



DEFRA

**WR0110 CHARACTERISATION OF RESIDUES FROM
INDUSTRIAL PROCESSES AND WASTE TREATMENT**

ANNEX F - WASTE STREAM SUMMARIES

**WRc Ref: Defra7932.2
MAY 2009**

FOREWORD

This Annex to the SID5 research project final report for project WR0110 summarises key characteristics of the principal waste streams investigated: the five organic wastes streams and three inorganic residue streams.

Summary information relating to the waste generation process, composition, biodegradability (if appropriate) and landfill WAC performance are summarised in tabular and graphic form to allow the major differences between these residues to be rapidly assessed.

Detailed analysis of the data can be undertaken by reference to Annex E. Background information on sampling and testing is provided in Annexes A and B respectively.

The waste streams are presented as follows:

- F1 FULLY COMPOSTED GREENWASTE <10MM
- F2 ANAEROBICALLY DIGESTED SEWAGE SLUDGE CAKE
- F3 PARTIALLY COMPOSTED BMW (EX-MBT)
- F4 FULLY COMPOSTED BMW (EX-MBT)
- F5 ANAEROBICALLY DIGESTED BMW (EX-MBT)
- F6 TREATED APC RESIDUES
- F7 PHYSICO-CHEMICAL TREATMENT FILTER CAKES
- F8 EUROPEAN MSW GASIFICATION BOTTOM ASH
- F9 EUROPEAN MSW GASIFICATION APC RESIDUE
- F10 STABILISED APC RESIDUES
- F11 BIOMASS GASIFICATION RESIDUES

F1 FULLY COMPOSTED GREENWASTE <10MM

COMPOSTED GREENWASTE SCREENED <10 MM - KEY CHARACTERISTICS	
Sample code	greenwaste_comp_10wk<10mm
List of Waste/EWC code	19 05 01 - non-composted fraction of municipal and similar wastes 19 05 99 - wastes not otherwise specified 19 05 03 - off-specification compost
Usual management option	Recycling to agricultural soil and growing media
Description of process	Greenwaste fully composted and then screened to <10 mm
Summary sampling plan	One spot sample taken of composted greenwaste and manually screened
Testing overview	Aqua regia metals, EN 12457-2 (restricted suite), upflow percolation leaching tests undertaken at OU (see methods, Annex B, analytical data Annex E), biodegradability tests (BM100, DR4 and EHT) undertaken at WRc, OU and Cranfield (Annexes E and H)
Appearance	Brown greenwaste compost consisting of peat-like particles.

Key compositional data

Determinand	Conc	trace metals (aqua regia)												
		mg/kg DM	As	Ba	Cd	Cr	Cu	Hg	Mo	Ni	Pb	Sb	Se	Zn
MC@105°C	29%	<1												
LOI@550°C	30%	1-10												
TOC wt%	18%	11-100												
pH	7.4	101-1000												
Total N	1.2%													
Total S	0.2%													

Comparison with landfill waste acceptance criteria for granular wastes

Granular WAC compliance									
WAC	Cd	Cr	Cu	Ni	Pb	Zn	Cl	SO ₄	DOC
inert									
SNRH									
haz									

Shading indicates exceedance of WAC

Non-haz samples, WAC compliance not required. Restricted suite.

Biodegradability and selected kappa values

	Biodegradability		Determinand	Kappa (kg/l)
	DR4 g O/kg LOI	BM100 l/kg LOI		
Composted greenwaste <10mm	18	12	NH ₄ ⁺	0.72
Typical ranges			DOC	0.38
-Fully stabilised organic waste	<20	<20	Cl	3.60
-Raw untreated organic waste	150-300	300 - 700	Ba	0.19
			Mo	0.22
			Ni	0.30
			Pb	0.19
			Zn	0.13

F2 ANAEROBICALLY DIGESTED SEWAGE SLUDGE CAKE

ANAEROBICALLY DIGESTED SEWAGE SLUDGE CAKE - KEY CHARACTERISTICS	
Sample code	Sewage_sludge_AD_cake
List of Wastes/EWC Code	19 08 05 sludges from treatment of urban waste water 19 08 12 (mirror code) sludges (containing dangerous substances) from biological treatment of industrial water
Usual management option	Recycling to agricultural soil
Description of process	Mixture of primary and secondary sewage sludge. Anaerobically digested in mesophilic AD. Pressed to dewater and produce cake.
Summary sampling plan	One spot sample taken of cake stockpile
Testing overview	Aqua regia metals, EN 12457-2 (restricted suite), upflow percolation leaching tests undertaken at OU (see methods, Annex B, analytical data Annex E), biodegradability tests (BM100, DR4 and EHT) undertaken at WRc, OU and Cranfield (Annexes E and H)
Appearance	Black dry soil/peat-like sludge.

Key compositional data

Determinand	Conc	trace metals (aqua regia)												
		mg/kg DM	As	Ba	Cd	Cr	Cu	Hg	Mo	Ni	Pb	Sb	Se	Zn
MC@105°C	81%													
LOI@550°C	61%													
TOC wt%	31%													
pH	7.4													
Total N	4.7%													
Total S	2.2%													
		<1												
		1-10												
		11-100												
		101-1000												

Comparison with landfill waste acceptance criteria for granular wastes

Granular WAC compliance									
WAC	Cd	Cr	Cu	Ni	Pb	Zn	Cl	SO ₄	DOC
inert									
SNRH									
haz									

Shading indicates exceedance of WAC

Non-haz samples, WAC compliance not required. Restricted suite.

Biodegradability and selected kappa values

	Biodegradability		Determinand	Kappa (kg/l)
	DR4	BM100		
	g O/kg LOI	l/kg LOI		
sewage sludge AD cake	122	140	NH ₄ ⁺	0.17
Typical ranges			DOC	0.22
-Fully stabilised organic waste	<20	<20	Cl	0.28
-Raw untreated organic waste	150-300	300 - 700	Ni	0.11
			Pb	0.12
			Zn	0.07
			F	0.07

F3 PARTIALLY COMPOSTED BMW (EX-MBT)

PARTIALLY COMPOSTED BMW (EX MBT) <25MM- KEY CHARACTERISTICS	
Sample code	MSW_MBT1_comp_sorted
List of wastes/EWC Code	19 05 99 - wastes not otherwise specified
Usual management option	Soil remediation or landfilling
Description of process	6 days composting of MSW in aerated in-vessel process to produce partially composted BMW fraction from composting MBT
Summary sampling plan	Two spot sample taken of compost like output
Testing overview	Aqua regia metals, EN 12457-2 (restricted suite), upflow percolation leaching tests undertaken at OU (see methods, Annex B, analytical data Annex E), biodegradability tests (BM100, DR4 and EHT) undertaken at WRc, OU and Cranfield (Annexes E and H)
Appearance	Compost like material composed of brown peat-like particles with some plastic and glass contamination

Key compositional data

Determinand	Conc	trace metals (aqua regia)												
MC@105°C	43-54%	mg/kg DM	As	Ba	Cd	Cr	Cu	Hg	Mo	Ni	Pb	Sb	Se	Zn
LOI@550°C	65-74%	<1												
TOC wt%	39-41%	1-10												
pH	6.9-7.5	11-100												
Total N	1.2%	101-1000												
Total P	0.22-0.26%													
Total K	0.35-0.71%													
Total S	0.9-1.0%													

Comparison with landfill waste acceptance criteria for granular wastes

WAC	Cd	Cr	Cu	Ni	Pb	Zn	Cl	SO ₄	DOC
inert									
SNRH									
haz									

Shading indicates exceedance of WAC
Non-haz samples, WAC compliance not required. Restricted suite.

Biodegradability and selected kappa values

	Biodegradability		Determinand	Kappa (kg/l)
	DR4	BM100	NH ₄ ⁺	0.92
	g O/kg LOI	l/kg LOI	DOC	0.3
Partially composted BMW	168-171	306-364	Cl	0.51
<i>Typical ranges</i>			Mo	0.36
-Fully stabilised organic waste	<20	<20	Ni	0.34
-Raw untreated organic waste	150-300	300 - 700	Pb	0.22
			Zn	0.65
			F	0.35

F4 FULLY COMPOSTED BMW (EX-MBT)

FULLY COMPOSTED BMW (EX-MBT) - KEY CHARACTERISTICS	
Sample code	MSW_MBT2_comp_out
List of wastes/EWC Code	19 05 01 - non-composted fraction of municipal and similar wastes 19 05 99 - wastes not otherwise specified
Usual management option	Recycling to agricultural soil and growing media
Description of process	MBT 5 weeks composting of MSW in aerated piles with turning to produce fully composted BMW fraction from composting
Summary sampling plan	One spot sample taken of composted MSW
Testing overview	Aqua regia metals, EN 12457-2 (restricted suite), upflow percolation leaching tests undertaken at OU (see methods, Annex B, analytical data Annex E), biodegradability tests (BM100, DR4 and EHT) undertaken at WRc, OU and Cranfield (Annexes E and H)
Appearance	Brown, compost-like material with some glass and plastic contamination.

Key compositional data

Determinand	Conc	trace metals (aqua regia)												
		mg/kg DM	As	Ba	Cd	Cr	Cu	Hg	Mo	Ni	Pb	Sb	Se	Zn
MC@105°C	29%	<1												
LOI@550°C	30%	1-10												
TOC wt%	18%	11-100												
pH	7.4	101-1000												
Total N	1.2%													
Total P	0.22%													
Total K	0.35%													
Total S	0.2%													

Comparison with landfill waste acceptance criteria for granular wastes

Granular WAC compliance									
WAC	Cd	Cr	Cu	Ni	Pb	Zn	Cl	SO ₄	DOC
inert									
SNRH									
haz									

Shading indicates exceedance of WAC
Non-haz samples, WAC compliance not required. Restricted suite.

Biodegradability and selected kappa values

	Biodegradability		Determinand	Kappa (kg/l)
	DR4	BM100		
	g O/kg LOI	l/kg LOI		
Fully composted BMW	18	12	NH ₄ ⁺	0.22
Typical ranges			DOC	0.17
-Fully stabilised organic waste	<20	<20	Cl	0.92
-Raw untreated organic waste	150-300	300 - 700	Ni	0.17
			Pb	0.25
			Zn	0.09

F5 ANAEROBICALLY DIGESTED BMW (EX-MBT)

AD MSW-DERIVED BMW - KEY CHARACTERISTICS	
Sample code	MSW_MBT3_AD_output
List of wastes/EWC sub-chapter and code	19 06 04 digestate from anaerobic treatment of municipal waste
Source of input waste	BMW separated from other MSW
Usual management option	Soil remediation
Description of process	Anaerobic digestion (20 days)
Summary sampling plan	One spot sample taken of de-watered AD output
Testing overview	Aqua regia metals, EN 12457-2 (restricted suite), upflow percolation leaching tests undertaken at OU (see methods, Annex B, analytical data Annex E), biodegradability tests (BM100, DR4 and EHT) undertaken at WRc, OU and Cranfield (Annexes E and H)
Appearance	Compost like output

Key compositional data

Determinand	Conc	trace metals (aqua regia)												
MC@105°C	67%	mg/kg DM	As	Ba	Cd	Cr	Cu	Hg	Mo	Ni	Pb	Sb	Se	Zn
LOI@550°C	61%	<1												
TOC wt%	34%	1-10												
pH	7.0	11-100												
Total N	1.5%	101-1000												
Total P	0.32%													
Total K	0.4%													
Total S	0.2%													

Comparison with landfill waste acceptance criteria for granular wastes

Granular WAC compliance										
WAC	Cd	Cr	Cu	Hg	Ni	Pb	Zn	Cl	SO ₄	DOC
inert				n/a						
SNRH										
haz										

Shading indicates exceedance of WAC
Non-haz samples, WAC compliance not required. Restricted suite.

Biodegradability and selected kappa values

	Biodegradability		Determinand	Kappa (kg/l)
	DR4	BM100	NH ₄ ⁺	0.31
	g O/kg LOI	l/kg LOI	DOC	0.37
Anaerobically digested MSW	54.4	62	Cl	0.37
Typical ranges			Ba	0.17
-Fully stabilised organic waste	<20	<20	Ni	0.32
-Raw untreated organic waste	150-300	300 - 700	Pb	0.15
			Zn	0.01

F6 TREATED APC RESIDUES

TREATED APC RESIDUES - KEY CHARACTERISTICS	
Sample code	MSW1_APCtreat_SL
List of wastes/EWC sub-chapter and code	19 02 - waste from physical/chemical treatment of waste (including dechromatation, decyanidation, neutralisation) 19 02 05* - sludges from physico-chemical treatment containing dangerous substances 19 02 06 mirror entry
Source of input waste	APC residues from MSW EfW plants and acidic wastes. See sampling plan (Annex A)
Usual management option	Landfill
Description of process	See sampling plan (Annex A)
Summary sampling plan	Twenty grab samples were taken from a volume of APC representing a lorry load i.e. equivalent to 90-minute processing period to make a single composite sample. This was repeated on six occasions during randomly selected runs of specific recipe mixes from 2 specific input EfW plants. Full details in sampling plan (Annex A)
Testing overview	aqua regia metals, EN 12457-3, max availability, pH dependence leaching and upflow percolation leaching tests undertaken at STL and OU (see methods, Annex B, analytical data Annex E)
Appearance	Damp, grey powder

Key compositional data

Determ/ unit	Conc	trace metals (aqua regia)												
		mg/kg	As	Ba	Cd	Cr	Cu	Hg	Mo	Ni	Pb	Sb	Se	Zn
MC@105°C	16-26%	<1												
LOI@550°C	<0.2%	1-10												
TOC wt%	1.4-2.1%	11-100												
pH	12.1-12.3	101-1000												
BTEX	<30 ug/kg	1001-1%												
TPH	110 mg/kg	1-5%												

Comparison with landfill waste acceptance criteria for granular wastes (6 samples)

WAC compliance																	
WAC	As	Ba	Cd	Cr	Cu	Hg	Mo	Ni	Pb	Sb	Se	Zn	F	Cl	SO ₄	TDS	DOC
inert																	
SNRH																	
haz																	

Shading indicates exceedance of WAC
Non-haz samples, WAC compliance not required.

Selected kappa values

Determinand	Kappa (l/kg)
DOC	0.31
NH ₄ ⁺	0.51
Cl	0.57
Ba	-0.14
Mo	0.28
Ni	0.42
Pb	0.52
Sb	0.02
Zn	0.41

F7 PHYSICO-CHEMICAL TREATMENT FILTER CAKES

FILTER-CAKES FROM PHYSICO-CHEMICAL TREATMENT - KEY CHARACTERISTICS	
Sample code	phys_chem_haz_fcake, phys_chem_nonhaz_fcake
List of wastes/EWC sub-chapter and code	19 02 - waste from physical/chemical treatment of waste (including dechromatation, decyanidation, neutralisation) 19 02 05* - sludges from physico-chemical treatment containing dangerous substances 19 02 06 mirror entry
Source of input waste	Variable input (acids alkaline, neutral waste and oily water mixtures). See sampling plan (Annex A)
Usual management option	Landfill
Description of process	Appropriate mixing and pressing to generate filter cakes (hazardous and non-hazardous). See sampling plan (Annex A)
Summary sampling plan	Six samples each of non-haz and haz filter cakes from random treatment batches over one month. Each sample representative of one lorry load and comprised of 10 incremental samples. See sampling plan (Annex A)
Testing overview	Aqua regia metals, EN 12457-3, max availability, pH dependence leaching and upflow percolation leaching tests undertaken at STL and OU (see methods, Annex B, analytical data Annex E)
Appearance	Fine grained pressed cake of variable colour.

NON-HAZARDOUS FILTER CAKES

Key compositional data

MC@105°C	3.8-7.7%	trace metals (aqua regia)												
LOI@550°C	22-44%	mg/kg	As	Ba	Cd	Cr	Cu	Hg	Mo	Ni	Pb	Sb	Se	Zn
TOC wt%	4.7-7.3%	<1												
pH	7.6-8.3	1-10												
Total N	0.15%	11-100												
Total P	0.3%	101-1000												
Total K	0.2%	1001-1%												
BTEX	<45 ug/kg	1-5%												
TPH	4.9%													

Comparison with landfill waste acceptance criteria for granular wastes (6 samples)

WAC compliance - non-haz filter cakes																	
	As	Ba	Cd	Cr	Cu	Hg	Mo	Ni	Pb	Sb	Se	Zn	F	Cl	SO ₄	TDS	DOC
inert																	
SNRH																	
haz																	

Shading indicates exceedance of WAC

Non-haz samples, WAC compliance not required. Zn – most samples inert WAC compliant

HAZARDOUS FILTER CAKES

Key compositional data (1 composite sample)

MC@105°C	4.4-7.4%	trace metals (aqua regia)												
LOI@550°C	32-44%													
TOC wt%	4.0-5.9%	mg/kg	As	Ba	Cd	Cr	Cu	Hg	Mo	Ni	Pb	Sb	Se	Zn
pH	7.4-8.3%	<1												
Total N	0.2%	1-10												
Total P	0.13%	11-100												
Total K	0.04%	101-1000												
BTEX	<100 ug/kg	1001-1%												
TPH	4.7%	1-5%												

Comparison with landfill waste acceptance criteria for granular wastes (6 samples)

WAC compliance - haz filter cakes																	
	As	Ba	Cd	Cr	Cu	Hg	Mo	Ni	Pb	Sb	Se	Zn	F	Cl	SO ₄	TDS	DOC
inert																	
SNRH																	
haz																	

Shading indicates exceedance of WAC

Ni – 1 sample exceeded hazWAC

TDS is compliant (therefore Cl & SO₄ can be disregarded)

DOC is non-compliant (TOC compliant)

Selected kappa values

Determinand	Kappa (l/kg)	
	nonhaz cake	haz cake
DOC	0.48	0.39
NH ₄ ⁺	0.49	0.63
Cl	0.96	1.05
Ba	0.30	0.45
Mo	0.01	-0.19
Ni	0.34	0.40
Pb	0.08	0.17
Sb	0.16	0.44
Zn	0.34	0.31

F8 EUROPEAN MSW GASIFICATION BOTTOM ASH

EUROPEAN MSW GASIFICATION BOTTOM ASH - KEY CHARACTERISTICS	
Sample code	Gasification IBA1 and IBA2
List of wastes/EWC sub-chapter and code	19 01 waste from incineration or pyrolysis of waste 19 01 11* - bottom ash and slag containing dangerous substances 19 01 12 - bottom ash and slag other than those mentioned in 19 01 11
Source of input waste	North European MSW
Description of process	35 kta MSW gasification plant. See sampling plan (Annex A)
Usual management option	Landfill
Summary sampling plan	20 incremental samples collected over period taken to fill skip for landfill disposal. 20 incremental samples combined to generate a single composite sample.
Testing overview	Aqua regia metals, EN 12457-3, max availability, pH dependence leaching. All undertaken at SINTEF (see analytical report, Annex C)
Sample preparation	Before compositional analysis - drying, removal of metal/rock fragments, crushing of <1mm samples, microwave aqua regia, duplicate testing
Appearance	Coarse grained, wet, strong odour, appearance similar to MSW IBA

Key compositional data

Determinand /unit	Conc	trace metals (aqua regia) in duplicate														
		mg/kg	As	Ba	Cd	Cr	Cu	Hg	Mo	Ni	Pb	Sb	Se	Zn		
MC@105°C%	19-21	<1														
LOI@550°C%	2-5	1-10														
TOC wt%	0.55-1.53	11-100														
Tot C wt%	0.9-2.0	101-1000														
pH	10.7-10.8	1001-1%														
		1-5%														

Comparison with landfill waste acceptance criteria for granular wastes

WAC	As	Ba	Cd	Cr	Cu	Hg	Mo	Ni	Pb	Sb	Se	Zn	F	Cl	SO ₄	TDS	DOC
inert																	
SNRH																	
haz																	

Shading indicates exceedance of WAC

Note: upflow percolation tests not undertaken on this sample, therefore kappa values not calculated.

F9 EUROPEAN MSW GASIFICATION APC RESIDUE

EUROPEAN MSW GASIFICATION APC RESIDUE - KEY CHARACTERISTICS	
Sample code	Gasification APC1 and APC2
List of wastes/EWC sub-chapter and code	19 01 waste from incineration or pyrolysis of waste 19 01 07* - solid wastes from gas treatment
Source of input waste	North European MSW
Description of process	See sampling plan (Annex A)
Usual management option	Landfill
Summary sampling plan	20 incremental samples collected over period taken to fill skip for landfill disposal. 20 incremental samples combined to generate a single composite sample.
Testing overview	Aqua regia metals, EN 12457-3, max availability, pH dependence leaching. All undertaken at SINTEF (see analytical report, Annex C)
Sample preparation	Before compositional analysis - drying, microwave aqua regia, duplicate testing
Appearance	Dry, odourless, mealy powder

Key compositional data (duplicate)

Determ/ unit	Conc	trace metals (aqua regia)												
		mg/kg	As	Ba	Cd	Cr	Cu	Hg	Mo	Ni	Pb	Sb	Se	Zn
	<1													
MC@105°C	<0.5%	1-10												
LOI@550°C	5-9%	11-100												
TOC wt%	0.16-0.19%	101-1000												
Tot C wt%	0.7-1.0	1001-1%												
pH	12.2-12.4	1-5%												

Comparison with landfill waste acceptance criteria for granular wastes (duplicate)

WAC	As	Ba	Cd	Cr	Cu	Hg	Mo	Ni	Pb	Sb	Se	Zn	F	Cl	SO ₄	TDS	DOC
inert																	
SNRH																	
haz																	

Shading indicates exceedance of WAC

Further treatment before landfill acceptance to reduce Pb and Cl or TDS leachability

Note: upflow percolation tests not undertaken on this sample, therefore kappa values not calculated.

F10 STABILISED APC RESIDUES

STABILISED APC RESIDUES - KEY CHARACTERISTICS	
Sample code	Stabilised waste: P15N1 & P15N2, P13N, P15C
List of wastes/EWC sub-chapter and code	19 03 04 - Wastes from Waste Management Facilities, Off-Site Waste Water Treatment Plants and the Preparation of Water for Human Consumption and Water for Industrial Use; stabilised/solidified wastes; wastes marked as hazardous, partly stabilised.
Source of input waste	European waste stabilisation plant
Usual management option	Landfill
Description of process	Cement stabilisation of APC residues, metal sludges etc.
Summary sampling plan	Cores taken during bulk production of a number of predetermined recipes.
Testing overview	aqua regia metals, EN 12457-3, max availability, pH dependence leaching, upflow percolation and tank leaching tests undertaken at ECN (see Annex D, analytical data and interpretation). Also mercury porosimetry (reported in Annex H).
Sample preparation	See Annex D (crushing of cores for granular leaching and compositional testing).

Photographs of core specimens



(a) APC residue + cement + metal sludge

(b) APC residue + cement only

Key compositional data (4 samples)

		trace metals (aqua regia)												
		mg/kg	As	Ba	Cd	Cr	Cu	Hg	Mo	Ni	Pb	Sb	Se	Zn
MC@105°C	14-23%	<1												
LOI@550°C	6.4-9.3%	1-10												
TOC wt%	0.55-1.9%	11-100												
pH	12.3-12.5	101-1000												
BTEX		1001-1%												
TPH		1-5%												

Comparison with landfill waste acceptance criteria (4 samples)

Granular WAC compliance - crushed cores																
WAC	As	Ba	Cd	Cr	Cu	Hg	Mo	Ni	Pb	Sb	Se	Zn	F	Cl	SO ₄	TDS
inert																
SNRH																
haz																

Monolithic WAC compliance - cores (cumulative 64 days)																
WAC	As	Ba	Cd	Cr	Cu	Hg	Mo	Ni	Pb	Sb	Se	Zn	F	Cl	SO ₄	TDS
SNRH																
haz																

Shading indicates exceedance of WAC

Selected kappa values (P15N1 cement + APC residue only)

Determinand	Kappa (l/kg)
DOC	0.50
Cl	0.82
Ba	-0.16
Mo	0.38
Ni	0.00
Pb	0.10
Sb	0.08
Zn	-0.08

F11 BIOMASS GASIFICATION RESIDUES

BIOMASS GASIFICATION RESIDUES - KEY CHARACTERISTICS	
Sample codes	char_biomassgasifier, gasfines_biomassgasifier
List of wastes/EWC sub-chapter and code	19 01 waste from incineration or pyrolysis of waste 19 01 11* - bottom ash and slag containing dangerous substances 19 01 12 - bottom ash and slag other than those mentioned in 19 01 11 19 01 07* - solid wastes from gas treatment
Source of input waste	UK farm based 250 kWe gasifier using mixed conifers on a daily basis. The system generates a primary char/ash product which is recovered from the bottom of the gasifier and a finer particle size char/ash that is recovered from the hot gas filter bag system. A condensate liquor is also collected from the hot gas stream.
Usual management option	Landfill
Summary sampling plan	Spot-sample of char and fines on day of visit. Plant run in a similar fashion 7 days a week using homogeneous input material so a single spot sample likely to be representative of waste from the plant over a much longer period.
Testing overview	Aqua regia metals, EN 12457-2 L/S10 leaching (see methods, Annex B, analytical data Annex E) – limited analytical suite

Key compositional data (fines and char)

Determinand /unit	Conc	trace metals (aqua regia)															
		mg/kg	As	Ba	Cd	Cr	Cu	Hg	Ni	Pb	Sb	Se	Zn				
		<1															
		1-10															
MC@105°C%	0.5-1%	11-100															
LOI@550°C%	18-20%	101-1000															
TOC wt%	14%	1001-1%															
pH	12.8-13.2	1-5%															

Comparison with landfill waste acceptance criteria for granular wastes (fines and char)

WAC	As	Ba	Cd	Cr	Cu	Hg	Mo	Ni	Pb	Sb	Se	Zn	F	Cl	SO ₄	TDS	DOC
inert																	
SNRH																	
haz																	

Shading indicates exceedance of WAC

Note: upflow percolation tests not undertaken on this sample, therefore kappa values not calculated.