Conceptual Framework for Asbestos Risk Assessment & Control

1. Origin and Concepts.

The origins of this document are

- CLR11- UK Risk Assessment Framework[1]
- R&D66 Safe Development of Housing on Land Affected by Contamination[2]
- The Local Authority Guide to Ground Gas[3]
- NIGLQ Qualitative Risk Assessment of Contaminated Land including Radioactive Contamination[4]

The key document used to develop and define words and phrases is the Nuclear Industry Qualitative Risk Assessment Guidance.

2. General Approach

The aim of the approach is to have a common framework that can scale to any number of activities that might take place prior, pre, during or post development. The key aims are to have a stepwise approach:

- Enable effective screening of potential areas of concern
- Encourage appropriate and sufficient data collection and site investigation to support robust decision making
- Facilitate timely identification and understanding of risky activities and
- Identify the point where mitigation and further Quantitative Risk Assessment is necessary to protect vulnerable on and off site receptors

Unlike the radiation qualitative assessment approach we propose the process is broken into a number of discrete steps to assist the user in developing the conceptual model and understanding the uncertainties of the site and the activities taking place. For each stage the approach is to use a standardised generic risk assessment to

- assess the significance of the risk and
- identify appropriate primary and secondary actions before moving on to the next stage of the process.

[1] Environment Agency (2004) Model Procedures for the Management of Land Contamination, Contaminated Land Report 11, September 2004
[2] NHBC and EA (2008) Guidance for the Safe Development of Housing on Land Affected by Contamination R&D66: 2008 Volume 1. Joint publication by the National House Building Council, Environment Agency and Chartered Institute of Environmental Health.
[3] CIEH (2008) The Local Authority Guide to Ground Gas, Steve Wilson, Geoff Card and Sarah Haines, September 2008
[4] NIGLQ (2012) Qualitative Risk Assessment for Land Contamination, including Radioactive Contamination, Industry Guidance, Version 1.1, Nuclear Industry Group for Land Quality, June 2012

The hope being that low risk zones or Areas of Potential Concern (APC) as the Nuclear Guidance calls them and low risk activities can be screened out at an early stage.

To achieve this it is proposed that all stages of the assessment use the same basic process of gridding off the "Potential Severity of Consequence" against the perceived "Likelihood of Consequence Occurring" in a 5 x 4 matrix to estimate the "Significance of the Risk" to potential receptors. The template significance table is shown in Table 1 below.

Table 1: Template Table for Assessment of "Significance of the Risk"

		Consequence (Defined by requirement of each stage)			
		Minor	**Mild**	**Moderate**	**Severe**
Probability (Constant definition as per table 2)	**Very Unlikely**	Negligible risk	Negligible risk	Low risk	Medium risk
	Unlikely	Negligible risk	Low risk	Medium risk	Medium risk
	Possible	Low risk	Low/medium risk	Medium risk	High risk
	Likely	Low risk	Medium risk	High risk	Very high risk
	High Likelihood	Low/medium risk	Medium risk	High risk	Very high risk

Fundamental to the approach is that the concept of likelihood remains fixed through out the assessment as defined in Table 1 below, but that the measure of severity/consequence differs depending on the stage of the process that you are trying to assess

Table 2 Likelihood Descriptor

Likelihood Descriptor	Probability of Occurrence
Very Unlikely	Less than 5%
Unlikely	5 to 33%
Possible	33 to 66%*[5]
Likely	66 to 95%
High Likelihood	More than 95%

Table 3 Proposed Severity of Consequence by Risk Assessment Stage

Risk Assessment Stage	Measure of Severity
Stage 1- Identification of Areas of Potential Concern (APC) and Risk Estimation	Consequence measured as Site Risk by APC
Stage 2- Risk Estimation by Activity	Consequence measured as Level of Asbestos risk from soil or other materials
Stage 3- Risk Estimation by Receptor	Consequence as measured by risk to off site receptors

[5] Possible category is a deviation from NIGLQ guidance which refers to "unlikely" as 5 to 44%.

Table 4 Consequence Descriptor

Risk Assessment Stage	Measure of Severity
Minor	Defined at each specific stage of the assessment process.
Mild	
Moderate	
Severe	

The significance of the risk at each stage scales from negligible to very high risk but the key output at each stage is a risk descriptor and a required Primary and Secondary Action.

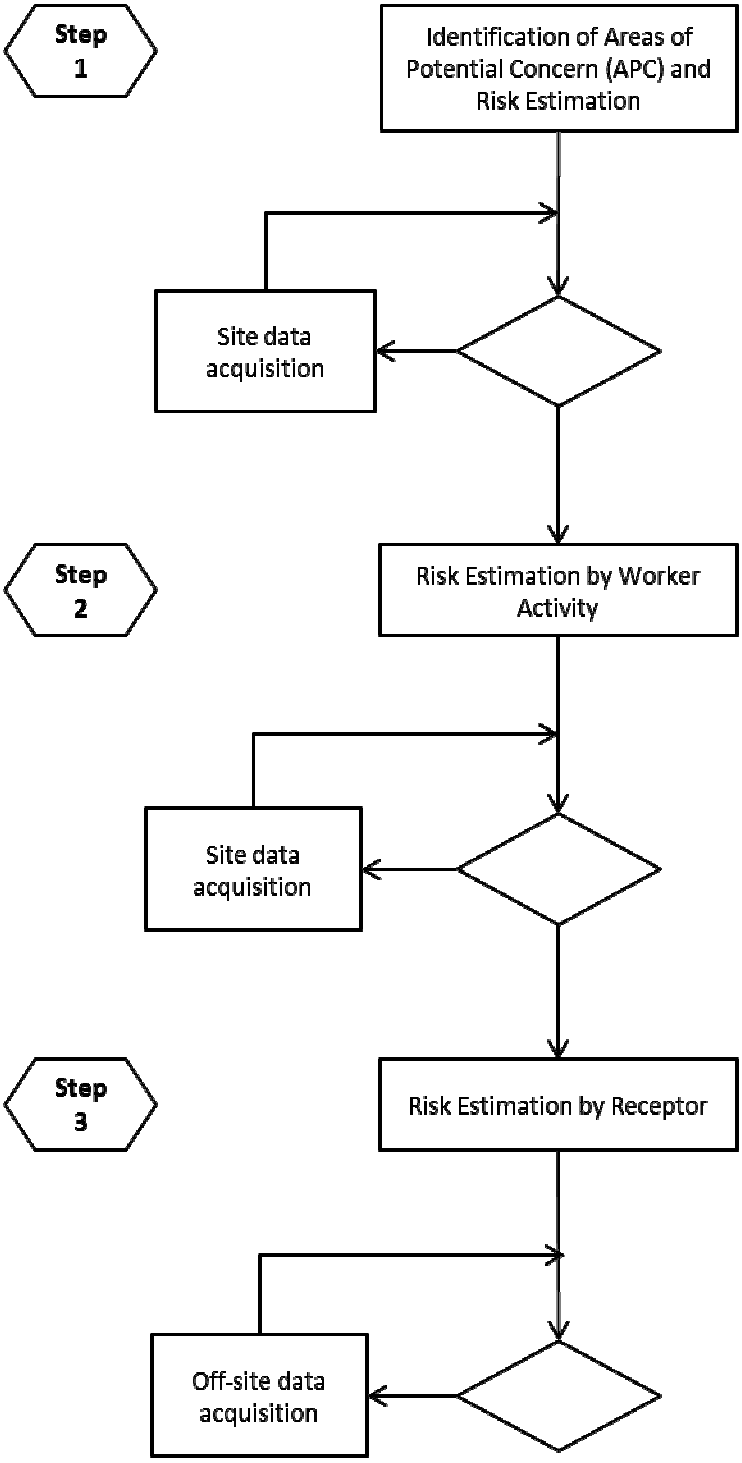
Key Point 1: The purpose of the process is to give a framework to consider the risks, and the necessary lines of evidence at all stages it is implicit that good site investigation data is required to estimate the level hazard that the materials being handled might represent (generally soil or demolition by products). All assumptions in relation to the source risk should be corroborated by suitable field data to an extent that is proportionate to the considered level of risk.

Table 5 Sample Risk Descriptor and Required Actions by Activity

Risk Descriptor	Required Primary Action	Secondary Action
Negligible risk	No mitigation measures required.	
Low risk	No mitigation measures required.	
Medium risk	Mitigation measures mandatory. Q_LRA mandatory.	Qualitative EMMP mandatory.
High risk	Mitigation mandatory. Q_NRA advised.	Quantitative EMMP mandatory
Very high risk	Mitigation and receptor Q_NRA mandatory.	Quantitative EMMP mandatory

* Mitigation = site actions and PPE
* Q_LRA = Qualitative Risk Assessment
* Q_NRA = Quantitative Risk Assessment
* EMMP = Environmental Monitoring and Management Plan

3. Flow Diagram for Risk Assessment Process and Additional Data Collection



Notes:

The site assessor must zone the site taking account of desk study and known site history information using Table 2 to estimate the residual asbestos risk and establish if further data collection is necessary

Are uncertainties acceptable taking account of risk?

The employer should consider all activities in a given APC, identifying activities
- requiring mitigation; and
- any high risk activities requiring quantitative risk assessment

Quantitative assessment of exposure needed (Q_NRA)?

Requirement to identify dust generating activities, estimate dust emissions levels, and calculate fibre exposure as function of time and airborne fibre concentration. Expectation that empirical data will be used to risk rank activities and provide initial estimate of significance

Either to demonstrate Environmental Compliance or Quantitative assessment of exposure needed (Q_NRA)

Step 1 Assessment of Site Risk by APC

Establish predicted probability of residual asbestos (in accordance with Table 2) for all APC's

This is a summation of the assessor's entire knowledge of the site taking account of

- The basic risk of the site as detailed in annexe x
- The recorded levels of mitigation or removal
- The level of confidence that these actions were properly carried out

Table A APC Risk Estimation

		Site Risk by APC			
		Negligible	**Low**	**Medium**	**High**
Predicted Probability of Residual Asbestos	**Very Unlikely**	Negligible risk	Negligible risk	Low risk	Low/medium risk
	Unlikely	Negligible risk	Low risk	Medium risk	Medium risk
	Likely	Low risk	Low/medium risk	Medium risk	High risk
	Possible	Low risk	Medium risk	High risk	Very high risk
	High Likelihood	Low/medium risk	Medium risk	High risk	Very high risk

Table B Risk Descriptor and Required Actions by APC

Risk Descriptor	Required Primary Action	Secondary Action
Negligible risk	No further Assessment	
Low risk	No further Assessment	
Medium risk	Additional Data collection mandatory Activity Assessment Advised (Q_LRA)	Site reporting and asbestos control plan Mandatory
High risk	Additional Data collection mandatory Activity Assessment mandatory.	Site reporting and asbestos control plan Mandatory
Very high risk	Additional Data collection mandatory Activity Assessment mandatory.	Site reporting and asbestos control plan Mandatory

Step 2 Assessment of Site Risk by activity

Consider probability of dust release by activity within each APC

Table C Estimation of "Significance of the Risk" by activity

		Consequence			
		Minor	**Mild**	**Moderate**	**Severe**
Probability of dust release from activity	**Very Unlikely**	Negligible risk	Negligible risk	Low risk	Medium risk
	Unlikely	Negligible risk	Low risk	Medium risk	Medium risk
	Possible	Low risk	Low/medium risk	Medium risk	High risk
	Likely	Low risk	Medium risk	High risk	Very high risk
	High Likelihood	Low/medium risk	Medium risk	High risk	Very high risk

Table D Risk Descriptor and Required Actions

Risk Descriptor	Required Primary Action	Secondary Action
Negligible risk	No mitigation measures required.	
Low risk	No mitigation measures required.	
Medium risk	Mitigation measures mandatory.	Qualitative EMMP mandatory
High risk	Mitigation and Receptor Q_LRA mandatory	Quantitative EMMP mandatory
Very high risk	Mitigation and Receptor Q_LRA mandatory	Quantitative EMMP mandatory.

Step 3 Assessment of Potential Receptor Impact

Identify a list of vulnerable offsite receptors and consider probability of dust release impacting those identified

Table E Estimation of "Significance of the Risk" by receptor type

		Consequence			
		Minor	**Mild**	**Moderate**	**Severe**
Probability of dust impacting each vulnerable receptor	**Very Unlikely**	Negligible risk	Negligible risk	Low risk	Medium risk
	Unlikely	Negligible risk	Low risk	Medium risk	Medium risk
	Possible	Low risk	Low/medium risk	Medium risk	High risk
	Likely	Low risk	Medium risk	High risk	Very high risk
	High Likelihood	Low/medium risk	Medium risk	High risk	Very high risk

Table F Risk Descriptor and Required Actions

Risk Descriptor	Required Primary Action	Secondary Action
Negligible risk	No mitigation measures required.	
Low risk	No mitigation measures required.	
Medium risk	Mitigation measures mandatory. Q_LRA mandatory	Quantitative EMMP advised
High risk	Mitigation and Receptor Q_NRA mandatory	Quantitative EMMP mandatory.
Very high risk	Mitigation and Receptor Q_NRA mandatory	Quantitative EMMP mandatory.

Suggested examples of site ranking

1. High Risk sites

Reason: These sites have high levels of energy generation and or fire protection e.g. large hospital site with multiple buildings

Asbestos Works
Chemical Works
Dockyards
Ship Yards
Oil refineries
Power Stations
Hospitals (suspected large scale boiler plant)
Disposal and Recycling Sites (uncertain history)
Metal Recycling sites

2. Medium Risk Sites

Reason- Sites with moderate levels of energy generation

Large scale Laundry
Large Scale Engineering Works
Gas Works
Glass Works
Brickworks
Metal Manufacturing
Pulp and Paper Manufacturing
Textile and Die Works
Water Works
Disposal and Recycling Sites (known activities)
Food processing sites (suspected large scale boiler plant)
Extensive made ground of unknown origin
Railway yards and stations

3. Low Risk Sites

Reason- Sites with low level and localised energy generation or small scale process related releases

Small Scale Laundry
Small Scale Engineering Works
Garages and Vehicle Service Stations
Dry Cleaners
Sewage Works
Printing and Bookbinding
Railway Land General
Timber product manufacturing

4. Negligible Risk Sites

Reason- Sites with no plausible expectation that asbestos would be present

Green space

Commercial Sites where only low levels of ACM might be expected <0.001% by strata

Limitations

This conceptual framework for qualitative risk assessment for sites where asbestos in soil is suspected or known has been developed by the SoBRA Asbestos-in-soil sub-group. It details an approach to risk ranking and deciding upon risk management actions when asbestos is a contaminant of concern that has developed as a result of discussions between the group members. It is provided freely on the SoBRA website to help promote discussion on what should constitute good practice in sampling asbestos-contaminated soil in the UK. Users of this framework must satisfy themselves that it is appropriate for the intended use and no guarantee of suitability is made.

Feedback

Feedback on this protocol is welcomed and should be submitted to info@sobra.org.uk

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