

APPENDIX D

CGL Re-use and Import Criteria

Table 1. Maximum permissible concentrations for imported capping layer soils.

Determinant		Maximum permissible concentration ¹ (mg/kg) ²		Rationale
		6% SOM	1% SOM	
Arsenic		35	35	GAC ⁴
Beryllium		88	88	GAC ⁴
Boron (water soluble)		5	5	Limit for phytotoxic effect ⁵
Cadmium		87	87	GAC ⁴
Chromium (III)		3,300	3,300	GAC ⁴
Chromium (VI)		6.3	6.3	GAC ⁴
Lead		310	310	C4SL ¹⁰
Mercury		250	250	GAC ⁴
Selenium		600	600	GAC ⁴
Copper		135 ³	135 ³	BS 3882:2015 Specification for Topsoil ³
Nickel		75 ³	75 ³	BS 3882:2015 Specification for Topsoil ³
Zinc		200 ³	200 ³	BS 3882:2015 Specification for Topsoil ³
Vanadium		1100	1100	GAC ⁴
Benzo(a)pyrene		3.6	3.6	GAC ⁴
Benzo(a)anthracene		22	18	GAC ⁴
Benzo(b)fluoranthene		23	23	
Benzo(k)fluoranthene		23	23	
Chrysene		230	220	
Dibenzo(a,h)anthracene		2.3	2.2	
Indeno(1,2,3-cd)pyrene		23	26	
Naphthalene		35	6.3	
TPH aliphatic ⁶	EC5-6	260	80	GAC ⁴
	EC>6-8	750	160	GAC ⁴
	EC>8-10	190	34	GAC ⁴
	EC>10-12	1,000 ⁷	1,000 ⁷	Hazardous waste threshold ⁷
	EC>12-16	1,000 ⁷	1,000 ⁷	Hazardous waste threshold ⁷
	EC>16-35	1,000 ⁷	1,000 ⁷	Hazardous waste threshold ⁷
TPH aromatic ⁶	EC5-7	3.2	0.88	GAC ⁴
	EC>7-8	1,000 ⁷	870	GAC ⁴ / Hazardous waste threshold ⁷
	EC>8-10	310	55	GAC ⁴
	EC>10-12	1,000	290	GAC ⁴ / Hazardous waste threshold ⁷
	EC>12-16	1,000 ⁷	1,000 ⁷	GAC ⁴ / Hazardous waste threshold ⁷
	EC>16-21	1,000 ⁷	1,000 ⁷	GAC ⁴ / Hazardous waste threshold ⁷
	EC>21-35	1,000 ⁷	1,000 ⁷	Hazardous waste threshold ⁷
Sum of TPH aliphatic & aromatic C5-C10		< 1,000	< 1,000	Hazardous waste thresholds ⁸ (C10+ MPC based on threshold for C25+)
Sum of TPH aliphatic & aromatic C10+		< 1,000	< 1,000	
pH		5-10	5-10	BS 3882:2015 Specification for Topsoil ³
Phenols		6,000	2,000	GAC ⁴
Cyanide		34	34	GAC ¹¹
Asbestos		No fibres detected ⁹		

Notes:

- These maximum permissible concentrations (MPCs) are for import of capping soils only. Refer to the main body of the report for details of the scheme re-use criteria for site-won soils.
- In mg/kg dry soil except pH and asbestos.
- British Standard BS3882:2015 Specification for Topsoil and requirements for use. Table 1. Values taken for pH 6-7.
- Generic Assessment Criteria generated 'in-house' based on CLEA model Version 1.06. Barium and total cyanide GACs are derived from previously endorsed human health risk assessment models and are conservative values with reference to Dutch Intervention Values.
- Nable, Banuelos and Paul. (1997). *Boron Toxicity*. Plant and Soil, **Vol. 193**, pp1 81-198.
- Speciated TPH values must not exceed GAC, or hazardous waste threshold, where indicated above. Assessment of TPH must be made against hazardous waste threshold to confirm imported soils do not classify as hazardous material.
- GAC derived MPC for TPH fraction limited to 1,000mg/kg based on 'waste thresholds'.
- Environment Agency. (2007). *A Guide to Hazardous Waste Regulations: How to find out if waste oil and waste that contain oil are hazardous*. HWR08.
- Laboratory screen by microscopy may be required subject to source of material.
- Published C4SL for lead (DEFRA, 2014).
- GAC for cyanide derived by Atkins based on acute exposure for a 0-6 year old child.

Table 1. Maximum permissible concentrations for importing soils for general fill.

Determinant		Maximum permissible concentration ¹ (mg/kg) ²		Rationale
		6% SOM	1% SOM	
Arsenic		35	35	GAC ⁴
Beryllium		88	88	GAC ⁴
Cadmium		87	87	GAC ⁴
Chromium (III)		3,300	3,300	GAC ⁴
Chromium (VI)		6.3	6.3	GAC ⁴
Lead		310	310	C4SL ⁹
Mercury		250	250	GAC ⁴
Selenium		600	600	GAC ⁴
Copper		135 ³	135 ³	BS 3882:2015 Specification for Topsoil ³
Nickel		75 ³	75 ³	BS 3882:2015 Specification for Topsoil ³
Zinc		200 ³	200 ³	BS 3882:2015 Specification for Topsoil ³
Vanadium		1100	1100	GAC ⁴
Benzo(a)pyrene		3.6	3.6	GAC ⁴
Benzo(a)anthracene		22	18	GAC ⁴
Benzo(b)fluoranthene		23	23	
Benzo(k)fluoranthene		23	23	
Chrysene		230	220	
Dibenzo(a,h)anthracene		2.3	2.2	
Indeno(1,2,3-cd)pyrene		23	26	
Naphthalene		35	6.3	
TPH aliphatic ⁶	EC5-6	260	80	GAC ⁴
	EC>6-8	750	160	GAC ⁴
	EC>8-10	190	34	GAC ⁴
	EC>10-12	1,000 ⁷	1,000 ⁷	Hazardous waste threshold ⁷
	EC>12-16	1,000 ⁷	1,000 ⁷	Hazardous waste threshold ⁷
	EC>16-35	1,000 ⁷	1,000 ⁷	Hazardous waste threshold ⁷
TPH aromatic ⁶	EC5-7	3.2	0.88	GAC ⁴
	EC>7-8	1,000 ⁷	870	GAC ⁴ / Hazardous waste threshold ⁷
	EC>8-10	310	55	GAC ⁴
	EC>10-12	1,000	290	GAC ⁴ / Hazardous waste threshold ⁷
	EC>12-16	1,000 ⁷	1,000 ⁷	GAC ⁴ / Hazardous waste threshold ⁷
	EC>16-21	1,000 ⁷	1,000 ⁷	GAC ⁴ / Hazardous waste threshold ⁷
	EC>21-35	1,000 ⁷	1,000 ⁷	Hazardous waste threshold ⁷
Sum of TPH aliphatic & aromatic C5-C10		< 1,000	< 1,000	Hazardous waste thresholds ⁸ (C10+ MPC based on threshold for C25+)
Sum of TPH aliphatic & aromatic C10+		< 1,000	< 1,000	
Phenols		6,000	2,000	GAC ⁴
Cyanide		34	34	GAC ¹⁰
Asbestos		<0.001% amosite and chrysotile, no detected fibres of crocidolite		GAC ¹¹

Notes:

- These maximum permissible concentrations (MPCs) are for import of capping soils only. Refer to the main body of the report for details of the scheme re-use criteria for site-won soils.
- In mg/kg dry soil except pH and asbestos.
- British Standard BS3882:2015 Specification for Topsoil and requirements for use. Table 1. Values taken for pH 6-7.
- Generic Assessment Criteria generated 'in-house' based on CLEA model Version 1.06. Barium and total cyanide GACs are derived from previously endorsed human health risk assessment models and are conservative values with reference to Dutch Intervention Values.
- Nable, Banuelos and Paul. (1997). *Boron Toxicity*. Plant and Soil, **Vol. 193**, pp1 81-198.
- Speciated TPH values must not exceed GAC, or hazardous waste threshold, where indicated above. Assessment of TPH must be made against hazardous waste threshold to confirm imported soils do not classify as hazardous material.
- GAC derived MPC for TPH fraction limited to 1,000mg/kg based on 'waste thresholds'.
- Environment Agency. (2007). *A Guide to Hazardous Waste Regulations: How to find out if waste oil and waste that contain oil are hazardous*. HWR08.
- Published C4SL for lead (DEFRA, 2014).
- GAC for cyanide derived by Atkins based on acute exposure for a 0-6 year old child.
- CGL in house modelling based on CIRIA C733 – Asbestos in soil and Made Ground and Addison et al (1988).

Table 1. Soil re-use criteria rev 1

Contaminant	Max concentration (mg/kg)	DWV (mg/l)	EQS Value (mg/l)	Level 3 RTC (mg/kg) [mg/l]
Total Ammonia	-	-	0.6	161 [100.4]
Benzene	1	-	0.01	2.22 [2.01]
Benzo(a)pyrene	26	-	0.00002	12.96 [0.004]
Cadmium	94	-	0.00025	12.05 [0.050]
Chromium VI	1.7	-	0.0034	23.99 [0.683]
Free Cyanide	-	-	0.001	0.085 (0.5) * [0.212]
Lead	930	-	0.0012	1,050 [0.241]
Mercury	6	-	0.00007	7.03 [0.0141]
Naphthalene	1	-	0.002	13.03 [0.403]
Phenol	2.9	-	0.0077	1.32 [1.59]

Note: * Free cyanide re-use criteria is limited by the achievable limit of detection of commercially available laboratories and has been set at 0.5mg/kg