4. Summary of findings

Dioxin-like chemicals were found in most of the 116 Australian soils sampled, with concentrations ranging from the limit of detection (0.05 pg TEQ g^{-1}) to 43 pg TEQ g^{-1} dm. It should be noted that the latter value is from the analysis of the original sample from the Hobart urban location. This concentration was regarded as anomalous not only because it was very much greater than those from any other study location, but also because the concentration in the sample from the Hobart industrial location was among the lowest of those from industrial locations. Analysis results from resampling both Hobart locations, taking soil from the same sites used for the original sampling, indicated that the concentration for the Hobart urban location was within the range for urban sites at other study locations and confirmed the previous result in respect of the Hobart industrial location. Setting aside the anomalous concentration of dioxin-like chemicals at the Hobart urban location, the range of concentrations found in this study ranged from less than the limit of detection to a maximum of 23 pg TEQ g^{-1} dm (urban location at Wollongong, New South Wales).

Analytical reproducibility for replicate analysis of six soil samples, carried out by AGAL, showed good reproducibility. In addition an inter-laboratory calibration carried out as part of the study showed that the detection and quantification of analytes was good and comparable with other studies from elsewhere. However, sampling reproducibility based on mean normalised differences between ‘A’ and ‘B’ samples from equivalent sites (i.e. different residential parks within the same city) was much more variable, with some mean normalised differences reaching greater than 100%. A possible explanation for these differences may be the occurrence of an historical or current point source near one of the sites where soil was collected.

In this project, median concentrations expressed as TEQ for dioxin-like chemicals in the samples of soils across all land-use types in the North and South-East study regions were not significantly different, but the median concentration in the South-West region was shown to be substantially lower with a statistically significant of $p < 0.05$. The greatest concentrations of dioxin-like chemicals were found in soils near centres of population within the south-east coastal area of the Australia, and concentrations were consistently low in Western Australia and inland areas.

Variability in concentrations of dioxin-like chemicals in soils within individual states and territories, across a range of land-use types, was high. This reflects a major finding from this study that land-use is a key variable in determining likely background levels of these chemicals. Data from the study showed that levels of dioxin-like chemicals in soils from urban and industrial locations were substantially higher relative to agricultural land-use and remote locations. This pattern was consistent regardless of whether concentrations were expressed as toxic equivalents or concentrations (for either the sum of detectable PCDD/PCDF or sum of detectable dioxin-like PCB). Conclusions based on the statistical analysis of data using ANOVAs and principal component analyses are consistent.

Across agricultural land-uses, concentrations of dioxin-like chemicals in soils were similar, with the exception of sugarcane growing (which was substantially greater than other land-uses studied). However, other evidence suggests that this is a geographic rather than a land-use related phenomenon.

On average greater than 80% of the toxic equivalency across soil samples was contributed by 2,3,7,8-PCDD/PCDF and the data indicated that the contribution was on average greater in soils from industrial locations (24%) and urban locations (15%) compared to remote and agricultural locations (5.8 and 5.3%). PCDD/PCDF homologue and congener profiles for the PCDD/PCDF in soils sampled in this study are strongly dominated by OCDD. Similarly, the tetra-heptachlorinated 2,3,7,8-chlorine substituted profiles are dominated by the highest chlorinated PCDD, 1,2,3,4,6,7,8-heptachloro dibenzodioxin. The dominance of higher chlorinated PCDD in the homologue and congener profiles and their consistency throughout most Australian soil samples is unusual and the source or formation processes by which such a higher chlorinated dominance could occur remains unresolved despite intensive studies by others.

Results from the analysis of a set of archived historical soil samples from a site near Adelaide, covering the period 1925 to 2001 suggest the presence of dioxin-like chemicals in soils 80 years ago. The data suggest a decrease from the 1920s to the 1940s followed by an increase in the concentration in the 1950s and the 1960s for PCDD/PCDF and PCB. However, detection of PCB in the 1925 soil sample is unexpected to say the least and it is uncertain whether this is an artifact related to sampling or storage of the samples.

As there is no Australian guideline for contamination of dioxin-like chemicals in soils, an assessment was made against guidelines from Germany and New Zealand for dioxin-like chemicals in soil. In total only 15% of the Australian samples (all but one of which were from urban or industrial locations) exceeded the German target value of <5 pg I-TE g^{-1} dm, and only one sample (Hobart urban) exceeded the German threshold of acceptability for specific agricultural uses of soil (40 pg I-TE g^{-1}). The elevated level in the Hobart sample was unexpected and a second sample collected from the same location was much lower (1.5 pg TEQ g^{-1} dm) and more in accord with other Tasmanian results, suggesting that the initial elevated result was anomalous.

The concentrations of dioxin-like chemicals in urban and industrial locations sampled as part of the NDP were similar to those reported in previous Australian studies and in the New Zealand Organochlorines Program. On the basis of toxic equivalents, concentrations of dioxin-like chemicals in remote and agricultural areas are on average much lower compared to results from remote and agricultural locations in other industrialised countries and can be considered among the lowest background concentrations internationally. The levels of dioxin-like chemicals in industrial and urban locations are more variable and the contribution of PCB to the TEQ is often more relevant. However, overall, the study found that soils in urban and industrial areas were also relatively low compared to results from overseas.

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6. Appendices

Appendix A – Sampling program

This appendix provides details of the sampling program. It includes:

- Table A1 - National sampling locations
- Table A2 - Year and profile depth of the analysed historical soil samples
- Sampling location criteria specific to land-use
- Sampling form, filled out for each sampling location.

Table A1 National sampling locations.

Region	State/territory	Site location name	Land-use	Region	State/territory	Site location name	Land-use
N	WA	Kununurra (R1A)	Remote	SE	VIC	Warracknabeal Region (A1A)	Agricult.
N	NT	Darwin (I1A)	Indust.	SE	VIC	Mansfield Region (A1A)	Agricult.
N	NT	Darwin (U1A)	Urban	SE	VIC	Mt. Buller (R1A)	Remote
N	NT	Kakadu NP (R1A)	Remote	SE	VIC	Bendigo (U1A)	Urban
N	NT	Kakadu NP (R2A)	Remote	SE	VIC	Latrobe Valley (I1A and I1B)	Indust.
N	NT	Katherine Region (A1A)	Agricult	SE	VIC	Yarra Ranges (A1A)	Agricult.
N	NT	Newcastle Waters (R1A)	Remote	SE	VIC	Melbourne (I1A)	Indust.
N	NT	Alice Springs (R1A)	Remote	SE	VIC	Melbourne (I2A and I2B)	Indust.
N	NT	Cape York (R1A)	Remote	SE	VIC	Melbourne (U2A and U2B)	Urban
N	QLD	Cairns (U1A and U1B)	Urban	SE	VIC	Geelong (I1A)	Indust.
N	QLD	Upper Johnstone (R1A)	Remote	SE	VIC	Geelong (U1A)	Urban
N	QLD	Gulf Savannah (R1A)	Remote	SE	VIC	Wilsons Promontory (R1A)	Remote
N	QLD	Banana Region (A1A)	Agricult	SE	TAS	Cape Grim (R1A)	Remote
N	QLD	Gladstone (I1A and I1B)	Indust.	SE	TAS	Elliott Region (A1A)	Agricult.
N	QLD	Carnarvon Gorge NP (R1A)	Remote	SE	TAS	Launceston (U1A and U1B)	Urban
N	QLD	Bedourie (R1A)	Remote	SE	TAS	West Tamar Region (A1A)	Agricult.
N	QLD	Cooper Creek (R1A)	Remote	SE	TAS	Meander Valley (A1A)	Agricult.
N	QLD	Gympie Region (A1A)	Agricult	SE	TAS	Lake St. Clair NP (R1A)	Remote
N	QLD	Cooloola NP (R1A)	Remote	SE	TAS	Hobart (I1A and I1B)	Indust.
N	QLD	Sunshine Coast (A1A)	Agricult	SE	TAS	Hobart (U1A and U1B)	Urban
N	QLD	Brisbane (I1A and I1B)	Indust.	SE	TAS	Huon Valley (A1A)	Agricult.
N	QLD	Brisbane (I2A)	Indust.	SE	SA	Renmark Region (A1A)	Agricult.
N	QLD	Brisbane (U1A and U1B)	Urban	SE	SA	Gluepot Reserve (R1A)	Remote
N	QLD	Ipswich Region (A1A)	Agricult	SE	SA	Fleurieu Peninsula (A1AandA1B)	Agricult.
N	QLD	Gold Coast (U1A)	Urban	SE	SA	Adelaide (I1A and I1B)	Indust.
SE	NSW	Stuart NP (R1A)	Remote	SE	SA	Adelaide (U1A)	Urban
SE	NSW	Narrabri Region (A1A)	Agricult	SE	SA	Yorke Peninsula (A1A)	Agricult.
SE	NSW	Lismore Region (A1A)	Agricult	SE	SA	Port Pirie (I1A)	Indust.
SE	NSW	New England NP (R1A)	Remote	SE	SA	Whyalla (I1A)	Indust.
SE	NSW	Newcastle (I1A)	Indust.	SE	SA	Flinders Ranges (R1A)	Remote
SE	NSW	Newcastle (U1A)	Urban	SE	SA	Simpson Desert (R1A)	Remote
SE	NSW	Sydney (I1A)	Indust.	SW	WA	Bunbury Region (A1A)	Agricult.
SE	NSW	Sydney (I2A and I2B)	Indust.	SW	WA	Perth (I1A)	Indust.
SE	NSW	Sydney (U1A and U1B)	Urban	SW	WA	Perth (I2A and I2B)	Indust.
SE	NSW	Sydney (U2A)	Urban	SW	WA	Perth (U1A)	Urban
SE	NSW	Sydney (U3A and U3B)	Urban	SW	WA	Perth (U2A)	Urban
SE	NSW	Royal NP (R1A)	Remote	SW	WA	Northam Region (A1A)	Agricult.
SE	NSW	Wollongong (I1A and I1B)	Indust.	SW	WA	Laverton (R1A)	Remote
SE	NSW	Wollongong (U1A and	Urban	SW	WA	Kalbarri (R1A)	Remote
SE	NSW	Hay Plains (R1A)	Remote	SW	WA	Canarvon (R1A)	Remote
SE	NSW	Wagga Wagga Region	Agricult	SW	WA	Newman (R1A)	Remote
SE	ACT	Canberra (U1A)	Urban				
SE	ACT	Eastern ACT (A1A)	Agricult				
SE	NSW	Namadgi NP (R1A)	Remote				
SE	NSW	Bombala Region (A1A)	Agricult				

Table A2 Year and profile depth of the analysed historical soil samples.

Year historical sample collected	Depth of soil profile sampled
1925	0–23 cm
1935	0–10 cm
1945	0–10 cm
1950	0–10 cm
1956	0–10 cm
1963	0–10 cm
1973	0–10 cm
1981	0–2.5 cm
1983	0–10 cm
2001	0–10 cm

Sampling location criteria specific to land-use

The following criteria were provided to sampling personnel for selection of sub-sampling sites:

Industrial and Urban locations:

- Sampling was undertaken in local public parks
- Samples were collected from undisturbed sites: sites to which soil may have been imported were avoided
- Areas subject to regular flooding and/or erosion problems were avoided
- Areas that receive specific chemical or physical treatment such as sports grounds, cricket pitches or theatre ovals, were avoided
- Samples were not collected form cultivated sites (for example flower beds or vegetable/herb patches)
- Power/transformer stations were avoided
- Samples were collected using the triangle approach: the triangle fitted to each park
- Samples were collected at least 20 m distant from any road
- Sampling avoided proximity to man made features - samples were collected no closer than 10 m to any buildings, fences, poles or any man-made structures.

Agricultural locations:

- Samples were collected from areas where agriculture is the main land-use
- Locations were > 30 km from major urban or industrial activities
- Areas subject to regular flooding and/or unusual erosion problems were avoided
- Samples were collected from undisturbed sites: sites to which soil may have been imported were avoided
- Areas receiving specific chemical or physical treatment were avoided (for example: cattle dips, areas used to burn waste, sites where pesticides are regularly loaded/unloaded)
- Samples were collected using the triangle approach: the triangle fitted to a field or paddock, with side lengths of approximately 100 m
- Samples were collected at least 50 m distant from any road
- Sampling avoided proximity to man made features - samples were collected no closer than 20 m to any buildings, fences, poles or any man-made structures.

Remote locations:

Sampling in remote areas was carried out in specific regions where anthropogenic activities are minimal and that represent specific environments/ecosystems typical for remote Australia. Areas subject to regular controlled burning provided an exception to this rule as, although an anthropogenic activity, burning is a land management strategy deployed by indigenous Australians at least for the last 30 000 years.

Criteria for sampling location selection included:

- Sampling locations were > 60 km from major urban centres or industrial activities
- Areas subject to regular flooding and/or unusual erosion problems were avoided
- Areas receiving specific chemical or physical treatment such as gaps related to powerlines, gaslines or pipelines were avoided
- Samples were collected using the triangle approach: with side lengths of up to 1km (were possible)
- Samples were collected at least 200 m from a 4WD track
- Samples were collected at least 1 km distant from any sealed road
- Sampling avoided proximity to man made features - samples were collected no closer than 100 m to any buildings, fences, poles or any man-made structures.

Soil sampling form

A. SITE INFORMATION - AREA DESCRIPTION

Sampling Date/Time: ____
Sampling Area
Region:________________________
State: _________________________

Please provide a map of the sampling area indicating the sub-sampling site locations.

Regional land uses:

a.) Industrial → Key Industry ____________________________________

b.) Urban → Type (city, suburb. Etc) ____________________________

c.) Agriculture → Key Crops_______________________________________

d.) Remote → Dominant Vegetation Type(s)_______________________

Rainfall events
Date of the last rainfall event? ___________Amount (mm) ________________
Date of the last heavy (> 25 mm) rainfall event? _______Amount (mm)_____

Further describe the area:
a) If Industrial – what are the key industries in the area?

Mining Waste disposal
Manufacturing Smelting/Refining
Chemical Power/Energy Generation
Other
If Other please specify____

Industry intensity?
Heavy
Moderate
Sparse

b) If Agriculture – what is the main type

Livestock
Farming
Mixture
Horticulture
Other

If other please
specify____

How much agriculture?
Intensive Extensive

Where there are crops –
Name main crops____

Pesticide use (Types/amount p.a.) ____________________________________

Are biosolids applied on the property
If biosolids are applied, how much and where do they originate from?

Quantity: ______________t/ha/year
Source: ____

c) If Urban – describe traffic
- Heavy
- Moderate
- Light

If Remote describe vegetation coverage – specify vegetation type
- Closed Forest (>70% foliage cover)
- Open Forest (30-70% foliage cover)
- Woodlands (10-30% foliage cover)
- Open Woodlands (<10% foliage cover)
- Tall Shrublands (shrubs >2m)
- Low Shrublands (shrubs <2m)
- Savannah
- Wetland
- Mangroves
- No Vegetation

Other information
Additional area information which may be relevant: ______________________

B. SUB-SAMPLING SITE DETAILS

SUB-SAMPLING SITE CRITERIA

Please consult the following checklist before sampling at each selected sub-sampling site.

1. Criteria for urban/industrial sites.

- ☐ The site is relatively undisturbed
- ☐ Sampling is carried out 20 m distant to any road
- ☐ Sampling avoids proximity to man made features (>10 m to any buildings, fences poles or man made structures)
- ☐ The site is not subject to regular flooding and/or erosion problems
- ☐ The site does not receive specific chemical or physical treatment (for example, sports grounds, cricket pitches or theatre ovals).
- ☐ The site is not cultivated (i.e. no flower beds or vegetable/herb patches)
- ☐ The sites is not be located on a former landfill (avoid port areas)
- ☐ The site is not located in the vicinity of power/transformer stations

2. Criteria for agricultural sites

- ☐ The site is distant (>30 km) to urban or industrial areas
- ☐ Sampling is carried out at least 50 m distant to any road
- ☐ Sampling avoids proximity to manmade obstructions (no closer than 20 m to any buildings, fences, poles or any man-made structures)
- ☐ The site is not subject to regular flooding and/or erosion problems
- ☐ The site does not receive specific chemical or physical treatment such as the edges of the fields, cattle dips, areas that have been used to burn waste material or where pesticides are un/loaded.
- ☐ The sites is not be located on a former landfill

3. Criteria for remote sites

- ☐ The site is distant (>60 km) to urban or industrial areas
- ☐ Sampling is carried out at least 1 km distant to any road
- ☐ Sampling is carried out at least 200 m distant to any 4WD track
- ☐ Sampling is carried out at least 20 m distant to any walking track
- ☐ Sampling avoids proximity to manmade obstructions (no closer than 100 m to any buildings, fences, poles or any man-made structures)
- ☐ Sampling avoids areas that are subject to regular flooding and/or unusual erosion problems

SUB-SAMPLING SITE 1:

Site Name/Basic description (eg. Newfarm Park): ________________________

GPS Reading –
Longitude___________________________
Latitude ___________________________
Altitude ___________________________

3. History of the site (previous land use)____
____

4. Soil
Type – if known___________________________________
Ground Coverage___________________________________
Depth of litter - if applicable_________________________

5. Foliage Projection Cover

Sub-Sample Number	Approximate Foliage Projection Cover (%)	Corresponding to Photo Number (if applicable)
1		
2		
3		
4		
5		
6		

6. Is the area subject to regular burning?
Yes
No
If yes – how regular________________________________

7. Brief description of site

Flat	Moderately steep	Steep
Marshy	Grassy	Stony
Sandy	Muddy	

8. Other Information

Is the site in an area, which is subject to regular erosion problems? Yes No

Additional information on site, or sampling, which may be relevant. ____________

SUB-SAMPLING SITE 2:

Site Name/Basic description (eg. Newfarm Park): ________________________

GPS Reading –
Longitude_________________________
Latitude _________________________
Altitude __________________________

3. History of the site (previous landuse)___________________________
____

4. Soil
Type – if known________________________________
Ground Coverage______________________________
Depth of litter - if applicable_______________________

5. Foliage Projection Cover

Sub-Sample Number	Approximate Foliage Projection Cover (%)	Corresponding to Photo Number (if applicable)
1		
2		
3		
4		
5		
6		

6. Is the area subject to regular burning?
Yes
No
If yes – how regular_______________________________

7. Brief description of site

Flat	Moderately steep	Steep
Marshy	Grassy	Stony
Sandy	Muddy	

8. Other Information
Is the site in an area, which is subject to regular erosion problems? Yes No

Additional information on site, or sampling, which may be relevant._________
____

SUB-SAMPLING SITE 3:

Site Name/Basic description (eg. Newfarm Park): ______________________

GPS Reading –
Longitude_________________________
Latitude _________________________
Altitude __________________________

3. History of the site (previous land-use)_________________________
____

4. Soil
Type – if known__________________________________
Ground Coverage________________________________
Depth of litter - if applicable_________________________

5. Foliage Projection Cover

Sub-Sample Number	Approximate Foliage Projection Cover (%)	Corresponding to Photo Number (if applicable)
1		
2		
3		
4		
5		
6		

6. Is the area subject to regular burning?
Yes
No
If yes – how regular______________________________

7. Brief description of site

Flat	Moderately steep	Steep
Marshy	Grassy	Stony
Sandy	Muddy	

8. Other Information
Is the site in an area, which is subject to regular erosion problems? Yes No

Additional information on site, or sampling, which may be relevant.
____
____

FIELD OFFICER DETAILS

Name ____________________________ Ph.: (_____) ____________________

Signature of field officer ________________________

Appendix B – Analytical methodology

This appendix provides details of the analytical methodology. It includes:

- PCDD/PCDF and dioxin-like PCB analyses
- Sample preparation
- High-Resolution Gas Chromatography High-Resolution Mass Spectrometric (HRGC-HRMS) Analysis
- Table B1. The MID Windows for PCDD/PCDF and list of analytes
- Table B2. Theoretical ion abundance ratios and QC limits
- Table B3. The MID Windows for non-ortho and mono-ortho PBC and list of analytes
- Table B4. Theoretical ion abundance ratios and QC limits
- Analyte identification and quantification criteria
- Quantification using the isotope dilution technique
- Total Organic Carbon (TOC) protocol.

Polychlorinated dibenzo-*p*-dioxins (PCDD) and polychlorinated dibenzofurans (PCDF), dioxin-like polychlorinated biphenyls (PCB):

The method is for determination of tetra- through octa-chlorinated dibenzo-*p*-dioxins (PCDD) & dibenzofurans (PCDF) and polychlorinated biphenyl congeners (PCB) in soil and sediment matrices by high resolution gas chromatography/high resolution mass spectrometry (HRGC/HRMS). A list of analytes is provided in Table B1 and B3.

This method provides data on all toxic 2,3,7,8-chlorinated PCDD (seven) and PCDF (ten) isomers, plus the 12 'dioxin-like' PCB congeners designated as toxic by the World Health Organisation (WHO). The PCDD/PCDF and PCB are determined by the isotope dilution quantitation technique. This technique allows determination of the dioxin toxicity equivalent (TEQ_{DF}) as well as the PCB toxicity equivalent (TEQ_{PCB}) for the 'dioxin-like' PCB in a sample using WHO_{98} toxicity equivalency factors (TEFs). The total toxic equivalents (TEQ_{DF+PCB}) are calculated as the sum of TEQ_{DF} + TEQ_{PCB}.

The detection limits and quantification levels in this method are usually dependent on the level of interferences rather than instrumental limitations. The method is 'performance based'.

PCDD/PCDF and dioxin-like PCB analyses

The following standards were all purchased from Wellington Laboratories (Ontario, Canada) and were used for calibration, quantification and determination of recovery of PCDD/PCDF and dioxin-like PCB.

PCDD/PCDF

- EPA-1613-CVS calibration and verification solutions (CS-1 to CS-5)
- EPA-1613-LCS labelled compound surrogate solution
- EPA-1613-ISS-ST internal standard solution.

Dioxin-like PCB

- WP-CVS calibration and verification solutions (CS-1 to CS-7)
- WP-LCS labelled surrogate spiking solution
- WP-ISS internal standard solution
- Acetone, dichloromethane, hexanes, and toluene were all OmniSolv® grade sourced from Merck KgaA (Darmstadt, Germany). Anhydrous sodium sulfate (granular) was AR grade sourced from Mallinckrodt (Kentucky, USA). AnalaR® sulfuric acid S.G. was sourced from Merck (Victoria, Australia).

All chromatographic columns were purchased from Fluid Management Systems. (Waltham, MA, USA) and were used without any further treatment. They comprised multi-layer (basic/neutral/acidic) silica, basic alumina and PX-21 carbon dispersed on celite which are packed in individual Teflon columns and vacuum sealed in aluminium foil packages.

Sample preparation

Accelerated solvent extraction was performed on soil and sediment samples using an ASE 100 (Dionex, Utah, USA) with toluene as the extracting solvent and a temperature and pressure of 150 °C and 1500 psi, respectively.

Approximately 20g of soil or sediment was accurately weighed and spiked with a known amount of the respective PCDD/PCDF and dioxin-like PCB isotopically labelled $^{13}C_{12}$ surrogate spiking solutions. Extracts were solvent exchanged into hexane from toluene and subsequently cleaned up using multiple extractions with concentrated sulfuric acid until the acid layer remained colourless. The hexane extracts were washed several times with water and dried through cleaned anhydrous sodium sulfate. Sulphur was removed using activated copper or silver nitrated dispersed on silica gel. The extracts were then concentrated prior to clean-up on the Power-Prep™ system. Elution through the different columns is computer controlled and requires applying the hexane extract first onto the multi-layer silica and using hexane at a flow rate of 10 mL/min onto the alumina column. Dichloromethane:hexane (2:98) at 10 mL/min is used initially and then the solvent strength is modified to dichloromethane:hexane (50:50) and transferred to the carbon column which is eluted with ethyl acetate:toluene (50:50) in the forward direction at 10 mL/min. The flow is then reversed and the carbon column is eluted with toluene at 5 mL/min.

Two fractions are collected. The first fraction is collected from the alumina column during elution using dichloromethane:hexane (50:50) and contains the mono-ortho and di-ortho PCB. The second fraction containing PCDD/PCDF and & non-ortho PCB are eluted from the carbon column during the reverse elution with toluene. The two fractions are concentrated separately under vacuum and the respective recovery standards (EPA-1613-ISS-ST & WP-ISS) are added and then further concentrated using clean dry nitrogen to a final volume of 10 µL prior to HRGC/HRMS analysis.

High-resolution gas chromatography high-resolution mass spectrometric (HRGC-HRMS) analysis

All analyses were conducted on a MAT95XL HRMS (ThermoFinnigan MAT GmbH, Bremen, Germany) coupled to an Agilent 6890 GC (Palo Alto, CA, USA) equipped with a CTC A200S autosampler. A DB-5 (J & W Scientific, Folsom, CA, USA) capillary column (60m x 0.25mm i.d., film thickness 0.25µm) was used as the primary analytical column with ultra-high purity Helium as the carrier gas. A flow rate of 1.0 mL/min was maintained throughout the chromatographic run. The temperature program was from 100 °C (isothermal for 1 min.) then ramp 1 to 200 °C at 40 °C/min, ramp 2 to 235 °C (isothermal for 10 min) at 3 °C/min and then ramp 3 to 310 °C (isothermal 9 min) at 5 °C/min. A 1µL splitless injection with an injector temperature of 290 °C was employed for all standards and sample extracts. The mass spectrometer operating conditions were: ion source and transfer line temperatures, 240 °C and 280 °C, respectively; ionisation energy 45eV, filament current 0.7mA and electron multiplier voltage set to produce a gain of 10^6. Resolution was maintained at 10,000 (10% valley definition) throughout the sample sequence. Multiple ion detection (MID) experiments were performed in the electron impact mode with monitoring of the exact masses of either M+ [M+2]+ or [M+4]+ ions for native and labelled compounds. Individual congeners are identified using the GC retention time and ion abundance ratios with reference to internal standards. A DB-dioxin column was used for confirmation analysis when required.

Table B1 The MID windows for PCDD/PCDF and list of analytes.

MID Window	Accurate Mass	*Ion Id	Ion Type	Analyte (I= internal standard)
1	303.9016	M	R	TCDF
	305.8987	M+2	T	TCDF
	315.9419	M	R	TCDF(I)
	317.9389	M+2	T	TCDF(I)
	319.8965	M	R	TCDD
	321.8936	M+2	T	TCDD
	331.9368	M	R	TCDD(I)
	333.9338	M+2	T	TCDD(I)
2	339.8597	M+2	T	PeCDF
	341.8567	M+4	R	PeCDF
	351.9000	M+2	T	PeCDF(I)
	353.8970	M+4	R	PeCDF(I)
	355.8546	M+2	T	PeCDD
	357.8516	M+4	R	PeCDD
	367.8949	M+2	T	PeCDD(I)
	369.8919	M+4	R	PeCDD(I)
3	373.8208	M+2	T	HxCDF
	375.8178	M+4	R	HxCDF
	383.8639	M	R	HxCDF(I)
	385.8610	M+2	T	HxCDF(I)
	389.8156	M+2	T	HxCDD
	391.8127	M+4	R	HxCDD
	401.8559	M+2	T	HxCDD(I)
	403.8529	M+4	R	HxCDD(I)
4	407.7818	M+2	T	HpCDF
	409.7788	M+4	R	HpCDF
	417.8250	M	R	HpCDF(I)
	419.8220	M+2	T	HpCDF(I)
	423.7767	M+2	T	HpCDD
	425.7737	M+4	R	HpCDD
	435.8169	M+2	T	HpCDD(I)
	437.8140	M+4	R	HpCDD(I)
5	441.7428	M+2	T	OCDF
	443.7399	M+4	R	OCDF
	457.7377	M+2	T	OCDD
	459.7348	M+4	R	OCDD
	469.7780	M+2	T	OCDD(I)
	471.7750	M+4	R	OCDD(I)

*T=Target Ion=Quantitation Ion; R=Ratio Ion=Qualifier Ion.

TCDD - tetrachlorodibenzo-*p*-dioxin
PeCDD - pentachlorodibenzo-*p*-dioxin
HxCDD - hexachlorodibenzo-*p*-dioxin
HpCDD - heptachlorodibenzo-*p*-dioxin
OCDD - octachlorodibenzo-*p*-dioxin

TCDF - tetrachlorodibenzofuran
PeCDF - pentachlorodibenzofuran
HxCDF - hexachlorodibenzofuran
HpCDF - heptachlorodibenzofuran
OCDF - octachlorodibenzofuran

Table B2 Theoretical Ion abundance ratios and QC limits.

No. of Chlorine Atoms	*m/z's forming the ratio	Theoretical Ratio	QC limits[1]	
			Lower	Upper
4[2]	M/(M+2)	0.77	0.65	0.89
5	(M+4)/(M+2)	0.65	0.56	0.76
6	(M+4)/(M+2)	0.81	0.70	0.95
6[3]	M/(M+2)	0.51	0.43	0.59
7	(M+4)/(M+2)	0.95	0.83	1.14
7[4]	M/(M+2)	0.44	0.37	0.51
8	(M+2)/(M+4)	0.89	0.76	1.02

[1] QC limits represent ±15% windows around the theoretical ion abundance ratios.
[2] Does not apply to $^{37}Cl_4$-2,3,7,8-TCDD (clean-up standard).
[3] Used for $^{13}C_{12}$-HxCDF only.
[4] Used for $^{13}C_{12}$-HpCDF only.
* The ratio is defined as the Qualifier ion area (R) divided by the Quantitation ion area (T).

Table B3 The MID windows for non-ortho and mono-ortho PCB and list of analytes

MID Window	Accurate Mass	*Ion Id	Analyte (I= internal standard)
1	289.9224	M	TeCB
	291.9194	M+2	TeCB
	293.9165	M+4	TeCB
	301.9626	M	TeCB (I)
	303.9597	M+2	TeCB (I)
	323.8834	M	PeCB
	325.8804	M+2	PeCB
	327.8775	M+4	PeCB
	337.9207	M+2	PeCB (I)
	339.9178	M+4	PeCB (I)
2	359.8415	M+2	HxCB
	361.8365	M+4	HxCB
	363.8356	M+6	HxCB
	371.8817	M+2	HxCB (I)
	373.8788	M+4	HxCB (I)
	393.8025	M+2	HpCB
	395.7995	M+4	HpCB
	397.7966	M+6	HpCB
	405.8428	M+2	HpCB (I)
	407.8398	M+4	HpCB (I)

TeCB - tetrachlorobiphenyl
PeCB - pentachlorobiphenyl
HxCB - hexachlorobiphenyl
HpCB - heptachlorobiphenyl

Table B4 Theoretical Ion abundance ratios and QC limits

No. of Chlorine Atoms	*m/z's forming the ratio	Theoretical Ratio	QC limits[1]	
			Lower	Upper
4	M/(M+2)	0.77	0.65	0.89
5	(M+4)/(M+2)	0.66	0.56	0.76
6	(M+4)/(M+2)	0.82	0.70	0.94
7	(M+4)/(M+2)	0.98	0.83	1.13

[1]QC limits represent ±15% windows around the theoretical ion abundance ratios.
*The ratio is defined as the Qualifier ion area (R) divided by the Quantitation ion area (T).

Analyte identification and quantification criteria

For positive identification and quantification, the following criteria must be met:

- The retention time of the analyte must be within 1 second of the retention time of the corresponding $^{13}C_{12}$ surrogate standard
- The ion ratio obtained for the analyte must be ±15% (±20% for PCB) of the theoretical ion ratio
- The signal to noise ratio must be greater than 3:1
- Levels of PCDD and PCDF congeners in a sample must be greater than 3 times any level found in the corresponding laboratory blank analysed
- Surrogate standard recoveries must be in the range 25-150%.

Quantification using the isotope dilution technique

The naturally occurring (native) compound is determined by reference to the same compound in which one or more atoms has been isotopically enriched. In this method, all carbon atoms for selected PCDD/PCDF and PCB molecules have been substituted with carbon-13 to produce $^{13}C_{12}$-labeled analogs of the chlorinated dibenzo-*p*-dioxins, dibenzofurans and biphenyls, respectively. The $^{13}C_{12}$-labelled PCDD/PCDF and PCB are spiked into each sample and allow identification and correction of the concentration of the native compounds in the analytical process. Homologue totals for the tetra to octachloro dibenzo-*p*-dioxins and dibenzofurans are calculated by summing the total areas for each positively identified congener within each group and quantifying these totals using the mean relative response factor (RRF) of the determined RRFs for a homologue series.

The proprietary chromatographic integration package supplied with the Thermo Finnigan instrument, (Xcalibur®), was used to target all monitored compounds and create a text file that was further manipulated in Excel to produce the final certificate of analysis.

Total organic carbon protocol

Total organic carbon (TOC) was determined in the Queensland Health Scientific Services (QHSS) laboratory according to a standardised procedure (QHSS, 1996). Inorganic carbonates were removed using acid-catalysed digestion (10% HCl, 1% $FeCl_2$ at 70°C). The remaining material was dried and combusted in the LECO induction furnace with subsequent detection of CO_2 (LECO WR12 CO_2 detector).

Appendix C – Quality control

This appendix reports the quality control measures undertaken for this study

Sample handling and quality assurance

Direct contact with the soil by sampling personnel was avoided by use of the coring tubes. Coring tubes were thoroughly pre-cleaned with acetone and toluene at ENTOX and sealed with aluminium foil prior to distribution to sampling personnel. Soil-filled coring tubes were resealed in aluminium foil at the point of collection, and returned as quickly as practical to ENTOX in the original packaging. Following receipt by ENTOX tube contents were removed promptly under clean laboratory conditions. All items of equipment involved in soil core handling were rinsed clean in a detergent solution and solvent rinsed (acetone) between samples. Once removed from coring tubes, samples were stored in foil packets prior to homogenisation and freeze-drying. They were then transferred to solvent-washed glass jars for transport to AGAL for analysis.

Laboratory quality control

Laboratory quality control was achieved through implementation of the following procedures:

- A laboratory blank was analysed with each batch of samples
- A suitable soil laboratory control sample (LCS) was analysed with each batch of samples as a replicate to assess method precision
- The GCMS resolution, performance and sensitivity was established for each MS run
- The recoveries of all isotopically-labeled surrogate standards was calculated and reported
- Ten percent of all samples were analysed by an independent crosscheck QC laboratory.

For positive analyte identification and quantification, the following criteria were met:

- The retention time of the analyte was within 1 second of the retention time of the corresponding $^{13}C_{12}$ surrogate standard
- The ion ratio obtained for the analyte was 10% (20% for PCB) of the theoretical ion ratio
- The signal to noise ratio was greater than 3:1
- Levels of PCDD and PCDF congeners in a sample were greater than 5 times any level found in the corresponding laboratory blank analysed (3 times the level in the blank for OCDD)
- Surrogate standard recoveries were in the range 25-150%.

Data quality and reporting for analysis of dioxin-like compounds

PCDD/PCDF and ‘dioxin-like’ PCB data were corrected for recovery of $^{13}C_{12}$ surrogate standards.

The basis of reporting for primary and quality control samples are given in Tables C1 and C2, respectively.

Table C1 **Reporting basis for contaminant concentrations in soils**

Contaminant class	Reporting basis
PCDD/PCDF	pg/g on a dry mass basis. Toxic equivalents for PCDD/PCDF (TEQ_{DF}) are calculated using the WHO Toxic Equivalents Factors (TEFs).
‘dioxin-like’ PCB	pg/g on a dry mass basis. Toxic equivalents for ‘dioxin-like’ PCB (TEQ_{PCB}) are calculated using the WHO Toxic Equivalents Factors (TEFs).
PCDD/PCDF and ‘dioxin-like’ PCB	Total toxic equivalents for PCDD/PCDF and ‘dioxin-like’ PCB (TEQ_{DF+PCB}) are calculated from the addition of the respective TEQ_{DF} and TEQ_{PCB} values

Table C2 **Reporting basis for quality control samples**

QC Sample	Reporting basis
Laboratory blanks	Calculated using the average dry mass of all samples analysed in the batch. Reported on a mass per mass basis.
Field blanks	Calculated using the dry mass of soil collected in a single jar for the corresponding field sample. Reported on a mass per mass basis.
Rinsate blanks	Calculated using the volume of rinsate analysed. Reported on a mass per volume basis.

Sampling reproducibility

Table C3 Comparison of results for 18 soil samples where both 'A' & 'B' samples were analysed.

Location	Land-use	Sample	TEQ_{DF+PCB} (Exc. LOD)	∑ PCDD/-F (Exc. LOD)	∑PCB (Exc LOD)	No. Detectables	Mean normalised difference[1]
Brisbane (I1)	Industrial	A	11	8100	880	38	85%
		B	5.7	9600	390	39	
Brisbane (U1)	Urban	A	7.5	7100	380	36	100%
		B	3.3	8200	180	36	
Gladstone (I1)	Industrial	A	0.53	850	79	29	63%
		B	0.45	140	150	30	
Wollongong (I1)	Industrial	A	4.2	1700	320	37	66%
		B	2.2	2500	2000	34	
Cairns (U1)	Urban	A	10	68000	2.0	22	130%
		B	1.5	6800	4.4	13	
Sydney (U1)	Urban	A	11	20000	2000	38	19%
		B	11	18000	1400	35	
Sydney (U3)	Urban	A	4.7	12000	290	37	71%
		B	9.3	42000	620	32	
Sydney (I2)	Industrial	A	11	11000	660	31	160%
		B	3.8	620	60	17	
Adelaide (I1)	Industrial	A	3.7	550	1800	37	64%
		B	1.3	350	300	29	
Melbourne (U2)	Urban	A	6.1	13000	570	31	43%
		B	6.1	25000	500	32	
Wollongong (U1)	Urban	A	23	68000	570	37	100%
		B	3.6	8800	260	36	
Fleurieu Peninsula (A1)	Agricult.	A	1.1	3200	0.61	19	71%
		B	1.4	5600	5.0	22	
Hobart (I1)	Industrial	A	0.95	210	270	33	45%
		B	0.55	240	260	33	
Hobart (U1)	Urban	A	42	25000	680	36	170%
		B	0.18	17	74	24	
Launceston (U1)	Urban	A	1.1	2500	96	30	100%
		B	3.7	2100	380	36	
Melbourne (I2)	Industrial	A	4.8	11000	170	33	45%
		B	6.0	30000	110	36	
Latrobe Valley (I1)	Industrial	A	2.3	7500	36	26	130%
		B	11	50000	140	33	
Perth (I2)	Industrial	A	0.19	21	35	24	71%
		B	0.39	59	7.2	29	

[1] Mean normalised difference calculated for all congeners detected in both samples

Analytical reproducibility

Table C4 Summary of analytical reproducibility for replicate analysis of six soil samples.

Sample	Land-use	$TEQ_{(DF+PCB)}$ (Exc. LOD)	∑ PCDD/-F (Exc. LOD)	∑PCB (Exc. LOD)	No. detectables	Mean normalised difference [1]
Cairns (U1A)	Urban	10	68400	2	23	25%
		7.4	53600	ND	15	
Sydney (U3A)	Urban	4.7	12000	290	39	39%
		3.7	12100	92	29	
Sydney (U3B)	Urban	9.3	42400	620	36	14%
		9.7	42200	98	32	
Melbourne (U2A)	Urban	6.1	13000	570	30	18%
		6.2	11300	37	32	
Sydney (I2A)	Industrial	11	11000	660	32	38%
		9.2	10800	60	30	
Adelaide (I1A)	Industrial	3.7	550	1800	37	17%
		2.6	610	690	27	

[1] Mean normalised difference calculated for all congeners detected in both samples

Table C5 Summary of the interlaboratory evaluation of analytical results for eight soil samples.

Sample	Laboratory	$TEQ_{(DF+PCB)}$ (Exc. LOD)	∑ PCDD/-F (Exc. LOD)	∑PCB (Exc. LOD)	No. detectables	Mean normalised difference [1]
Kakadu NP (R2A)	AGAL	0.80	1100	2.1	16	65%
	MoE C	0.28	1100	ND	4	
Sunshine Coast (A1A)	AGAL	4.1	8600	89	29	33%
	MoE C	3.8	9700	31	21	
Brisbane (I1A)	AGAL	11	8100	880	35	25%
	MoE C	10	7300	710	37	
Newcastle (I1A)	AGAL	4.3	940	980	35	27%
	MoE C	6.7	1100	1100	35	
Sydney (I2A)	AGAL	11	11000	660	29	43%
	MoE C	9.1	11000	310	35	
Sydney (U3A)	AGAL	4.7	12000	290	35	28%
	MoE C	4.2	14000	220	27	
Melbourne (U2A)	AGAL	6.1	13000	570	29	24%
	MoE C	7.7	15000	520	35	
Adelaide (U1A)	AGAL	3.5	530	320	36	24%
	MoE C	3.9	540	230	34	

[1] Mean normalised difference calculated for all congeners detected by both laboratories

Appendix D – Concentrations of PCDD/PCDF and PCB in Australian soils

This appendix reports the concentrations of PCDD/PCDF and PCB in Australian soils.

For PCDD/PCDF, the tables report the results for each of the 2, 3, 7, 8-dioxin substituted congeners, the concentration of the sum of all congeners in a homologue group and the calculated sum of all the tetra-octachlorinated PCDD/PCDF (a).

For PCB, the tables report the results for each of the dioxin-like PCB congeners and the calculated sum for each sample (b).

TEQ_{DF} (a), TEQ_{PCB} (b), and TEQ_{DF+PCB} (c) were calculated, both including half LOD values and excluding LOD values, using the WHO_{98} scheme (van den Berg et al. 1998).

TOC (Total Organic Carbon) are reported for each sample (d).

Table D1	Concentrations in industrial soils
Table D2	Concentrations in urban soils
Table D3	Concentrations in agricultural soils
Table D4	Concentrations in remote soils
Table D5	Concentrations in historical soils

Table D1a. Concentrations of PCDD/PCDF in Australian industrial soils (pg g^{-1} dm)

	N	N	N	N	N	N	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE
Congener	Darwin (I1A)	Gladstone (I1A)	Gladstone (I1B)	Brisbane (I1A)	Brisbane (I1B)	Brisbane (I2A)	Newcastle (I1A)	Sydney (I1A)	Sydney (I2AAve)	Sydney (I2B)	Wollongong (I1A)	Wollongong (I1B)	Latrobe Valley (I1A)	Latrobe Valley (I1B)	Melbourne (I1A)	Melbourne (I2A)	Melbourne (I2B)	Geelong (I1A)
2,3,7,8-TCDD	<0.04	<0.06	<0.03	1.1	0.14	<0.1	0.057	<0.1	<0.4	<0.2	0.23	<0.3	0.27	0.19	<0.2	<0.1	0.12	<0.1
Total TCDD isomers	0.25	0.96	1.5	11	2.8	1.8	6.7	5.2	13 ± 8.5	1.2	8.5	3.6	20	92	12	3	3.5	4.2
1,2,3,7,8-PeCDD	<0.3	<0.1	<0.2	1.6	0.8	0.3	<0.4	<0.3	1.4	<0.3	0.65	<0.3	0.68	1.4	0.42	0.86	0.59	<0.2
Total PeCDD isomers	0.68	0.27	<1	9	4.3	2.6	4.7	3	15 ± 3.5	<2	7	2.1	15	50	3.7	4.7	5.5	1
1,2,3,4,7,8-HxCDD	0.5	0.21	0.14	2.5	2.3	0.5	0.61	1.1	3.1 ± 0.78	<0.3	<0.8	<0.3	0.39	3.1	0.49	2.3	1.5	0.23
1,2,3,6,7,8-HxCDD	0.98	0.42	0.62	13	4.8	1.9	1.5	1.9	17 ± 3.5	0.39	<2	0.93	0.75	4.3	1.4	3.5	2.1	0.35
1,2,3,7,8,9-HxCDD	1.7	<0.4	0.89	5.1	5.7	2.8	1	2.3	4.6 ± 3.7	<0.3	2.3	1.2	0.64	6.7	1.4	4.8	2.7	0.58
Total HxCDD isomers	13	6.3	4.4	64	59	35	18	26	110 ± 17	7.1	25	13	25	110	16	67	64	6.3
1,2,3,4,6,7,8-HpCDD	36	14	5.4	370	130	38	30	84	270 ± 14	11	35	22	35	250	24	150	130	9.2
Total HpCDD isomers	90	37	13	670	320	100	69	200	510 ± 28	30	92	58	97	750	57	470	400	24
OCDD	2700	800	120	6600	9160	5300	730	12000	10000 ± 0	580	1500	2350	7370	49200	1100	10100	29300	520
2,3,7,8-TCDF	0.11	<0.2	0.08	0.5	0.31	0.2	1.6	0.36	1.6 ± *0.78*	<0.3	1.1	0.82	<0.06	0.47	0.4	0.2	0.41	0.18
Total TCDF isomers	1	2.2	1.8	27	4.9	2.4	29	5.1	29 ± 16	<3	27	7.3	3.5	20	11	2.7	12	4.3
1,2,3,7,8-PeCDF	<0.09	0.17	<0.01	0.3	0.28	0.2	2.1	<0.3	1.4 ± 0.21	<0.1	1.1	0.71	<0.05	0.24	0.37	<0.1	0.41	0.15
2,3,4,7,8-PeCDF	<0.08	0.22	<0.04	0.3	0.23	0.1	3.1	0.32	2.2 ± 0.57	<0.3	1.8	1	<0.04	0.24	0.3	0.16	0.3	0.16
Total PeCDF isomers	0.7	0.62	0.39	18	3	<2	32	1.2	30 ± 9.2	<3	20	11	0.58	3.3	4.6	1.8	3.3	1.4
1,2,3,4,7,8-HxCDF	<0.2	<0.1	<0.06	<2	0.45	0.2	3	0.32	3.3 ± 1.3	<0.2	1.9	1.1	0.058	<0.2	<0.3	<0.1	<0.2	0.1
1,2,3,6,7,8-HxCDF	0.17	<0.2	0.18	1.2	0.98	0.8	2.7	0.35	1.8 ± 0	<0.05	1.6	0.85	<0.03	0.21	0.66	0.14	0.22	0.28
2,3,4,6,7,8-HxCDF	<0.2	0.17	<0.03	1.9	0.24	<0.2	2.5	0.38	2.2 ± 0.49	<0.1	1.7	1	0.054	0.18	0.45	0.18	0.17	<0.1
1,2,3,7,8,9-HxCDF	0.24	<0.03	0.18	<0.1	0.57	0.4	0.21	<0.2	<0.1	<0.07	<0.4	0.24	0.34	<0.2	<0.09	0.23	0.44	0.09
Total HxCDF isomers	1.2	1.2	0.52	40	4.1	2.7	24	4	22 ± 1.4	<1	15	7.6	0.63	1.6	6.3	1.6	1.6	1.2
1,2,3,4,6,7,8-HpCDF	1.5	1	0.44	62	3.5	1.7	9.4	3	19 ± 0	0.9	7.9	5.6	<0.3	1.3	6	1.4	1.1	0.68
1,2,3,4,7,8,9-HpCDF	<0.1	0.09	<0.04	3.2	0.25	0.2	1	<0.2	1.1 ± 0	<0.1	0.73	0.63	<0.04	0.12	0.62	0.1	0.11	0.056
Total HpCDF isomers	<3	1.1	1	230	7.8	4.1	17	6	47 ± 4.2	1.4	12	7.9	<0.4	2.3	10	0.73	2.3	<1
OCDF	2.2	1.4	0.88	460	11	5.2	10	6.3	43 ± 9.2	1.8	12	6.1	0.44	<2	21	2	2.6	0.65
Sum of PCDD/-F (exc)[1]	**2800**	**850**	**140**	**8100**	**9600**	**5500**	**940**	**12000**	**11000 ± 140**	**620**	**1700**	**2500**	**7500**	**50000**	**1200**	**11000**	**30000**	**560**
WHO_{98}-TEQ_{DF} (inc)[2]	**1.2**	**0.56**	**0.41**	**10**	**4.9**	**2.0**	**3.7**	**3.1**	**10**	**0.61**	**3.4**	**2**	**2.3**	**11**	**1.6**	**4.7**	**5.9**	**0.57**
WHO_{98}-TEQ_{DF} (exc)[1]	**1.0**	**0.43**	**0.28**	**10**	**4.9**	**2.0**	**3.5**	**2.9**	**9.8**	**0.22**	**3.3**	**1.7**	**2.3**	**11**	**1.5**	**4.6**	**5.9**	**0.42**

1 = excluding LOD values
2 = including half LOD values
3 = Mean value reported only if a PCDD/PCDF congener detected on more than 66% of occasions (minimum of 17 positive determinations)
4 = For any individual congener, calculation of the mean includes half LOD values
For italicised standard deviations from replicate results, average was calculated from a detected value and a LOD smaller than the detected value in the replicate analysis.

Table D1b. Concentrations of PCB in Australian industrial soils (pg g^{-1} dm)

Congener	Darwin (I1A)	Gladstone (I1A)	Gladstone (I1B)	Brisbane (I1A)	Brisbane (I1B)	Brisbane (I2A)	Newcastle (I1A)	Sydney (I1A)	Sydney (I2AAve)	Sydney (I2B)	Wollongong (I1A)	Wollongong (I1B)	Latrobe Valley (I1A)	Latrobe Valley (I1B)	Melbourne (I1A)	Melbourne (I2A)	Melbourne (I2B)	Geelong (I1A)
	N	N	N	N	N	N	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE
PCB 77	3.1	1.9	9.3	7.6	22	4.7	34	13	46 ± 37	<5	27	<10	2	10	43	11	4.5	4.8
PCB 81	0.12	0.13	0.39	0.3	0.75	0.2	1.6	0.49	1.5 ± 1.1	<0.2	1.6	<0.6	0.11	0.61	1	0.26	<0.2	0.35
PCB 126	1	0.92	1.5	5.7	7.5	1.9	6.1	3	8.2 ± 5.4	1.3	8	2.2	0.25	1.4	5	1.8	1.1	0.84
PCB 169	<0.06	<0.03	<0.07	1.2	0.47	0.3	0.6	0.28	0.62 ± *0.30*	<0.2	0.93	<0.4	<0.08	0.2	<0.6	<0.2	<0.2	0.15
PCB 105	<60	20	41	180	92	38	250	91	115 ± *21*	58	220	520	9.7	37	110	52	27	45
PCB 114	<2	0.76	1.8	9.7	2.7	1.1	10	<3	<4	<3	8.7	26	<0.4	<1	3	<0.3	0.78	<1
PCB 118	<100	45	80	360	200	71	520	180	300 ± *140*	140	460	1160	24	81	210	86	55	94
PCB 123	<5	<0.5	2.5	64	6.4	3.2	12	<9	14 ± *5.7*	4.9	64	41	<0.5	<3	14	5.3	3.4	4
PCB 156	28	8.2	14	160	43	28	110	35	39	28	75	200	<2	9.8	42	14	11	15
PCB 157	6.5	2.1	2.4	43	15	8.4	28	<5	<10	3.6	17	40	<0.4	1	13	4.2	2.5	<2
PCB 167	<10	<2	<5	22	<20	3.4	<30	<10	<20	<9	64	31	<1	<3	<10	<4	<5	<6
PCB 189	<3	<0.4	0.65	30	4.3	3.5	5.6	<3	12 ± *8.5*	<2	6.2	22	<0.2	<0.4	4.8	<0.9	0.84	<0.1
Sum of PCB (exc)[1]	**39**	**79**	**150**	**880**	**390**	**160**	**980**	**320**	**540**	**60**	**320**	**2000**	**36**	**140**	**450**	**170**	**110**	**160**
WHO_{98}-TEQ_{PCB} (inc)[2]	**0.13**	**0.10**	**0.17**	**0.75**	**0.82**	**0.22**	**0.77**	**0.35**	**0.89**	**0.17**	**0.94**	**0.53**	**0.030**	**0.16**	**0.57**	**0.21**	**0.13**	**0.11**
WHO_{98}-TEQ_{PCB} (exc)[1]	**0.12**	**0.10**	**0.17**	**0.75**	**0.82**	**0.22**	**0.77**	**0.35**	**0.82**	**0.17**	**0.94**	**0.53**	**0.029**	**0.16**	**0.57**	**0.20**	**0.13**	**0.11**

1 = excluding LOD values
2 = including half LOD values
3 = Mean value reported only if a PCB congener detected on more than 66% of occasions (minimum of 17 positive determinations)
4 = For any individual congener, calculation of the mean includes half LOD values
For italicised standard deviations from replicate results, average was calculated from a detected value and a LOD smaller than the detected value in the replicate analysis.

Table D1c. TEQ_{DF+PCB} in Australian industrial soils (pg TEQ g^{-1} dm). TEQ is based on TEF_{HUMANS} (van den Berg *et al*. 1998)

WHO_{98}-TEQ_{DF+PCB} (inc)[2]	**1.4**	**0.66**	**0.58**	**11**	**5.7**	**2.3**	**4.5**	**3.5**	**11 ± 1.6**	**0.78**	**4.4**	**2.5**	**2.3**	**11**	**2.2**	**4.9**	**6.0**	**0.68**
WHO_{98}-TEQ_{DF+PCB} (exc)[1]	**1.1**	**0.53**	**0.45**	**11**	**5.7**	**2.2**	**4.3**	**3.3**	**11 ± 1.3**	**0.38**	**4.2**	**2.2**	**2.3**	**11**	**2.1**	**4.8**	**6.0**	**0.53**

Table D1d. Total Organic Carbon in Australian industrial soils (%)

Total Organic Carbon %	**2.5**	**5.5**	**9.9**	**1.8**	**5.4**	**3.6**	**3.6**	**2.2**	**2.6**	**0.99**	**5.1**	**3.0**	**2.6**	**3.0**	**3.5**	**2.5**	**6.0**	**2.1**

Table D1a cont'd. Concentrations of PCDD/PCDF in Australian industrial soils (pg g^{-1} dm)

Congener	Hobart (I1A) SE	Hobart (I1A) - resample SE	Hobart (I1B) SE	Adelaide (I1AAve) SE	Adelaide (I1B) SE	Port Pirie (I1A) SE	Whyalla (I1A) SE	Perth (I1A) SW	Perth (I2A) SW	Perth (I2B) SW	Number of positives	Minimum	Maximum	Median	Mean[3,4]	Mean of ^{13}C surrogate standard recoveries, %, n=28
2,3,7,8-TCDD	<0.06	0.099	<0.09	0.1	<0.4	<0.01	<0.04	<0.03	<0.1	0.05	10	<0.01	1.1	0.1	-	61
Total TCDD isomers	10	13	3.2	10 ± 2.6	14	0.78	0.66	<0.3	0.77	0.9	27	0.25	92	3.55	8.7	
1,2,3,7,8-PeCDD	<0.2	0.21	0.1	0.42	0.23	<0.06	<0.1	<0.06	<0.1	0.087	15	<0.06	1.6	0.3	-	59
Total PeCDD isomers	1.5	1.7	0.66	4.8 ± 0.64	11	0.49	0.35	<0.5	<6	0.2	24	0.2	50	2.8	5.5	
1,2,3,4,7,8-HxCDD	<0.1	0.18	0.15	0.51 ± 0.12	0.45	<0.06	<0.3	<0.04	<0.05	0.078	20	<0.04	3.1	0.42	0.76	86
1,2,3,6,7,8-HxCDD	0.49	0.42	0.3	1.5 ± 0.071	0.99	0.21	<0.2	0.057	0.091	0.14	27	0.057	16.5	0.955	2.2	72
1,2,3,7,8,9-HxCDD	0.61	0.53	0.34	0.9 ± *0.42*	0.61	0.16	<0.5	0.041	<0.03	<0.05	23	<0.03	6.7	0.895	1.7	
Total HxCDD isomers	6.4	5.9	4.6	21 ± 0.71	11	1.6	1.7	0.44	0.44	1.5	28	0.44	110	13	26	
1,2,3,4,6,7,8-HpCDD	7.8	6.1	6.6	34 ± 2.1	14	3	5.3	2.7	0.82	3.8	28	0.82	370	23	62	69
Total HpCDD isomers	18	14	15	70 ± 4.9	28	6.1	11	4.1	0.83	6.8	28	0.83	750	57.5	150	
OCDD	140	110	200	430 ± 42	250	28	41	17	17	42	28	17	49200	765	5400	61
2,3,7,8-TCDF	0.67	0.43	0.25	0.84 ± 0.099	0.58	<0.2	<0.1	<0.03	<0.08	0.15	21	<0.03	1.6	0.305	0.42	65
Total TCDF isomers	20	16	5.5	10 ± 1.3	8.9	2.2	0.37	0.1	0.35	2.7	27	0.1	29	5	9.2	
1,2,3,7,8-PeCDF	0.34	0.28	<0.09	<0.4	0.46	<0.2	<0.1	<0.01	0.082	0.13	17	<0.01	2.1	0.22	0.34	60
2,3,4,7,8-PeCDF	0.47	0.36	<0.1	0.66 ± *0.078*	0.76	0.2	<0.2	0.041	0.14	<0.2	21	<0.04	3.1	0.235	0.48	60
Total PeCDF isomers	4.7	3.9	1.4	7.4 ± 2.8	9.1	1.3	0.89	0.1	0.55	1	26	0.1	32	2.5	5.9	
1,2,3,4,7,8-HxCDF	<0.3	0.44	0.14	0.97	<1	<0.2	<0.3	<0.02	<0.1	0.23	13	<0.02	3.3	0.215	-	82
1,2,3,6,7,8-HxCDF	0.37	0.34	0.14	0.77 ± 0.028	0.79	0.2	<0.2	<0.02	0.099	0.16	23	<0.02	2.7	0.25	0.54	79
2,3,4,6,7,8-HxCDF	0.29	0.28	<0.1	0.87 ± 0.16	0.98	0.22	0.23	<0.03	0.083	0.17	21	<0.03	2.5	0.21	0.52	82
1,2,3,7,8,9-HxCDF	<0.06	0.079	<0.03	<0.04	<0.2	<0.02	<0.1	<0.01	<0.03	0.024	12	<0.01	0.57	0.1	-	78
Total HxCDF isomers	2.4	2.6	1.7	8.6 ± 0.21	6.6	1.5	<2	<0.2	0.7	1.3	25	<0.2	40	1.85	5.8	
1,2,3,4,6,7,8-HpCDF	1.7	1.3	1.9	6.5 ± 0.14	5.7	1.6	2.1	0.4	0.44	1	27	<0.3	62	1.65	5.3	67
1,2,3,4,7,8,9-HpCDF	0.13	0.12	<0.09	0.34 ± 0.042	<0.2	<0.1	<0.08	<0.03	<0.05	0.077	17	<0.03	3.2	0.115	0.34	68
Total HpCDF isomers	3.1	2.2	3.3	11 ± 0	9	1.7	3.5	0.63	<0.6	1.6	24	<0.4	230	3.05	14	
OCDF	2.9	1.8	3.1	8.1 ± 1.9	5.3	1.3	2.9	0.82	0.43	1.1	27	0.43	460	2.75	22	
Sum of PCDD/-F (exc)[1]	**210**	**170**	**240**	**580 ± 42**	**350**	**45**	**62**	**23**	**21**	**59**		**21**	**50000**	**900**	**5600**	
WHO_{98}-TEQ_{DF} (inc)[2]	**0.76**	**0.86**	**0.42**	**1.9**	**1.6**	**0.29**	**0.31**	**0.12**	**0.23**	**0.34**		**0.12**	**11**	**1.6**	**2.7**	
WHO_{98}-TEQ_{DF} (exc)[1]	**0.61**	**0.86**	**0.34**	**0.89**	**1.3**	**0.23**	**0.10**	**0.063**	**0.12**	**0.29**		**0.063**	**11**	**1.2**	**2.5**	

1 = excluding LOD values
2 = including half LOD values
3 = Mean value reported only if a PCDD/PCDF congener detected on more than 66% of occasions (minimum of 17 positive determinations)
4 = For any individual congener, calculation of the mean includes half LOD values
For italicised standard deviations from replicate results, average was calculated from a detected value and a LOD smaller than the detected value in the replicate analysis.

Table D1b cont'd. Concentrations of PCB in Australian industrial soils (pg g^{-1} dm)

	SE	SE	SE	SE	SE	SE	SE	SW	SW	SW						
Congener	Hobart (I1A)	Hobart (I1A) - resample	Hobart (I1B)	Adelaide (I1AAve)	Adelaide (I1B)	Port Pirie (I1A)	Whyalla (I1A)	Perth (I1A)	Perth (I2A)	Perth (I2B)	Number of positives	Minimum	Maximum	Median	Mean[3,4]	Mean of ^{13}C surrogate standard recoveries, %, n=28
PCB 77	19	13	16	56 ± 0	<7	2.3	2.8	0.44	1.9	2.7	25	0.44	56	8.45	13	59
PCB 81	0.82	0.51	0.68	2.5 ± 0.35	<0.5	<0.1	<0.2	<0.02	<0.08	<0.1	19	<0.02	2.45	0.37	0.53	56
PCB 126	3	1.9	1.7	15 ± 1.4	<3	1.2	0.69	<0.2	0.65	0.92	26	<0.2	15	1.75	3.0	75
PCB 169	0.42	0.21	0.11	0.91 ± *0.014*	<0.3	<0.2	<0.08	<0.04	<0.05	<0.1	12	<0.03	1.2	0.2	-	79
PCB 105	69	52	71	470 ± 78	83	18	16	10	7.6	<8	25	7.6	520	55	98	77
PCB 114	2.5	2	3.4	14 ± *5.7*	<2	<0.6	<0.4	<0.4	<0.3	<0.3	13	<0.3	26	2	-	78
PCB 118	140	110	130	870 ± *99*	160	<30	<40	27	21	<20	22	20	1160	105	200	73
PCB 123	4.3	3.6	5.6	30 ± *14*	7	<2	<1	0.84	<1	<0.8	19	<0.5	64	4.6	11	77
PCB 156	20	<20	27	170 ± 14	37	7.5	7.2	2.3	2.9	3.6	25	<2	200	23.5	41	77
PCB 157	6.3	5.3	3.6	46 ± 5.7	9.2	<2	<1	<0.4	0.96	<1	20	<0.4	46	4.6	9.6	75
PCB 167	<6	<5	<9	<70	<9	<4	<4	<0.6	<1	<2	4	<0.6	<70	6	-	85
PCB 189	<2	1.3	2.2	10 ± *1.4*	<3	<2	0.41	<0.2	<0.4	<0.3	14	<0.1	30	2	-	84
Sum of PCB (exc)[1]	**270**	**190**	**260**	**1700**	**300**	**28**	**27**	**41**	**35**	**7.2**		**7.2**	**2000**	**170**	**350**	
WHO_{98}-TEQ_{PCB} (inc)[2]	**0.34**	**0.22**	**0.21**	**1.8**	**0.20**	**0.13**	**0.077**	**0.015**	**0.070**	**0.096**		**0.015**	**1.8**	**0.20**	**0.36**	
WHO_{98}-TEQ_{PCB} (exc)[1]	**0.34**	**0.21**	**0.21**	**1.7**	**0.048**	**0.13**	**0.075**	**0.005**	**0.070**	**0.094**		**0.0050**	**1.7**	**0.19**	**0.35**	

1 = excluding LOD values
2 = including half LOD values
3 = Mean value reported only if a PCB congener detected on more than 66% of occasions (minimum of 17 positive determinations)
4 = For any individual congener, calculation of the mean includes half LOD values
For italicised standard deviations from replicate results, average was calculated from a detected value and a LOD smaller than the detected value in the replicate analysis.

Table D1c cont'd. TEQ_{DF+PCB} in Australian industrial soils (pg TEQ g^{-1} dm). TEQ is based on TEF_{HUMANS} (van den Berg *et al*. 1998)

	Hobart (I1A)	Hobart (I1A) - resample	Hobart (I1B)	Adelaide (I1AAve)	Adelaide (I1B)	Port Pirie (I1A)	Whyalla (I1A)	Perth (I1A)	Perth (I2A)	Perth (I2B)	Number of positives	Minimum	Maximum	Median	Mean
WHO_{98}-TEQ_{DF+PCB} (inc)[2]	**1.1**	**1.1**	**0.63**	**3.7 ± 0.14**	**1.8**	**0.42**	**0.31**	**0.13**	**0.30**	**0.44**		**0.13**	**11**	**2.2**	**3.1**
WHO_{98}-TEQ_{DF+PCB} (exc)[1]	**0.95**	**1.1**	**0.55**	**2.6 ± 0.78**	**1.3**	**0.35**	**0.10**	**0.069**	**0.19**	**0.39**		**0.069**	**11**	**2.1**	**2.9**

Table D1d cont'd. Total Organic Carbon in Australian industrial soils (%)

	Hobart (I1A)	Hobart (I1A) - resample	Hobart (I1B)	Adelaide (I1AAve)	Adelaide (I1B)	Port Pirie (I1A)	Whyalla (I1A)	Perth (I1A)	Perth (I2A)	Perth (I2B)	Number of positives	Minimum	Maximum	Median	Mean
Total Organic Carbon %	**7.2**	**-**	**3.9**	**2.5**	**3.4**	**3.4**	**1.3**	**2.3**	**0.77**	**1.9**		**0.77**	**9.9**	**3.0**	**3.4**

Table D2a. Concentrations of PCDD/PCDF in Australian urban soils (pg g^{-1} dm)

	N	N	N	N	N	N	SE	SE	SE	SE	SE	SE	SE	SE	SE
Congener	Darwin (U1A)	Cairns (U1AAve)	Cairns (U1B)	Brisbane (U1A)	Brisbane (U1B)	Gold Coast (U1A)	Newcastle (U1A)	Sydney (U1A)	Sydney (U1B)	Sydney (U2A)	Sydney (U3AAve)	Sydney (U3BAve)	Wollongong (U1A)	Wollongong (U1B)	Canberra (U1A)
2,3,7,8-TCDD	<0.08	<0.1	<0.2	<0.1	0.11	<0.05	0.8	0.16	<0.4	0.45	0.18	<0.4	0.5	<0.09	<0.06
Total TCDD isomers	0.59	1.3 ± 0.80	<1	10	1.8	2.7	6.9	25	17	4.3	3.3 ± 2.3	4.7 ± 0.14	5.7	5.1	2.5
1,2,3,7,8-PeCDD	0.42	0.59	<0.5	0.9	0.51	0.2	0.66	1.8	1.8	1.5	0.67 ± 0.13	1.1 ± 0.16	3.5	0.47	0.11
Total PeCDD isomers	1	3.7	<4	9.4	2.9	2.5	2.2	21	30	8.8	4.2 ± 2.5	8.5 ± 1.3	28	1.5	1.5
1,2,3,4,7,8-HxCDD	<0.7	1.7 ± 0.50	<0.6	1.7	1.2	0.4	0.69	3	2.9	3.6	1.0 ± 0.23	2.0 ± 0.071	11	1.1	<0.2
1,2,3,6,7,8-HxCDD	0.99	2.3 ± 0	<1	10	2.1	0.7	1.5	7	6.9	6.1	2.0 ± 0.071	3.6 ± 0.28	14	2	<0.4
1,2,3,7,8,9-HxCDD	1.3	2.5 ± *0.71*	2	9.5	2.5	0.7	<0.6	6.9	7.6	<0.5	1.9 ± 0.28	3.1 ± 0.071	19	2.7	<0.6
Total HxCDD isomers	8.8	47 ± 12	24	68	47	13	36	88	120	83	28 ± 2.8	52 ± 0.71	220	45	4.5
1,2,3,4,6,7,8-HpCDD	32	180 ± 14	63	180	70	25	46	170	200	200	110 ± 51	160 ± 0	680	68	5.6
Total HpCDD isomers	74	420 ± 35	150	370	200	60	120	390	510	440	220 ± 71	370 ± 7.1	1700	180	10
OCDD	2600	61000 ± 10000	6610	6500	7950	2200	5030	19000	17600	9260	12000 ± 71	42000 ± 140	66000	8560	100
2,3,7,8-TCDF	<0.2	<0.07	<0.5	0.9	0.37	<0.04	0.89	1.7	1.6	<0.4	0.32 ± *0.021*	0.81 ± 0.042	0.63	0.4	0.48
Total TCDF isomers	2.2	1 ± 0	<3	12	3.1	2	10	36	23	8.8	4.3 ± 1.9	11 ± 0.71	9.8	5.9	9.4
1,2,3,7,8-PeCDF	<0.1	<0.02	<0.3	0.6	0.18	<0.06	0.47	1.6	1.3	<0.5	0.26	0.72 ± 0.12	0.67	0.43	0.27
2,3,4,7,8-PeCDF	<0.2	<0.03	<0.2	0.8	0.24	0.1	0.81	2.3	2.2	0.59	0.34	0.91 ± 0.014	0.91	0.57	0.55
Total PeCDF isomers	1.1	0.5	<3	8.9	1.8	<1	3.2	20	21	4.9	3.5 ± 0.28	9.6 ± 0.57	11	5.2	<3
1,2,3,4,7,8-HxCDF	0.21	<0.03	<0.4	2.5	0.18	<0.2	<0.7	2.2	2.6	6.8	0.3 ± *0.14*	<0.5	<2	0.81	0.3
1,2,3,6,7,8-HxCDF	<0.08	<0.04	<0.2	7.6	0.61	<0.1	0.44	1.8	1.8	0.71	0.39 ± 0.064	0.88 ± 0.13	1.1	0.56	0.43
2,3,4,6,7,8-HxCDF	<0.2	0.065	0.17	1.5	0.19	0.06	0.31	1.9	2.2	<0.5	0.41 ± 0.028	0.79 ± 0.15	1	0.39	<0.3
1,2,3,7,8,9-HxCDF	0.14	<0.07	<0.2	0.8	<0.2	0.08	<0.2	1.7	<0.2	0.69	<0.05	0.12 ± *0.042*	0.53	0.76	<0.06
Total HxCDF isomers	0.99	0.22	4.9	26	1.8	<1	3.8	24	22	6.4	3.5 ± 0.21	6.2 ± 0	17	4.5	3.1
1,2,3,4,6,7,8-HpCDF	1.3	0.62 ± 0.11	3.5	16	1.5	0.8	3.2	13	20	6.1	2.6 ± 0.14	5.1 ± 0.64	15	2.4	2.5
1,2,3,4,7,8,9-HpCDF	0.12	0.074	<0.2	2.6	<0.1	0.1	0.24	1.2	1.1	<0.4	0.22 ± *0.021*	0.34 ± *0.049*	1.1	0.17	<0.1
Total HpCDF isomers	1.9	1.4 ± 0.14	15	41	2.6	2	5.9	31	31	12	2.7	7.8 ± 0.89	46	3.6	3.5
OCDF	1.7	2.5 ± 0.21	22	31	2.5	1.6	5.2	24	23	11	2.7 ± 1.1	7.3 ± 0.14	40	2.4	<0.8
Sum of PCDD/-F (exc)[1]	**2700**	**61000 ± 10000**	**6800**	**7100**	**8200**	**2300**	**5200**	**20000**	**18000**	**9800**	**12000 ± 71**	**42000 ± 140**	**68000**	**8800**	**130**
WHO_{98}-TEQ_{DF} (inc)[2]	**1.4**	**9.2**	**2.1**	**7.5**	**3.0**	**1.0**	**3.3**	**9.6**	**9.7**	**7.1**	**4.0**	**8.8**	**23**	**3.3**	**0.72**
WHO_{98}-TEQ_{DF} (exc)[1]	**1.3**	**9.1**	**1.5**	**7.4**	**3.0**	**0.92**	**3.3**	**9.6**	**9.5**	**7.0**	**4.0**	**8.5**	**23**	**3.2**	**0.61**

1 = excluding LOD values
2 = including half LOD values
3 = Mean value reported only if a PCDD/PCDF congener detected on more than 66% of occasions (minimum of 16 positive determinations)
4 = For any individual congener, calculation of the mean includes half LOD values
For italicised standard deviations from replicate results, average was calculated from a detected value and an LOD smaller than the detected value in the replicate analysis.

Table D2b. Concentrations of PCB in Australian urban soils (pg g^{-1} dm)

	N	N	N	N	N	N	SE	SE	SE	SE	SE	SE	SE	SE	SE
Congener	Darwin (U1A)	Cairns (U1AAve)	Cairns (U1B)	Brisbane (U1A)	Brisbane (U1B)	Gold Coast (U1A)	Newcastle (U1A)	Sydney (U1A)	Sydney (U1B)	Sydney (U2A)	Sydney (U3AAve)	Sydney (U3BAve)	Wollongong (U1A)	Wollongong (U1B)	Canberra (U1A)
PCB 77	2.7	0.82	<4	<0.2	9.2	2.3	20	34	36	18	22 ± 7.8	60 ± 9.2	18	12	<10
PCB 81	<0.07	<0.05	<0.2	<0.06	0.45	0.07	3.5	1.7	1.4	0.57	0.49	1.8 ± 0.14	0.75	0.56	0.51
PCB 126	<0.7	<0.08	<0.3	0.3	2.6	<0.5	12	13	8.8	6	3.5 ± 0.71	9.4 ± 0.92	4.1	3.1	2.8
PCB 169	<0.2	<0.1	<0.2	<0.02	0.25	0.07	2.3	1	<0.7	<0.4	0.26	0.57 ± *0.099*	0.71	0.46	<0.2
PCB 105	<20	<3	<20	120	48	11	43	520	290	170	63	150	160	73	<70
PCB 114	<0.7	<0.1	<0.7	2.8	<2	<0.4	<2	16	<20	7.4	2	4.5	4.3	2.5	<1
PCB 118	<50	<7	<30	180	89	20	110	1100	690	410	130	340	320	140	<100
PCB 123	<2	<0.7	<0.5	10	3.6	0.8	3.6	41	31	<20	20 ± 20	15 ± 7.4	11	<4	<4
PCB 156	<9	1.2	<5	42	19	3.9	21	190	140	75	23	51	44	24	21
PCB 157	<2	<0.2	<3	14	5.8	1.1	3.6	52	34	25	16 ± 15	<9	<10	5.6	5.9
PCB 167	<5	<0.7	4.4	6.7	<6	1.9	36	<50	200	<30	37	<20	<20	<10	39
PCB 189	<0.5	<0.2	<0.7	3.4	1.5	0.3	<2	11	11	5.8	2.4	<4	3.8	<1	<0.9
Sum of PCB (exc)[1]	**2.7**	**2.0**	**4.4**	**380**	**180**	**41**	**260**	**2000**	**1400**	**720**	**320**	**630**	**570**	**260**	**24**
WHO$_{98}$-TEQ$_{PCB}$ (inc)[2]	**0.043**	**0.0058**	**0.021**	**0.091**	**0.29**	**0.032**	**1.3**	**1.6**	**1.1**	**0.72**	**0.40**	**1.0**	**0.50**	**0.35**	**0.30**
WHO$_{98}$-TEQ$_{PCB}$ (exc)[1]	**0.00027**	**0.00068**	**0.000044**	**0.091**	**0.29**	**0.0067**	**1.3**	**1.6**	**1.1**	**0.71**	**0.40**	**1.0**	**0.50**	**0.35**	**0.29**

1 = excluding LOD values
2 = including half LOD values
3 = Mean value reported only if a PCB congener detected on more than 66% of occasions (minimum of 16 positive determinations)
4 = For any individual congener, calculation of the mean includes half LOD values
For italicised standard deviations from replicate results, average was calculated from a detected value and an LOD smaller than the detected value in the replicate analysis.

Table D2c. TEQ$_{DF+PCB}$ in Australian urban soils (pg TEQ g^{-1} dm). TEQ is based on TEF$_{HUMANS}$ (van den Berg *et al*. 1998)

WHO$_{98}$-TEQ$_{DF+PCB}$ (inc)[2]	**1.5**	**9.2 ± 1.2**	**2.1**	**7.6**	**3.3**	**1.0**	**4.6**	**11**	**11**	**7.8**	**4.5 ± 0.35**	**9.8 ± 0.28**	**23**	**3.6**	**1.0**
WHO$_{98}$-TEQ$_{DF+PCB}$ (exc)[1]	**1.3**	**8.7 ± 1.8**	**1.5**	**7.5**	**3.3**	**0.93**	**4.5**	**11**	**11**	**7.7**	**4.2 ± 0.71**	**9.5 ± 0.28**	**23**	**3.6**	**0.90**

Table D2d. Total Organic Carbon in Australian urban soils (%)

Total Organic Carbon %	**2.4**	**2.3**	**1.8**	**5.4**	**2.3**	**2.1**	**2.7**	**3.0**	**2.2**	**4.4**	**2.4**	**2.9**	**7.0**	**5.8**	**4.5**

Table D2a cont'd. Concentrations of PCDD/PCDF in Australian urban soils (pg g^{-1} dm)

Congener	Melbourne (U2AAve)	Melbourne (U2B)	Geelong (U1A)	Bendigo (U1A)	Launceston (U1A)	Launceston (U1B)	Hobart (U1A)	Hobart (U1A) - resample	Hobart (U1B)	Adelaide (U1A)	Perth (U1A)	Perth (U2A)	Number of positives	Minimum	Maximum	Median	Mean[3,4]	Mean of ^{13}C surrogate standard recoveries, %, n=27
	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SW	SW						
2,3,7,8-TCDD	<0.08	<0.3	<0.07	<0.2	0.11	0.22	<0.3	0.11	<0.04	0.18	<0.06	<0.1	10	<0.04	0.8	0.11	-	62
Total TCDD isomers	15 ± 0.71	14	0.68	2.9	1.4	8.9	17	12	4.4	13	0.15	<0.7	24	0.15	25	4.4	6.7	
1,2,3,7,8-PeCDD	0.94 ± *0.057*	<0.6	<0.1	0.17	<0.2	0.55	2.6	0.4	<0.06	0.7	<0.04	0.084	21	<0.04	3.5	0.55	0.76	60
Total PeCDD isomers	5.8 ± 3.3	5.4	<7	1.6	1.7	5	42	2.7	0.49	14	<0.2	0.73	24	<0.2	42	4	7.8	
1,2,3,4,7,8-HxCDD	2.4 ± 0.35	<2	<0.2	0.16	0.48	<0.7	6.4	0.83	<0.05	0.68	<0.04	0.077	19	<0.04	11	0.83	1.6	89
1,2,3,6,7,8-HxCDD	5.7 ± 0.78	3.8	<0.2	0.29	0.86	1.3	84	1.2	<0.08	1.5	<0.06	0.14	22	<0.06	84	1.5	5.9	73
1,2,3,7,8,9-HxCDD	3.2 ± *1.7*	3.9	<0.6	0.26	1.6	1.7	19	1.1	0.14	1.2	<0.2	<0.06	21	<0.06	19	1.7	3.4	
Total HxCDD isomers	60 ± 0.71	58	1.5	3.3	14	19	690	23	3.2	19	<0.4	2.1	26	<0.4	690	28	66	
1,2,3,4,6,7,8-HpCDD	160 ± 14	160	4.5	3.7	26	28	1630	30	1.5	16	1	1.5	27	1	1630	63	160	73
Total HpCDD isomers	360 ± 21	410	12	8.3	71	74	3140	110	3.6	33	2.1	2.9	27	2.1	3140	150	350	
OCDD	11000 ± 850	24300	380	150	2400	1950	15500	1650	<20	370	<20	<10	24	<10	66000	6500	12000	69
2,3,7,8-TCDF	2.4 ± 0	0.7	<0.09	<0.2	0.25	2.5	7.1	0.16	0.12	1.5	<0.05	0.19	19	<0.04	7.1	0.4	0.88	65
Total TCDF isomers	25 ± 0.71	11	4.8	4.7	4.2	33	32	12	3.3	35	0.55	2.6	26	0.55	36	8.8	11	
1,2,3,7,8-PeCDF	1.0 ± 0.25	0.5	<0.07	0.21	<0.1	1.2	4.4	<0.1	0.055	1.2	<0.03	0.2	18	<0.02	4.4	0.3	0.59	62
2,3,4,7,8-PeCDF	1.4 ± 0.14	0.65	<0.05	0.31	<0.1	1.7	2.7	0.11	0.067	1.7	<0.06	0.25	21	<0.03	2.7	0.55	0.72	60
Total PeCDF isomers	11 ± 5.1	6.2	<0.8	2.8	1	9.5	68	1.4	0.56	19	0.33	2.1	23	0.33	68	3.2	8	
1,2,3,4,7,8-HxCDF	<1	<0.5	<0.09	0.21	<0.2	1.5	<10	<0.1	<0.04	1.5	<0.08	0.16	13	<0.03	<10	0.4	-	85
1,2,3,6,7,8-HxCDF	1.1 ± *0.14*	0.72	<0.07	0.15	0.11	1.1	10	0.084	<0.04	1.5	0.052	0.14	21	<0.04	10	0.44	1.2	80
2,3,4,6,7,8-HxCDF	0.97	0.59	<0.07	0.19	0.13	0.97	6.4	0.081	0.051	1.4	0.054	0.16	23	0.051	6.4	0.31	0.76	83
1,2,3,7,8,9-HxCDF	0.18	<0.2	<0.6	<0.03	<0.06	<0.1	2.5	0.071	<0.02	0.4	<0.03	<0.03	12	<0.02	2.5	0.18	-	79
Total HxCDF isomers	19 ± 0.71	7.5	<0.7	1.2	1	6.7	420	0.86	0.43	12	<0.6	1.2	24	0.22	420	3.8	22	
1,2,3,4,6,7,8-HpCDF	16 ± 1.4	7.7	<0.4	0.62	0.86	5.8	540	0.43	<0.3	5.2	0.21	0.61	25	0.21	540	2.6	29	70
1,2,3,4,7,8,9-HpCDF	1.1 ± 0.30	0.6	<0.1	0.072	<0.06	0.38	43	<0.02	<0.03	0.44	<0.04	0.068	18	<0.02	43	0.2	2	71
Total HpCDF isomers	39 ± 4.2	19	<1	0.7	1.4	6.4	1990	0.43	<0.6	8.6	0.25	0.97	24	0.25	1990	3.6	84	
OCDF	31 ± 2.8	18	<0.4	0.35	1.5	5.6	2730	0.45	0.62	4.4	<0.4	0.6	24	0.35	2730	2.7	110	
Sum of PCDD/-F (exc)[1]	**12000 ± 1200**	**25000**	**400**	**180**	**2500**	**2100**	**25000**	1800	**17**	**530**	**3.4**	**13**		3.4	68000	7000	13000	
WHO_{98}-TEQ_{DF} (inc)[2]	**6.3**	**6.0**	**0.28**	**0.63**	**1.1**	**3.2**	**42**	1.4	**0.15**	**3.0**	**0.11**	**0.38**		0.11	42	3.2	5.9	
WHO_{98}-TEQ_{DF} (exc)[1]	**6.2**	**5.4**	**0.083**	**0.52**	**1.0**	**3.1**	**42**	1.4	**0.08**	**3.0**	**0.023**	**0.33**		0.023	42	3.1	5.7	

1 = excluding LOD values
2 = including half LOD values
3 = Mean value reported only if a PCDD/PCDF congener detected on more than 66% of occasions (minimum of 16 positive determinations)
4 = For any individual congener, calculation of the mean includes half LOD values
For italicised standard deviations from replicate results, average was calculated from a detected value and an LOD smaller than the detected value in the replicate analysis.

Table D2b cont'd. Concentrations of PCB in Australian urban soils (pg g^{-1} dm)

Congener	Melbourne (U2Ave) SE	Melbourne (U2B) SE	Geelong (U1A) SE	Bendigo (U1A) SE	Launceston (U1A) SE	Launceston (U1B) SE	Hobart (U1A) SE	Hobart (U1A) - resample SE	Hobart (U1B) SE	Adelaide (U1A) SE	Perth (U1A) SW	Perth (U2A) SW	Number of positives	Minimum	Maximum	Median	Mean[3,4]	Mean of ^{13}C surrogate standard recoveries, %, n=27
PCB 77	23 ± 3.5	18	<0.7	3.9	4.9	23	39	5.6	7.4	12	1.5	3.5	23	<0.2	60	11	14	59
PCB 81	1.1 ± 0.14	0.84	<0.08	0.15	0.2	1.1	1.6	0.22	0.3	0.53	<0.09	<0.1	20	<0.05	3.5	0.5	0.67	57
PCB 126	5.6 ± 0.42	5.3	<0.1	0.89	0.91	4.7	2.7	0.67	0.85	4.6	0.41	0.73	22	<0.08	13	2.8	3.5	78
PCB 169	<0.5	0.63	<0.2	<0.1	<0.3	<0.7	0.41	<0.09	<0.05	0.75	<0.06	<0.08	11	<0.02	2.3	0.28	-	79
PCB 105	130 ± *35*	120	<4	14	27	110	150	15	20	81	31	8.1	22	<3	520	67	89	78
PCB 114	5.4 ± *0.49*	<4	<0.4	<2	<0.7	4	6.6	<0.7	0.54	2.7	<1	<0.2	12	<0.1	<20	2	-	77
PCB 118	310 ± *7.1*	250	<10	35	51	190	420	35	39	160	140	18	22	<7	1100	140	200	74
PCB 123	12 ± 0.71	21	<1	1.2	2.7	8.6	<10	1.2	<1	12	3.2	<2	17	<0.5	41	4	8.1	78
PCB 156	45	59	<2	4.8	7.7	28	43	6.1	5.6	35	<4	1.9	23	1.2	190	22	33	78
PCB 157	8.5	14	<0.3	<0.8	1.6	7.2	12	1.4	<1	12	<1	<0.8	17	<0.2	52	5.9	8.7	76
PCB 167	<10	<30	<0.8	<1	<3	<20	<10	<0.8	<7	<20	<2	<1	7	<0.7	200	10	-	83
PCB 189	3.7 ± *0.92*	10	<0.3	<0.3	<0.7	2.7	4.3	<0.5	<0.4	4.3	<0.4	<0.3	13	<0.2	11	1.8	-	84
Sum of PCB (exc)[1]	**530**	**500**	**0**	**60**	**96**	**380**	**680**	65	**74**	**320**	**180**	**32**		0	2000	260	360	
WHO_{98}-TEQ_{PCB} (inc)[2]	**0.64**	**0.62**	**0.0075**	**0.098**	**0.11**	**0.53**	**0.37**	0.077	**0.095**	**0.52**	**0.060**	**0.078**		0.0058	1.6	0.30	0.41	
WHO_{98}-TEQ_{PCB} (exc)[1]	**0.64**	**0.61**	**0**	**0.097**	**0.10**	**0.52**	**0.37**	0.076	**0.095**	**0.52**	**0.059**	**0.077**		0	1.6	0.29	0.40	

1 = excluding LOD values
2 = including half LOD values
3 = Mean value reported only if a PCB congener detected on more than 66% of occasions (minimum of 16 positive determinations)
4 = For any individual congener, calculation of the mean includes half LOD values
For italicised standard deviations from replicate results, average was calculated from a detected value and an LOD smaller than the detected value in the replicate analysis.

Table D2c cont'd. TEQ_{DF+PCB} in Australian urban soils (pg TEQ g^{-1} dm). TEQ is based on TEF_{HUMANS} (van den Berg *et al*. 1998)

WHO_{98}-TEQ_{DF+PCB} (inc)[2]	**6.7 ± 0.21**	**6.6**	**0.29**	**0.74**	**1.2**	**3.7**	**43**	**1.5**	**0.24**	**3.5**	**0.17**	**0.47**		**0.17**	**43**	**3.6**	**6.3**
WHO_{98}-TEQ_{DF+PCB} (exc)[1]	**6.2 ± 0.071**	**6.1**	**0.083**	**0.62**	**1.1**	**3.7**	**42**	**1.5**	**0.18**	**3.5**	**0.081**	**0.41**		**0.081**	**42**	**3.6**	**6.1**

Table D2d cont'd. Total Organic Carbon in Australian urban soils (%)

Total Organic Carbon %	**4.5**	**3.8**	**3.8**	**3.2**	**3.6**	**4.8**	**4.8**	**-**	**3.9**	**3.8**	**1.2**	**1.1**		**1.1**	**7.0**	**3.4**	**3.4**

Table D3a. Concentrations of PCDD/PCDF in Australian agricultural soils (pg g^{-1} dm)

Congener	N Katherine Region (A1A) Grazing	N Banana Region (A1A) Cotton	N Sunshine Coast (A1A) Sugarcane	N Gympie Region (A1A) Forestry	N Ipswich Region (A1A) Grazing	SE Lismore Region (A1A) Grazing	SE Narrabri Region (A1A) Cotton	SE Eastern ACT (A1A) Grazing	SE Wagga Wagga Region (A1A) Cereals	SE Bombala Region (A1A) Forestry	SE Mansfield (A1A) Grazing	SE Yarra Ranges (A1A) Forestry	SE Warracknabeal Region (A1A) Cereals	SE West Tamar Region (A1A) Forestry	SE Elliott Region (A1A) Grazing	SE Meander Valley (A1A) Cereals	SE Huon Valley (A1A) Forestry	SE Renmark Region (A1A) Vegetables
2,3,7,8-TCDD	<0.04	<0.06	<0.2	<0.03	<0.02	<0.03	<0.05	<0.01	<0.02	<0.03	<0.06	<0.1	<0.1	<0.1	<0.05	<0.1	<0.09	<0.02
Total TCDD isomers	16	<0.4	4.3	<0.3	0.37	0.3	<0.7	0.18	0.57	0.69	1.1	4.2	<8	2.2	0.55	<0.8	3.4	0.14
1,2,3,7,8-PeCDD	<0.06	<0.4	0.48	<0.04	<0.03	0.072	<0.1	<0.01	<0.03	<0.03	<0.03	<0.05	<0.09	<0.2	<0.1	<0.2	<0.1	<0.03
Total PeCDD isomers	<0.7	<2	9.1	0.16	<0.4	0.22	<1	<0.1	<0.4	0.19	0.11	<0.4	<0.6	0.5	0.29	<1	1.2	0.07
1,2,3,4,7,8-HxCDD	<0.04	<0.7	1.8	<0.1	0.15	0.19	<0.1	<0.03	<0.07	<0.04	<0.04	<0.2	<0.2	<0.3	0.24	<0.09	<0.08	<0.04
1,2,3,6,7,8-HxCDD	<0.05	<0.7	2.6	0.11	0.19	0.43	<0.1	<0.04	0.5	0.11	<0.04	0.45	<0.1	<0.5	0.29	<0.1	0.15	0.51
1,2,3,7,8,9-HxCDD	<0.04	<0.2	7.8	<0.07	0.39	0.56	<0.2	<0.08	0.48	0.25	<0.06	<1	<0.2	<0.5	<1	<0.1	0.29	<0.09
Total HxCDD isomers	<0.4	1.5	87	1.7	2.7	6.6	0.72	<0.3	<2	0.64	0.24	10	<0.7	2.9	11	<0.7	5.5	3.4
1,2,3,4,6,7,8-HpCDD	0.2	4.1	130	3.6	7.4	13	2.1	<0.3	0.89	1.4	1.4	4.5	<0.3	6.8	4.4	<0.3	1.5	15
Total HpCDD isomers	0.2	17	380	9.7	21	39	5.8	0.73	1	3.1	2.1	10	<0.4	17	8.6	<0.4	3.1	29
OCDD	3.1	170	8100	320	400	890	200	<10	130	33	61	67	15	640	59	<4	<20	210
2,3,7,8-TCDF	<0.06	<0.04	0.23	<0.009	<0.02	<0.05	<0.06	<0.01	<0.02	<0.03	<0.02	<0.04	<0.08	<0.2	<0.09	<0.07	<0.05	0.068
Total TCDF isomers	<0.5	<0.6	9	0.64	0.66	0.4	<1	0.86	1.7	1.3	1.6	3.6	<0.8	9.6	2.4	<0.6	13	0.32
1,2,3,7,8-PeCDF	<0.05	<0.2	0.32	<0.01	0.046	<0.07	<0.08	<0.004	<0.02	<0.03	<0.01	<0.08	<0.07	<0.2	0.14	<0.04	<0.04	<0.02
2,3,4,7,8-PeCDF	<0.05	<0.1	<0.05	<0.01	<0.03	<0.05	<0.04	<0.01	<0.02	<0.02	<0.02	<0.1	<0.07	<0.2	<0.2	<0.05	<0.07	<0.02
Total PeCDF isomers	<0.7	<2	4.8	<0.07	<0.4	0.44	<0.8	<0.1	<0.1	0.055	0.13	0.76	<0.7	<0.5	0.58	<0.4	0.4	0.3
1,2,3,4,7,8-HxCDF	<0.02	<0.1	0.2	<0.09	<0.03	<0.05	<0.05	<0.04	<0.06	<0.03	<0.06	<0.1	<0.08	<0.1	<0.09	<0.06	<0.08	<0.06
1,2,3,6,7,8-HxCDF	<0.02	<0.1	0.16	<0.009	<0.02	0.079	<0.06	<0.01	0.13	<0.02	<0.02	<0.1	<0.1	<0.2	<0.04	<0.08	<0.08	<0.02
2,3,4,6,7,8-HxCDF	<0.03	<0.2	<0.2	<0.01	<0.05	0.099	<0.08	<0.02	<0.04	<0.01	<0.02	<0.2	<0.1	<0.1	0.07	<0.05	<0.06	0.044
1,2,3,7,8,9-HxCDF	<0.05	<0.1	1.4	<0.02	0.22	0.34	0.15	<0.01	0.2	0.29	<0.02	<0.2	<0.06	<0.1	1.9	<0.09	<0.08	<0.1
Total HxCDF isomers	<0.6	<2	4.1	<0.2	<0.5	0.96	<0.7	<0.2	<1	0.45	<0.2	1.2	<0.7	<1	2.1	<0.7	0.4	0.96
1,2,3,4,6,7,8-HpCDF	<0.05	<0.6	1.9	<0.04	0.18	0.7	<0.2	<0.04	<0.2	<0.1	<0.1	<0.8	<0.5	<0.3	1.6	<0.1	0.23	1.2
1,2,3,4,7,8,9-HpCDF	<0.04	<0.4	0.27	<0.02	<0.05	<0.07	<0.1	<0.01	<0.04	<0.04	<0.02	<0.09	<0.5	<0.2	<0.07	<0.2	<0.1	<0.07
Total HpCDF isomers	<0.2	<2	5.7	0.013	<0.4	0.67	<0.4	<0.1	<0.4	<0.2	<2	0.15	<2	<0.8	2.3	<0.4	<0.4	3.5
OCDF	<0.04	<2	2.5	<0.03	<0.1	1.4	<0.5	<0.02	0.5	<0.07	<0.1	<0.6	<1	<0.8	1.3	<0.2	<0.3	5.9
Sum of PCDD/-F (exc)[1]	**19**	**190**	**8600**	**330**	**420**	**940**	**210**	**1.8**	**130**	**39**	**66**	**97**	**15**	**670**	**88**	**0**	**27**	**250**
WHO_{98}-TEQ_{DF} (inc)[2]	**0.082**	**0.43**	**4.2**	**0.13**	**0.25**	**0.50**	**0.18**	**0.027**	**0.19**	**0.13**	**0.085**	**0.30**	**0.17**	**0.44**	**0.51**	**0.20**	**0.20**	**0.29**
WHO_{98}-TEQ_{DF} (exc)[1]	**0.0023**	**0.058**	**4.0**	**0.079**	**0.21**	**0.47**	**0.056**	**0**	**0.15**	**0.082**	**0.020**	**0.097**	**0.0015**	**0.13**	**0.32**	**0**	**0.061**	**0.25**

1 = excluding LOD values
2 = including half LOD values
3 = Mean value reported only if a PCDD/PCDF congener detected on more than 66% of occasions (minimum of 14 positive determinations)
4 = For any individual congener, calculation of the mean includes half LOD values

Table D3b. Concentrations of PCB in Australian agricultural soils (pg g^{-1} dm)

Congener	N Katherine Region (A1A) Grazing	N Banana Region (A1A) Cotton	N Sunshine Coast (A1A) Sugarcane	N Gympie Region (A1A) Forestry	N Ipswich Region (A1A) Grazing	SE Lismore Region (A1A) Grazing	SE Narrabri Region (A1A) Cotton	SE Eastern ACT (A1A) Grazing	SE Wagga Wagga Region (A1A) Cereals	SE Bombala Region (A1A) Forestry	SE Mansfield (A1A) Grazing	SE Yarra Ranges (A1A) Forestry	SE Warracknabeal Region(A1A) Cereals	SE West Tamar Region (A1A) Forestry	SE Elliott Region (A1A) Grazing	SE Meander Valley (A1A) Cereals	SE Huon Valley (A1A) Forestry	SE Renmark Region (A1A) Vegetables
PCB 77	<0.3	<0.3	68	<0.4	0.51	<0.5	<0.9	<0.2	0.56	0.49	<0.7	3.9	<0.9	<5	<0.5	<1	0.97	<0.9
PCB 81	0.082	0.052	0.18	<0.1	0.023	<0.03	0.2	<0.01	0.058	<0.07	<0.03	<0.08	<0.03	<0.1	<0.03	<0.06	<0.06	<0.07
PCB 126	<0.1	<0.1	0.76	<0.2	0.085	<0.1	<0.05	<0.04	<0.08	<0.1	<0.1	<0.3	<0.06	<0.2	0.16	<0.06	0.13	<0.07
PCB 169	<0.03	<0.2	0.21	<0.08	<0.08	0.62	<0.02	<0.03	<0.02	<0.06	<0.07	<0.08	<0.02	<0.1	0.3	<0.3	<0.1	<0.01
PCB 105	3.1	<0.8	6.5	<1	2.3	<5	<10	2.8	2	<4	<40	130	<5	<20	6.4	<5	2.4	4.3
PCB 114	<0.6	<0.3	0.13	<0.2	<0.08	<0.1	<0.1	<0.06	<0.06	<0.2	<1	5.2	<0.4	<0.5	0.28	<0.9	<0.3	<0.2
PCB 118	<6	<3	13	<4	<7	<10	<10	<6	<5	<9	<90	250	<20	<30	17	<20	<7	11
PCB 123	<1	<0.4	<30	<0.4	<0.2	<0.5	<0.2	<10	<0.2	<0.4	<0.7	<7	<0.7	<2	<2	<0.2	<0.6	<0.5
PCB 156	<1	<0.7	<1	<0.8	<0.4	<3	<0.8	0.83	0.66	<0.5	<8	31	<0.7	<1	1.5	<1	0.58	<1
PCB 157	<0.9	<0.7	<0.3	<0.3	<0.3	<0.6	<0.6	<0.1	<0.1	<0.2	2.3	<6	<0.6	<0.6	<0.3	<0.7	<0.4	<0.2
PCB 167	<0.1	<0.2	<1	<0.2	<1	<0.9	<0.6	<0.4	<0.2	<0.9	<4	<20	<0.8	<2	1.5	<0.4	<0.5	<0.5
PCB 189	<0.2	<0.2	<0.04	<0.4	<0.08	<0.1	<0.4	<0.04	<0.03	<0.06	<0.2	<1	<0.4	<0.5	<0.2	<0.9	<0.5	<0.1
Sum of PCB (exc)[1]	**3.2**	**0.052**	**89**	**0**	**2.9**	**0.62**	**0.2**	**3.6**	**3.3**	**0.49**	**2.3**	**420**	**0**	**0**	**27**	**0**	**4.1**	**15**
WHO_{98}-TEQ_{PCB} (inc)[2]	**0.0065**	**0.0067**	**0.089**	**0.011**	**0.0097**	**0.013**	**0.0041**	**0.0037**	**0.005**	**0.0063**	**0.015**	**0.074**	**0.0049**	**0.014**	**0.022**	**0.0065**	**0.015**	**0.0055**
WHO_{98}-TEQ_{PCB} (exc)[1]	**0.00032**	**0.0000052**	**0.087**	**0**	**0.0088**	**0.0062**	**0.00002**	**0.0007**	**0.00059**	**0.000049**	**0.0012**	**0.056**	**0**	**0**	**0.022**	**0**	**0.014**	**0.0015**

1 = excluding LOD values
2 = including half LOD values
3 = Mean value reported only if a PCB congener detected on more than 66% of occasions (minimum of 14 positive determinations)
4 = For any individual congener, calculation of the mean includes half LOD values

Table D3c. TEQ_{DF+PCB} in Australian agricultural soils (pg TEQ g^{-1} dm). TEQ is based on TEF_{HUMANS} (van den Berg *et al*. 1998)

	Katherine	Banana	Sunshine Coast	Gympie	Ipswich	Lismore	Narrabri	Eastern ACT	Wagga Wagga	Bombala	Mansfield	Yarra Ranges	Warracknabeal	West Tamar	Elliott	Meander Valley	Huon Valley	Renmark
WHO_{98}-TEQ_{DF+PCB} (inc)[2]	**0.089**	**0.44**	**4.3**	**0.14**	**0.26**	**0.52**	**0.18**	**0.031**	**0.20**	**0.13**	**0.10**	**0.37**	**0.17**	**0.45**	**0.53**	**0.20**	**0.21**	**0.3**
WHO_{98}-TEQ_{DF+PCB} (exc)[1]	**0.0026**	**0.058**	**4.1**	**0.079**	**0.22**	**0.47**	**0.056**	**0.00069**	**0.15**	**0.082**	**0.021**	**0.15**	**0.0015**	**0.13**	**0.35**	**0**	**0.075**	**0.25**

Table D3d. Total Organic Carbon in Australian agricultural soils (%)

	Katherine	Banana	Sunshine Coast	Gympie	Ipswich	Lismore	Narrabri	Eastern ACT	Wagga Wagga	Bombala	Mansfield	Yarra Ranges	Warracknabeal	West Tamar	Elliott	Meander Valley	Huon Valley	Renmark
Total Organic Carbon %	**1.4**	**1.4**	**1.7**	**1.5**	**3.1**	**6.4**	**0.93**	**2.0**	**1.3**	**3.7**	**2.4**	**9.4**	**1.4**	**7.0**	**1.8**	**4.3**	**2.1**	**1.3**

Table D3a cont'd. Concentrations of PCDD/PCDF in Australian agricultural soils (pg g^{-1} dm)

Congener	SE Fleurieu Peninsula (A1A) Forestry	SE Fleurieu Peninsula (A1B) Forestry	SE Yorke Peninsula (A1A) Cereals	SW Bunbury Region (A1A) Grazing	SW Northam Region (A1A) Cereals	Number of positives	Minimum	Maximum	Median	Mean[3,4]	Mean of ^{13}C surrogate standard recoveries, %, n=23
2,3,7,8-TCDD	<0.05	<0.09	<0.06	0.31	<0.04	1	<0.01	0.31	<0.05	-	60
Total TCDD isomers	0.73	2.6	0.8	2.3	0.22	18	0.14	16	0.73	2.0	
1,2,3,7,8-PeCDD	0.25	<0.4	<0.06	<0.03	<0.06	3	<0.01	0.48	<0.06	-	58
Total PeCDD isomers	1.2	1.2	0.11	0.24	0.079	14	0.07	9.1	<0.4	0.78	
1,2,3,4,7,8-HxCDD	0.48	0.75	<0.09	<0.04	<0.008	6	<0.008	1.8	<0.1	-	74
1,2,3,6,7,8-HxCDD	0.77	1.2	<0.09	<0.1	0.54	13	<0.04	2.6	0.19	-	65
1,2,3,7,8,9-HxCDD	0.3	1.6	0.29	0.16	0.64	11	<0.04	7.8	0.29	-	
Total HxCDD isomers	13	19	1.5	0.72	1.2	18	0.24	87	1.7	7.5	
1,2,3,4,6,7,8-HpCDD	33	51	2.9	<0.5	<0.1	18	<0.1	130	2.9	12	61
Total HpCDD isomers	82	130	8.5	0.65	<0.4	20	0.2	380	8.5	33	
OCDD	3140	5480	340	27	<0.8	19	<0.8	8100	130	880	51
2,3,7,8-TCDF	<0.04	<0.03	<0.07	0.083	<0.02	3	<0.009	0.23	<0.05	-	64
Total TCDF isomers	1.1	3.4	2.9	5.1	0.52	18	0.32	13	1.1	2.6	
1,2,3,7,8-PeCDF	<0.03	0.056	<0.05	0.063	<0.02	5	<0.004	0.32	<0.05	-	57
2,3,4,7,8-PeCDF	<0.05	<0.03	<0.03	0.076	<0.05	1	<0.01	<0.2	<0.05	-	60
Total PeCDF isomers	0.11	0.21	0.18	0.2	<0.4	12	0.055	4.8	0.4	-	
1,2,3,4,7,8-HxCDF	0.067	<0.06	<0.04	<0.09	<0.1	2	<0.02	0.2	<0.06	-	70
1,2,3,6,7,8-HxCDF	<0.02	0.23	<0.04	<0.05	0.042	5	<0.009	0.23	<0.05	-	67
2,3,4,6,7,8-HxCDF	<0.02	<0.03	<0.05	0.049	<0.01	4	<0.01	<0.2	<0.05	-	69
1,2,3,7,8,9-HxCDF	<0.02	<0.03	<0.04	0.63	0.094	9	<0.01	1.9	<0.1	-	68
Total HxCDF isomers	<0.4	0.35	<0.2	0.9	<0.4	9	<0.2	4.1	<0.7	-	
1,2,3,4,6,7,8-HpCDF	<0.1	0.46	0.35	<0.2	<0.03	8	<0.03	1.9	<0.2	-	57
1,2,3,4,7,8,9-HpCDF	<0.02	<0.04	<0.07	<0.04	<0.02	1	<0.01	<0.5	<0.07	-	60
Total HpCDF isomers	<0.2	0.72	<0.5	<0.4	<0.08	7	0.013	5.7	<0.4	-	
OCDF	0.19	0.98	2.5	<0.2	0.096	9	<0.02	5.9	0.5	-	
Sum of PCDD/-F (exc)[1]	**3200**	**5600**	**360**	**37**	**2.1**		**0**	**8600**	**130**	**930**	
WHO_{98}-TEQ_{DF} (inc)[2]	**1.1**	**1.7**	**0.19**	**0.48**	**0.20**		**0.027**	**4.2**	**0.20**	**0.52**	
WHO_{98}-TEQ_{DF} (exc)[1]	**1.1**	**1.4**	**0.096**	**0.45**	**0.13**		**0**	**4.0**	**0.097**	**0.40**	

1 = excluding LOD values
2 = including half LOD values
3 = Mean value reported only if a PCDD/F congener detected on more than 66% of occasions (minimum of 14 positive determinations)
4 = For any individual congener, calculation of the mean includes half LOD values

Table D3b cont'd. Concentrations of PCB in Australian agricultural soils (pg g^{-1} dm)

Congener	SE Fleurieu Peninsula (A1A) Forestry	SE Fleurieu Peninsula (A1B) Forestry	SE Yorke Peninsula (A1A) Cereals	SW Bunbury Region (A1A) Grazing	SW Northam Region (A1A) Cereals	Number of positives	Minimum	Maximum	Median	Mean[3,4]	Mean of ^{13}C surrogate standard recoveries, %, n=23
PCB 77	0.53	<1	0.79	<0.4	<0.3	8	<0.2	68	0.56	-	60
PCB 81	<0.07	<0.04	<0.06	<0.06	<0.04	6	<0.01	0.2	<0.06	-	57
PCB 126	0.084	<0.2	<0.08	0.084	<0.07	6	<0.04	0.76	<0.1	-	71
PCB 169	<0.05	<0.07	<0.04	<0.06	<0.03	3	<0.01	0.62	<0.07	-	85
PCB 105	<3	4	<3	<3	<2	10	<0.8	130	4	-	73
PCB 114	<0.1	<0.2	<0.3	<0.2	<0.09	3	<0.06	5.2	<0.2	-	74
PCB 118	<9	<8	<7	<9	<5	4	<3	250	<9	-	72
PCB 123	<1	<0.4	<0.6	<0.4	<0.6	0	<0.2	<30	<0.6	-	76
PCB 156	<1	0.98	0.99	<1	<0.6	7	<0.4	31	0.99	-	78
PCB 157	<0.4	<0.5	<0.2	<0.2	<0.4	1	<0.1	<6	<0.4	-	77
PCB 167	<0.5	<1	<0.4	<0.5	<0.4	1	<0.1	<20	<0.5	-	84
PCB 189	<0.1	<0.2	<0.2	<0.2	<0.1	0	<0.03	<1	<0.2	-	83
Sum of PCB (exc)[1]	**0.61**	**5**	**1.8**	**0.084**	**0**		**0**	**420**	**1.8**	**25**	
WHO_{98}-TEQ_{PCB} (inc)[2]	**0.0097**	**0.012**	**0.0054**	**0.0097**	**0.0043**		**0.0037**	**0.089**	**0.0097**	**0.015**	
WHO_{98}-TEQ_{PCB} (exc)[1]	**0.0085**	**0.00089**	**0.00057**	**0.0084**	**0**		**0**	**0.087**	**0.0007**	**0.0094**	

1 = excluding LOD values
2 = including half LOD values
3 = Mean value reported only if a PCB congener detected on more than 66% of occasions (minimum of 14 positive determinations)
4 = For any individual congener, calculation of the mean includes half LOD values

Table D3c. TEQ_{DF+PCB} in Australian agricultural soils (pg TEQ g^{-1} dm). TEQ is based on TEF_{HUMANS} (van den Berg *et al*. 1998)

WHO_{98}-TEQ_{DF+PCB} (inc)[2]	**1.1**	**1.7**	**0.19**	**0.49**	**0.21**	**0.031**	**4.3**	**0.21**	**0.54**	
WHO_{98}-TEQ_{DF+PCB} (exc)[1]	**1.1**	**1.4**	**0.096**	**0.45**	**0.13**	**0**	**4.1**	**0.13**	**0.41**	

Table D3d. Total Organic Carbon in Australian agricultural soils (%)

Total Organic Carbon %	**2.1**	**2.3**	**1.6**	**4.1**	**0.55**	**0.55**	**9.4**	**2.0**	**2.8**	

Table D4a. Concentrations of PCDD/PCDF in Australian remote soils (pg g^{-1} dm)

Congener	Kununurra (R1A)	Kakadu NP (R1A)	Kakadu NP (R2A)	Newcastle Waters (R1A)	Alice Springs (R1A)	Cape York (R1A)	Upper Johnstone (R1A)	Gulf Suvannah (R1A)	Bedourie (R1A)	Cooper Creek (R1A)	Carnarvon Gorge NP (R1A)	Cooloola NP (R1A)	Stuart NP (R1A)	New England NP (R1A)	Royal NP (R1A)	Hay Plains (R1A)	Namadgi NP (R1A)	Mt. Buller (R1A)	Wilsons Promontory (R1A)
	N	N	N	N	N	N	N	N	N	N	N	N	SE	SE	SE	SE	SE	SE	SE
2,3,7,8-TCDD	<0.04	<0.05	0.094	0.19	<0.05	<0.1	<0.2	<0.2	<0.05	<0.03	<0.1	<0.03	<0.04	<0.5	0.18	<0.03	<0.02	<0.1	<0.1
Total TCDD isomers	0.59	<0.3	<0.2	2	0.058	0.98	<1	5.5	0.05	<0.2	<0.8	0.6	<0.3	7.2	1.3	0.69	0.8	5.7	1.4
1,2,3,7,8-PeCDD	<0.1	0.29	0.19	0.23	<0.04	<0.2	<0.3	<0.2	<0.07	<0.05	<0.1	0.2	<0.1	<0.06	0.84	0.19	<0.02	<0.1	<0.1
Total PeCDD isomers	<0.6	0.41	<1	0.66	<0.4	<1	<2	<1	<0.5	0.22	<7	1.5	<0.6	0.61	3.5	0.19	<0.2	4	<7
1,2,3,4,7,8-HxCDD	<0.01	0.33	0.3	0.43	<0.04	<0.1	<0.5	<0.1	<0.06	<0.06	<0.2	0.5	<0.2	<0.07	2.9	<0.03	<0.03	<0.2	<0.1
1,2,3,6,7,8-HxCDD	0.17	0.64	0.5	0.48	<0.1	<0.7	<0.5	<0.2	<0.07	0.55	<0.2	0.7	<0.2	<0.2	3.5	2	<0.02	<0.2	<0.2
1,2,3,7,8,9-HxCDD	<0.2	1.1	1.4	0.82	0.32	<0.6	<0.2	<0.3	<0.08	0.93	<0.1	1	<0.09	<0.3	4.9	3.5	<0.1	<0.2	<0.2
Total HxCDD isomers	0.43	7.2	5.6	6.8	0.56	<3	<2	<1	<0.4	2	<1	14	<0.7	2.3	64	5.9	<0.2	8.1	0.85
1,2,3,4,6,7,8-HpCDD	<0.1	25	16	16	<0.2	1.9	2.3	<0.7	<0.1	1.8	<0.6	30	<0.8	4.3	140	0.77	<0.3	2.9	7
Total HpCDD isomers	0.41	52	38	41	0.2	4.2	8.1	<0.8	0.14	4.7	1.8	89	<0.8	9.2	390	1.7	<0.4	7.9	17
OCDD	6.2	1720	1100	840	8.8	49	260	10	5.6	340	17	3400	440	43	14500	28	<10	55	910
2,3,7,8-TCDF	<0.02	<0.03	0.01	<0.03	<0.01	<0.09	<0.06	<0.3	<0.03	<0.01	<0.1	<0.03	<0.03	<0.06	0.086	0.033	<0.01	<0.07	<0.1
Total TCDF isomers	1.7	0.088	0.32	1.5	0.11	14	<0.5	1.1	0.34	<0.08	0.96	1.2	0.074	8.8	0.87	4.6	0.63	2.8	2.4
1,2,3,7,8-PeCDF	<0.007	<0.03	0.033	<0.04	<0.02	<0.2	<0.2	<0.2	<0.02	<0.03	<0.04	0.02	<0.04	<0.04	0.085	<0.02	<0.01	<0.07	<0.09
2,3,4,7,8-PeCDF	<0.04	<0.04	<0.02	<0.03	<0.02	<0.06	<0.1	<0.2	<0.04	<0.02	<0.06	0.02	<0.06	<0.08	<0.08	<0.02	<0.009	<0.08	<0.06
Total PeCDF isomers	0.064	<0.3	<0.2	0.085	<0.3	<0.3	<2	<1	<0.4	<0.1	0.17	<0.3	<0.7	0.91	0.55	0.15	<0.1	0.21	0.19
1,2,3,4,7,8-HxCDF	<0.05	<0.02	<0.06	<0.05	<0.01	<0.2	<0.1	<0.2	<0.02	<0.04	<0.05	<0.03	<0.04	<0.2	0.12	<0.02	<0.04	<0.2	<0.07
1,2,3,6,7,8-HxCDF	0.033	<0.02	<0.02	<0.02	<0.01	<0.2	<0.1	<0.2	<0.02	<0.04	<0.07	0.01	<0.04	<0.07	<0.1	0.085	<0.01	<0.09	<0.08
2,3,4,6,7,8-HxCDF	<0.02	<0.02	<0.008	<0.01	<0.03	<0.07	<0.1	<0.1	<0.03	<0.03	<0.07	<0.01	<0.08	<0.1	<0.06	<0.02	<0.02	<0.06	<0.07
1,2,3,7,8,9-HxCDF	0.075	0.24	0.25	0.23	<0.02	<0.8	<0.1	<0.2	<0.04	<0.1	<0.1	<0.07	<0.1	<0.04	<0.07	0.31	<0.009	0.15	<0.05
Total HxCDF isomers	<0.6	<0.4	<0.4	<0.7	<0.4	<2	<1	<1	<0.5	<0.4	<0.7	<1	<0.5	<0.6	0.079	0.51	<0.2	0.37	<0.7
1,2,3,4,6,7,8-HpCDF	<0.03	<0.03	<0.02	<0.03	<0.03	<0.1	<0.2	<0.2	<0.005	<0.2	<0.2	<0.07	<0.2	<0.7	0.59	<0.2	0.084	0.49	<0.3
1,2,3,4,7,8,9-HpCDF	<0.06	<0.01	<0.01	<0.03	<0.03	<0.1	<0.2	<0.4	<0.06	<0.04	<0.2	<0.03	<0.2	<0.2	0.08	<0.04	<0.01	0.18	<0.1
Total HpCDF isomers	<0.1	<0.04	0.067	<0.08	<0.08	<0.4	<0.8	<1	<0.2	<0.3	<0.6	<0.4	<0.4	1.8	0.28	<0.04	<0.2	0.48	<0.5
OCDF	<0.1	<0.09	<0.02	<0.04	<0.05	<0.4	<0.3	<0.6	<0.07	<0.5	<0.1	<1.9	<3.6	1.6	1.3	2.7	<0.06	<0.7	<0.3
Sum of PCDD/-F (exc)[1]	**9.4**	**1800**	**1100**	**890**	**9.7**	**68**	**270**	**17**	**6.1**	**350**	**20**	**3500**	**440**	**75**	**15000**	**44**	**1.4**	**85**	**930**
WHO_{98}-TEQ_{DF} (inc)[2]	**0.12**	**0.98**	**0.81**	**0.87**	**0.096**	**0.33**	**0.41**	**0.34**	**0.089**	**0.26**	**0.17**	**1.1**	**0.18**	**0.4**	**5.1**	**0.82**	**0.037**	**0.23**	**0.32**
WHO_{98}-TEQ_{DF} (exc)[1]	**0.028**	**0.94**	**0.80**	**0.86**	**0.033**	**0.024**	**0.049**	**0.001**	**0.00056**	**0.20**	**0.0017**	**1.1**	**0.044**	**0.047**	**5.0**	**0.79**	**0.00084**	**0.056**	**0.16**

1 = excluding LOD values
2 = including half LOD values
3 = Mean value reported only if a PCDD/PCDF congener detected on more than 66% of occasions (minimum of 17 positive determinations)
4 = For any individual congener, calculation of the mean includes half LOD values

Table D4b. Concentrations of PCB in Australian remote soils (pg g^{-1} dm)

Congener	Kununurra (R1A)	Kakadu NP (R1A)	Kakadu NP (R2A)	Newcastle Waters (R1A)	Alice Springs (R1A)	Cape York (R1A)	Upper Johnstone (R1A)	Gulf Suvannah (R1A)	Bedourie (R1A)	Cooper Creek (R1A)	Carnarvon Gorge NP (R1A)	Cooloola NP (R1A)	Stuart NP (R1A)	New England NP (R1A)	Royal NP (R1A)	Hay Plains (R1A)	Namadgi NP (R1A)	Mt. Buller (R1A)	Wilsons Promontory (R1A)
	N	N	N	N	N	N	N	N	N	N	N	N	SE	SE	SE	SE	SE	SE	SE
PCB 77	<0.2	<0.3	<0.2	<0.3	0.44	<5	<0.4	<2	0.22	<0.3	<1	<0.3	<0.1	3.1	4.5	<0.3	2	<4	<2
PCB 81	<0.04	<0.03	<0.03	<0.08	0.026	<0.06	<0.3	<0.1	<0.06	<0.02	<0.05	0.01	<0.04	0.11	<0.1	<0.06	0.057	0.098	<0.2
PCB 126	<0.1	<0.1	<0.02	<0.04	<0.05	<0.06	<0.6	<0.1	<0.09	<0.03	<0.06	0.02	<0.08	<0.2	0.69	<0.07	0.19	0.41	<0.1
PCB 169	<0.06	<0.3	<0.02	<0.04	<0.03	<0.03	<0.5	<0.1	<0.03	<0.008	<0.05	<0.1	<0.05	<0.04	<0.1	<0.02	<0.04	<0.07	<0.2
PCB 105	<0.3	<2	1.9	<2	<4	<20	2	<30	4.3	<1	<40	<2	<0.8	5.5	16	<1	7.4	<5	<10
PCB 114	<0.2	<0.2	0.15	<0.2	<0.1	<0.9	<0.4	<3	<0.4	<0.3	<0.8	<0.06	<0.2	<0.2	0.62	<0.1	<0.1	<0.6	<0.4
PCB 118	<7	<3	<5	<6	<10	<40	<4	<50	<10	<4	<80	5.3	<5	<10	38	4.9	16	<20	<30
PCB 123	0.22	<0.4	<0.2	<1	<0.9	<3	<0.3	<0.9	<0.8	<0.3	<2	<0.6	<0.2	0.53	<2	<0.2	<0.8	<0.07	<4
PCB 156	<0.3	0.87	<0.3	<0.7	1.1	<2	<0.1	<2	<0.6	<0.5	<5	<0.6	<0.5	<2	5.2	<0.4	<1	<0.7	3.5
PCB 157	<0.3	<0.4	<0.09	<0.2	<0.2	1.7	<1	<2	<0.2	<0.4	<0.4	<0.05	<0.1	<0.2	1.1	<0.2	<0.1	<0.2	1
PCB 167	0.74	0.55	<1	<0.6	<0.4	<0.6	<0.3	<0.7	<0.3	<0.1	<2	<0.06	<0.2	3.5	<2	<0.2	<3	<4	1.1
PCB 189	<0.2	<0.5	<0.05	<0.1	<0.08	<1	<0.5	<2	<0.1	<0.1	<0.9	<0.04	<0.1	<0.1	<0.3	<0.04	0.17	<0.09	<0.4
Sum of PCB (exc)[1]	**0.96**	**1.4**	**2.1**	**0**	**1.6**	**1.7**	**2**	**0**	**4.5**	**0**	**0**	**5.3**	**0**	**13**	**66**	**4.9**	**26**	**0.51**	**5.6**
WHO_{98}-TEQ_{PCB} (inc)[2]	**0.0059**	**0.0074**	**0.0017**	**0.0030**	**0.0041**	**0.0082**	**0.033**	**0.012**	**0.006**	**0.0021**	**0.011**	**0.0034**	**0.0048**	**0.012**	**0.079**	**0.0043**	**0.022**	**0.043**	**0.011**
WHO_{98}-TEQ_{PCB} (exc)[1]	**0.000030**	**0.00044**	**0.00027**	**0**	**0.00060**	**0.00085**	**0.00020**	**0**	**0.00045**	**0**	**0**	**0.0025**	**0**	**0.00096**	**0.078**	**0.00049**	**0.022**	**0.041**	**0.0023**

1 = excluding LOD values
2 = including half LOD values
3 = Mean value reported only if a PCB congener detected on more than 66% of occasions (minimum of 17 positive determinations)
4 = For any individual congener, calculation of the mean includes half LOD values

Table D4c. TEQ_{DF+PCB} in Australian remote soils (pg TEQ g^{-1} dm). TEQ is based on TEF_{HUMANS} (van den Berg *et al.* 1998)

	Kununurra (R1A)	Kakadu NP (R1A)	Kakadu NP (R2A)	Newcastle Waters (R1A)	Alice Springs (R1A)	Cape York (R1A)	Upper Johnstone (R1A)	Gulf Suvannah (R1A)	Bedourie (R1A)	Cooper Creek (R1A)	Carnarvon Gorge NP (R1A)	Cooloola NP (R1A)	Stuart NP (R1A)	New England NP (R1A)	Royal NP (R1A)	Hay Plains (R1A)	Namadgi NP (R1A)	Mt. Buller (R1A)	Wilsons Promontory (R1A)
WHO_{98}-TEQ_{DF+PCB} (inc)[2]	**0.13**	**0.99**	**0.81**	**0.88**	**0.10**	**0.34**	**0.45**	**0.35**	**0.095**	**0.26**	**0.18**	**1.1**	**0.18**	**0.42**	**5.2**	**0.82**	**0.059**	**0.27**	**0.33**
WHO_{98}-TEQ_{DF+PCB} (exc)[1]	**0.028**	**0.94**	**0.80**	**0.86**	**0.033**	**0.025**	**0.049**	**0.0010**	**0.0010**	**0.20**	**0.0017**	**1.1**	**0.044**	**0.048**	**5.2**	**0.79**	**0.022**	**0.097**	**0.16**

Table D4d. Total Organic Carbon in Australian remote soils (%)

	Kununurra (R1A)	Kakadu NP (R1A)	Kakadu NP (R2A)	Newcastle Waters (R1A)	Alice Springs (R1A)	Cape York (R1A)	Upper Johnstone (R1A)	Gulf Suvannah (R1A)	Bedourie (R1A)	Cooper Creek (R1A)	Carnarvon Gorge NP (R1A)	Cooloola NP (R1A)	Stuart NP (R1A)	New England NP (R1A)	Royal NP (R1A)	Hay Plains (R1A)	Namadgi NP (R1A)	Mt. Buller (R1A)	Wilsons Promontory (R1A)
Total Organic Carbon %	**0.38**	**2.5**	**2.2**	**1.1**	**0.44**	**0.72**	**6.2**	**0.82**	**0.20**	**0.31**	**1.2**	**1.0**	**0.42**	**13**	**1.1**	**1.3**	**5.3**	**8.8**	**9.8**

Table D4a cont'd. Concentrations of PCDD/PCDF in Australian remote soils (pg g^{-1} dm)

Congener	Cape Grim (R1A)	Lake St. Clair NP (R1A)	Gluepot Reserve (R1A)	Flinders Ranges (R1A)	Simpson Desert (R1A)	Laverton (R1A)	Kalbarri (R1A)	Canarvon (R1A)	Newman (R1A)	Number of positives	Minimum	Maximum	Median	Mean[3,4]	Mean of ^{13}C surrogate standard recoveries, %, n=28
	SE	SE	SE	SE	SE	SW	SW	SW	SW						
2,3,7,8-TCDD	<0.05	<0.07	<0.03	<0.02	<0.05	<0.05	<0.02	<0.02	<0.06	3	<0.02	0.5	0.050	-	53
Total TCDD isomers	0.84	4	0.28	<0.1	<0.3	0.11	<0.1	<0.1	0.2	18	0.05	7.2	0.60	1.2	
1,2,3,7,8-PeCDD	<0.08	<0.08	<0.03	<0.07	<0.08	<0.1	<0.02	<0.03	<0.2	6	<0.02	0.84	0.10	-	53
Total PeCDD isomers	<0.5	1.3	<0.2	<0.5	<0.5	0.56	0.62	<0.2	<1	11	0.19	<7	0.61	-	
1,2,3,4,7,8-HxCDD	<0.2	0.17	<0.03	<0.1	<0.1	<0.3	<0.05	<0.02	<0.04	6	<0.01	2.9	0.10	-	72
1,2,3,6,7,8-HxCDD	<0.07	<0.07	<0.1	<0.1	<0.09	<0.2	<0.05	<0.04	0.25	9	<0.02	3.5	0.20	-	61
1,2,3,7,8,9-HxCDD	<0.06	<0.4	0.38	<0.6	<0.3	<0.09	<0.09	<0.1	0.78	10	<0.06	4.9	0.30	-	
Total HxCDD isomers	1.6	3	0.38	<2	<0.6	<0.7	0.51	0.12	1.1	18	0.12	64	1.4	4.7	
1,2,3,4,6,7,8-HpCDD	1.4	0.86	<0.1	0.95	<0.2	<0.6	1.7	<0.04	0.84	17	<0.04	140	0.91	-	60
Total HpCDD isomers	2.3	2.2	<0.1	0.95	0.71	<0.6	5.2	0.055	2.7	23	0.055	390	2.3	24	
OCDD	11	13	<1	19	6.8	81	150	<1	36	25	<1	14500	40	860	47
2,3,7,8-TCDF	<0.06	<0.09	<0.03	<0.04	<0.04	<0.03	<0.02	<0.02	<0.05	3	<0.01	<0.3	0.032	-	55
Total TCDF isomers	2.9	8	<0.2	<0.3	<0.3	0.041	<0.2	0.13	0.7	22	0.041	14	0.67	1.9	
1,2,3,7,8-PeCDF	<0.09	<0.04	<0.02	<0.04	<0.05	<0.09	<0.02	<0.009	<0.03	3	<0.007	<0.2	0.040	-	53
2,3,4,7,8-PeCDF	0.033	<0.01	<0.03	<0.03	<0.04	<0.07	<0.02	<0.01	<0.06	2	<0.009	<0.2	0.040	-	55
Total PeCDF isomers	0.18	0.67	<0.3	<0.3	<0.6	<0.6	<0.1	<0.07	<0.6	10	0.064	<2	0.30	-	
1,2,3,4,7,8-HxCDF	<0.04	<0.04	<0.02	<0.1	<0.06	<0.03	<0.01	<0.009	<0.1	1	<0.009	<0.2	0.045	-	67
1,2,3,6,7,8-HxCDF	<0.04	<0.03	<0.02	<0.04	<0.06	<0.06	<0.01	<0.009	<0.03	3	<0.009	<0.2	0.040	-	64
2,3,4,6,7,8-HxCDF	0.051	<0.02	<0.03	<0.04	<0.09	<0.04	<0.008	<0.007	<0.05	1	<0.007	<0.1	0.035	-	68
1,2,3,7,8,9-HxCDF	<0.03	<0.05	0.069	<0.2	<0.1	0.64	<0.01	0.019	0.13	10	<0.009	<0.8	0.10	-	64
Total HxCDF isomers	<1	0.33	0.069	<1	<0.5	0.82	<0.1	<0.4	<0.8	6	0.069	<2	0.51	-	
1,2,3,4,6,7,8-HpCDF	1.3	0.13	<0.05	<0.2	<0.09	<0.7	<0.02	<0.02	<0.05	5	<0.005	1.3	0.12	-	57
1,2,3,4,7,8,9-HpCDF	<0.05	<0.02	<0.02	<0.1	<0.06	<0.4	<0.03	<0.02	<0.08	2	<0.01	<0.4	0.060	-	57
Total HpCDF isomers	1.4	<2	<0.1	<0.4	<0.2	<1	<0.08	<0.08	<0.2	5	<0.04	<2	0.29	-	
OCDF	<0.3	<0.1	<0.02	<0.1	<0.3	<2	<0.02	<0.04	<0.2	3	<0.02	<3.6	0.25	-	
Sum of PCDD/-F (exc)[1]	**20**	**33**	**0.73**	**20**	**7.5**	**83**	**160**	**0.31**	**41**		**0.31**	**15000**	**56**	**890**	
WHO_{98}-TEQ_{DF} (inc)[2]	**0.14**	**0.14**	**0.095**	**0.13**	**0.12**	**0.21**	**0.070**	**0.040**	**0.29**		**0.037**	**5.1**	**0.22**	**0.50**	
WHO_{98}-TEQ_{DF} (exc)[1]	**0.050**	**0.028**	**0.045**	**0.011**	**0.00068**	**0.072**	**0.032**	**0.0019**	**0.13**		**0.00056**	**5.0**	**0.046**	**0.38**	

1 = excluding LOD values
2 = including half LOD values
3 = Mean value reported only if a PCDD/PCDF congener detected on more than 66% of occasions (minimum of 17 positive determinations)
4 = For any individual congener, calculation of the mean includes half LOD values

Table D4b cont'd. Concentrations of PCB in Australian remote soils (pg g^{-1} dm)

Congener	SE Cape Grim (R1A)	SE Lake St. Clair NP (R1A)	SE Gluepot Reserve (R1A)	SE Flinders Ranges (R1A)	SE Simpson Desert (R1A)	SW Laverton (R1A)	SW Kalbarri (R1A)	SW Canarvon (R1A)	SW Newman (R1A)	Number of positives	Minimum	Maximum	Median	Mean[3,4]	Mean of ^{13}C surrogate standard recoveries, %, n=28
PCB 77	<0.4	1.3	<0.2	<0.3	<0.1	<0.2	<0.3	<0.4	<0.5	6	<0.1	<5	0.35	0.75	49
PCB 81	<0.02	<0.1	<0.04	<0.01	<0.03	<0.1	<0.04	<0.07	<0.4	5	<0.01	<0.4	0.059	0.046	47
PCB 126	<0.2	<0.2	<0.03	<0.02	<0.03	<0.03	<0.08	<0.01	<0.08	4	<0.01	0.69	0.08	0.089	63
PCB 169	<0.3	<0.1	<0.04	<0.006	<0.05	<0.02	<0.04	<0.01	<0.2	0	<0.006	<0.5	0.045	0.046	74
PCB 105	1.9	<2	<1	<3	<1	<0.4	<1	<1	<3	7	<0.3	<40	2	3.7	64
PCB 114	<0.3	<0.6	<0.1	<0.1	<0.1	<0.3	<0.3	<0.07	<0.09	2	<0.06	<3	0.2	0.21	64
PCB 118	<6	<9	<3	<8	<3	<3	<5	3.1	<10	5	<3	<80	6.5	8.3	60
PCB 123	<0.5	<0.6	<0.1	<0.2	<0.2	<0.4	<0.3	<0.2	<1	2	<0.07	<4	0.45	0.40	65
PCB 156	<0.7	0.86	<0.8	<1	<0.6	<0.2	<0.3	<0.6	<0.5	5	<0.1	5.2	0.7	0.79	71
PCB 157	<0.6	<1	<0.2	<0.2	<0.2	<0.2	<0.1	<0.2	<0.1	3	<0.05	<2	0.2	0.29	70
PCB 167	<0.2	<0.6	<0.2	<0.3	<0.4	<0.1	<0.3	<0.3	<0.5	4	<0.06	<4	0.45	0.54	77
PCB 189	<0.4	<0.8	<0.1	0.28	<0.08	<0.2	<0.05	<0.06	<0.1	2	<0.04	<2	0.1	0.17	72
Sum of PCB (exc)[1]	**1.9**	**2.2**	**0**	**0.28**	**0**	**0**	**0**	**3.1**	**0**		**0**	**66**	**1.5**	**5.1**	
WHO_{98}-TEQ_{PCB} (inc)[2]	**0.012**	**0.012**	**0.0022**	**0.0020**	**0.0022**	**0.0020**	**0.0047**	**0.0012**	**0.0059**		**0.0012**	**0.079**	**0.0059**	**0.011**	
WHO_{98}-TEQ_{PCB} (exc)[1]	**0.00019**	**0.00056**	**0**	**0.000028**	**0**	**0**	**0**	**0.00031**	**0**		**0**	**0.078**	**0.00024**	**0.0054**	

1 = excluding LOD values
2 = including half LOD values
3 = Mean value reported only if a PCB congener detected on more than 66% of occasions (minimum of 17 positive determinations)
4 = For any individual congener, calculation of the mean includes half LOD values

Table D4c cont'd. TEQ_{DF+PCB} in Australian remote soils (pg TEQ g^{-1} dm). TEQ is based on TEF_{HUMANS} (van den Berg *et al*. 1998)

WHO_{98}-TEQ_{DF+PCB} (inc)[2]	**0.16**	**0.15**	**0.097**	**0.13**	**0.12**	**0.22**	**0.075**	**0.041**	**0.29**		**0.041**	**5.2**	**0.24**	**0.51**	
WHO_{98}-TEQ_{DF+PCB} (exc)[1]	**0.050**	**0.029**	**0.045**	**0.011**	**0.00068**	**0.072**	**0.032**	**0.0022**	**0.13**		**0.00068**	**5.2**	**0.047**	**0.38**	

Table D4d cont'd. Total Organic Carbon in Australian remote soils (%)

Total Organic Carbon %	**2.9**	**5.1**	**0.59**	**0.49**	**0.46**	**0.27**	**0.23**	**0.20**	**0.49**		**0.20**	**13**	**0.92**	**2.4**	

Table D5a. Concentrations of PCDD/PCDF in South Australia historical soils (pg g^{-1} dm)

Congener	1925	1935	1945	1950	1956	1963	1973	1981	1983	2001	Number of Positives	Minimum	Maximum	Median	Mean[3,4]	Mean of ^{13}C surrogate standard recoveries, %, n=10
2,3,7,8-TCDD	0.05	<0.06	0.03	0.03	<0.06	<0.03	<0.04	<0.08	0.1	0.04	5	<0.03	0.1	0.045	-	53
Total TCDD isomers	2.1	1.4	<2	1.6	2.7	3.5	3.3	8.5	3.7	3	9	1.4	8.5	2.9	3.1	
1,2,3,7,8-PeCDD	0.3	0.1	0.2	0.3	0.1	0.1	0.2	0.6	0.2	0.2	10	0.1	0.6	0.2	0.23	50
Total PeCDD isomers	<2	<1	<1	<2	1.2	<1	<1	4.6	1.9	<2	3	<1	4.6	1.6	-	
1,2,3,4,7,8-HxCDD	0.06	0.04	0.03	0.05	<0.09	0.08	0.08	0.3	0.1	0.1	9	0.03	0.3	0.08	0.089	65
1,2,3,6,7,8-HxCDD	3.4	0.9	2.2	3.3	0.6	0.9	1	4.7	1.5	1.5	10	0.6	4.7	1.5	2	68
1,2,3,7,8,9-HxCDD	7	<2	3.7	5.7	1.1	1.7	2.2	6.1	2.6	2.5	9	1.1	7	2.6	3.4	
Total HxCDD isomers	12	<6	6.5	9.4	4.3	4.1	4.7	23	8.4	6.3	9	4.1	23	6.4	8.2	
1,2,3,4,6,7,8-HpCDD	2.2	1.2	0.5	<0.6	1.7	2.3	2.9	14	3.6	3.8	9	0.5	14	2.3	3.3	56
Total HpCDD isomers	5	3.3	1.4	0.9	4.4	5.8	7.1	30	8.8	9.6	10	0.9	30	5.4	7.6	
OCDD	76	43	15	12	46	55	59	220	60	66	10	12	220	57	65	45
2,3,7,8-TCDF	0.2	0.2	0.2	0.3	0.2	<0.2	0.3	0.7	<0.3	0.2	8	<0.2	0.7	0.2	0.26	60
Total TCDF isomers	11	7.2	5.3	7.6	7.5	6	4.8	22	7.3	6.3	10	4.8	22	7.3	8.5	
1,2,3,7,8-PeCDF	0.1	0.1	0.1	0.2	0.2	0.1	<0.1	0.6	0.2	0.2	9	<0.1	0.6	0.15	0.19	53
2,3,4,7,8-PeCDF	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.7	0.2	0.2	10	0.2	0.7	0.2	0.25	52
Total PeCDF isomers	2.6	<2	<2	3	3.2	1.6	<1	7.8	2.8	2.9	7	<1	7.8	2.7	2.6	
1,2,3,4,7,8-HxCDF	<0.1	<0.2	0.1	<0.1	0.1	<0.06	0.2	0.7	0.1	0.2	6	<0.06	0.7	0.1	-	71
1,2,3,6,7,8-HxCDF	0.7	0.2	0.5	0.8	0.2	0.3	0.3	1.3	0.4	0.4	10	0.2	1.3	0.4	0.51	73
2,3,4,6,7,8-HxCDF	0.2	<0.08	0.1	0.1	0.2	0.2	0.1	1	0.2	<0.2	8	<0.08	1	0.2	0.22	69
1,2,3,7,8,9-HxCDF	0.2	0.1	0.09	0.2	0.1	0.1	0.1	0.4	0.2	0.2	10	0.09	0.4	0.15	0.17	72
Total HxCDF isomers	2.3	<1	<2	1.8	1.3	1.4	1.6	7.9	2.3	<2	7	<1	7.9	1.9	2.1	
1,2,3,4,6,7,8-HpCDF	1.9	0.3	0.3	0.5	0.5	0.7	1.1	4.2	1.1	1	10	0.3	4.2	0.85	1.2	59
1,2,3,4,7,8,9-HpCDF	0.1	0.04	0.06	0.05	0.05	0.06	0.09	0.3	0.1	<0.06	9	0.04	0.3	0.06	0.088	55
Total HpCDF isomers	3.6	<1	<1	0.6	<1	1.4	1.9	6.9	1.8	<2	6	0.6	6.9	1.6	-	
OCDF	20	0.4	<0.2	0.5	0.8	4.2	4.4	5.4	3.5	1.8	9	<0.2	20	2.7	4.1	
Sum of PCDD/-F (exc)[1]	**130**	**55**	**28**	**37**	**71**	**83**	**87**	**340**	**100**	**96**		**28**	**340**	**85**	**100**	
WHO_{98}-TEQ_{DF} (inc)[2]	**1.7**	**0.51**	**1**	**1.5**	**0.52**	**0.6**	**0.8**	**2.7**	**0.99**	**0.93**		**0.51**	**2.7**	**0.96**	**1.1**	
WHO_{98}-TEQ_{DF} (exc)[1]	**1.7**	**0.37**	**1**	**1.5**	**0.49**	**0.6**	**0.78**	**2.7**	**0.97**	**0.91**		**0.37**	**2.7**	**0.94**	**1.1**	

1 = excluding LOD values
2 = including half LOD values
3 = Mean value reported only if a PCDD/PCDF congener detected on more than 66% of occasions (minimum of 6 positive determinations)
4 = For any individual congener, calculation of the mean includes half LOD values

Table D5b. Concentrations of PCB in South Australia historical soils (pg g^{-1} dm)

Congener	1925	1935	1945	1950	1956	1963	1973	1981	1983	2001	Number of Positives	Minimum	Maximum	Median	Mean[3,4]	Mean of ^{13}C surrogate standard recoveries, %, n=10
PCB 77	4.7	1.2	1.7	2.4	3.5	2.5	23	35	5.7	8	10	1.2	35	4.1	8.8	52
PCB 81	0.3	<0.07	0.1	0.2	0.2	0.1	0.9	1.4	0.3	0.4	9	<0.07	1.4	0.25	0.39	51
PCB 126	<0.9	0.2	<0.2	<0.2	0.3	0.4	1.1	10	1	0.8	7	<0.2	10	0.6	1.4	61
PCB 169	0.3	0.2	0.1	0.09	0.2	0.1	0.1	1	0.2	0.2	10	0.09	1	0.2	0.25	85
PCB 105	23	5.1	4.6	7.4	14	12	49	140	21	57	10	4.6	140	18	33	67
PCB 114	1.1	<0.2	<0.3	<0.2	0.8	0.5	2.4	4.2	<0.6	2.6	6	<0.2	4.2	0.7	-	68
PCB 118	66	<10	12	16	49	26	100	310	40	120	9	<10	310	45	74	68
PCB 123	10	<2	0.3	0.6	5.6	12	3.4	12	1.9	3.1	9	0.3	12	3.3	5.0	71
PCB 156	18	<2	<1	<1	3.9	3.4	11	51	8	12	7	<1	51	6.0	11	90
PCB 157	1.6	<0.1	0.3	<0.2	0.5	0.7	2.1	15	<1	2.9	7	<0.1	15	0.85	2.4	86
PCB 167	8.7	3.6	0.5	1	4.8	2.1	6.1	19	0.3	11	10	0.3	19	4.2	5.7	95
PCB 189	3	<0.1	0.09	0.1	1.6	0.3	0.5	4.2	0.7	0.8	9	0.09	4.2	0.6	1.1	89
Sum of PCB (exc)[1]	**160**	**15**	**24**	**35**	**98**	**72**	**250**	**740**	**100**	**280**		**15**	**740**	**99**	**180**	
WHO_{98}-TEQ_P (inc)[2]	**0.071**	**0.024**	**0.014**	**0.015**	**0.043**	**0.05**	**0.14**	**1.1**	**0.12**	**0.12**		**0.014**	**1.1**	**0.061**	**0.17**	
WHO_{98}-TEQ_P (exc)[1]	**0.026**	**0.023**	**0.0035**	**0.0043**	**0.043**	**0.05**	**0.14**	**1.1**	**0.12**	**0.12**		**0.0035**	**1.1**	**0.047**	**0.16**	

1 = excluding LOD values
2 = including half LOD values
3 = Mean value reported only if a PCB congener detected on more than 66% of occasions (minimum of 6 positive determinations)
4 = For any individual congener, calculation of the mean includes half LOD values

Table C5c. TEQ_{DF+PCB} in South Australia historical soils (pg TEQ g^{-1} dm). TEQ is based on TEF_{HUMANS} (van den Berg *et al.* 1998)

WHO_{98}-TEQ_{DF+PCB} (inc)[2]	**1.8**	**0.54**	**1.1**	**1.5**	**0.56**	**0.65**	**0.93**	**3.8**	**1.1**	**1.0**		**0.54**	**3.8**	**1.0**	**1.3**	
WHO_{98}-TEQ_{DF+PCB} (exc)[1]	**1.7**	**0.39**	**1.0**	**1.5**	**0.53**	**0.62**	**0.91**	**3.8**	**1.1**	**1.0**		**0.39**	**3.8**	**0.99**	**1.3**	

Appendix E – Results of the interlaboratory calibration study

This appendix reports the comparison of the concentrations of PCDD/PCDF and PCB in the eight samples analysed by both AGAL and the Canadian Laboratory.

Table E1 Interlaboratory analytical comparison between AGAL and MoE C laboratories in eight Australian soils.

Table E1a. Interlaboratory analytical comparison between AGAL and MoE C laboratories in eight Australian soils. Concentrations of PCDD/PCDF (pg g^{-1} dm). Note that the AGAL results are reported also in Appendix D1 and D2.

	N		N		N		SE		SE		SE		SE		SE	
Congener	Kakadu NP (R2A)		Sunshine Coast (A1A)		Brisbane (I1A)		Newcastle (I1A)		Sydney (I2A)		Sydney (U3A)		Melbourne (U2A)		Adelaide (U1A)	
	AGAL	MoE C	AGAL	MoE C	AGAL	MoE C	AGAL	MoE C	AGAL	MoE C	AGAL	MoE C	AGAL	MoE C	AGAL	MoE C
2,3,7,8-TCDD	0.094	<0.3	<0.2	<0.3	1.1	1.1	0.057	<0.3	<0.4	<0.4	0.18	<0.3	<0.08	<0.4	0.18	<0.4
Total TCDD isomers	<0.2	<0.3	4.3	3.1	11	8.3	6.7	6.7	19	9.6	4.9	4.3	14	16	13	12
1,2,3,7,8-PeCDD	0.19	<0.5	0.48	<1	1.6	1.4	<0.4	1.1	<2	1.3	0.57	0.95	<0.9	1.1	0.7	1
Total PeCDD isomers	<1	<0.5	9.1	9.9	9	14	4.7	9.6	17	21	5.9	6.3	8.1	18	14	17
1,2,3,4,7,8-HxCDD	0.3	<0.4	1.8	2	2.5	2.1	0.61	0.97	3.6	2.3	1.2	1.1	2.6	2.5	0.68	0.93
1,2,3,6,7,8-HxCDD	0.5	<0.7	2.6	2.6	13	9.6	1.5	1.6	19	11	1.9	1.5	6.2	5.4	1.5	1.8
1,2,3,7,8,9-HxCDD	1.4	<1	7.8	10	5.1	5.4	1	2.2	7.2	7.1	2.1	3.5	4.4	6	1.2	2.6
Total HxCDD isomers	5.6	4.8	87	86	64	73	18	23	120	95	30	30	60	73	19	25
1,2,3,4,6,7,8-HpCDD	16	17	130	130	370	330	30	34	280	250	150	84	170	190	16	16
Total HpCDD isomers	38	40	380	410	670	670	69	82	530	530	270	200	370	460	33	37
OCDD	1100	1100	8100	9200	6600	5800	730	780	10000	10000	12000	14000	12000	14000	370	360
2,3,7,8-TCDF	0.01	<0.1	0.23	0.55	0.5	2.8	1.6	6.1	2.1	3.6	0.33	0.65	2.4	2.6	1.5	4.2
Total TCDF isomers	0.32	<0.1	9	6.4	27	25	29	37	40	25	5.6	5.1	24	28	35	37
1,2,3,7,8-PeCDF	0.033	<0.2	0.32	<0.7	0.3	0.2	2.1	2.8	1.5	1.1	0.26	<0.3	1.2	0.82	1.2	1.1
2,3,4,7,8-PeCDF	<0.02	<0.2	<0.05	<0.6	0.3	0.3	3.1	4.2	2.6	1.7	0.34	<0.4	1.5	1.4	1.7	1.8
Total PeCDF isomers	<0.2	<0.2	4.8	2.7	18	17	32	44	36	25	3.7	4	15	20	19	24
1,2,3,4,7,8-HxCDF	<0.06	<0.2	0.2	<0.9	<2	1.5	3	3.9	2.4	2.1	0.4	<0.5	<1	1.5	1.5	1.6
1,2,3,6,7,8-HxCDF	<0.02	<0.2	0.16	<0.7	1.2	1.1	2.7	3.6	1.8	1.7	0.34	<0.4	<1	1.3	1.5	1.7
2,3,4,6,7,8-HxCDF	<0.008	<0.2	<0.2	<0.6	1.9	0.87	2.5	2.6	2.5	1.6	0.39	<0.4	<1	1.1	1.4	1.4
1,2,3,7,8,9-HxCDF	0.25	<0.4	1.4	<1	<0.1	0.2	0.21	<0.7	<0.2	<0.2	<0.05	<0.2	<0.2	<0.4	0.4	<0.3
Total HxCDF isomers	<0.4	<0.2	4.1	3.2	40	45	24	35	21	27	3.3	2.7	18	22	12	15
1,2,3,4,6,7,8-HpCDF	<0.02	<0.2	1.9	2.4	62	60	9.4	12	19	15	2.5	2.5	17	14	5.2	5
1,2,3,4,7,8,9-HpCDF	<0.01	<0.2	0.27	<0.8	3.2	3	1	1.6	1.1	1.1	0.23	<0.3	1.3	1.1	0.44	<0.6
Total HpCDF isomers	0.067	<0.2	5.7	6.4	230	260	17	23	44	42	<3	4	42	37	8.6	8
OCDF	<0.02	<0.4	2.5	4.1	460	410	10	11	36	30	1.9	3.9	33	23	4.4	4.7
Sum of PCDD/-F (exc)[1]	**1100**	**1100**	**8600**	**9700**	**8100**	**7300**	**940**	**1100**	**11000**	**11000**	**12000**	**14000**	**13000**	**15000**	**530**	**540**
WHO_{98}-TEQ_{DF} (inc)[2]	**0.81**	**0.90**	**4.2**	**4.7**	**10**	**9.6**	**3.7**	**6.2**	**10**	**9.0**	**4.3**	**4.2**	**6.1**	**7.6**	**3.0**	**3.8**
WHO_{98}-TEQ_{DF} (exc)[1]	**0.80**	**0.28**	**4.0**	**3.8**	**10**	**9.6**	**3.5**	**6.0**	**9.2**	**8.8**	**4.3**	**3.9**	**5.5**	**7.3**	**3.0**	**3.6**

1 = excluding LOD values
2 = including half LOD values

Table E1b. Interlaboratory analytical comparison between AGAL and MoE C laboratories in eight Australian soils. Concentrations of PCB (pg g^{-1} dm). Note that the AGAL results are reported also in Appendix D1 and D2.

	N		N		N		SE		SE		SE		SE		SE	
Congener	Kakadu NP (R2A)		Sunshine Coast (A1A)		Brisbane (I1A)		Newcastle (I1A)		Sydney (I2A)		Sydney (U3A)		Melbourne (U2A)		Adelaide (U1A)	
	AGAL	MoE C	AGAL	MoE C	AGAL	MoE C	AGAL	MoE C	AGAL	MoE C	AGAL	MoE C	AGAL	MoE C	AGAL	MoE C
PCB 77	<0.2	<0.1	68	18	7.6	4.6	34	36	72	8.6	16	13	25	15	12	6.7
PCB 81	<0.03	<0.04	0.18	0.19	0.3	0.18	1.6	1.2	2.3	0.47	0.49	0.28	1.2	0.91	0.53	0.37
PCB 126	<0.02	<0.1	0.76	0.45	5.7	3.6	6.1	5.2	12	2.6	3	2.3	5.9	3.3	4.6	2.8
PCB 169	<0.02	<0.06	0.21	<0.2	1.2	0.97	0.6	0.81	0.83	0.56	0.26	<0.3	<0.5	0.68	0.75	0.78
PCB 105	1.9	<1	6.5	4.2	180	140	250	290	130	70	63	55	150	140	81	58
PCB 114	0.15	<1	0.13	<2	9.7	8.4	10	11	<6	3.6	2	3.5	5.7	6.7	2.7	2.7
PCB 118	<5	<2	13	7.7	360	250	520	560	400	150	130	110	310	270	160	100
PCB 123	<0.2	<0.9	<30	<1	64	45	12	23	<10	12	6.4	<4	12	16	12	14
PCB 156	<0.3	<0.9	<1	<2	160	130	110	120	39	34	23	20	45	39	35	23
PCB 157	<0.09	<0.7	<0.3	<1	43	36	28	30	<10	11	5.9	6.7	8.5	11	12	9.1
PCB 167	<1	<1	<1	<2	22	60	<30	41	<20	12	37	6.3	<30	17	<20	10
PCB 189	<0.05	<0.6	<0.04	<0.3	30	27	5.6	6.6	<6	3.5	2.4	2.3	4.3	3.2	4.3	3.7
Sum of PCB (exc)[1]	**2.1**	**0**	**89**	**31**	**880**	**710**	**980**	**1100**	**660**	**310**	**290**	**220**	**570**	**520**	**320**	**230**
WHO_{98}-TEQ_{PCB} (inc)[2]	**0.0017**	**0.0062**	**0.089**	**0.050**	**0.75**	**0.50**	**0.77**	**0.70**	**1.3**	**0.31**	**0.34**	**0.26**	**0.67**	**0.41**	**0.52**	**0.32**
WHO_{98}-TEQ_{PCB} (exc)[1]	**0.00027**	**0.0**	**0.087**	**0.048**	**0.75**	**0.50**	**0.77**	**0.70**	**1.3**	**0.31**	**0.34**	**0.26**	**0.67**	**0.41**	**0.52**	**0.32**

1 = excluding LOD values
2 = including half LOD values

Table E1c. TEQ_{DF+PCB} in Australian soils (pg TEQ g^{-1} dm). TEQ is based on TEF_{HUMANS} (van den Berg *et al*. 1998).

WHO_{98}-TEQ_{DF+PCB} (inc)[2]	**0.81**	**0.90**	**4.3**	**4.8**	**11**	**10**	**4.5**	**6.9**	**12**	**9.3**	**4.7**	**4.5**	**6.8**	**8.0**	**3.5**	**4.2**
WHO_{98}-TEQ_{DF+PCB} (exc)[1]	**0.80**	**0.28**	**4.1**	**3.8**	**11**	**10**	**4.3**	**6.7**	**11**	**9.1**	**4.7**	**4.2**	**6.1**	**7.7**	**3.5**	**3.9**

Appendix F – Literature review

This Appendix attempts to summaries relevant data on dioxin-like chemicals in soils from Australian studies and recent international studies.

Table F1 Summary of concentration of dioxin-like chemicals from Australian and international studies.

Table F1 Summary of concentrations of dioxin-like chemicals from Australian & international studies.

Country	Location type	Date sampled	n	∑17 PCDD/PCDF (pg g^{-1} dm)			I-TE (pg g^{-1} dm)			Reference
				Mean/median	Min	Max	Mean/median	Min	Max	
Reference/pristine										
Australia	Remote (all included)	2002/2003		870/43	0.019	15000	0.24/0.51	0.041	5.2	this study
Australia	Remote (not include. Royal National Park)	2002/2003		360/38	0.019	3450	0.22/0.34	0.041	1.1	this study
Australia	Bushland		1		510			0.163		Prange et al. 2002
Australia	Wetland		1		6200			27		Prange et al. 2002
Australia	Conservation bushland	1994	5		1050	28200		2.2	38.5	Buckland et al. 1994
Austria	Alpine meadow	1990-1991	1		19.1			1.3		Boos et al. 1992
Brazil	Forest	2000	1					0.04		Braga et al. 2002
Canada	Remote soils		4					<LOD	0.9	Grundy et al. 1997
Czech Republic	High mountain forest		6					16.8	26.6	Holoubek et al. 1994
Germany	Forest		21		413.3	6480	35.9/24	5.4	112	Rotard et al. 1994
Netherlands	Background levels	1988	1					<5		Unreferenced in van Wijnen et al. 1992
New Zealand	Indigenous Forest	1996	7		17.1	306	1.06/1.26	0.17	1.99	Buckland et al. 1998
South Korea	Mountain top	1994	1		69			0.2		Im et al. 2002
Spain	Control site	1996	11				0.88/0.67	0.27	2.44	Eljarrat et al. 2001
USA	Wetland areas (potentially impacted)	2001	12	4107/3407	277	9965	3.85/3.3	0.59	8.4	Tysklind et al. 2002
Remote/agricultural										
Australia	Agricultural areas	2002/2003		900/130	<LOD	15000	0.21/0.54	0.031	4.3	this study
Australia	Rural coastal		37	5400	500	20000				Prange, unpub thesis 2003
Australia	Rural inland		5	20	11	30				Prange, unpub thesis 2003
Australia	Sugarcane		1		2100			1.65		Prange et al. 2002
Australia	Sugarcane and grazing land		2		490	1700		0.74	2.4	Gaus et al. 2001
Australia	Sugarcane		2					6.1	11	Müller et al. 1996
Austria	Rural meadows	1990-1991	5	113.6/76.1	43.2	261.3	2.56/1.9	1.6	3.8	Boos et al. 1992
Canada	Rural		30					0.16	2.2	Birmingham 1990

Country	Location type	Date sampled	n	∑17 PCDD/PCDF (pg g^{-1} dm)			I-TE (pg g^{-1} dm)			Reference
				Mean/median	Min	Max	Mean/median	Min	Max	
China	Farmland	2002	22				0.87	0.16	3.7	Chen et al. 2003
China	Grassland	2002	12				0.48	0.086	0.64	Chen et al. 2003
China	Agricultural fields	1997	2		17.5	18.1		0.11	0.29	Wu et al. 2002
Czech Republic	Background area	1988-2003	9	87.1	22.8	1241	1.3	0.3	16.4	Holoubek et al. 2003
Denmark	Background rural sites	2001	13				0.67	0.35	0.99	Vikelsoe 2002
Europe	Pasture	1999						0.004	43	Fiedler et al. 1999
Europe	Arable	1999						0.03	25	Fiedler et al. 1999
Europe	Rural	1999						0.1	20	Fiedler et al. 1999
Europe	Forest	1999						0.01	64	Fiedler et al. 1999
Germany	Plowland	1985-1999					1	0	26	Umweltbundesamt, 2002
Germany	Grassland	1985-1999					4	0	100	Umweltbundesamt, 2002
Germany	Rural	1985-1999					1	0	26	Umweltbundesamt, 2002
Germany	Grassland		7	170/112	68.3	330.4	2.3/1.8	0.4	4.8	Rotard et al. 1994
Germany	Plowland		14	123/106	33.4	245.7	1.7/1.5	0.3	3.7	Rotard et al. 1994
Germany	Rural/suburban grassland		25					0.02	7.6	Nobel et al. 1993
Greece	Remote arable land	1995	1					2		Martens et al. 1998
Japan	Farmland		9					4.7	240	Ono et al. 2001
Japan	Forest	1992-1998	54				3.9	0.6	13	Seike et al. 2001
Japan	Paddy field	1992-1998	36				120	4.5	230	Seike et al. 2001
Japan	Paddy field	1993	1		1608			2.53		Sakurai et al. 1996
South Korea	Farmland	2001-2002	25				2.3	<LOD	43.3	Choi et al. 2003a
South Korea	Rural and urban sites	1994	15	563/213	35	1476	6.9/3.3	0.2	29.3	Im et al. 2002
Netherlands	Grassland	1991	32					1.8	16.4	van den Berg et al. 1994 in Buckland et al. 1998
New Zealand	Pasture lands	1996	16		15.8	372	0.54/0.52	0.17	0.74	Buckland et al. 1998
Poland	Agricultural region				675			2		Luthardt et al. 2003
Portugal	Rural area	1998-2001	6 sites					1.4	20	Coutinho et al. 2002
Russia	Background, rural area	2002	13 (5 pools)		3.7	7774		0.15	1.95	Amirova and Kruglov 2002
UK	Rural area		> 50				5.2	0.78	17.5	UK HMIP quoted in Buckland et al. 1998

Country	Location type	Date sampled	n	∑17 PCDD/PCDF ($pg\ g^{-1}$ dm)			I-TE ($pg\ g^{-1}$ dm)			Reference
				Mean/median	Min	Max	Mean/median	Min	Max	
USA	Rural area		3	199	96	363	1	0.99	1.95	Lorber et al. 1996
USA	Rural area	1994	36				3/0.77	0.083	22.6	Rappe et al. 1997
USA	Agricultural fields	2001	15				2.88/2.61	1.77	5.51	Petreas et al. 2003
USA	Background		252				2.5	0.1	6	US EPA reassessment 2000
Urban/industrial										
Australia	Industrial sites		2		400	8300		0.93	3.2	Prange et al. 2002
Australia	Traffic impacted urban area	1994	1		22300			42.6		Buckland et al. 1994
Australia	Urban Melbourne	1990	3				4.03	1.8	8.2	Sund et al. 1993
Australia	Industrial Melbourne	1990	4				0.915	0.09	2.1	Sund et al. 1993
Austria	Urban outskirts	1990-1991	11	417.52/204.1	79.3	1404	3.93/3.5	2	6	Boos et al. 1992
Austria	Industrial sites	1990-1991	5	362.32/270	158.6	810.3	6.7/5	4.1	12.5	Boos et al. 1992
Brazil	Vicinity of industrial site	2000	9					0.19	2.08	Braga et al. 2002
Canada	Urban		47					0.1	78.5	Birmingham 1990
Canada	Industrial sites		20					1.7	101.8	Birmingham 1990
China	Parkland	2002	12				1.1	0.42	2.3	Chen et al. 2003
Czech Republic	Industrial and urban areas	1988-2003	25	276.2	98.3	1279	1.82	0.97	7.11	Holoubek et al. 2003
Denmark	Industrial and urban areas	2001	15				0.74	0.35	3	Vikelsoe 2002
Europe	Contaminated	1999						332	98000	Fiedler et al. 1999
Germany	High density urban area	1985-1999					/3	0	112	Umweltbundesamt, 2002
Germany	Urbanised area	1985-1999					/2	0	88	Umweltbundesamt, 2002
Germany	Industrial areas	1985-1999					/4	0	72	Umweltbundesamt, 2002
Germany	Grassland near incinerator		5					2.1	10.2	Nobel et al. 1993
Greece	Waste disposal	1995	2					34	1144	Martens et al. 1998*

Country	Location type	Date sampled	n	∑17 PCDD/PCDF ($pg\ g^{-1}$ dm) Mean/median	Min	Max	I-TE ($pg\ g^{-1}$ dm) Mean/median	Min	Max	Reference
Japan	Urban playgrounds		15				9/2.7	0.17	67	Ono et al. 2001
Japan	Side of major road		4				17.75/16.5	15	25	Ono et al. 2001
Japan	General survey incl. urban and industrial		3031				6.9	0	1200	Ministry of Environment Japan, 2001
Japan	Paddy field	1992-1998	34				3.1	0.3	9.4	Seike et al. 2001
Japan	Tokyo residential area	1996	1		3690			42.8		Sakurai et al. 2000
Japan	Tokyo metropolitan area	1993	1		2171			19.73		Sakurai et al. 1996
Poland	Vicinity of combustion facilities		5					5.94	21.2	Luthardt et al. 2003
Russia	Urban soil	2002	47 (4 pools)		32.9	146		1.19	3.69	Amirova and Kruglov 2002
South Korea	Vicinity of major highways	2002	25		652	1345		23.37	39.22	Choi et al. 2003b
South Korea	Industrial	2001-2002	3				0.237	0.017	0.6	Choi et al. 2003a
South Korea	Industrial sites	1994	7	20324/3639	814	121400	572.5/33.9	8.9	3720	Im et al. 2002
South Korea	Industrial sites	1999	5	0.97			7.55			Kim et al. 2001
South Korea	Urban area	1999	13	1.26			3.98			Kim et al. 2001
Netherlands	Scrap metal incineration sites	1988	20					60	98000	van Wijnen et al. 1992*
New Zealand	Metropolitan centre	1996	15		50.6	2850	1.83/1.72	0.26	6.67	Buckland et al. 1998
Spain	Vicinity of waste incinerator	1998	40				1.59/0.75	0.12	17.2	Schumacher et al. 2002
Spain	Vicinity of cement plant	2001	4				0.39	0.19	0.8	Schumacher et al. 2003
UK	Industrial urban area		85					6	1911	Vizard et al. 2003*
UK	Suburban/ urban sites	1990	12					3	20	Stenhouse and Badsha 1990
UK	Urban		> 27				28.4	4.9	87	UK HMIP quoted in Buckland et al. 1998
USA	Urban area		14	1099	127	4850	10	3	33	Lorber et al. 1996
USA	Solid waste Incinerator		4	4834	1199	9455	356	50	843	Lorber et al. 1996
USA	Urbanised area		171				9.4	2	21	US EPA reassessment 2000

* not included in Figure 3.18