

PCB

A total of fifty-six samples recovered from the mineral workings site were tested for PCB. The initial investigations included analysis of twenty-five soil samples for the PCB7 suite of substances and the PCB World Health Organisation (WHO) 12 suite of substances, and the delineation exercise included the analysis of a further thirty-one soil samples for the PCB WHO12 suite of substances.

Data Assessment

The Environment Agency has developed a Soil Guideline Value (SGV) for dioxins, furans and dioxin-like PCBs¹ for a residential end use (8µg/kg), allotment end use (8µg/kg) and commercial end use (240µg/kg). Concentrations above the SGV do not necessarily indicate unacceptable risk, but do indicate that further consideration is required. The SGV is based on the standard land use models² presented in current guidance documents. The SGV has been developed based on a number of assumptions including inter alia a soil organic matter (SOM) content of 6% (which is higher than the SOM on site) and a 'typical' mix of dioxins, furans and dioxin-like PCBs (based on a UK wide study which sampled herbage). Where the on-site mix is similar to the 'typical' mix then the SGV can be compared to the sum of the results. Where the mix is different the results can be compared to a hazard index using worksheets within the SGV report. However, it is not appropriate to use the SGV to assess the PCB7 results, these are discussed later.

Dioxins and furans are generally present in the environment as a result of incomplete combustion and are often associated with incinerators; these were not identified as potential contaminants of concern and were not therefore included in the analysis suite. The PCB WHO12 results were therefore compared against the hazard index. Where the hazard index is exceeded the contaminants may represent an unacceptable risk to human health.

The proposed end use is green infrastructure which will be utilised as public open space. It is envisaged that access to the open space will be improved through the construction of more formal access routes; landscaping and habitat improvement will also be undertaken. The site, therefore, does not match the standard land use models used in the SGV report. The residential and allotment SGV are conservative (potential risks could be over reported) whereas the commercial SGV may not be protective of site users in this case. Comparison with these land uses does, however provide a useful benchmark for the assessment of the laboratory results.

The majority of samples and congeners did not exhibit concentrations above the LOD, however a limited number of samples did record concentrations above the LOD, as summarised below:

- HA02A: sum of all congeners = 302µg/kg (congeners 118, 105, 167, 156, 157 all recorded concentrations above the LOD (3µg/kg); 118 exhibited the highest concentration (188µg/kg)
- HA45A: sum of all congeners <LOD, however congener 118 recorded a concentration (3.87µg/kg) above the LOD (3.1µg/kg)
- HA45B: sum of all congeners <LOD, however congener 118 recorded a concentration (3.1µg/kg) above the LOD (3µg/kg)
- HA45C: sum of all congeners <LOD, however congeners 118, 77, 105 all recorded concentrations above the LOD (3µg/kg); 118 exhibited the highest concentration (19.5µg/kg)

The results of the assessment are presented in the Table 1.

¹ Environment Agency. 2009. *Soil Guideline Values for dioxins, furans and dioxin like PCBs in soils. Science Report SC050021/Dioxins SGV*

² Environment Agency. 2009. *Updated Technical Background to the CLEA Model. Science Report SC050021/SR3*

Table 1 Assessment results

Land Use	Hazard Index	Results
Residential	1	5
Allotment	1	1.5
Commercial	1	0.17
LOD included at full value		

The results indicate the hazard index is exceeded for both residential and allotment land uses, although not significantly for the allotment scenario. The hazard index is not exceeded for the commercial scenario. It should also be noted that a large number of the samples did not record concentrations exceeding the laboratory limit of detection (non-detects); in these circumstances the actual concentration of the contaminant in the sample is unknown, although it will lie somewhere between zero and the laboratory limit of detection. Current guidance³ indicates it may be reasonable to include non-detects at 50% of the laboratory limit of detection, the results of which are presented in the Table 2.

Table 2 Assessment results

Land Use	Hazard Index	Results
Residential	1	2.5
Allotment	1	0.8
Commercial	1	0.08
LOD included at 50% of value		

The results indicate the hazard index is exceeded for residential, but the hazard index is not exceeded for the allotment or commercial scenario.

Furthermore, as noted above the standard land use scenarios for residential and allotment⁴ are overly conservative for the landfill site which will be used as public open space (residential and allotment land uses are more sensitive than a public open space end use). The residential and allotment land use scenarios incorporate a number of assumptions, including the consumption of home grown produce which would not be applicable to an open space end use. Exposure durations, which are linked to time spent on site, will also be much lower for a public open space end use. Based on the investigations undertaken to date and the conservative assessment undertaken it is unlikely the hazard index would be exceeded for a less sensitive public open space end use as proposed for the site.

The UK does not have a SGV for assessing the PCB7 results. We have, therefore referred to guidance developed in the Netherlands. The Dutch ministry has developed an Intervention Value (IV) for PCB which can be used to screen the sum of PCB7 results. The published Intervention Value has been adjusted to take account of the SOM conditions on site. The IV for a residential land use is 200ug/kg.

The majority of samples and congeners did not exhibit concentrations above the LOD (21µg/kg); the limited number of samples which did record concentrations above the LOD are as follows:

- HA02 = 23.8µg/kg (sum)
- HA30 = 26.9µg/kg (sum)

³ CIEH, CL:AIRE, May 2008. *Guidance on Comparing Soil Contamination Data with a Critical Concentration.*

⁴ Environment Agency. 2009. *Updated Technical Background to the CLEA Model. Science Report SC050021/SR3*

- HA45 = 40.8µg/kg (sum)

The sum of the PCB results should be compared to the IV to establish the potential for unacceptable risk to human health. The concentrations recorded were significantly below the IV for all samples.

Conclusions

Based on the investigations undertaken to date and the assessments presented above the PCB concentrations recorded at the site would be unlikely to represent a significant risk to site users.