



# Landfill Waste Classification and Waste Definitions

## Uncontaminated Fill Packages (WA)

### Background

The State Government of Western Australia has legislation that permits clean fill (and other fill material meeting certain thresholds) to be used on development and construction sites without attracting any waste avoidance and resource recovery fees. 'Clean fill' is defined in the Waste Definitions to mean raw and excavated natural material such as clay, gravel, sand, soil, or rock files that:

- has been excavated or removed from the earth in areas that have not been subject to potentially contaminating land uses including industrial, commercial, mining, or agricultural activities; and
- has not been processed except for the purposes of achieving desired particle size distribution; and/or removing naturally occurring organic materials such as roots; and
- does not contain any acid sulphate soil; and
- does not contain any other type of waste.



### Introduction of Uncontaminated Fill Criteria

Table 6 of the WA Landfill Guidelines details Maximum Concentrations (thresholds) of relevant chemical substances and limits of relevant physical attributes for uncontaminated fill. For a sample to be considered uncontaminated the Department of Water and Environmental Regulation requires both the total concentration and leaching tests to assess the quality of the fill material.

Table 7 of the WA Landfill Guidelines, the minimum sampling and testing standards for uncontaminated fill, allows for testing of substances based on land use history and statistical evaluation of the laboratory results. This includes a reference to the list of potentially contaminating activities, industries, and land uses (Appendix B) of the Assessment and Management of Contaminated Sites document (DER 2014). Therefore, Appendix B is key to determining what tests are relevant from Table 6.

ALS has created several packages to assess the criteria laid out in Table 6 of the guidelines. The P-19/4 packages meet the requirements stipulated by the Maximum Concentrations and the P-19/5 packages meet the requirements of the Leaching tests. See Tables 1 and 2 below for a list of package inclusions. If you require a variation, please contact Client Services to receive a project specific quotation.

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Table 1. Uncontaminated Fill Soil Analytical Requirements (Total Concentrations)

Parameter	ALS Packages			Leaching test*	ALS LOR (mg/kg)
	ALS PACKAGE CODE:	P-19/4	P-19/4b		
<b>Metals &amp; metalloids</b>					
Antimony		√	√	√	20
Arsenic		√	√	√	100
Barium		√	√	√	500
Beryllium		√	√	√	4
Cadmium		√	√	√	1
Chromium III		√	√	√	160
Chromium VI		√	√	√	1
Cobalt		√	√	√	50
Copper		√	√	√	50
Lead		√	√	√	300
Manganese		√	√	√	500
Mercury (inorganic)		√	√	√	0.5
Molybdenum		√	√	√	10
Nickel		√	√	√	10
Selenium		√	√	√	1
Silver		√	√	√	20
Thallium		√	√	√	1
Tin (inorganic)		√	√	√	50
Uranium		√	√	√	25
Vanadium		√	√	√	130
Zinc		√	√	√	120
<b>Other Inorganics</b>					
Asbestos		√			0.001%
Sulfate		√			2,500
Cyanides (WAD, Free)		√			5 complexed, 1 free
Fluoride		√			400
<b>Organic Compounds</b>					
Benzene		√			0.5
Toluene		√			85
Ethyl benzene		√			55
Xylene (total)		√			40
TRH (C6-C10)		√			45
TRH (>C10- C16)		√			110
TRH (>C16- C34)		√			300
TRH (>C34- C40)		√			2800
Naphthalene		√			3
Benzo[a]pyrene		√			1
(PAHs) as BaP TEQ (8 species)		√			3
Total PAHs (16 species)		√			300
Phenol		√			1
PCBs		√			1
<b>Pesticides</b>					
DDT+DDD+DDE		√			3
<b>Physical attributes</b>					
pH (pH units)		√			5.5 to 8.5

The √ symbol indicates the inclusion of the corresponding analyte in the package.  
Where there is no √ present, the analyte is not included in the package.

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Table 2. Uncontaminated Fill Soil Analytical Requirements (Leaching Concentrations)

Parameter	ALS Packages			Leaching test*	ALS LOR
	ALS PACKAGE CODE:	P-19/5a	P-19/5b	P-19/5 Metals	µg/L
<b>Metals &amp; metalloids</b>					
Antimony	√	√	√	3	1
Arsenic	√	√	√	10	0.2
Cadmium	√	√	√	0.2	0.1
Chromium III	√	√	√	3	5
Chromium VI	√	√	√	1	1
Cobalt	√	√	√	1	0.1
Copper	√	√	√	2	2
Lead	√	√	√	3	0.2
Manganese	√	√	√	500	0.5
Mercury (inorganic)	√	√	√	0.05	0.04
Molybdenum	√	√	√	50	1
Nickel	√	√	√	10	2
Selenium	√	√	√	5	0.2
Silver	√	√	√	0.05	0.2
Thallium	√	√	√	0.03	0.05
Uranium	√	√	√	0.5	0.05
Zinc	√	√	√	10	5
<b>Other Inorganics</b>					
Cyanides (Total)	√	√		5	4
Ammonia as N	√	√		350	10
Fluoride	√	√		120	100
Total nitrogen	√	√		2000	100
Total phosphorus	√	√		200	10
<b>Organic Compounds</b>					
Benzene	√	√		1	1
Toluene	√	√		25	2
Ethyl benzene	√	√		5	2
Xylene (total)	√	√		20	2
Naphthalene	√	√		15	0.02
Benzo[a]pyrene	√	√		0.01	0.005
Phenol	√	√		50	1
Cresols (Total)	√	√		2	1
<b>Pesticides</b>					
Aldrin	√	√		0.001	0.001
Dieldrin	√	√		0.01	0.002
DDT	√	√		0.006	0.002
DDE	√	√		0.0005	0.002
Other pesticides	√			<ADWG and <WQG*	0.005-20

The √ symbol indicates the inclusion of the corresponding analyte in the package.  
Where there is no √ present, the analyte is not included in the package.

\*ADWG - Australian Drinking Water Guidelines (2011 as updated). The relevant compounds to be tested should be guided by the source of the fill material (site history).

\*WQG - Default guideline values for toxicants as specified in Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2018 and as updated).

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## WA Waste Classification Packages

Potentially contaminated soil in Western Australia destined for disposal via landfill must be classified as Class I, II, III, IV or V (WA DWER Landfill Waste Classification and Waste Definitions December 2019). To categorise the soil, total concentrations of specified analytes are compared against the upper limits of the Contaminant Thresholds (CT - Table 3) and Concentration Limits (CL - Table 4) where CT values are absent. To cater to these analytical requirements ALS has the following packages displayed in Table 2 which can be utilised.

**Table 3. Contaminant threshold (CT) values for waste not requiring a leach test.**


CONTAMINANT	P-19/1	P-19/2	P-19/3	CT1 (mg/Kg)	ALS LOR (mg/Kg)
<b>Metals</b>					
Arsenic	√	√	√	14	5
Beryllium	√	√	√	2	1
Molybdenum	√	√	√	10	2
Nickel	√	√	√	4	2
Silver	√	√	√	20	2
Aluminium, Copper, Manganese, Vanadium, Zinc	√	√	√	50,000	5
Barium	√	√	√	50,000	10
Boron	√	√	√	50,000	50
Cobalt	√	√	√	50,000	2
Cadmium	√	√	√	0.4	0.1
Lead	√	√	√	2	0.1
Selenium	√	√	√	2	1
Mercury	√	√	√	0.2	0.1
<b>Other Inorganic Species</b>					
pH	√	√	√	N/A	0.01(pH unit)
Cyanide (WAD)	√			7	1
Cyanide (Total)	√			16	1
Fluoride Total	√			300	40
<b>Non-chlorinated Organics</b>					
Benzene	√		√	0.2	0.2
Ethylbenzene	√		√	60	0.5
Toluene	√		√	160	0.5
Xylenes (total) ^	√		√	120	1.0
TRH (C6-C40)	√		√	N/A	10-100
Phenols (total)	√			28.8	1
Cresols (total) Phenols (non-halogenated)	√			400	0.5-1
PAHs hydrocarbons (total) ^	√		√	100	0.5
2,4-D	√			0.02	0.02
Styrene (vinyl benzene)	√			6	0.5
Organochlorine Pesticides (total) ^	√			50	0.05-0.2
PCBs	√			50	0.1
TPH Speciation	√		√	450	90-100
<b>Leachate ASLP</b>					
Acetic acid ASLP (All metals listed above)			√	Various	Various

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## Automated Comparison Reporting

The ALS generated Guideline Report presents the laboratory results against selected guideline limits. The report assists by removing the need for manual comparison of a large number of data points. Additionally, a summary of all breaches is presented at the beginning of the report (see Figure 2 example). The aim of this report is to assist ALS clients with accurate and rapid assessment, facilitating on-site management options or further classification analysis as required (e.g., ASLP determination). To receive this report, simply request the report format 'GL\_Generic Test' on the chain of custody accompanying the samples.

Figure 1. Summary of guidelines reached or exceeded

Compound	Method	LOR	Unit							
<b>EG005(ED093)T: Total Metals by ICP-AES</b>										
Aluminium	EG005T	50	mg/kg	----	50000	15400	3790	2950	15500	8480
Arsenic	EG005T	5	mg/kg	----	500	6	10	6	6	10
Barium	EG005T	10	mg/kg	----	50000	2040	710	200	2580	2090
Beryllium	EG005T	1	mg/kg	----	100	<1	<1	<1	<1	<1
Boron	EG005T	50	mg/kg	----	50000	<50	<50	<50	<50	<50
Cobalt	EG005T	2	mg/kg	----	50000	9	4	<2	10	6
Copper	EG005T	5	mg/kg	----	50000	97	49	66	114	103
Manganese	EG005T	5	mg/kg	----	50000	480	214	53	506	318
Molybdenum	EG005T	2	mg/kg	----	1000	2	2	<2	2	6
Nickel	EG005T	2	mg/kg	----	3000	79	26	6	85	53
Silver	EG005T	2	mg/kg	----	180	<2	<2	<2	<2	<2
Vanadium	EG005T	5	mg/kg	----	50000	72	42	24	79	44
Zinc	EG005T	5	mg/kg	----	50000	114	180	150	116	250
<b>EG020T: Total Metals by ICP-MS</b>										
Cadmium	EG020T	0.1	mg/kg	----	100	0.8	0.9	0.2	0.9	1.2


Figure 2. Example tabulation of results in comparison to WA DWER Landfill Waste Classification contaminant threshold

Summary of Thresholds Reached or Exceeded							
<b>WA DWER Landfill Waste Classification and Waste Definitions 1996 (As amended December 2019)</b>							
<b>Class III - Table 3 Contaminant threshold (CT3) values for waste not requiring leachate</b>							
Client Sample ID	ALS Sample ID	Compound	Method	LOR	Limits	Result	
		Lead	EG020T	0.1	< 20 mg/kg	28.0 mg/kg	
		Lead	EG020T	0.1	< 20 mg/kg	28.6 mg/kg	
		Lead	EG020T	0.1	< 20 mg/kg	34.9 mg/kg	
		Lead	EG020T	0.1	< 20 mg/kg	66.4 mg/kg	
<b>WA DWER Landfill Waste Classification and Waste Definitions 1996 (As amended December 2019)</b>							
<b>Class II - Table 3 Contaminant threshold (CT2) values for waste not requiring leachate</b>							
Client Sample ID	ALS Sample ID	Compound	Method	LOR	Limits	Result	
		Nickel	EG005T	2	< 4 mg/kg	10 mg/kg	
		Nickel	EG005T	2	< 4 mg/kg	12 mg/kg	
		Nickel	EG005T	2	< 4 mg/kg	16 mg/kg	
		Nickel	EG005T	2	< 4 mg/kg	16 mg/kg	
		Lead	EG020T	0.1	< 2 mg/kg	28.0 mg/kg	
		Lead	EG020T	0.1	< 2 mg/kg	28.6 mg/kg	
		Lead	EG020T	0.1	< 2 mg/kg	34.9 mg/kg	
		Lead	EG020T	0.1	< 2 mg/kg	4.8 mg/kg	
		Lead	EG020T	0.1	< 2 mg/kg	5.6 mg/kg	
		Lead	EG020T	0.1	< 2 mg/kg	66.4 mg/kg	
		Nickel	EG005T	2	< 4 mg/kg	8 mg/kg	
		Nickel	EG005T	2	< 4 mg/kg	9 mg/kg	

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