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Version 2

## Covering Report

### Details of Client and Project Site

Client:	Wasteserv Malta Ltd.
Address:	Triq Sant' Antnin, Marsaskala, MSK 9052, Malta
Project Site:	Ex-Hazardous Cell, Magtab Environmental Complex
Sampling Date:	12 February 2021

### Job Description

In accordance with the Method Statement for characterisation of a mixture of RDF and inert material dated January 2021, the Client has applied with the Planning Authority (PA 03144/19) to convert an un-used existing hazardous cell into a non-hazardous cell. The current RDF waste present in this cell needs to be moved elsewhere in preparation for further excavation. In 2019, a fire broke out within the RDF stockpile, which was brought under control by depriving the fire of oxygen using inert material (crushed limestone). This RDF did not suffer fire damage but was covered with limestone.

The Environment and Resources Authority (ERA) requested characterisation of this material via compositional analysis and hazardous property assessment to determine whether this material conforms with either of the following European Waste Catalogue (EWC) mirror codes:

- 19 12 11\* other wastes (including mixtures of materials) from mechanical treatment of wastes containing hazardous substances.
- 19 12 12 other wastes (including mixtures of materials) from mechanical treatment of wastes other than those mentioned in 19 12 11.

Leachability analysis in accordance with Council Decision 2003/33/EC is also required to determine whether the material is suitable for disposal in a non-hazardous landfill.

### Compositional analysis

Given the proposed disposal in a non-hazardous landfill, the chemical parameters are to be analysed should follow the list in Council Decision of 19 December 2002 establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 of and Annex II to Directive 1999/31/EC. The chemical parameters requiring evaluation are:

- Arsenic
- Barium
- Cadmium
- Chromium (valences III, VI and total)
- Copper
- Mercury
- Molybdenum
- Nickel
- Lead
- Antimony
- Selenium
- Zinc
- Chloride
- Fluoride
- Sulphate
- Total Dissolved Solids (TDS)
- pH
- ANC (acid neutralisation capacity)
- Loss on Ignition (LOI) as percentage
- TOC (total organic carbon) as percentage
- BTEX (benzene, toluene, ethylbenzene and xylenes)
- PCBs (polychlorinated biphenyls, (7 congeners: PCB 28, 52, 101, 118, 138, 153, 180)
- Mineral oil (C10 to C40)
- PAHs (polycyclic aromatic hydrocarbons) suite (USEPA16):  
Acenaphthene, Acenaphthylene, Anthracene, Benzo[a]anthracene, Benzo[a]pyrene, Benzo[e]pyrene, Benzo[b/j/k]fluoranthene, Benzo[g,h,i]perylene, Chrysene, Dibenzo[a,h]anthracene, Fluoranthene, Fluorene, Indeno[1,2,3-c,d]pyrene, Phenanthrene, Pyrene, Naphthalene
- Dioxins and furans as per table below

2378TCDD	123478HxCDF	PeCDD	PeCDF
12378PeCDD	123678HxCDF	HxCDD	HxCDF
123478HxCDD	234678HxCDF	HpCDD	HpCDF
123678HxCDD	123789HxCDF	2378TCDF	Sum of PCDD
123789HxCDD	1234678HpCDF	12378PeCDF	Sum of PCDF
1234678HpCDD	1234789HpCDF	23478PeCDF	Sum of PCDD/F
OCDD	OCDF		
TCDD	TCDF		

### Leachate analysis

Leachate analysis following EN 12457-2:2002 in accordance with the Council Decision 2003/33/EC on establishing the criteria and procedures for the acceptance of waste at landfills was carried out to determine whether landfilling could be an option for eventual disposal of the material.

The leachate results will be used to determine whether the material fulfils all the waste acceptance criteria (WAC) for the different kinds of landfills, as set out by Annex II to the Council Directive 1999/31/EC (Landfill Directive) and as laid down in Council Decision 2003/33/EC (WAC Decision).

Parameters to be analysed in the leachate are shown in Table 1.

**Table 1:** List of parameters proposed for the leachate analysis

Parameter	Method	LOD	
As	EN 12457-2:2002 + EPA 6020B:2014	1	µg/l
Ba	EN 12457-2:2002 + EPA 6020B:2014	1	µg/l
Cd	EN 12457-2:2002 + EPA 6020B:2014	0.5	µg/l
Cr (total)	EN 12457-2:2002 + EPA 6020B:2014	1	µg/l
Cu	EN 12457-2:2002 + EPA 6020B:2014	1	µg/l
Hg	EN 12457-2:2002 + EPA 6020B:2014	0.1	µg/l
Mo	EN 12457-2:2002 + EPA 6020B:2014	1	µg/l
Ni	EN 12457-2:2002 + EPA 6020B:2014	1	µg/l
Pb	EN 12457-2:2002 + EPA 6020B:2014	1	µg/l
Sb	EN 12457-2:2002 + EPA 6020B:2014	0.5	µg/l
Se	EN 12457-2:2002 + EPA 6020B:2014	1	µg/l
Zn	EN 12457-2:2002 + EPA 6020B:2014	1	µg/l
Chloride	EN 12457-2:2002 +UNI EN ISO 10304-1:2009	2.5	mg/l
Fluoride	EN 12457-2:2002 +UNI EN ISO 10304-1:2009	0.025	mg/l
Sulphate	EN 12457-2:2002 +UNI EN ISO 10304-1:2009	2.5	mg/l
Phenol index	EN 12457-2:2002 + APAT IRSA 5070 A1/A2 Man 29 2003	0.1	mg/l
TDS	EN 12457-2:2002 + APAT CNR IRSA 2090A Man. 29 2003	5	mg/l
DOC	EN 12457-2:2002 + EN 1484:1999	10	mg/l
pH	EN 12457-2:2002 + APAT CNR IRSA 2060 Man 29 2003	0 - 14	scale

Given that this analysis is carried out on a liquid extract, instrumental limits of detection are in reality expressed as mg/l or µg/l. However, given that the liquid:solid leachate extract procedure shall follow a ratio of 10:1 as per EN 12457-2:2002, a simple multiplication x10 would convert the mg/l or µg/l LOD to mg/kg or µg/kg LOD, respectively. The LODs listed are suitable for this kind of matrix due to potential matrix interferences, and are well within all limit values stipulated in the Council Decision 2003/33/EC.

### Samples

In accordance with the Method Statement, two composite sample replicates were collected on the 12/02/21 and sent for laboratory analysis.

### Testing Laboratory

Samples were sent for analysis to **BIOCHEMIE LAB srl** of Via di Limite 27/G, 50013, Campi Bisenzio (FI), Italy. The laboratory is ISO 17025:2017 Accredited by ACCREDIA, having Accreditation Number 0195. The analytical reports issued by the laboratory are attached to this covering report.

## **Results**

### **Compositional analysis**

The analytical results obtained, together with Hazardous Property Assessment (HPA) carried out for both samples, are presented in the respective laboratory reports.

### **Leachate analysis**

The results presented in the laboratory reports are expressed in mg/l or µg/l given that this analysis is carried out on a liquid extract. However, since that the liquid:solid leachate extract procedure follows a ratio of 10:1 as per EN 12457-2:2002, a simple multiplication x10 converts the mg/l or µg/l result to mg/kg or µg/kg result, respectively. This converted data is presented in Table 2. This same data set has been colour coded with comparison to WAC limits values.

**Table 2:** Leachate results compared to WACs

Sample Code	2102290.001/01	2102290.002/01	Leaching limit values for waste acceptable at the different landfill types		
Matrix	Solid Waste (RDF)	Solid Waste (RDF)	Values obtained from Directive 2003/33/EC where L/S = 10 l/kg		
Sampling Location	Maghtab Env. Complex	Maghtab Env. Complex	Inert Landfill	Non-Hazardous Landfill	Hazardous Landfill
As (mg/kg)	0.0293	0.0157	0.5	2	25
Ba (mg/kg)	2.17	2.78	20	100	300
Cd (mg/kg)	< 0.005	< 0.005	0.04	1	5
Cr (mg/kg)	0.0147	0.0258	0.5	10	70
Cu (mg/kg)	0.472	0.64	2	50	100
Hg (mg/kg)	0.0065	0.006	0.01	0.2	2
Mo (mg/kg)	0.0556	0.145	0.5	10	30
Ni (mg/kg)	0.04	0.06	0.4	10	40
Pb (mg/kg)	0.0532	0.0658	0.5	10	50
Sb (mg/kg)	0.0144	0.0656	0.06	0.7	5
Se (mg/kg)	< 0.01	< 0.01	0.1	0.5	7
Zn (mg/kg)	0.864	1.48	4	50	200
Chloride (mg/kg)	659	808	800	15000	25000
Fluoride (mg/kg)	4.88	6.24	10	150	500
Sulfate (mg/kg)	970	919	1000	20000	50000
Total Dissolved Solids (TDS) (mg/kg)	6610	5870	4000	60000	100000
Dissolved Organic Carbon (DOC) (mg/kg)	900	920	500	800	1000
Phenol Index (mg/kg)	< 1	< 1	1	-	-
pH	7.20	7.30			
E. Conductivity at 25°C (µS/cm)	1010	920			

Colour-coding Key
Levels falling within inert limits
Levels falling within non-hazardous landfill limits
Levels falling within hazardous landfill limits
Levels exceeding hazardous landfill limits
Values in red denote levels are < Instrumental LOD

## Conclusion

The constituents of these RDF replicate samples include paper, cardboard, and plastic. These were 'contaminated' with limestone, which chemically is calcium carbonate. The HPA of both replicate samples confirmed that the waste material is classified with EWC Code 19 12 12. Therefore, as expected, the limestone dust present did not chemically alter the outcome of the waste characterisation analysis.

However, the limestone present may be a contributory factor towards the TDS results obtained in the leachate analysis, which exceeded inert landfill dumping limit values (DLVs) but were still well within the non-hazardous landfill DLVs. The metals, anions, and phenol index leachate results obtained are in line with expectations for this kind of sample, where all averaged results of both replicate samples produced values that were below the inert landfill dumping limit values.

The elevated DOC result is expected given that the constituent materials of RDF are made of organic carbon. However, a derogation exists whereby the DOC parameter is not applicable to waste having EWC Code 19 12 12. Reference for this is obtained from the consolidated Italian legislation (which groups various EU Directives) *Dlgs 3 settembre 2020, n. 121, Allegato 4, Tabella 5*.

Therefore, the leachate results obtained show that the material may be disposed of in a non-hazardous landfill.

**Report issued on:** 01 April 2021

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**Signed:** 