.8 One less charitable than myself might suggest at this point that we have all been saying this for years, eg -

Risk assessment for contaminated land is a confusing mix of concepts and methods borrowed from sociological, psychological and technical disciplines. No single process provides all the answers, and often there are none. The process is slow, cumbersome and expensive. It attempts a degree of precision that is invariably unachievable and often unnecessary. The results are at best suspect, at worst, dangerously wrong²⁰.

2.9 I just hope that as I read on at least some, if not all of my prayers, have been answered.

THE PROCESS:

2.10 A rather complex flow chart has been produced to demonstrate the, "judgement points". It uses terminology such as - acceptable, tolerable, minimal, desirable, context, probability, proportionate, precedent, peer review, flanking guidance and, flanking measures. Whilst rather worrying in it's scope, it does usefully identify four "Zones" -

Zone A	-	science of human toxicology
Zone B	-	science of exposure pathways
Zone C	-	practical and policy considerations of the process
Zone D	-	decision making process by officers on individual sites

Zone A - Human Toxicology and Health Effects

2.11 "The collation and interpretation of toxicological data is (highly) complex and it is essential that mistakes are not made at this point."

2.12 This part considers the difficulties and the fact that often data is not available, therefore there may be a tendency to be over cautious "The precautionary approach applies - even where health effects have not yet been observed in experimental or epidemiological studies."

2.13 "CLR9⁶ will have to be re-visited along with all the Tox Reports²."

Zone B - Exposure Pathways

2.14 These form the link between the contaminant and the receptor, quite a number were left out of the CLEA model such as; fruit, water, meat, milk (mother's milk potentially important due to the possibility of bio-accumulation). Pathways vary significantly on different sites.

“Pathway analysis is complex and often has to rely on assumptions (best *qualified* guess) rather than observed data.”

“Choice of pathways for a generic model is key and decision makers must be clearly informed so they can understand how their site relates to the ‘generic’ site. This should enable them to make a reasonable judgement on appropriate exposure in the particular circumstances of the site under consideration.”

2.15 This part points out that, “likely”, can be read as, “more likely than not”, and, “might”, can be considered as, “anything that is not an unreasonable possibility”.
(I am not sure whether this helps a lot?)

2.16 The document then goes on to consider critical receptors, which are not pathways, but this is linked to the Environment Agency's work on exposure modelling detailed in Annex B (Zone B may have been better served if it was called exposure modelling rather than exposure pathways).

2.17 Key points identified are:

- * Soil ingestion rates may be reduced
- * In the case of home grown produce, SGVs should be based on a reasonable worst case for the general population (ie ordinary people, not the, ‘Good Life’)
- * CLEA will become deterministic²¹
- * An attempt will be made to reduce double counting
- * Additional information will be provided on the CLEA components
- * Clear guidance will be provided on applying and adjusting SGVs and how to decide whether an, ‘unacceptable’, risk exists
- * Further work is required on:

- Plant pathways
- Vapour intrusion into buildings required
- Lead
- Degradation of volatiles
- Database on ‘UK conditions’
- Quantifying human exposure to soil

2.18 The immediate changes in soil ingestion rate, vegetable consumption and the deterministic model, would result in new CLEA numbers (an example is given but note caveat in 2.1 above), and no doubt when all the changes have been implemented there will a further set of numbers.

Zone C - Practical & Policy Considerations in Assessing Risks from Land Contamination

2.19 This part considers the policy and legal context of the risk judgement, ie, what is actually meant by unacceptable intake? Are the requirements of the authority (whether in planning or Part IIA terms) both reasonable and practical?

2.20 The rhetoric here is rather flowery and goes on a bit (thirteen pages). For example, it includes an interesting graphic that shows us that the greater the risk, the more unacceptable it is(!).

2.21 In a nutshell I think it is telling us that action to limit / control risks should be proportionate and, perhaps, BATNEEC? On this point it says that whilst cost benefit analysis may inform judgement, it does not decide it. Unfortunately it does not make clear what does.

2.22 Key points identified in this part are:

- * Decisions must be legal, practical and robust
- * Clear central guidance is required
- * Establishing general principles will help

2.23 Interestingly, even though it is now felt that SGVs should relate to Mr & Mrs Average (see 2.17 above) placing controls on self sufficient gardeners is not considered practicable. It is suggested DEFRA will work with the EA and the FSA on this to produce further guidance (that will be interesting).

2.24 Again examples are given and DEFRA clearly believe that all this will eventually result in SGVs that are, "more realistic and proportionate", ie bigger numbers.

Zone D - Decisions on Individual Sites

2.25 After all the re-evaluations, improvements, updates etc necessary to implement the new thinking of Zones A, B and C, then the contaminated land authority still has to make a decision (under Part IIA) as to whether the land affected by various types of contamination actually forms, *contaminated land*.

2.26 The original CLEA documents were, to be fair, quite good at emphasising the need to ensure that the exposure scenario (conceptual model) of the site under consideration matched that assumed in CLEA, before considering the use of a generic SGV.

2.27 The most pleasing paragraph in this part tells us that there is already a lot of technical guidance and, whilst there are calls for more guidance, these are balanced by calls for guidance to be simpler or more accessible. I would suggest simpler and more accessible.

2.28 Key points identified in this part are:

- * Decisions must be legal, consistent and transparent
- * Decisions must be efficient (?)
- * Clear central guidance is required which, 'adds value'
- * Skills needed to apply the new guidance need to be available or, 'developed'
- * Sites and contamination can be highly complex

2.29 The new guidance should:

- * Emphasise the importance of the conceptual model
- * Explain how to 'adjust' SGVs
(soil zones affected by the contamination get a particular mention)
- * Clarify issues around natural contamination
(I would suggest, 'naturally elevated levels of certain potentially hazardous substances', rather than, 'natural contamination', which is a contradiction in terms)
- * Clarify issues around bio-accessibility
- * Clarify issues around zoning, statistical analysis, marginal exceedences etc

THE TIME FRAME:

2.30 The final page of the document tells us that it is hoped that a new version of CLEA UK will be developed to accommodate all these changes, "as soon as possible".

2.31 Improvements to the current guidance should be made by the end of next year (2007), but a more detailed timetable, "is expected to be made available", soon after the consultation responses on the proposals have been evaluated.

2.32 Training requirements will also be, "explored further", depending on the responses to the paper.

ISSUES OF SCALE

2.33 As mentioned in 2.4 above the AGS have produced a short paper on issues of scale¹⁸ to accompany the , 'Way Forward', publications.

2.34 This work was produced by the AGS and presented to the SGV TF on the 13th of July last year (2006). In a nutshell it considers the problems of trying to deal with a host of SGVs at or around the background level of uncontaminated soils. In particular arsenic, lead and B[a]P²².

2.35 It estimates that if 60% of all new homes are built on brownfield sites to 2016 costs of remediation for this type of minor contamination may be in the order of £135m to £450m per annum, and questions whether this would be good value for money.

2.36 It should be born in mind, however, that a proportion of those brownfield sites would be found not to be in need of remediation, and another proportion would be badly contaminated and be in need of remediation anyway.

2.37 What would be useful would be an indication of additional costs as a result of undertaking remediation on what could be described as, borderline sites. I am not sure whether these figures can help in this respect.

3. THE NEW CIEH / LQM GACs

3.1 Shortly after DEFRA published the 'Way Forward' papers, Land Quality Management and the Chartered Institute of Environmental Health, released a document entitled, *Generic Assessment Criteria for Human Health Risk Assessment*.

3.2 This, in effect, goes through the process of calculating 'CLEA UK'(Beta version1) based SGVs for:

- * Four metals (beryllium, copper, vanadium, zinc)
four PAHs (benzo[a]pyrene, dibenzon[a,h]anthracene, flourene, naphthalene)
- * Petroleum hydrocarbons
- * Nine chlorinated solvents (chlorobenzene, 1,2-dichloroethane, hexachlorobutadiene, tetrachlorethane, tetrachlorethene, 1,1,1,trichloroethane, trichloroethene. trichlormethane, vinyl chloride), and
- * the pesticide Atrazine

3.3 You will be pleased to know that this is no Mickey Mouse volume, it comprises around 300 pages of techno speak with not just the numbers we want, but the whys and the wherefores too, which we also want (don't we?).

3.4 I couldn't bring myself to read it all, but I assured myself that I could at least skip through the mere 31 pages on TPHs, because of it's vital relevance to so much of my work, surely I would be riveted throughout?

3.5 Here are a few extracts from these pages taken at random (not necessarily linked):

The value recommended for benzene, however, is based in its carcinogenic properties and so is not suitable for use in assessing the non-threshold effects of the EC₅-EC₆. In contrast, the TDI_{bral} (200 Fg kg⁻¹ day⁻¹) and TDI_{inhal} (74 Fg kg⁻¹ day⁻¹) recommended by the Environment Agency for toluene are based on its threshold effects.

The available information does indicate that the UK population is exposed to detectable levels of various hydrocarbon compounds in air, drinking water (UK Drinking Water Regulations 1999) and food (FSA 2003). Consequently, a common, precautionary approach has been adopted across all the fractions. This involves assuming that the background exposure (MDI) is high in comparison to the TDI. Following the logic of guidance contained within CLR9 (Defra & Environment Agency, 2003b), the maximum background exposure possible is 80% of the TDI ($MDI = 0.8 \times TDI \times bw$). Consequently for each fraction it has to be assumed that $TDSI = 0.2 \times TDI$.

There is insufficient measured concentration data for hydrocarbon fractions to provide fraction-specific concentration factors for the modelling of plant uptake

..... Consequently, the default Briggs approach has been used to derive below and above ground plant uptake factors for the lighter fractions with a $\log K_{ow}$ below 4.5; for heavier fractions with a $\log K_{ow}$ greater than 4.5, the Travis Arms regression (Travis and Arms, 1988) has been used to derive an estimate of plant uptake into leafy tissues ($C_{f_{leafy}}$):

$$B_v = 1.588 - 0.578(\log K_{ow})$$

However, due to weaknesses in CLEA UK that apparently result in temperature conversions not being correctly applied when the dimensionless Henry's Law Constant (H) is input, in calculating the values within this report dimensioned Henry's Law Constant (H) values have been utilised. Consequently, the recommended dimensionless value has been converted to its dimensioned form ($\text{atm}\cdot\text{m}^3/\text{mol}$) using the following equation, which is based on that presented in the Environment Agency 2003:

$$H = \frac{H' \times T_{ref} \times R}{101325}$$

3.6 If you look back at paragraph 2.6 above I quoted the new DEFRA document¹⁷ as follows:

..... it is also considered impractical to consider on a case by case basis, fundamental matters of science.

3.7 Whilst some of you out there in your white coats may want to check for yourselves whether a TD_{inhal} of $74 \text{ Fg kg}^{-1} \text{ day}^{-1}$ for toluene isn't a teeny weeny bit on the conservative side, or, disagree with the author's interpretation of the logic of CLR9, or, be horrified at the presumption that Travis Arms will accurately predict leafy uptake for ALL the heavier fractions, or, indeed, require a detailed analysis of every weakness exhibited by CLEA UK if it can't even deal with a dimensionless H!

I don't

3.8 All I want to know is what should I look for, where should I look, how should I sample, how should I store the sample, how should I ask for it to be extracted and analysed, and what do I do with the numbers when they land squarely and heavily on my desk? This document was supposed to help us with the last bit, but, whilst it does (I think), it's still no walk in the park.

3.9 Sticking with petroleum hydrocarbons, there is no utopian number for TPH or PROs or DROs, there are instead 48 numbers (SGVs) for each of the three standard land uses (residential with plant uptake, without, and industrial / commercial).

3.10 This number has been arrived at by splitting petroleum hydrocarbons into 7 for aliphatics and 8 for aromatics plus a 16th category of the really heavy things (both aliphatic and aromatic). Then there is one SGV for each x 3 different soil types (1%, 2.5% and 5% organic matter). All soils must be neutral pH and sandy (so useless if acidic, alkaline or sticky).

SO WHERE DOES THIS LEAVE US?

3.11 The introduction to this document is, as you would expect, full of caveats, such as:

..... experience has been that the performance of the software leaves much to be desired in terms of stability and consistency of output. We ... urge extreme caution

They (the values) do not have the status of SGVs simply by reason of their origin. They will be redundant if and when DEFRA and the EA publish SGV for a substance.

Exceedence of a relevant value DOES NOT CONSTITUTE (their emphasis) evidence of a significant possibility of significant harm.

3.12 I for one am eternally grateful for the drive and initiative of the CIEH (and you Bill) in trying to move this vexatious matter forward, for all the time and effort of the team at LQM and their long list of willing helpers, but what was the response from the centre to the publication?

“Unhelpful”²³

3.13 Can you believe that?

3.14 Many of you will be familiar with the work of Steve Jones, the wonderfully plain speaking Professor of genetics at University College London. In his latest collection of, ‘tell it like it is’, writings²⁴ he tells us:

“Science is a broad church full of narrow minds trained to know ever more about ever less”.

3.15 As simple old contaminated land professionals, trying to move mountains every day, we can not carry round with us a team statistical counsellors to guide us through this endless maze of what ifs and maybes. Look where pretending to know something about statistics got Professor Roy Meadow. We are not Professors in anything, we are just overworked, modestly paid professionals trying our best to ensure that our world is a reasonable safe place to live in. We have neither the time nor the inclination to become Professors in biochemistry, toxicology, or any other ‘ology. We can not and should not question any of the parameters in any of the myriad of formulae like –

$$C_{\text{indoor}} = \frac{C_{\text{soil}} \times \left[\left(D_{12} + \frac{I_{12}}{A} \right) \times \left(D_{01} + \frac{V_s \times P \times L}{?_a \times A} \right) \times K_b \right]}{E_{x1} \times h_1 + \frac{D_{13} \times (A_{\text{wat}} - A_h)}{A} + D_{01} + D_{12} + \frac{I_{12}}{A}} \times \frac{1}{\left\{ (E_{x2} \times h_2) + D_{23(c)} + \left(D_{23(w)} + \frac{A_{\text{wat}} - A_{\text{wd}}}{A} \right) + D_{12} \right\} \times \left\{ \frac{D_{12} \times \left(D_{12} + \frac{I_{12}}{A} \right)}{(E_{x1} \times h_1) + \left(D_{13} \times \frac{A_{\text{wat}} - A_h}{A} \right) + D_{01} + D_{12} + \frac{I_{12}}{A}} \right\}}$$

taken from ref¹

3.16 Getting it wrong is much easier than getting it right, even where you have some numbers to enter into these things and don't just make them up sorry, make a qualified estimate based on current scientific knowledge.

3.17 For centuries scientists have been trying to work out a figure for calculating that tiny force we know as gravity. G, the gravitational constant, has its own units of mass length and time. I am told that most now agree that the figure is about 6.67×10^{-11} which isn't much. Unfortunately, however, some German scientists using a different technique came up with a figure which is 0.5% more than anyone else. So what? you may say, that isn't much either. Well that 0.5% would add 10 million billion kilograms to the mass of the earth. Get a decimal point or two in the wrong place and heaven knows what the consequences may be.

3.18 Would any of you would consider the minutiae of the derivation of 274 mg / m³ as the long term exposure limit for 1-Methoxypropylacetate when doing a Health and Safety at Work inspection, or argue with an MOT technician about what should and should not come out of the exhaust pipe of your gas guzzling 4x4 ? I hope not. Someone else has that responsibility, and even then many of the numbers in these standards ultimately result from political considerations, not scientific ones .

3.19 I said seven years ago:

Ultimately, the long-suffering but hopefully pragmatic local authority officer will have to use the wisdom of Solomon to make the final decision on whether the site is statutorily contaminated. The outcome could on the one hand blight a whole housing estate in perpetuity, on the other, leave a generation of children at risk²⁰.

3.20 It was difficult then, but unbelievably, it is much more difficult now. Potentially we could have sites approved using ICRCL numbers, Dutch numbers, US EPA numbers, CLEA numbers, and now CLEA UK (*Beta version1*) numbers, which no doubt one day will all change again.

3.21 In my short critique on CLEA in 2003²⁵ I asked whether it was time to revolt. Well I have no doubt, it is now. So, I have a proposal to put to you, the professional contaminated land community.

3.22 With the support of the CIEH Centre of England Branch I will be hosting a meeting at Coombe Abbey near Coventry on Tuesday the 20th of February at 9.30am to discuss the issues in this briefing note and consider a alternative, "Way Forward". The meeting will be free to anyone with an interest in contaminated land and offer a minimum of 3 hrs CPD. Places will be allocated on a first come first served basis. If you would like to attend please contact Paul Knight on 02476 376566 or paul.knight@nuneatonandbedworth.gov.uk . If you would like more information [click on http://www.zeroenvironment.co.uk/SGVmeet1.pdf](http://www.zeroenvironment.co.uk/SGVmeet1.pdf).

If anyone would like to arrange a similar meeting in their area please get in touch via roger@zeroenvironment.co.uk

References and further reading:

- 1 - *The Contaminated Land Exposure Assessment Model (CLEA): Technical Basis and Algorithms* - R&D Publication CLR 10 - DEFRA March 2002 (since withdrawn upon the release of an updated model called CLEA UK).
- 2 - *Contaminants in soil: Collation of Toxicological Data and Intake Values for Humans*, R&D Publication TOX series, several - DEFRA March 2002.
- 3 - In 2002 Tox data was published for As, Cd, Cr, CN (free inorganic), Pb, Hg, Ni and Se.
- 4 - *Soil Guideline Values: (several)*
R&D Publication SGV series, - DEFRA March 2002.
- 5 - In 2002 SGVs were published for As, Cd, Cr, Hg, Ni, Se and Pb.
- 6- *Contaminants in soil: Collation of Toxicological Data and Intake Values for Humans*, R&D Publication CLR 9 - DEFRA March 2002.
- 7 - *Guidance on the Assessment and Redevelopment of Contaminated Land 2nd Edition*, Interdepartmental Committee on the Redevelopment of Contaminated Land 59/83 DOE (1987).
- 8 - There were ICRCCL threshold and action values for PAHs, phenols, free cyanide, complex cyanide, thiocyanate, sulphate, sulphide and sulphur.
- 9 - There were ICRCCL threshold values for arsenic, cadmium, total chromium, hexavalent chromium, lead, mercury, selenium, boron, copper, nickel and zinc.
- 10 - The new contaminated land regime in England and Wales was introduced by the Environment Act 1995 section 57. This amended the Environmental Protection Act 1990 by inserting a new Part IIA. It came into force in April 2000 upon publication the Secretary of State's Guidance for contaminated land within Circular 2/2000, and the Contaminated Land (England) Regulations 2000.
- 11 - *Contaminated Land Advisory Note 1/02* DEFRA December 2002.
- 12 - *Contaminated Land Advisory Note 3/02* DEFRA December 2002.
- 13 - One of the CLEA package of documents (CLR8) listed nearly 50 substances as, "potential contaminants for the assessment of industrial land". Even so it emphasised, "... non-selection of a substance does not guarantee that it could not pose a risk as a result of its presence in contaminated land".
- 14 - *Assessment of Risks to Human Health from Land Contamination: An Overview of the Development of Soil Guideline Values and Related Research*
R&D Publication CLR 7 - DEFRA March 2002.

- 15 - *Contaminated Land Advisory Note 2/05*, DEFRA Note on SGVs and the determination of contaminated land - September 2005.
- 16 - *Contaminated Land Advisory Note 6/06*, DEFRA Note on SGV Task force - 24th November 2006.
- 17 - *Assessing Risks From Contaminated Land - A Proportionate Approach. Soil Guideline Values: The Way Forward*, DEFRA November 2006.
- 18 - *Issues of Scale and the Potential Impact of SGVs for Land Remediation*, prepared for DEFRA by the Association of Geotechnical Specialists (AGS), November 2006.
- 19 - Environmental Protection Act 1990 Part IIA, the Contaminated Land (England Regulations 2006, and associated statutory guidance (contained within DEFRA Circular 1/2006).
- 20- Braithwaite Roger D, *Surveying the Land*, second in a three part series in the Environmental Health Journal, March 2000, published by Chadwick House Publishing, London.
- 21 - The matter of the deterministic exposure model as opposed to the probabilistic is considered in CLR7 paragraphs 5.21 to 23. This analysis is now considered incorrect (or inappropriate, or?).
- 22 - B[a]P refers to the polycyclic aromatic hydrocarbon (PAH) benzo[a]pyrene, chemical formula C₂₀H₁₂. This carcinogenic substance is formed during the incomplete combustion of organic materials and is therefore is ubiquitous in UK soils due to the widespread use of fossil fuels and distribution of coal ash etc.
- 23 - Comment published in the, *Contaminated Land Bulletin*, December 2006 Issue 5, page 1, Environmental Management Publishing Ltd, London.
- 24 - Jones Steve, *The Single Helix*, published by Little Brown, 2006.
- 25 - Braithwaite Roger D, *As CLEA as Mud*, in the Environmental Health Journal, April 2003, published by Chadwick House Publishing, London.