South Africa

National Environmental Management: Waste Act, 2008

National Norms and Standards for the Assessment of Waste for Landfill Disposal, 2013

Government Notice R635 of 2013

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National Norms and Standards for the Assessment of Waste for Landfill Disposal, 2013
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I, Bomo Edith Edna Molewa, Minister of Water and Environmental Affairs, hereby set national norms and standards for the assessment of waste for landfill disposal, under section 7(1)(c) of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008), in the Schedule hereto.

Bomo Edith Edna Molewa

Minister of Water and Environmental Affairs

Chapter 1
Interpretation and purpose

1. Definitions

In these National Norms and Standards, any word or expression to which a meaning has been assigned in the Act has that same meaning, and unless the context indicates otherwise-

"**Leachable Concentration (LC)**" means the leachable concentration of a particular element or chemical substance in a waste, expressed as mg/l;

"**Leachable Concentration Threshold (LCT)**" means the leachable concentration threshold limit for particular elements and chemical substances in a waste, expressed as mg/l, prescribed in section 6 of these Norms and Standards;

"**putrescible waste**" means waste that contains organic matter capable of being decomposed by microorganisms, or that will readily decay under normal conditions, giving rise to offensive odours, or which is capable of providing food for birds and animals, thereby attracting vermin or disease-causing vectors such as flies and rodents;

"**Total Concentration (TC)**" means the total concentration of a particular element or chemical substance in a waste, expressed as mg/kg;

"**Total Concentration Threshold (TCT)**" means the total concentration threshold limit for particular elements or chemical substances in a waste, expressed as mg/kg, prescribed in section 6 of these Norms and Standards;

"**the Act**" means the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008);

"**the regulations**" means the waste classification and management regulations, 2013.

2. Purpose and application

These Norms and Standards prescribe the requirements for the assessment of waste prior to disposal to landfill in terms of Regulation 8(1)(a) of the Regulations.

Chapter 2
Standard assessment methodology

3. Approach

(1) To assess waste for the purpose of disposal to landfill, the following are required-

(a) identification of chemical substances present in the waste; and

(b) sampling and analysis to determine the total concentrations (TC) and leachable concentrations (LC) of the elements and chemical substances that have been identified in the waste and that are specified in section 6 of these Norms and Standards.

(2) Within three (3) years of the date of commencement of the Regulations, all analyses of the TC and LC of elements and chemical substances in waste must be conducted by laboratories accredited by the South African National Accreditation System (SANAS) to conduct the particular techniques and analysis methods required.

(3) The TC and LC limits of the chemical substances in the waste must be compared to the threshold limits specified in section 6 of these Norms and Standards for total concentrations (TCT limits) and leachable concentrations (LCT limits) of specific elements and chemical substances.

(4) Based on the TC and LC limits of the elements and chemical substances in the waste exceeding the corresponding TCT and LCT limits respectively, the specific type of waste for disposal to landfill must be determined in terms of section 7 of these Norms and Standards.

4. Total Concentration (TC) analysis

(1) The TC of all the elements and chemical substances specified in section 6 of these Norms and Standards that are known to occur, likely to occur or can reasonably be expected to occur in the waste must be determined.

(2) The TC of elements and chemical substances in waste must be determined using techniques and analysis methods that will provide reliable, accurate and repeatable results of the TC of elements and chemical substances specified in section 6 of these Norms and Standards.

5. Leachable Concentration (LC) analysis

(1) The LC of elements and chemical substances must be determined using the Australian Standard Leaching Procedure (AS 4439.1, 4439.2 and 4439.3).

(2) The type of leaching fluid (section 5.2 and 5.3 of AS 4439.3) used in the leaching procedure must be selected as follows -

(a) Waste to be disposed of with, or waste that contains, putrescible wastes: Use 0.1M acetic acid solution with altered pH 5.0 or pH 2.9 determined as per section 7.5(a-e) of AS 4439.3;

(b) Waste to be disposed of with non-putrescible waste: Use a basic 0.1M sodium tetraborate decahydrate solution of pH 9.2 ±0.1, as well as an acetic acid solution with pH 5.0 or pH 2.9) determined as per section 7.5(a-e) of AS 4439.3; or

(c) Non-putrescible waste to be disposed of without any other wastes: Use reagent water.

(3) Existing LC results for elements and chemical substances in wastes, which have been determined in terms of the Toxicity Characteristic Leaching Procedure (TCLP) leach test criteria of the Minimum Requirements for the Handling, Classification and Disposal of Hazardous Waste (2nd Edition, 1998; Department of Water Affairs and Forestry) prior to the Regulations taking effect, may be utilised for comparison with the LCT limits in section 6 of these Norms and Standards to asses waste for the

purpose of disposal of the waste to landfill, for a period not exceeding three (3) years from the date of publication of this Notice.

6. LCT and TCT Limits

(1) Total Concentration Threshold (TCT) Limits (mg/kg):

Elements & Chemical Substances in Waste	**TCTO**	**TCT1**	**TCT2**
Metal Ions			
As, Arsenic	5.8	500	2000
B, Boron	150	15000	60000
Ba, Barium	62.5	6250	25000
Cd, Cadmium	7.5	260	1040
Co, Cobalt	50	5000	20000
Cr_{Total}, Chromium Total	46000	800000	N/A
Cr(VI), Chromium (VI)	6.5	500	2000
Cu, Copper	16	19500	78000
Hg, Mercury	0.93	160	640
Mn, Manganese	1000	25000	100000
Mo, Molybdenum	40	1000	4000
Ni, Nickel	91	10600	42400
Pb, Lead	20	1900	7600
Sb, Antimony	10	75	300
Se, Selenium	10	50	200
V, Vanadium	150	2680	10720
Zn, Zinc	240	160000	640000
Inorganic Anions			

TDS			
Chloride			
Sulphate			
NO_3 as N, Nitrate-N			
F, Fluoride	100	10000	40000
CN-(total), Cyanide Total	14	10500	42000
Organics			
Benzene		10	40
Benzo(a)pyrene		1.7	6.8
Carbon tetrachloride		4	16
Chlorobenzene		8800	35200
Chloroform		700	2800
2-Chlorophenol		2100	8400
Di (2 ethylhexyl) phthalate		40	160
1,2-Dichlorobenzene		31900	127600
1,4-Dichlorobenzene		18400	73600
1,2-Dichloroethane		3.7	14.8
1,1-Dichloroethylene		150	600
1-2-Dichloroethylene		3750	15000
Dichloromethane		16	64

2,4-Dichlorophenol		800	3200
2,4-Dinitrotoluene		5.2	20.8
Ethylbenzene		540	2160
Formaldehyde		2000	8000
Hexachlorobutadiene		2.8	5.4
Methyl ethyl ketone		8000	32000
MTBE (Methyl t-butyl ether)		1435	5740
Nitrobenzene		45	180
PAHs (total)		50	200
Petroleum H/Cs, C6 to C9		650	2600
Petroleum H/Cs, C10 to C36		10000	40000
Phenols (total, non-halogenated)		560	2240
Polychlorinated biphenyls		12	48
Styrene		120	480
1,1,1,2-Tetrachloroethane		400	1600
1,1,2,2-Tetrachloroethane		5.0	20
Tetrachloroethylene		200	800
Toluene		1150	4600

Trichlorobenzenes (total)		3300	13200
1,1,1-Trichloroethane		1200	4800
1,1,2-Trichloroethane		48	192
Trichloroethylene		11600	46400
2,4,6-Trichlorophenol		1770	7080
Vinyl chloride		1.5	6.0
Xylenes (total)		890	3560
Pesticides			
Aldrin + Dieldrin	0.05	1.2	4.8
DDT + DDD + DDE	0.05	50	200
2,4-D	0.05	120	480
Chlordane	0.05	4	16
Heptachlor	0.05	1.2	4.8

Notes:

• TCT1 limits, where appropriate, have been derived from the land remediation values for commercial/industrial land determined by the Department of Environmental Affairs' "Framework for the Management of Contaminated Land", March 2010. The TCT2 limits were derived by multiplying TCT1 by a factor of 4, as used by the Environmental Protection Agency, Australian State of Victoria.

• If South African limits for TCT1 were unavailable, in general, the limits published by the Environmental Protection Agency, Australian State of Victoria have been used.

• Some TC limits have been adjusted because of various attenuation factors that are observed in landfills.

• Where available, the TCT0 limits for have been obtained from SA Soil Screening Values that are protective of water resources. If not available, the State of Victoria value for fill material (EPA Victoria, Classification of Wastes) has been selected. If limits were not available in these references a conservative value was obtained by dividing the TCT1 value by 100.

(2) Leachable Concentration Threshold (LCT) Limits (mg/l):

Elements & Chemical Substances in Waste	**LCTO**	**LCT1**	**LCT2**	**LCT3**
Metal Ions				
As, Arsenic	0.01	0.5	1	4
B, Boron	0.5	25	50	200
Ba, Barium	0.7	35	70	280
Cd, Cadmium	0.003	0.15	0.3	1.2
Co, Cobalt	0.5	25	50	200
Cr_{Total}, Chromium Total	0.1	5	10	40
Cr(VI), Chromium (VI)	0.05	2.5	5	20
Cu, Copper	2.0	100	200	800
Hg, Mercury	0.006	0.3	0.6	2.4
Mn, Manganese	0.5	25	50	200
Mo, Molybdenum	0.07	3.5	7	28
Ni, Nickel	0.07	3.5	7	28
Pb, Lead	0.01	0.5	1	4
Sb, Antimony	0.02	1.0	2	8
Se, Selenium	0.01	0.5	1	4
V, Vanadium	0.2	10	20	80

Zn, Zinc	5.0	250	500	2000
Inorganic Anions				
TDS	1000	12 500	25 000	100 000
Chloride	300	15 000	30 000	120 000
Sulphate	250	12 500	25 000	100 000
NO_3 as N, Nitrate-N	11	550	1100	4400
F, Fluoride	1.5	75	150	600
CN-(total), Cyanide Total	0.07	3.5	7	28
Organics				
Benzene		0.01	0.02	0.08
Benzo(a)pyrene		0.035	0.07	0.28
Carbon tetrachloride		0.20	0.40	1.6
Chlorobenzene		5.0	10	40
Chloroform		15	30	120
2-Chlorophenol		15	30	120
Di (2 ethylhexyl) phthalate		0.50	1	4
1,2-Dichlorobenzene		5	10	40
1,4-Dichlorobenzene		15	30	120

1,2-Dichloroethane		1.5	3	12
1,1-Dichloroethylene		0.35	0.7	2.8
1-2-Dichloroethylene		2.5	5	20
Dichloromethane		0.25	0.5	2
2,4-Dichlorophenol		10	20	80
2,4-Dinitrotoluene		0.065	0.13	0.52
Ethylbenzene		3.5	7	28
Formaldehyde		25	50	200
Hexachlorobutadiene		0.03	0.06	0.24
Methyl ethyl ketone		100	200	800
MTBE (Methyl t-butyl ether)		2.5	5.0	20.0
Nitrobenzene		1	2	8
PAHs (total)		N/A	N/A	N/A
Petroleum H/Cs, C6 to C9		N/A	N/A	N/A
Petroleum H/Cs, C10 to C36		N/A	N/A	N/A
Phenols (total, non-halogenated)		7	14	56
Polychlorinated biphenyls		0.025	0.05	0.2

Styrene		1.0	2	8
1,1,1,2-Tetrachloroethane		5	10	40
1,1,2,2-Tetrachloroethane		0.65	1.3	5.3
Tetrachloroethylene		0.25	0.5	2
Toluene		35	70	280
Trichlorobenzenes (total)		3.5	7	28
1,1,1-Trichloroethane		15	30	120
1,1,2-Trichloroethane		0.6	1	4
Trichloroethylene		0.25	2	8
2,4,6-Trichlorophenol		10.0	20	80
Vinyl chloride		0.015	0.03	0.12
Xylenes (total)		25	50	200
Pesticides				
Aldrin + Dieldrin		0.015	0.03	0.03
DDT + DDD + DDE		1	2	2
2,4-D		1.5	3	3
Chlordane		0.05	0.1	0.1
Heptachlor		0.015	0.03	0.03

Notes:

• LCT1 limits have, where possible, been derived from the lowest value of the standard for human health effects listed for drinking water (LCTO) in South Africa (DWAF, SANS) by multiplying with a Dilution Attenuation Factor (DAF) of 50 as proposed by the Australian State of Victoria, "Industrial Waste Resource Guidelines: Solid Industrial Waste Hazard Categorisation and Management", June 2009 www.epa.vic.gov.au. If no standard was available in South Africa then the limits given by the WHO or other appropriate drinking water standard, such as those published in the California Regulations have been used.

• LCT2 limits were derived by multiplying the LCT1 value with a factor of 2, and the LCT3 limits have been derived by multiplying the LCT2 value with a factor of 4. The factors applied represents a conservative assessment of the decrease in risk achieved by the increase in environmental protection provided by more comprehensive liner designs in higher classes of landfill and landfill operating requirements.

7. Determining waste types for landfill disposal

(1) The specific type of waste for disposal to landfill must be determined by comparing the TC and LC of the elements and chemical substances in the waste with the TCT and LCT limits specified in section 6 of these Norms and Standards.

(2) Based on the assessment of the particular waste destined for disposal to landfill, the type of waste is determined as follows-

(a) Wastes with any element or chemical substance concentration above the LCT3 or TCT2 limits (LC > LCT3 or TC > TCT2) are Type 0 Wastes;

(b) Wastes with any element or chemical substance concentration above the LCT2 but below or equal to the LCT3 limits, or above the TCT1 but below or equal to the TCT2 limits (LCT2 < LC 5 LCT3 or TCT1 < TC TCT2), are Type 1 Wastes;

(c) Wastes with any element or chemical substance concentration above the LCT1 but below or equal to the LCT2 limits and all concentrations below or equal to the TCT1 limits (LCT1 < LC 5 LCT2 and TC 5 TCT1) are Type 2 Wastes;

(d) Wastes with any element or chemical substance concentration above the LCT0 but below or equal to the LCT1 limits and all TC concentrations below or equal to the TCT1 limits (LCT0 < LC 5 LCT1 and TC 5 TCT1) are Type 3 Wastes; or

(e) Wastes with all element and chemical substance concentration levels for metal ions and inorganic anions below or equal to the LCT0 and TCT0 limits (LC 5 LCT0 and TC TCT0), and with all chemical substance concentration levels also below the following total concentration limits for organics and pesticides, are Type 4 Wastes-

Chemical Substances in Waste	Total Concentration (mg/kg)
Organics	
TOC	30 000 (= 3%)
BTEX	6
PCBs	1
Mineral Oil (C10 to C40)	500
Pesticides	
Aldrin + Dieldrin	0.05
DDT + DDD + DDE	0.05
2,4-D	0.05
Chlordane	0.05
Heptachlor	0.05

(3) If a particular chemical substance in a waste is not listed with corresponding LCT and TCT limits in section 6 of these Norms and Standards, and the waste has been classified as hazardous in terms of regulation 4(2) of the Regulations based on the health or environmental hazard characteristics of the particular element or chemical substance, the following applies

(a) the waste is considered to be Type 1 Waste; and

(b) the Department must be informed in writing in 30 days of the particular element or chemical substance not listed in section 6 of these Norms and Standards.

(4) Notwithstanding section 7(2) of these Norms and Standards, if the TC of an element or chemical substance is above the TCT2 limit, and the concentration cannot be reduced to below the TCT2 limit, but the LC for the particular element or chemical substance is below the LCT3 limit, the waste is considered to be Type 1 Waste.

(5) Wastes listed in item (2)(b) of Annexure 1 to the Regulations are considered to be Type 1 Waste, unless assessed and determined otherwise in terms of these Norms and Standards.

(6) Notwithstanding section 7(2) of these Norms and Standards, wastes with all element or chemical substance leachable concentration levels for metal ions and inorganic anions below or equal to the

LCT0 limits are considered to be Type 3 waste, irrespective of the total concentration of elements or chemical substances in the waste, provided that-

(a) all chemical substance concentration levels are below the following total concentration limits for organics and pesticides:

Chemical Substances in Waste	**Total Concentration (mg/kg)**
Organics	
TOC	30 000 (= 3%)
BTEX	6
PCBs	1
Mineral Oil (C10 to C40)	500
Pesticides	
Aldrin + Dieldrin	0.05
DDT + DDD + DDE	0.05
2,4-D	0.05
Chlordane	0.05
Heptachlor	0.05

(b) the inherent physical and chemical character of the waste is stable and will not change over time; and

(c) the waste is disposed of to landfill without any other waste.