

Trommel Fines Campaign Review

Hazardous Waste and Mis-description Team

Waste & Industry Regulatory Services (WIRS)

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1. Executive summary

Data from lab analysis and information obtained from Area audits over the last few years has increased our understanding of the chemical composition of trommel fines, how they are being managed, and the environmental risk this waste stream poses. The main findings are:

- The quality of trommel fines appears to have improved considerably since the sampling exercise in 2019 (overall reduction in hazardous substances & loss on ignition), indicating that the fines campaign has had a positive impact on practices in the waste sector.
- The majority of trommel fines in the most recent data set are non-hazardous, with occasional batches breaching hazardous thresholds for Total Petroleum Hydrocarbons (TPH) and heavy metals.
- Sulphate concentrations suggest gypsum contamination is still an issue. The average total sulphate concentration in the collated lab analysis was 4.1% with a high of 20.2%.
- A significant proportion of trommel fines are described as 'qualifying fines', but the audits show some of this waste is being mis-described and incorrectly assigned the lower rate of landfill tax. This is down to a combination of factors, including non-qualifying materials being processed, high sulphate levels and elevated Loss on Ignition (LOI). The hazardous waste and mis-description team are working closely with HMRC on this issue.
- In some instances, trommel fines are being mis-described as 191209 (minerals) and 191210 (refuse-derived fuel). These waste codes are absolute non-hazardous entries, which means the producer is avoiding carrying out a WM3 waste assessment to assess for hazardous properties.
- Sampling of trommel fines undertaken at certain sites has revealed unusually high, hazardous levels of heavy metals and petroleum hydrocarbons. The analysis appears to be more consistent with metal shredder residue (MSR) and may indicate that other waste streams are being illegally mixed with trommel fines.

2. Background

The trommel fines campaign ran for three years and it remains a priority waste stream for the hazardous waste regime in 2023/24. Significant resource has been used in Area to tackle issues with the classification of this waste stream.

Non-hazardous trommel fines are assigned EWC code 191212 '*other wastes (including mixtures of materials) from mechanical treatment of waste other than those mentioned in 191211**'. In 2021, 17.2 million tonnes of 191212 was removed from permitted waste facilities in England. In contrast, just 137,000 tonnes of waste removed from waste facilities in England was assigned the code for hazardous trommel fines: 191211*.¹ These EWC codes are known as 'mirror entries' and require a waste assessment prior to removal from the place of production. The non-hazardous EWC code 191212 cannot legally be assigned to the waste unless it can be shown, through sampling and analysis, that the waste does not display any hazardous properties. The assessment must be carried out in line with guidance document WM3.

Most waste sites that produce trommel fines are primarily authorised to accept and treat non-hazardous waste only, but this often includes mixed loads from the construction (chapter 17) and municipal (chapter 20) sectors. Mixed skips have the potential to contain unauthorised or contaminated wastes and have not always been assessed for hazardous properties. Even if these sites only accept non-hazardous wastes, low level contaminants in waste can become concentrated within the trommel fines and potentially exceed hazardous thresholds. Non-hazardous waste sites therefore still have the potential to produce trommel fines that contain hazardous substances, such as petroleum hydrocarbons, asbestos, and heavy metals.

In 2019/20 the hazardous waste regime asked Area officers to carry out sampling of trommel fines at three separate producer sites in their respective Areas. The main findings from this sampling exercise were:

- 77% of the samples contained concentrations of hydrocarbons that exceeded the threshold for hazardous properties HP7 Carcinogenic and HP11 Mutagenic.
- 6% of the samples contained concentrations of heavy metals that exceeded threshold for hazardous property HP14 Ecotoxic.
- 2.5% of the samples contained asbestos at levels that exceeded threshold for hazardous property HP7 Carcinogenic.

¹ These EWC codes are not used exclusively for trommel fines and can be assigned to other wastes. As such trommel fines will only make up a proportion of these figures. Limitations in data capture mean it is not possible to identify exact volumes of specific wastes, but trommel fines are thought to make up a high proportion of 191212.

- Over 60% of the samples exceeded the Loss on Ignition (LOI) limit set by HMRC. Trommel fines must be non-hazardous and not exceed the Loss on Ignition (LOI) limit of 10% (amongst other criteria) to qualify for the lower rate of landfill tax.
- None of the producers had carried out WM3 compliant waste assessments (a legal requirement) prior to them classifying the waste as non-hazardous.

Since this report was published, various analytical methods have been employed to better understand the chemical composition of trommel fines. This report will compare the initial results with the analysis that has subsequently been submitted by operators.² It will also assess the effectiveness of the trommel fines campaign and recommend actions for regulating this waste stream in the future.

	2019 data		
	Lowest	Highest	Avg
TPH (mg/kg)	356	13500	3113
Heavy metals (mg/kg)	156	11659	1116
Asbestos	0	0.19%	n/a
pH	6.6	12	9.1
Sulphate	n/a	n/a	n/a
LOI	1.4%	48%	14.05%

Table 1 (Sampling data from 37 waste sites)

	2021-23 data		
	Lowest	Highest	Avg
TPH (mg/kg)	7.3	4602	474
Heavy metals (mg/kg)	49	24970	721
Asbestos	0	0.031%	n/a
pH	6.6	11.2	8.6
Sulphate	0.1%	20.2%	4.1%
LOI	1.4%	15%	5.8%

Table 2 (Sampling data from 36 waste sites)

The tables above show trommel fines analysis from 2019 data, taken at the start of the fines campaign, and data obtained two years after the campaign began (2021-23). There is a significant difference in all parameters, with the most recent data having much lower averages in total petroleum hydrocarbons (TPH), heavy metals, asbestos, and loss on ignition (LOI). The highest average and highest single sample results have been highlighted.

² This is not an exact like for like comparison as the analysis comes from various sites, some of which were not included in the original sampling campaign in 2019.

3. Compliance

Following the sampling phase of the campaign, letters were sent to producers to remind them of their legal responsibility to classify their waste correctly. A grace period was given to enable operators to produce sampling plans and undertake waste assessments. From 2021/22 officers were asked to carry out audits at trommel fines producers to assess compliance. Over 500 trommel fines audits have been conducted in Area so far. These waste assessment audits assess compliance with WM3 and check whether the operator has properly assessed their trommel fines to determine if they display any hazardous properties.

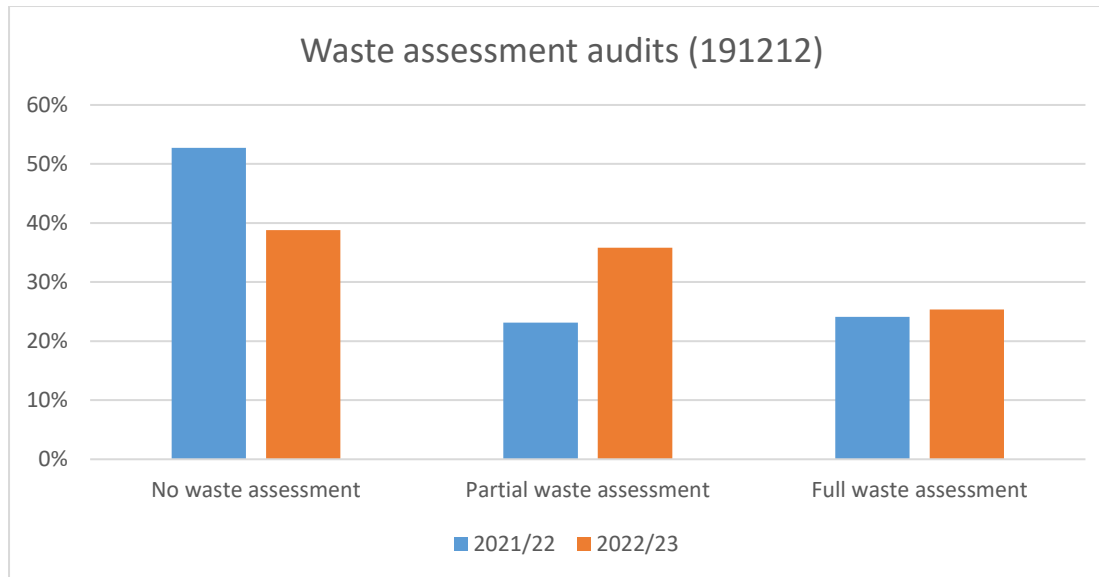


Chart 1

During the initial sampling phase of the campaign in 2019/20, none of the sites audited were able to provide a waste assessment for their trommel fines. In 2021/22, 47% of sites had a full or partial assessment. In 2022/23 this had increased to 61%, demonstrating a move towards compliance for much of the industry.

4. Chemical analysis and classification

4.1 Petroleum hydrocarbons

During the initial sampling exercise in 2019, 77% of the samples taken were found to contain total petroleum hydrocarbons (TPH) above the hazardous threshold of 0.1% (1000mg/kg). Following conversations with trade associations ESA and UROC, concerns were raised regarding the potential impact of interfering compounds in the trommel fines, such as plastics and humic substances, causing inflated TPH results. Laboratories can carry out a 'clean-up' on the samples prior to testing, usually by florisil or silica gel, to remove any interfering compounds. This was not done in the 2019 testing and therefore the results gave a 'worst case' scenario.

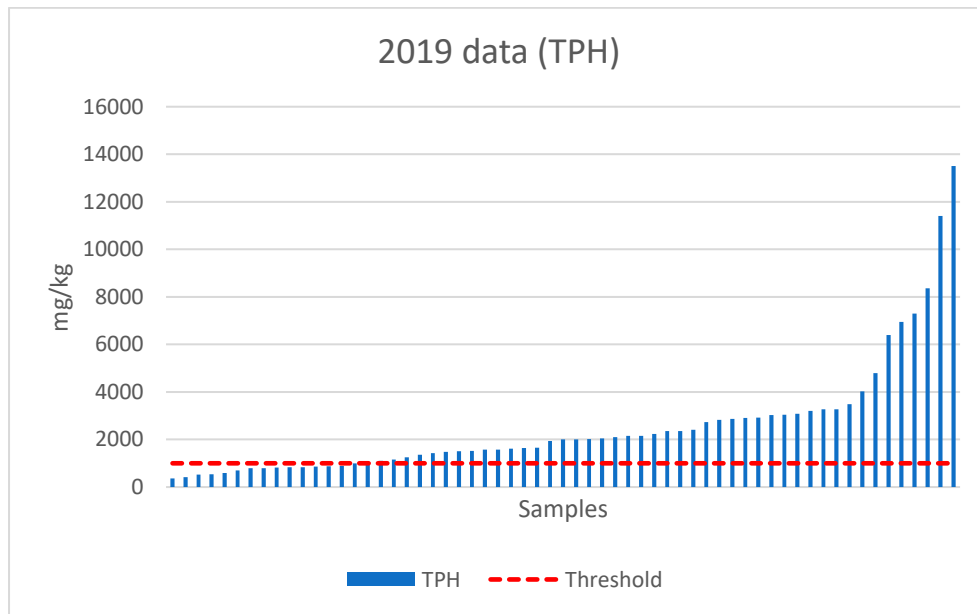


Chart 2 (66 samples from 29 waste sites)

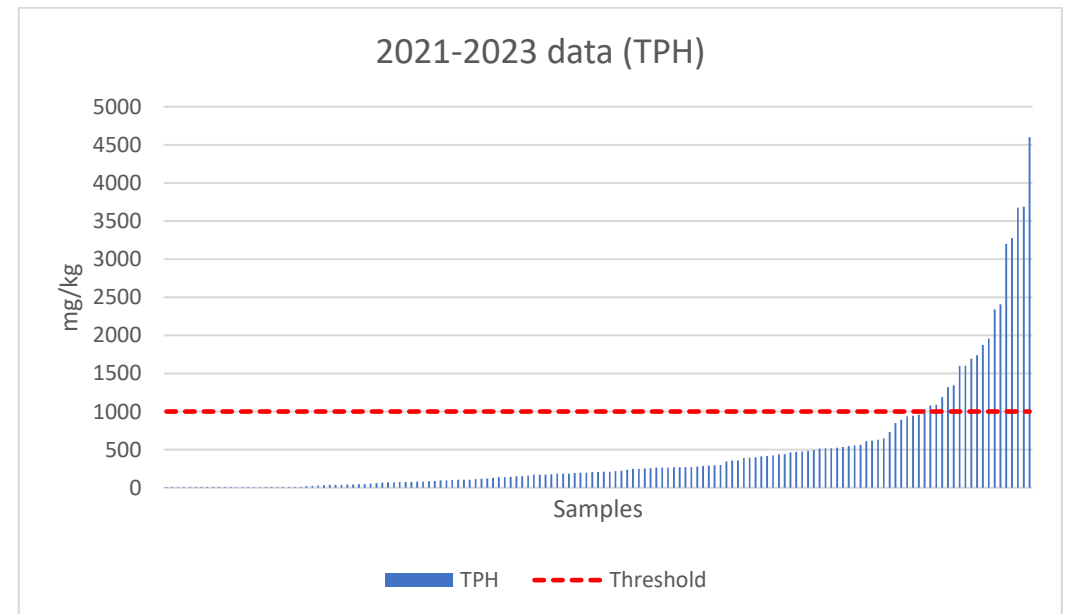


Chart 3 (184 samples from 36 waste sites)

Chart 2 shows the TPH results from the EA sampling carried out in 2019. The average TPH result was 3113mg/kg, well above the hazardous threshold of 1000mg/kg. Chart 2 shows the results from sampling undertaken since 2021. The level of TPH in these samples is much lower, with an average of 474mg/kg. There are several factors which may explain this:

1. The 2019 analysis did not include a 'clean-up' to remove interfering compounds. This would appear to be an obvious reason for the difference in results, but the 2021-23 data does not necessarily support this. The average TPH result for samples where the laboratory has confirmed a clean-up was carried out was 1111mg/kg whereas the average result for samples where no clean-up was reported was just 346mg/kg. This suggests that interfering compounds are not having as significant effect on TPH results as speculated and that the 2019 data may not have been adversely affected by the test methodology.
2. The 2019 samples were all taken by environment officers, whilst most of the samples in the 2021-23 data were taken by operators. This could bring into question whether the operator samples were truly representative, but again the data doesn't support this. The 49 samples which were taken by EA officers had an average TPH of ~600mg/kg. Whilst slightly higher than the overall average this is still well below the average from the 2019 sampling, suggesting that since the start of this campaign industry has improved waste acceptance and waste management procedures to reduce the level of contamination in trommel fines.
3. There are hundreds of waste sites producing trommel fines in England. The collated lab analysis only represents a fraction of these sites. The sites targeted in the 2019 campaign are not all the same sites in the 2021-23 data set. However, this is unlikely to impact the data significantly as the audits have revealed similar practices and procedures are used across the waste industry with regards to the production of trommel fines.
4. Whilst the above points may all be contributing factors, it is also likely that the trommel fines campaign has had a direct impact on waste management activities, resulting in improvements to operations and increased quality of trommel fines. There has been a significant increase in the number of waste assessments being undertaken by the waste sector as a result of this campaign, which has led to an increased awareness of the chemical composition of this waste stream. Classifying trommel fines as hazardous waste would have significant cost implications for waste operators and it is therefore in their interests to have robust waste acceptance and segregation procedures in place to ensure their trommel fines do not breach hazardous thresholds. This was highlighted in a letter sent to all trommel fines producers in 2020, putting pressure on operators to tighten their procedures.

4.2 Heavy metals (HP14 Ecotoxic)

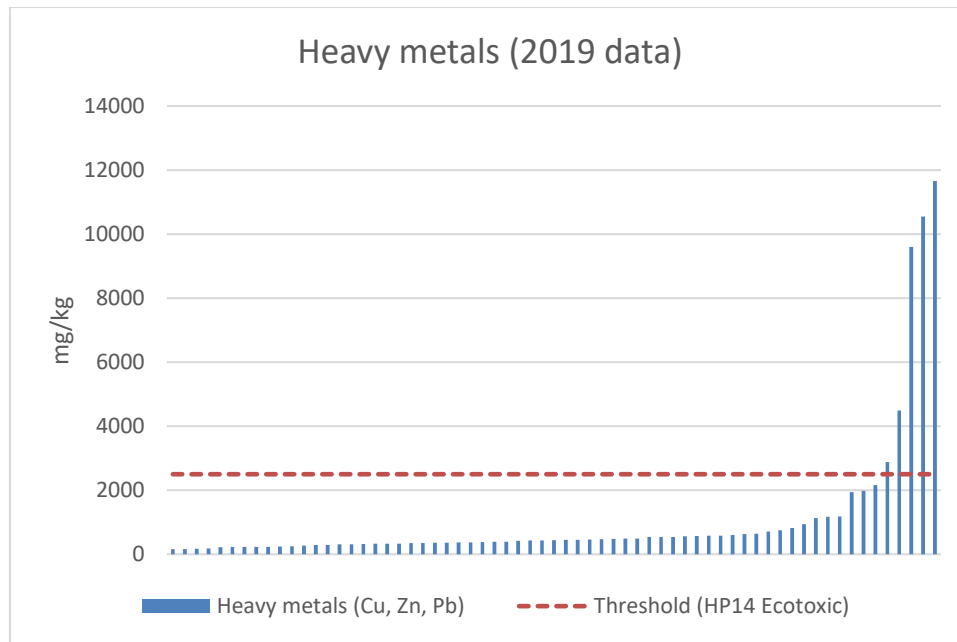


Chart 4 (71 samples taken from 31 waste sites)

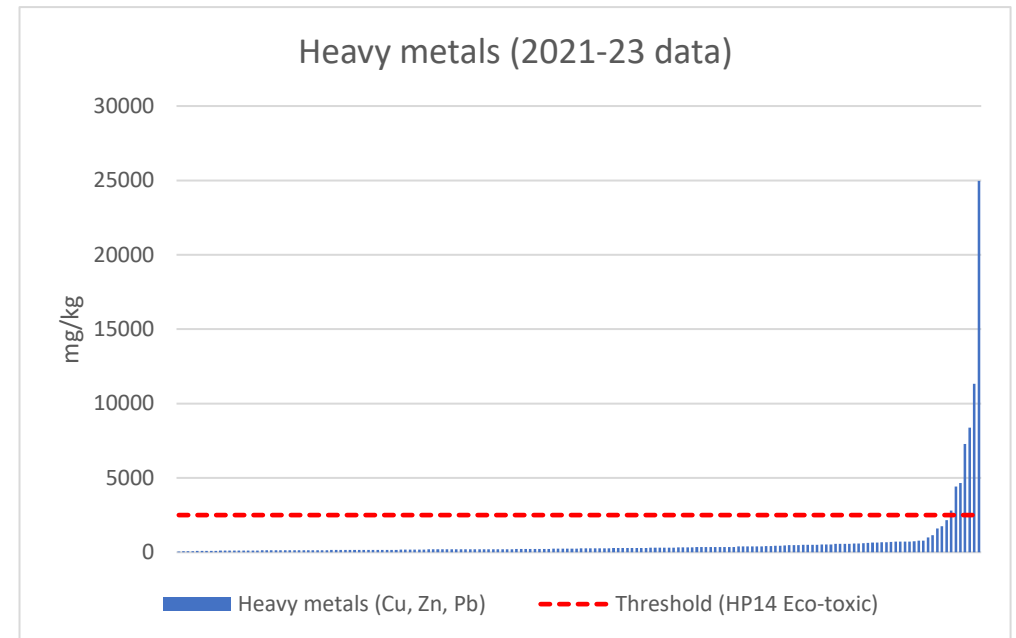


Chart 5 (174 samples taken from 34 waste sites)

Both data sets have low concentrations of heavy metals in the majority of trommel fines samples.³ The average across the 2019 data set (1116mg/kg) was higher than the 2021-23 data (721mg/kg), but only a small proportion of each were at concentrations that could make the waste hazardous.

³ Copper, zinc and lead results have been combined. Other heavy metals were not found in sufficient concentrations to be included in the assessment of HP14 Ecotoxicity

4.3 Asbestos (HP7 carcinogenic)

In 2019, 6 out of 76 samples (8%) were found to contain asbestos, two of which were above the hazardous threshold of 0.1%. In the 2021-2023 data, 8 out of 174 samples (4.9%) were found to contain asbestos between 0.0002% and 0.031%. None of these samples were above the hazardous threshold.

4.4 HP8 Corrosive

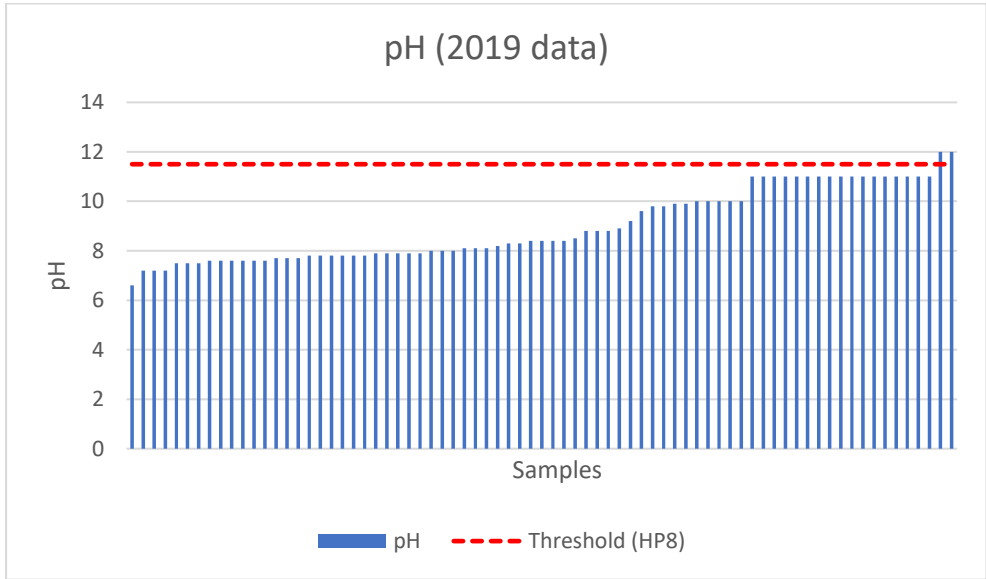


Chart 6 (75 samples taken from 37 waste sites)

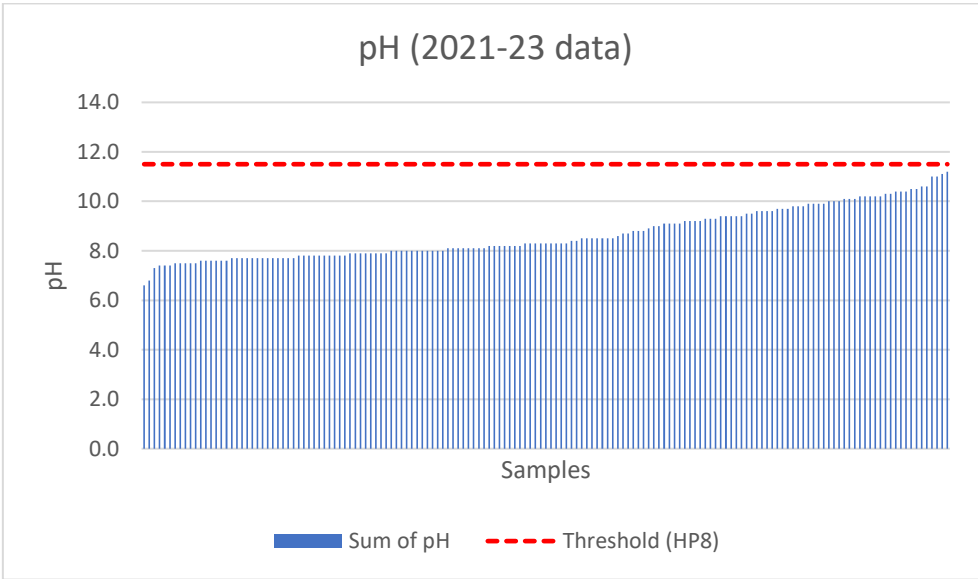


Chart 7 (157 samples taken from 35 waste sites)

None of the samples from the 2021-23 data set breached the pH threshold for corrosivity (pH 11.5), although a handful of samples were close to this limit. The average pH was 8.6, slightly lower than the average from the 2019 data (pH 9.1). Two samples from the 2019 data set breached the pH threshold for corrosivity.

4.5 Gypsum/Sulphate

Whilst not a hazardous substance, gypsum and other high sulphate wastes can cause significant odour issues at landfill. This is caused by hydrogen sulphide gas, which can be released when gypsum is mixed with biodegradable waste. A ban on disposing these two wastes together at landfill has been in effect since 2005. However, unless effective waste acceptance procedures are adhered to, gypsum has the potential to enter waste sites and make its way into trommel fines, which are usually disposed of at landfill. In 2019 the samples were tested for water soluble sulphate. The majority of samples came back with the same result of 16000mg/kg. Because of the relatively low solubility of calcium sulphate, if gypsum is present in a waste sample the leachable sulphate will not go above 16000mg/kg. The results indicated that the samples were saturated with gypsum and contained more than the 16000mg/kg leachable limit. Following this the decision was made to test for total sulphate (acid extractable) for all future tests to see exactly how much sulphate was in the fines.

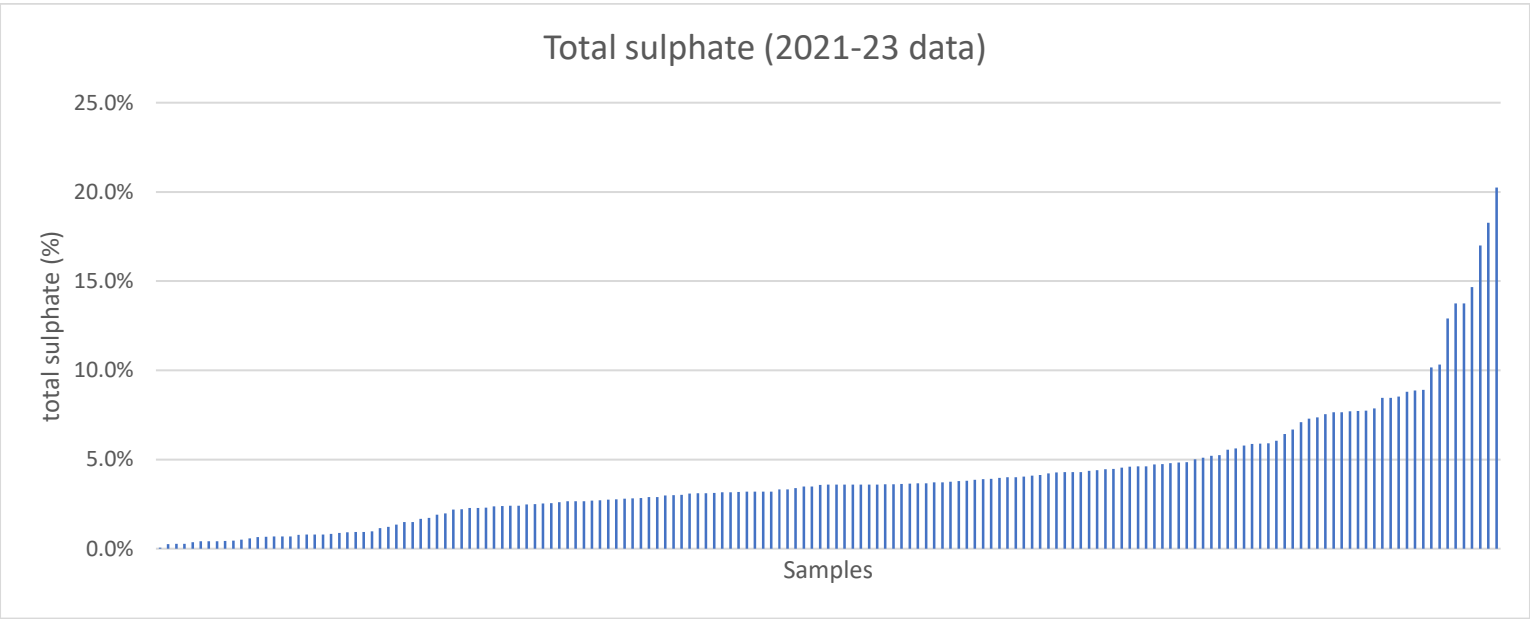


Chart 7 (147 samples from 31 waste sites)

The total sulphate results in chart 7 show a large variation between samples, ranging from 0.1% to 20.2%. The previous sulphate limit for disposal at landfill was 10% but this was removed as it was discovered that much smaller amounts of sulphate could still cause odour issues. Currently there is a zero limit, although this is not practical when considering that all trommel fines contain some level of sulphates, even in cases where good waste acceptance procedures are in place. Following discussions with the landfill sector, work is underway to introduce a new sulphate threshold for disposal at landfill. Trommel fines that contain high sulphate bearing wastes should only be disposed of in a dedicated landfill cell, but there is a limited number of these outlets. Better segregation procedures are needed to reduce the amount of gypsum entering this waste stream. The number of waste sites affected will depend on what sulphate threshold is introduced by the landfill sector.

4.6 Loss on ignition (LOI)

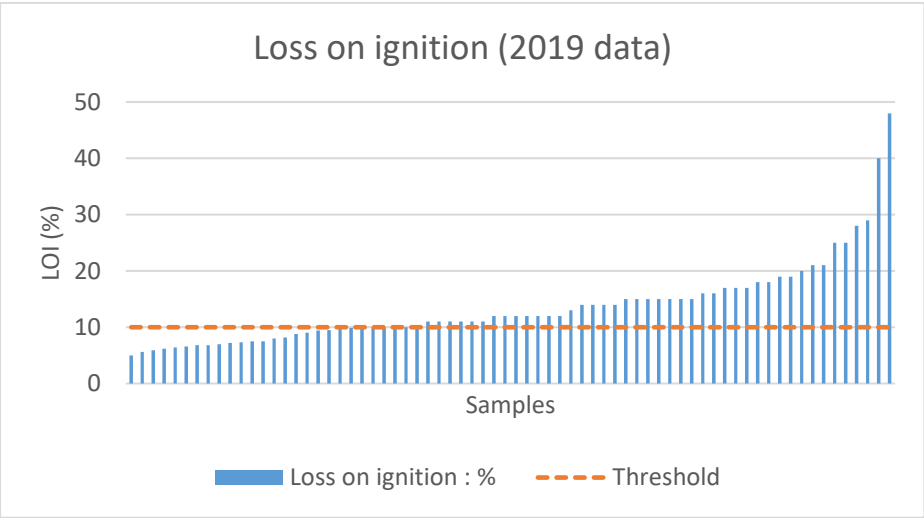


Chart 8 (73 samples taken from 36 waste sites)

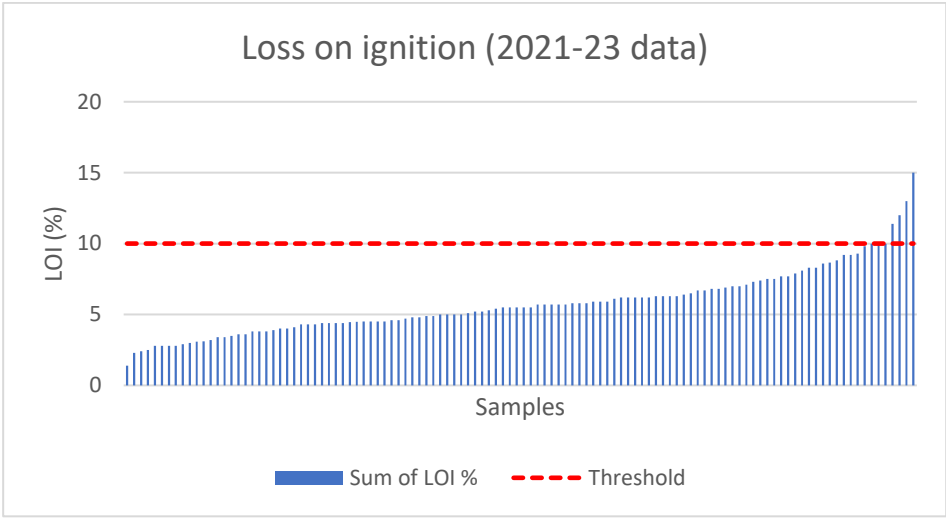


Chart 9 (114 samples taken from 26 waste sites)

The loss on ignition test is one of the criteria used by HMRC to determine whether trommel fines qualify for the lower rate of landfill tax. The average LOI result from the 2019 sampling was 14%, well above the threshold of 10%. The highest recorded result was 48%. Of all the samples tested, 61% breached the 10% threshold. This indicated that a high proportion of trommel fines were being misdescribed, potentially resulting in

landfill tax evasion. The current standard rate of landfill tax is £98.60 per tonne, compared to just £3.15 per tonne for the lower rate. There is therefore a significant financial incentive for producers to dispose of their trommel fines under the lower rate.

The 2021-2023 data shows a significantly different picture. Only 3.4% of the samples where LOI testing was undertaken breached the 10% limit. The average figure across 114 samples was 5.8%, with the highest recorded result of 15%. This indicates there has been a big change in the waste sector following the 2019 campaign and operators appear to be paying much closer attention to the quality of trommel fines that they produce. Environment Officers have been asked to submit referrals to HMRC whenever they suspect an operator is misdescribing trommel fines as qualifying materials for lower rate tax purposes. A new KPI (R23) was created for 2023/24 to drive this work.

Although not regulated by the Environment Agency, working collaboratively with HMRC on this issue has mutual benefits. Support has been provided to HMRC with regards to waste classification, enabling them to consider this alongside LOI testing during their interventions. This in turn assists the agency in improving waste classification and compliance with environmental legislation as HMRC put additional pressure on operators to become more compliant.

5. Conclusion

The most recent analysis indicates a significant improvement to the quality of trommel fines since 2019. Not only is the quantity of hazardous contaminants in trommel fines lower, but the number of loss-on-ignition breaches has also fallen significantly. Because of the issues with the 2019 test method, it is not possible to know whether the sulphate content in trommel fines has reduced since the campaign started in 2019. However, the 2021-23 data suggests gypsum contamination is still an issue in trommel fines and could be contributing to odour issues at landfill. In order to regulate this effectively a new sulphate limit for waste destined for landfill is required.

Whilst the trommel fines campaign has led to a number of improvements across the waste sector, further interventions are required to secure industry-wide compliance. In 2022/23, 39% of trommel fines producers that were audited had failed to carry out any waste assessment for the fines they produce. Trommel fines will remain a priority waste stream for the hazardous waste regime. As a continuously produced waste stream, operators must continue to sample and assess this waste indefinitely. The number and frequency of samples required for compliance testing is

determined by the waste characterisation phase i.e. how close to thresholds and how variable the waste is. As such, checking waste assessments should be a routine and ongoing compliance activity for officers regulating EPR sites that produce trommel fines.

The regulations underpinning the requirement to classify waste fall under section 34 of duty of care. This can make enforcement difficult at producer sites, as it isn't always possible to score for breaches of the permit. However, another option that has been used to good effect is to look at where the trommel fines are going and cause disruption downstream of the waste chain. A receiving landfill will be in breach of its permits waste acceptance requirements if it is accepting trommel fines that have not been properly assessed for hazardous properties. Scoring the receiving site for waste acceptance breaches can often help to achieve compliance from the producer site, as the landfill will insist on seeing waste assessments in future.

As a result of the trommel fines campaign it is harder for operators to send contaminated or non-conforming trommel fines to landfill at the lower rate of landfill tax. Some operators are therefore looking for novel ways to deal with this waste. Blending fines to create refuse derived fuel (RDF) and even Compost like output (CLO) have been reported, however there are concerns about the suitability of this waste stream for these treatment activities. Water discounts are another way operators are looking to reduce the cost of landfill tax when their waste cannot meet the qualifying material criteria for lower rate tax. Officers should therefore be wary of these changes and ensure that these activities are compliant with permits and that waste classification requirements are being complied with.

End of report