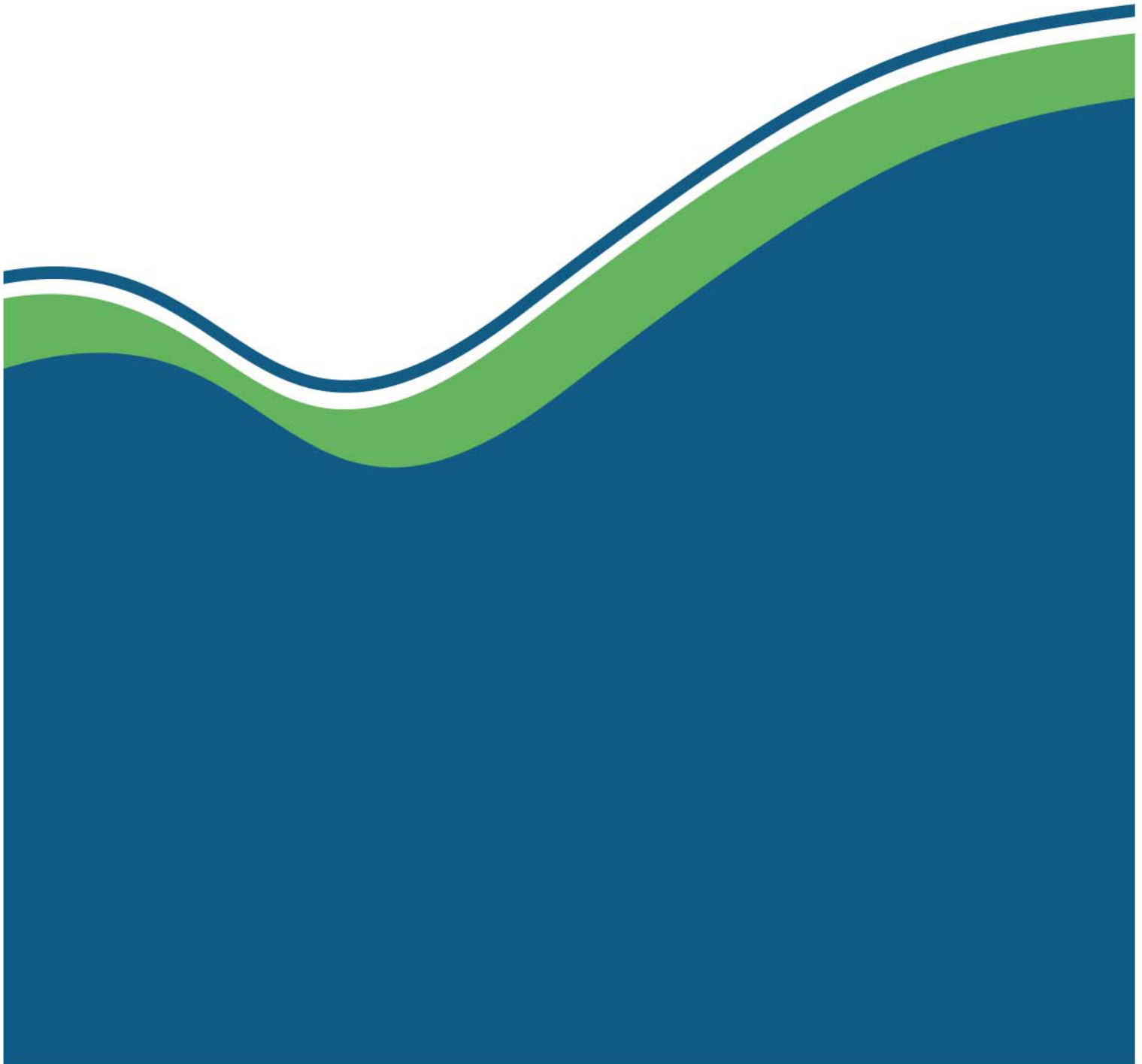


Materials Recovery Code

A Summary of the Quality of Recyclables Processed at
Materials Recovery Facilities in Scotland



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Executive summary

Traditional environmental regulation has delivered a lot, but we are now in a situation where, if everyone lived as we do in Scotland, we would need almost three planets. We only have one and must reduce the amount of resources we consume to live within this constraint. Replacement of virgin resources with high quality secondary materials is a key driver towards this and the Materials Recovery Code facilitates increased supplies of these.

Since sampling under the Code began in October 2015, data has been provided from 13 materials recovery facilities (MRFs), representing a reported 327,760 tonnes of Scotland's recyclable waste.

SEPA is confident the sampling results reported are broadly accurate, with some exceptions which we are working to address. However, caution should be exercised when drawing conclusions from the data because variation in site operation, differing degrees of grading across facilities and inconsistency in material categorisation can all effect the reported information. The data should be viewed with care and used as an indicator only. It is strongly recommended that further engagement with SEPA, or with operators, takes place before decisions are made on the basis of the published data.

Overall sampling data suggests that on average, 17% of waste sent to MRFs for sorting is contamination (ranging from 0.91% to 43.04%). But this is unlikely to represent the true scale of contamination as some facilities divert heavily contaminated waste to residual treatment facilities, bypassing the requirement to sample and report. Any perceived trend of improved input quality since 2015 should also be considered with care, as some changes are a direct result of improvements in reporting by sites as they became more familiar with the requirements.

During audits, SEPA analysed 22 samples of waste outputs and found offensive & hazardous contaminants in eight samples. This included waste electricals, batteries, animal excrement, soiled nappies and used hygiene products. Other common contaminants included baby wipes, low grade plastics, crisp and sweet wrappers and too heavily contaminated recyclables. Concerns therefore remain over the quality of material being produced at some MRFs. Outputs are reportedly contaminated with on average 2% non-recyclable waste, with many not meeting the UK's legal export requirements or the 1.5% threshold currently set by China (the primary destination for UK recyclate). Poor quality material in containers that have been repatriated or intercepted before export has come from some of these MRFs.

SEPA auditing and discussions with operators have made clear that most MRFs are working hard to get maximum value from the material they are managing, and they are taking their sampling work seriously. Sampling staff also exposed the difficulty involved in trying to identify the different grades of plastic used for packaging, and the impact this has on efforts to correctly manage waste. Commitment is needed across the supply chain to improve awareness of what can be recycled and tackle quality issues at each stage, from manufacturers and householders through to commodity brokers and reprocessors. Work is also required to understand the degree to which recyclables are still being landfilled or incinerated due to contamination at source, or inefficiencies in the sorting process.

Duty of Care compliance issues were also identified at most sites visited, making it difficult to have confidence in the results reported for material use at next destinations. Given this, and the potential for waste criminals to take advantage (for example through illegal dumping and/or landfill tax evasion), Duty of Care will be an area of focus during future site audits and subsequent material quality work.

Introduction

In 2016 Scottish Government published [Making Things Last – A Circular Economy Strategy for Scotland](#), laying out an ambition to keep products and materials in high value use for as long as possible. Publishing data on recyclate quality at materials recovery facilities, via the [Code of Practice on Sampling and Reporting at Materials Recovery Facilities](#) (the Materials Recovery Code), is a core component of this strategy (illustrated in Figure 1).

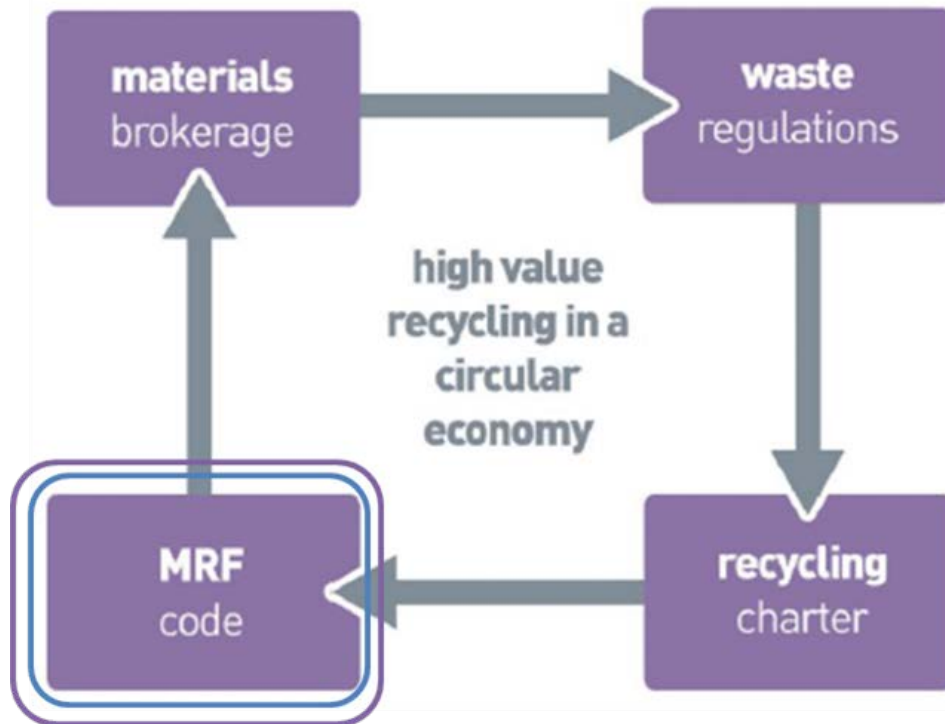


Figure 1: The MRF Code (Materials Recovery Code) is a core component of Scottish Government's framework for improving recycling, as set out in 'Making Things Last: A Circular Economy Strategy for Scotland'

SEPA wants to move Scotland from our current position of consuming the resources of almost three planets, to living within our one planetary constraint. We recognise that the recirculation of high quality recyclate is a critical part of that vision. Furthermore, tightening quality requirements from buyers (at home and abroad) requires action across the supply chain to ensure Scotland is a reliable place to source secondary materials. The Materials Recovery Code facilitates the increased supply of high quality material.

Under the code, licensed MRFs treating 1,000 tonnes per year or more of dry recyclable waste have been required to sample and report on input and output quality data to SEPA since October 2015. The results of the first five reporting periods are [published online](#). The flowchart in Question 1 of SEPA's [Materials Recovery Code FAQs](#) provides further guidance on scope. SEPA has also undertaken audits on these facilities to assess compliance with the code and to further develop our understanding of the input & output quality at these facilities.

This report provides an overview of the data submitted so far and SEPA's findings during site audits carried out between May 2016 and May 2017. The report focusses on overall contamination rates, causes of contamination, the role of Duty of Care and ongoing concerns regarding illegal exports of recyclables.

SEPA's approach

Effective regulation of the [Materials Recovery Code](#) supports Scottish Government's ambitions to produce high value materials, and the four of the aims of SEPA's [Waste to Resources Framework](#).

SEPA uses the data collated via the code, as well as on site audit and sampling work, to:

- Improve understanding of circular economy material flows
- Identify problem waste streams and suppliers
- Track destinations for poor quality materials
- Improve our overall understanding of the movements of waste in Scotland and beyond
- Target our regulatory efforts, particularly with respect to:
 - Recycling legislation
 - Waste exports legislation
 - Duty of Care obligations
 - Landfill tax

Materials Recovery Code benefits (set out in [Making Things Last – A Circular Economy Strategy for Scotland](#)):

1. Provides greater transparency in the market place around the quality of recyclables on offer
2. Ensures those contracting with sorting facilities know for what they are contracting
3. Stimulates a robust and vibrant home market for the sale and reprocessing of quality recycle
4. Provide the public with an understanding of the way their recyclables are handled after disposal

Work in SEPA's first year focussed on set up of:

1. SEPA's cross-portfolio implementation team
2. Internal systems to receive and process data returns
3. Guidance for staff conducting sampling audits and compliance assessment work

Throughout the year, SEPA assisted operators to develop compliant sampling, reporting and record keeping systems, to improve the accuracy and robustness of submitted data.

Introductory site visits to all in scope MRFs were conducted between May – August 2016 and the purpose of the visits was to:

1. Assist sites with understanding their obligations under the code
2. Allow SEPA staff to develop an overall understanding of site operations
3. Address any logistical issues regarding future sampling visits from SEPA

Formal compliance assessment began in November 2016, via a programme of site visits which took place between November 2016 – February 2017, as well as data return assessments, which are carried out on a routine quarterly basis. Data specialists attended all audits to gain a full understanding of site processes and provide support to operators to ensure data is reported as accurately and consistently as possible.

A workshop was held in October 2016 to facilitate further engagement between SEPA and MRF operators and improve understanding of the code requirements and common issues facing operators.

During SEPA's engagement with these MRFs it has become apparent that most are working hard to get maximum value from the material they are managing, and have been taking their sampling work seriously.

'In scope' facilities

There are currently 13 sites sampling and reporting to SEPA, listed in Table A.

Table A: Sites currently in scope (March 2017)
Biffa Waste Services Limited, Broxburn (WML-E-0020002)
Falkirk Council Recycling Centre, Bonnybridge (WML-E-0020112)
Glasgow City Council, Blochairn Road (WML-W-0020181)
Green Circle Recycling Limited, Grangemouth (WML-E-0120034)
J&M Murdoch & Sons Limited, Darnley (WML-W-0022002)
Saica Natur UK Limited, Croy (WML-W-0220257)
SITA UK Limited, Glenfarg, Perth (WML-L-1106191)
Viridor Enviros Scot Limited, Bargeddie (WML-L-1028820)
Viridor Waste Management Limited, Newhouse (WML-L-1117120)
William Munro Construction (Highland) Limited, Evanton (WML-N-0220249)
William Tracey Limited, Linwood (WML-W-0020110)
Biffa Waste Services Limited, Glasgow (WML-W-0000026)
SITA UK Limited, Altens East Ind. Est., Aberdeen (WML-L-1137739)

Each site received two visits between May 2016 - February 2017, with two exceptions:

- SITA UK Limited (WML-L-1137739) commenced operation in 2017 and had an introductory visit in July 2017.
- Biffa Waste Services Limited (WML-W-0000026) underwent a number of operational changes during 2016 & 2017, bringing it out of scope and back in again. Although data submissions were received for 2015 Q4 (October – December), the site was declared out of scope before site visits began. It has since come back in and had an introductory visit at the end of March. A compliance assessment visit took place in July 2017.

The impact for this report is that SEPA sampling information is based on 11 of the above 13 sites.

The sites detailed in Table B have submitted sampling data returns to SEPA, but are no longer in scope due to operational changes on site.

Table B: Sites no longer in scope	Date declared out of scope
Binn Skips Limited, Glenfarg, Perthshire (WML-E-0220286)	16/11/2016
Biffa Waste Services Limited, Edinburgh (WML-E-0000108)	21/04/2016
SITA North East Limited, Aberdeen (WML-N-020011)	08/09/2016

Freeriders

Whilst confident that all facilities which are required to comply with the [Materials Recovery Code](#) are doing so, SEPA continues to look beyond the current list of sites, with a member of staff working on this on an ongoing basis.

Sampling results and compliance

Data Limitations

The data published by SEPA online and in this report is taken directly from operator returns, with some basic data consolidation carried out, with the consent of operators, to allow for more efficient analysis. This consolidation in no way alters the actual results reported in line with the [Materials Recovery Code](#) and generally relates to the streamlining of information entered into free text fields within the data return. For further information on this consolidation, contact SEPA directly.

Non-reporting of contaminated recyclables

SEPA understands that some waste collected under a dry recyclable waste contract in Scotland is diverted straight to secondary sort or residual waste facilities due to heavy contamination. Whilst this is operationally pragmatic, because it prevents further contamination of other clean material running through the MRF, it does mean material collected for recycling may not be fit for being recycled. As well as this being a lost opportunity, it also means the material bypasses the sampling and reporting requirements under the code. Therefore, the input sampling results reported by MRF operators may not reflect the true scale of contamination from suppliers, as some of the most significantly contaminated loads are not captured in the data.

Variation in facility operations and reporting terminology

A wide range of variables impact the data reported by operators, which cannot be fully illustrated in the analysis tool, and the data should therefore be used with caution. The following are examples of some of the most significant variables identified so far, although it should be noted that this is not an exhaustive list.

Operations across MRFs vary significantly, from input sources to sorting processes. For example, two MRFs accept commercial waste only, four accept household waste only and six accept a mix of both, with the proportions of commercial and household waste accepted differing significantly. Furthermore, in terms of sorting, optical sorters, ballistic separators and v-screens are not commonly used across all MRFs, reportedly due to high installation costs. Most MRFs operate a combination of positive & negative picks. Positive picking is the practice of actively targeting a desired material to remove from the sorting line, leaving the remainder of the waste to pass by. Negative picking is the practice of actively targeting contamination for removal from the sorting line, leaving the desired material to pass by and be collected at the end of the line (usually mixed paper).

There is considerable difference in the type of materials targeted across sites. For example, some operators target very specific materials during sorting, such as clear HDPE bottles or newspapers & magazines. In contrast, others will target mixed grades, such as mixed paper or mixed plastic. Furthermore, some sites consistently target the same grades every quarter, whereas others change their grades, based on material inputs and market demand. This has an impact on the ability to directly compare sampling results and establish trends.

There was also inconsistency across operators in the usage of the terms “target”, “non-target” and “non-recyclable”. Additional guidance produced (available in [SEPA's FAQs](#)) has largely addressed this. However it has also highlighted that materials classified as target or non-target do vary considerably from operator to operator, for example one facility may classify cardboard in a mixed paper bales as target, whereas another may classify it as non-target, depending on buyer specifications. This is something which isn't possible to reflect in the [recyclate quality data reporting tool](#). The non-recyclable element is more consistent by comparison, but does still see some variation.

Supplier rankings

Providing a clear ranking of supplier input contamination rates is not provided in this report due to the way supplier information is reported. (For example, where the MRF operator has collected the material themselves as part of a route involving multiple businesses, they are reported as the supplier, rather than the companies presenting their waste for collection on that route.) However interested parties are still able to access the data and analyse the information provided via [Scotland's Environment Web](#). SEPA will consider alternative ways to report this data more effectively in the future.

Material inputs

Since sampling began in October 2015, 327,760 tonnes of material has been reported as processed through these MRFs, from approximately 100 suppliers (as defined in the [code](#)).

The total quantity of treated waste across all MRFs ranged from 47,846 tonnes in 2015 (Q4) to 90,057 tonnes in 2016 (Q4), with the tonnage increasing as the number of sites reporting increases. This is illustrated in Figure 2, which also shows, based on the difference between 2016 (Q2) and 2016 (Q3) that the addition of new facilities can have a big impact on the quantities of waste reported each quarter. Of the 13 sites to have reported, the smallest facility treated 222 tonnes in a quarter compared with 30,981 tonnes treated at the largest facility.

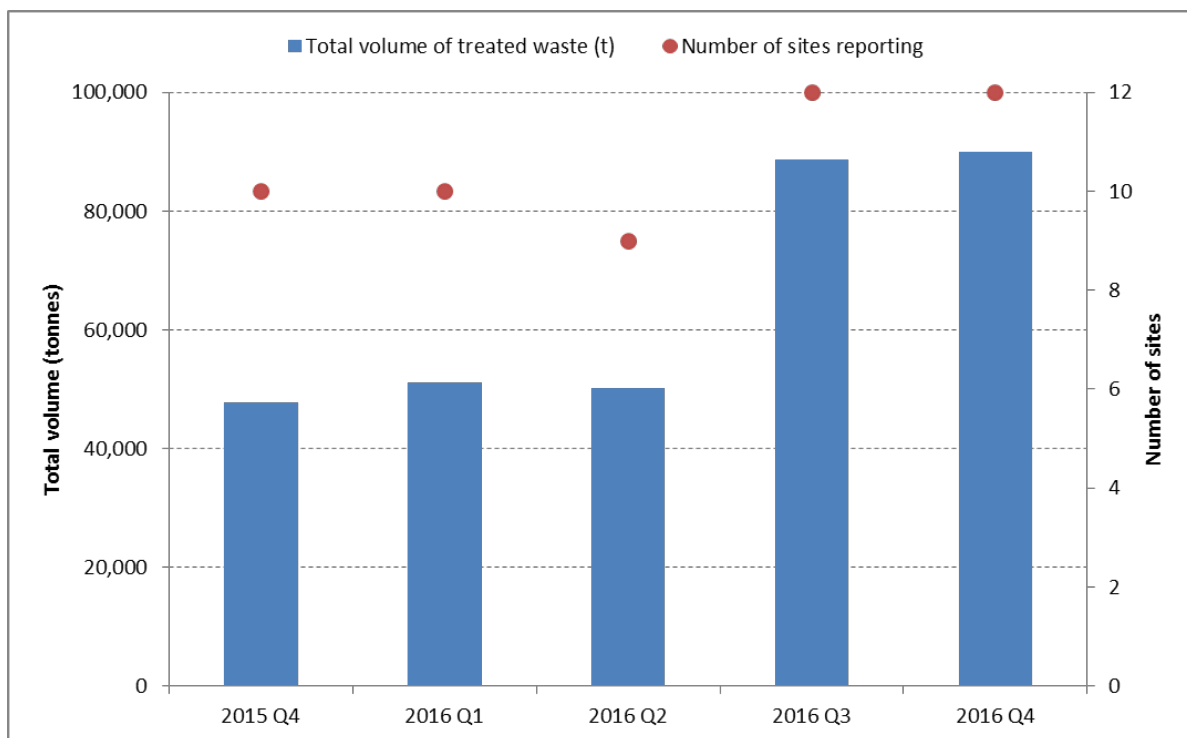


Figure 2: Total volume of treated material and number of sites reporting during that quarter

It is not possible to give a robust estimate of the total tonnage of dry recyclate collected for recycling in Scotland due to the number of exempt sites receiving fully segregated dry recyclable waste. These sites are not required to report their waste figures to SEPA.

Overall, the reported average national contamination rates for material entering MRFs is 16.9%, including non-target and non-recyclable materials. Figure 3 shows the range of quarterly averages from 8.4% (Q3 2016) to 29.5% (Q4 2015). However the range on an individual operator basis is much wider, from as little as 0.91% to as much as 43.04%. The proportion of non-recyclables entering MRFs has ranged nationally from 5.24% in Q3 2016 to 9.9% in Q1 2016. On an individual operator basis, they have ranged from 0.21% to 19.48%. Detail on the non-recyclable elements is provided later in this report.

It is important to note that, because of the relatively small number of operators in this dataset, the national data is sensitive to changes at an individual operator level. The dashed lines in Figure 3 represent the national results if one operator's data is removed, illustrating a clear difference in apparent trends.

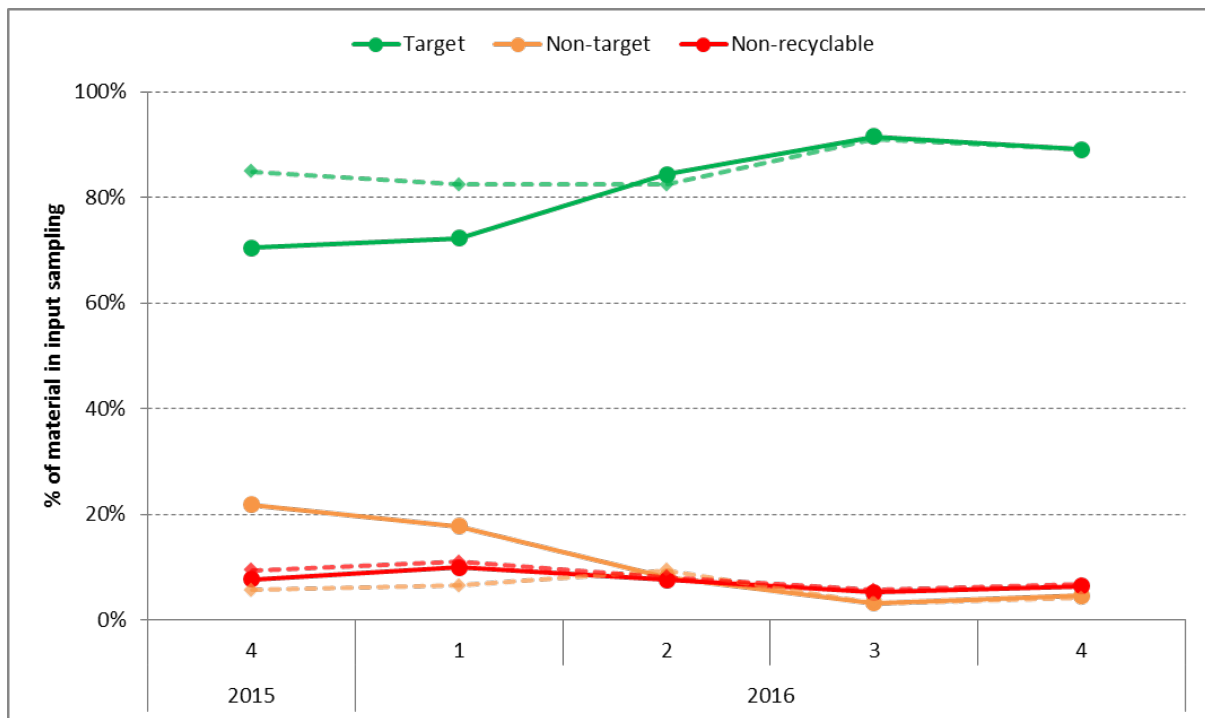


Figure 3: National Fluctuations in Input Stream Samples (note, the dashed lines represent the data with one operator's data removed). This is sample weighted average data.

Contamination rates vary widely when looking at individual suppliers with sampling data ranging from no contamination to over 40%. While it might be tempting to conclude that the level of non-recyclables entering MRFs has dropped overall since sampling began it could be a result of sites refining the way they define incoming materials (following guidance from SEPA).

It would be unwise to draw any long term conclusions on national contamination trends from this relatively short term dataset. This becomes evident when looking at the fluctuations in input stream sampling for each operator with no identifiable trend (Figure 4). Note, “Biffa Glasgow” was not required to report sample results to SEPA in Q2 and 3 of 2016, due to operational changes.

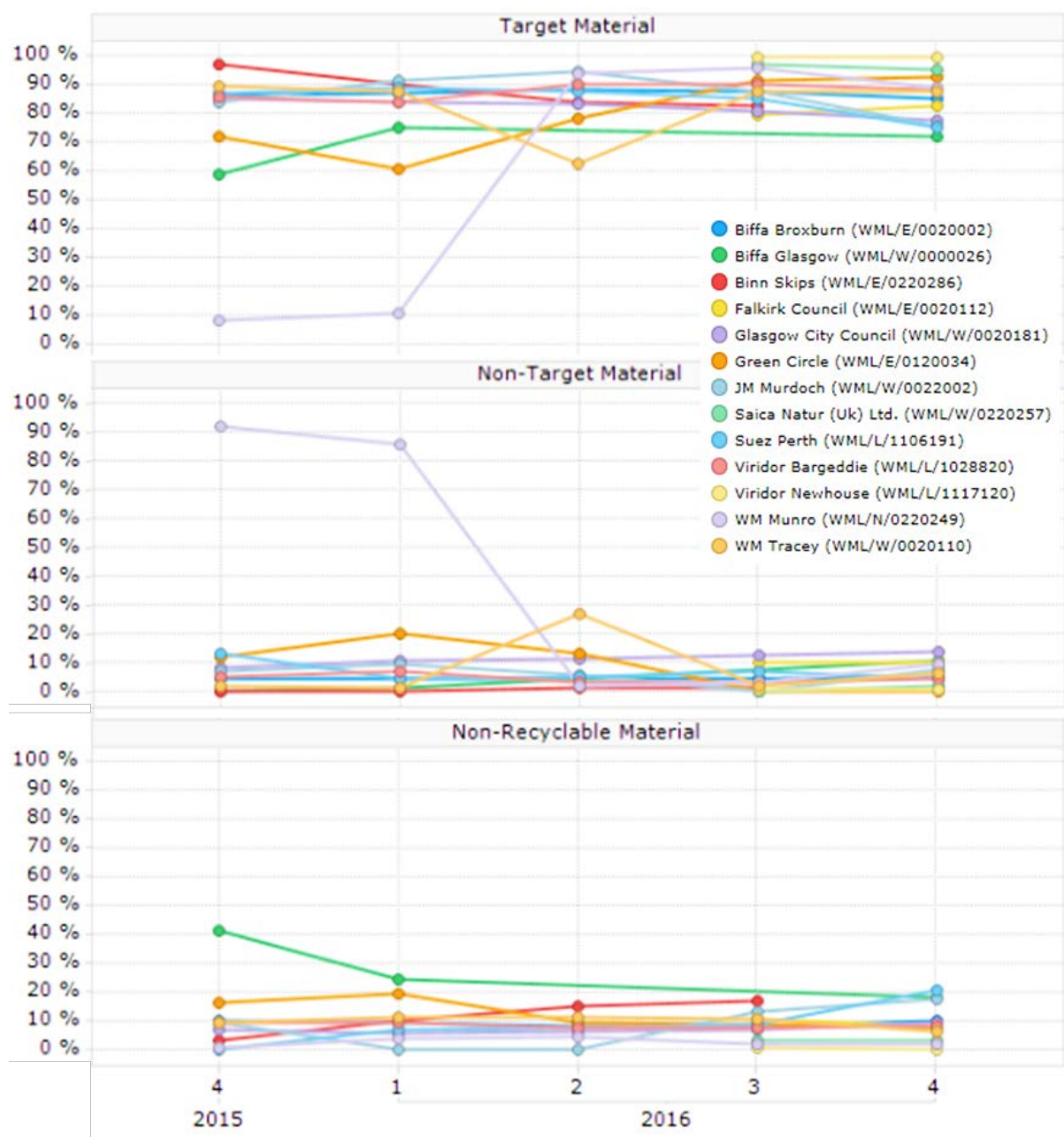


Figure 4: Fluctuations in Input Stream Samples in Scotland. This is sample weighted averaged data.

Material outputs

So far, operators have reported extracting 237,427 tonnes of recyclate from the reported 327,760 tonnes of material processed. Given the 16.9% contamination reported at the input stage, an extraction of only 72% may seem unusual as it suggests a contamination rate of 28%, much higher than the average input sampling. This difference is likely to be due to:

- The additional fragment material generated as waste is processed through the MRF which is made up of target, non-target and non-recyclable material, but categorised separately as fragments.
- Material such as paper being reported as a target material at the input stage, but non-recyclable at the output stage due to contamination occurring from food, liquid and other wastes during the sorting process.

Overall, national contamination rates for recyclate targeted by the MRFs have reportedly averaged 9.6% at the output stage, including non-target and non-recyclable material. Figure 5 shows this has ranged from 6% (Q2 2016) to 12% (Q4 2015). The proportion of non-recyclables found in target recyclate outputs has remained steady at approximately 2% every quarter. However there is significant variation depending on site and material grade in question. For example, the composition of output sampling for non-recyclables across all operators ranges from 0.63% for cardboard, to 11.39% for glass, with operator results varying from one quarter to the next (Figure 6).

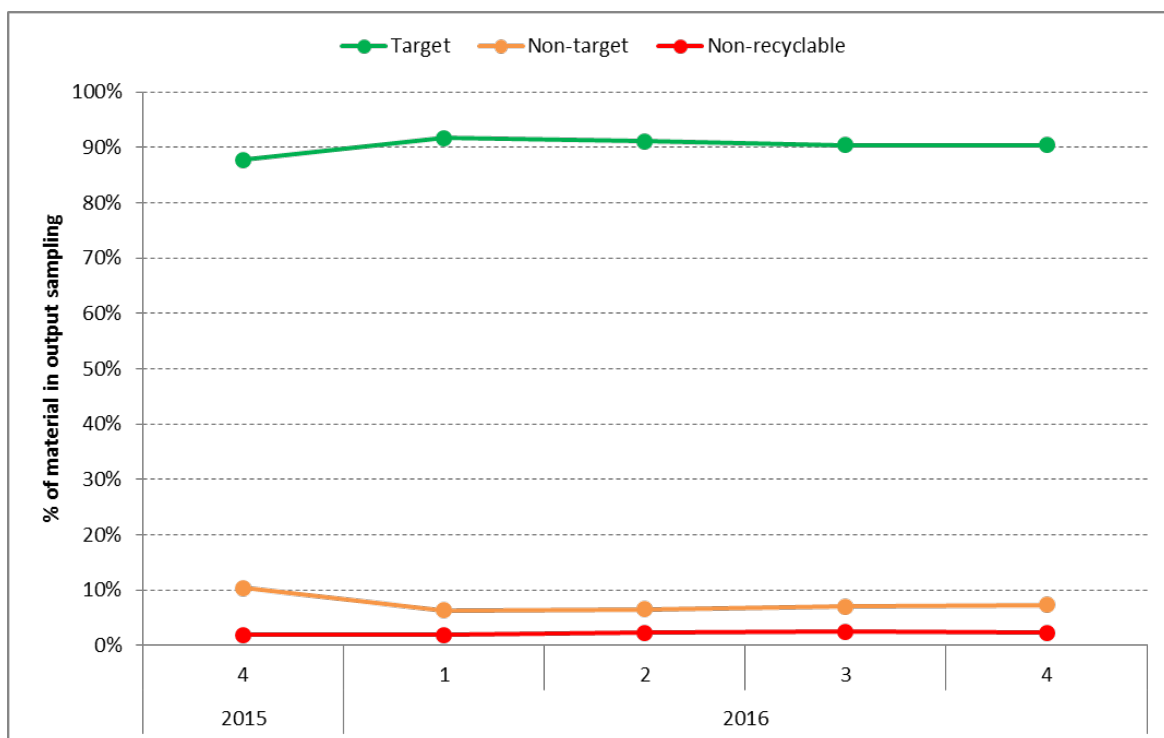


Figure 5: National Fluctuations in Output Stream Samples. This is sample weighted averaged data.

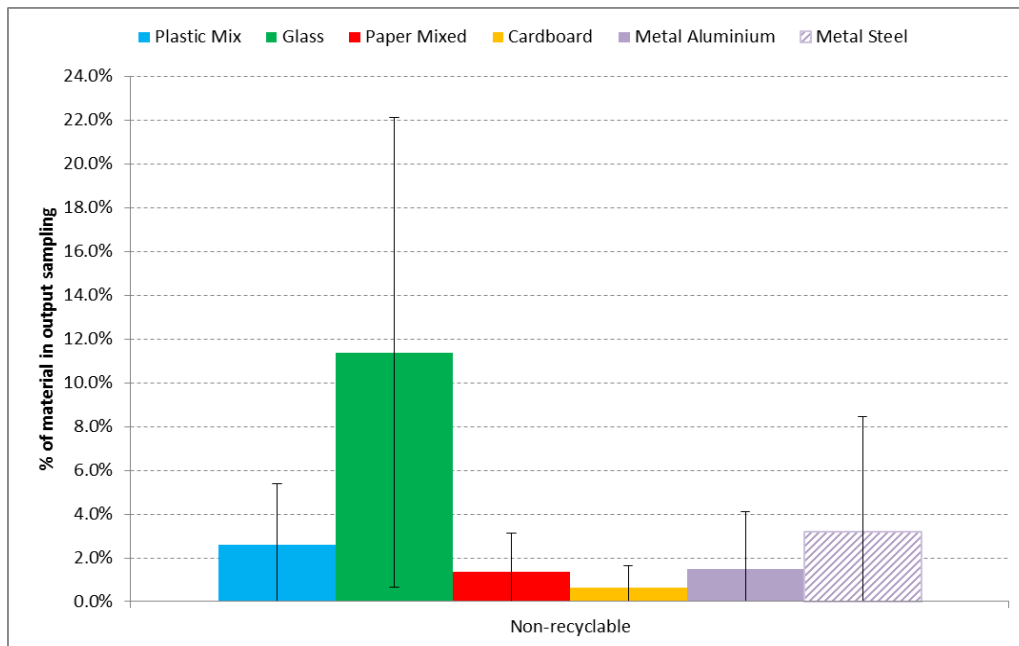


Figure 6: Proportion of non-recyclable materials within different material grades during output sampling across all operators. Bars represent average of raw sampling data with standard deviation displayed. Material grades presented are grouped for simplification.

At face value the sampling analysis results do not suggest significant improvements in output quality compared with input quality. However a range of factors impact this, including but not limited to:

- The way a material is categorised changes at the output sampling stage. For example, at input a site may class a plastic bottle as “target” material, because they actively segregate these for recycling. However, at output a plastic bottle found in a paper stream sample may be classed as a “non-target recyclable” because this is a recyclable material, but it shouldn’t be in the paper waste stream.
- Some sites appear to be more tolerant with their suppliers than others, in the way they categorise their input materials, apparently for fear of losing contracts. However this adversely reflects on the MRF when looking at site efficiency. This is something SEPA will investigate going forward.

SEPA sampling and compliance results

Broadly speaking, SEPA sampling is as expected based on operator data returns. The exceptions to this are:

- William Tracey Group (WML/W/0020110). Results for both SEPA samples were more contaminated than the sampling results reported to SEPA by the operator
- Wm Munro Construction Limited (WML/N/0220249). Results for both SEPA samples were more contaminated than the sampling results reported to SEPA by the operator (although for the paper sample, this was only by a small margin).
- Saica Natur (WML) and Biffa Broxburn (WML). One of the two SEPA samples analysed at each site was more contaminated than the results reported by the operators.

On the whole the sites have been assessed as compliant with the permit requirement to sample and report in accordance with the code. The exceptions to this are:

- William Tracey Group (WML/W/0020110) for failure to sample enough material
- Wm Munro Construction Limited (WML/N/0220249) for failure to sample to the required standard

SEPA is working with the operators to address these issues. It is important to note that a site can be:

- Reporting sampling results which match with SEPA's findings, but not be compliant with the Code (e.g. not enough samples taken, or returns submitted late)
- Compliant with the materials recovery code, but have reported sampling results which do not match with SEPA's findings (e.g. if material blending after sampling degrades final bale quality)

Non-recyclables in SEPA output samples

The most common non-recyclables identified in recyclate output bales, based on samples analysed by SEPA, are:

- baby wipes
- heavily contaminated recyclables (usually food or liquids)
- low grade plastic films
- crisp packets & sweet wrappers

These items were found in at least half of the 22 samples SEPA analysed. Tetrapak/waxed cups and black plastics featured in 8 and 7 of the 22 samples respectively, both of which are technically recyclable, but do not currently have viable mainstream markets. This is also the case for many low grade plastics and textiles.

Offensive and hazardous waste was found in 8 of the 22 samples, including from bales that were likely to have been bound for international export. This included:

- animal excrement
- soiled nappies & other hygiene products
- batteries and waste electrical & electronic equipment

These findings broadly match the common contaminants operators advise they receive in co-mingled inputs (Figure 7) and indicate the difficulty operators face in removing them during the sorting process.

More work is required to engage with waste producers, to prevent these common contaminants ending up in recycling collections.

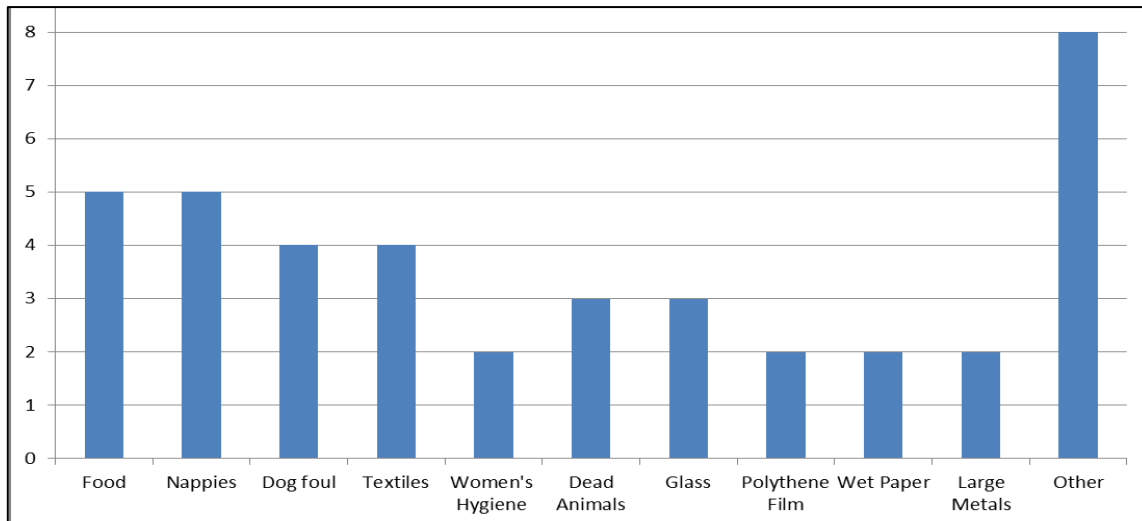


Figure 7: Common input contaminants reported during SEPA site visits. Vertical axis represents number of operators. "Other" includes black food trays, WEEE, unsorted bagged waste, hard plastics, bulky cardboard, cassette tape, gun cartridges & diabetic pens.

Key audit findings

Recyclate sent to downstream facilities

SEPA is aware that, a proportion of recyclables sent to MRFs end up in the residual waste during sorting, which is sent to downstream facilities for further processing. The fate of this material appears to most frequently include either:

- Production of refuse-derived fuel for incineration at energy from waste plants, with or without prior removal of recyclables
- Landfilling, with or without prior removal of recyclables

Follow up work needs to be done to estimate the proportion of recyclables that this applies to and whether more needs to be done to prevent this leakage.

Confusion over identification of recyclables

At initial audits, not all operator sampling staff demonstrated an understanding of the different types of recyclate targeted by their company, for example, not understanding the difference between certain grades of plastic, such as HDPE and PET. This was flagged as a training issue for the relevant staff, but is an important observation. In some instances, SEPA staff also struggled during sampling to identify the various grades of recyclate.

To reduce confusion amongst the public regarding which items can be recycled, more work needs to be done to make identification of types of recyclate easy and consistent.

Common causes of confusion over identification of recyclables:

- Recyclate labels too small & faint to read
- Recyclate labels in hard to reach places (particularly after compaction)
- Different ways of displaying information (e.g. material description/numbered coding)
- No recycling information

Supply chain engagement

SEPA observed a number of differences in tolerance levels for supplier contamination. At the time of our first visits, two MRFs were routinely feeding back sample results to their suppliers. In contrast, two sites advised that they did not provide any feedback to their suppliers. Most operators were providing a degree of feedback, either via financial penalties for downgrades or rejection of loads on arrival. Contracts have been dropped in some cases due to persistent levels of contamination, but this is not common practice and there is a fear that putting too much pressure on customers for contamination will push them towards others who will be more tolerant, rather than encouraging them to improve quality.

Some operators are actively working with local authorities to assist with householder engagement, although this was in the minority. Furthermore, the level of engagement on the part of the supplier was found to be highly variable. Some Local Authorities actively engage with their MRF via for example, monthly meetings, regular on-site checks of their recyclate being unloaded and targeted communications to their householders. In contrast a minority of other Local Authorities are resistant to efforts by MRF operators to engage in attempts to improve the quality of their recyclate inputs.

Effective communication among all players in the supply chain has been highlighted on numerous occasions as a key factor in tackling material quality issues, particularly with respect to common contaminants.

Best practice cases need to be highlighted as part of efforts to raise the standards of supplier engagement across the whole sector.

It is worth noting that some MRFs are adapting their operations to accommodate supplier inputs. For example, Figure 8 shows small recyclable plastics that have been collected, using specific equipment, because of a supplier producing these materials in high volumes. Another operator has installed a second line to process recyclate containing glass, to avoid it being mixed with non-glass recyclate streams.



Figure 8: Small plastics being targeted at a MRF which has installed specific equipment to collect the large volume produced by their supplier

Finally, SEPA found a range of contracting habits across the sector. Although some were using long-term contracts, an increasing number of operators are moving towards shorter term contracts, including some 30 day agreements. In some instances, particularly for MRF outputs, no contracts at all are used and agreements are made for individual loads at the point of enquiry. The most common reasons cited for this are to be able to react flexibly to inconsistency of material inputs and global market volatility.

We need to continue to explore how Scotland's waste industry can become more resilient to global commodity fluctuations.

Waste exports from MRFs

The sampling results carried out by MRF operators and SEPA have found material destined for export to be of variable quality, and there is an export compliance risk associated with this variable quality. With an average contamination rate of 2% non-recyclables & 7% non-target, many outputs do not meet the legal requirements for UK exports and fall short of China's 1.5% threshold (the primary destination for UK exported recyclables).

This is reflected in SEPA's regulatory work. Over the last 18 months, several MRFs have been involved in repatriation cases, totalling more than 60 containers and SEPA has intercepted many more before export. Some of these were targeted as a direct result of the materials recovery code audits, and issues often relate to failure to suitably process incoming waste, for example:

- Failure to remove all contamination from negatively picked recyclable outputs during the sorting process (usually mixed paper)
- Failure to remove fragments during the sorting process, resulting in food waste, broken glass, batteries and other small contaminants finding their way into the recyclable output

SEPA intervention to date has been reserved for the most serious of contamination incidents. Containers are not stopped or repatriated for marginal contamination, but are stopped where offensive and hazardous waste has been found in bales categorised as recyclable (for example, nappies & other absorbent hygiene products, waste electricals & electronic equipment, batteries, food waste and bagged mixed municipal waste). As noted earlier in the report, these kinds of items were found in several of SEPA's audit samples, so it is unsurprising that containers continue to be intercepted or repatriated.

The final destination for much of our exported waste is often a non-OECD country, where the potential for environmental damage due to poor waste management practices are higher than here in the EU. Perhaps more serious however are the human health implications of exporting these kinds of contaminants to non-OECD countries, as legislation protecting workers from exposure to the harmful nature of these wastes is often inadequate.

We will explore methods of engagement and intervention tools to tackle these issues.

Duty of care

Compliance with Duty of Care obligations was looked at during the visits, in terms of completeness, consistency and accuracy of waste transfer notes and season tickets.

A number of common issues were identified here, the most frequent relating to discrepancies between EWC codes and waste descriptions. This is a significant problem as it reduces SEPA's ability to track waste from one location to another. It is indicative of a common issue across the industry, not one unique to the dry recyclables waste stream.

A lack of certainty regarding the fate of material once passed to the next party was another common issue identified, with very few companies having anything in writing confirming this information. This is a serious problem, given that we have found operators often believe their material is destined for domestic markets when in fact it is sometimes exported. This matters if the material does not meet the required standards for legal exports. Furthermore, other material leaving these sites comprises sorting residues and fines, which are vulnerable to illegal dumping and landfill tax avoidance.

Written confirmation from buyers is therefore critical for MRFs operators, to confirm that there will be no breach of waste legislation by those further down their waste management chain. It is evident to SEPA that MRF operators have been working to remedy this, however commercial confidentiality is often still cited as a reason for refusal to provide this information. The fact that much of it is transported to England, where SEPA loses sight of it, adds to the difficulty faced in tracking the fate of this material.

Further work is needed across the supply chain to improve Duty of Care compliance. An electronic duty of care system that can effectively track material would greatly assist in efforts to track the fate of these materials.

Next steps

Work is needed to ensure Scotland is a first choice for material buyers across the world. This requires us to:

- Manage downstream outcomes more effectively through Duty of Care, building confidence in what is happening to material after leaving MRFs and ensuring appropriate treatment is taking place
- Improve supplier engagement, from packaging manufacturer, to reprocessing facility and each stakeholder handling material in between
- Find ways to reduce contamination at source, including addressing inadequate collection systems, communicating with waste producers, reducing confusion over what can be recycled and sharing examples of best practice
- Consider how we can improve the visibility of contaminated material diverted to alternative facilities, to improve our understanding of the true quality of Scotland's recycle.

This work will also inform other work, including:

- Exploring options to improve Duty of Care as part of a 4-agency group, such as possible development of a mandatory UK-wide electronic system to effectively track material
- Increased scrutiny of the data received, as part of an overall increase in efforts to improve Duty of Care regulation. SEPA is now part of a 5-agency group involving the UK and Ireland, considering how best to tackle this across the whole waste sector
- Development of further interventions to tackle illegal exports of waste