



Materials Recovery Facilities Testing and Reporting Guidance

A guide to the development and implementation of
material quality sampling

August 2015

1 Aim of this guidance	2 Definitions	3 Facilities in scope	4 Materials to be sampled	5 Sample size and sample frequency	6 Sampling options for inputs and outputs	7 Material testing procedure	8 Sampling and testing equipment	9 Statistical reporting	10 Information required by SEPA	11 Enforcement of the regulations	12 Staff training	13 Q&A	Appendix
------------------------	---------------	-----------------------	---------------------------	------------------------------------	---	------------------------------	----------------------------------	-------------------------	---------------------------------	-----------------------------------	-------------------	--------	-----------------

Inspiring change for Scotland's resource economy

Find out more at
www.zerowastescotland.org.uk

Acknowledgements

Scottish Government, SEPA, SESA, WRAP

1 Aim of this
guidance

2 Definitions

3 Facilities in
scope

4 Materials
to be
sampled

5 Sample
size and
sample
frequency

6 Sampling
options for
inputs and
outputs

7 Material
testing
procedure

8 Sampling
and testing
equipment

9 Statistical
reporting

10
Information
required by
SEPA

11
Enforcement
of the
regulations

12 Staff
training

13 Q&A

Appendix

1 Aim of this guidance

This guidance document has been jointly developed by Zero Waste Scotland and Scottish Environment Protection Agency (SEPA), to assist licence or permit holders of material recovery facilities (MRFs) in Scotland with the introduction of sampling and testing regimes that are consistent with the requirements of the *Code of Practice on Sampling and Reporting at Materials Recovery Facilities* issued by the Scottish Ministers.

This document summarises the key elements of the sampling and reporting requirements set out in the Code of Practice (hereinafter referred to as “the Code”), and by following this guidance you are more likely to satisfy SEPA (the Regulator) that you are fulfilling your requirements of the Code.

This guidance was derived from WRAPs “Sampling and Testing Guidance for Material Facilities” to ensure a consistent approach to material quality sampling is applied across the UK.

For information on what you must do as a MRF licence or permit holder, you should refer to the Code itself. The full Code of Practice can be found on the Scottish Government website.



1 Aim of this guidance	2 Definitions	3 Facilities in scope	4 Materials to be sampled	5 Sample size and sample frequency	6 Sampling options for inputs and outputs	7 Material testing procedure	8 Sampling and testing equipment	9 Statistical reporting	10 Information required by SEPA	11 Enforcement of the regulations	12 Staff training	13 Q&A	Appendix
-------------------------------	---------------	-----------------------	---------------------------	------------------------------------	---	------------------------------	----------------------------------	-------------------------	---------------------------------	-----------------------------------	-------------------	--------	-----------------

2 Definitions

The following definitions are used in this guidance. The singular includes the plural and the plural the singular.

Buyer	A person or organisation who has arranged to purchase output material from the MRF licence or permit holder. This includes but is not limited to end users and intermediaries.
Co-mingled	The collection of two or more target materials in a single receptacle for subsequent sorting into separate streams at a materials recovery facility.
Input Material	Mixed dry recyclable waste received at the facility for sorting and separately collected dry recyclable waste received at the facility for sorting (e.g. to remove contamination).
Material Fragments	Target, non-target and non-recyclable material that is made up of: <ul style="list-style-type: none"> a) in the largest proportion of glass material, fragments of that material that measure less than 13 millimetres along their longest dimension; and b) in relation to all other types of output material and for mixed dry recyclable waste, fragments of that material that measure less than 55 millimetres along their longest dimension.
Materials Recovery Facility	A facility where dry recyclable waste is treated in order to separate that waste into a dry waste stream or streams.
Mean (also known as arithmetic mean)	The sum of a group of figures divided by the number of figures in the group.

Mixed Dry Recyclable Waste	Waste material that consists of two or more of the following kinds of material mixed together: <ul style="list-style-type: none"> 1) Glass; 2) Paper; 3) Cardboard; 4) Metal; 5) Plastic.
Non-Recyclable Material	Waste material that is not capable of being recycled.
Non-Target Material	A material that is capable of being recycled but is not a target material for the MRF.
Output Material	A batch of material that is: <ul style="list-style-type: none"> a) produced from a separating process for mixed dry recyclable waste and separately collected dry recyclable waste at a MRF; and b) is made up of one of the following kinds of target material, in the largest proportion; <ul style="list-style-type: none"> 1) Glass; 2) Paper; 3) Cardboard; 4) Metal; 5) Plastic.
Recycling	Recycling has the meaning given to it in Article 3(17) of the Waste Framework Directive, and any references to “recycled” or “recyclable” are to be construed accordingly..
Reporting Year	1 April to 31 March the following year.

1 Aim of this guidance

2 definitions

3 Facilities in scope

4 Materials to be sampled

5 Sample size and sample frequency

6 Sampling options for inputs and outputs

7 Material testing procedure

8 Sampling and testing equipment

9 Statistical reporting

10 Information required by SEPA

11 Enforcement of the regulations

12 Staff training

13 Q&A

Appendix

SEPA	Scottish Environment Protection Agency (the body responsible for enforcing the Code of Practice).
Separately Collected Dry Recyclable Waste	<p>Dry recyclable waste that has been separately collected in line with the Waste (Scotland) Regulations 2012, which introduced a statutory requirement for all waste producers (with the exception of householders) to separate the key dry recyclables (glass, metal, plastic, paper and cardboard.)</p> <p>a) Produced from a separating process for mixed dry recyclable waste and separately collected dry recyclable waste at a MRF; and</p> <p>b) Is made up of one of the following kinds of target material, in the largest proportion:</p> <ol style="list-style-type: none"> 1) Glass; 2) Paper; 3) Cardboard; 4) Metal; 5) Plastic.
Standard Deviation	The standard deviation is a measure of how widely a set of values are dispersed from the average value (the mean). A low standard deviation indicates that all of the data points in a sample tend to be very close to the mean; a high standard deviation indicates that the data points are spread out over a large range from the mean. The standard deviation of a sample can be calculated in Microsoft Excel using the function "STDEV".

Supplier	<p>In relation to a batch of mixed dry recyclable waste or separately collected dry recyclable waste received at a MRF:</p> <ol style="list-style-type: none"> 1) Where that batch comprises material collected pursuant to arrangements made by a waste collection authority under section 45(1)(a) or (b) of the Environmental Protection Act 1990(a), that authority is the supplier; 2) Where that batch has been transferred from another MRF or group of facilities, the MRF licence or permit holder of that MRF or group of facilities from which that material was transferred is the supplier; 3) In any other case, the person or organisation who collected the material or, if that person or organisation is not known, the person or organisation responsible for delivering it to the MRF is the supplier; 4) Where the batch comprises material from more than one supplier, and the proportion of that batch attributable to a particular supplier cannot accurately be ascertained, a reasonable estimate of the proportion is sufficient.
Target Material	A material that is specifically targeted by the MRF licence or permit holder as destined to be separated out from other materials to facilitate its recycling.

1 Aim of this guidance

2 definitions

3 Facilities in scope

4 Materials to be sampled

5 Sample size and sample frequency

6 Sampling options for inputs and outputs

7 Material testing procedure

8 Sampling and testing equipment

9 Statistical reporting

10 Information required by SEPA

11 Enforcement of the regulations

12 Staff training

13 Q&A

Appendix

3 Facilities in scope

The requirement to sample materials and report test data applies to MRF licence or permit holders that receive, or are likely to receive; more than 1000 tonnes of mixed dry recyclable waste or separately collected dry recyclable waste in any reporting year (1 April to 31 March the following year).

MRF licence or permit holders are required under the Code to self-assess whether their facility is in scope and, if so, notify SEPA accordingly. If you are unsure whether your facility is in scope, you should speak to SEPA for clarification.

Where a MRF has not previously been in scope, but during the course of a reporting year receives over 1000 tonnes of qualifying input material, the MRF licence or permit holder must notify SEPA immediately to seek agreement on a timescale to commence sampling. Similarly, where operations change such that a facility previously in scope no longer receives over 1000 tonnes of qualifying input material in that reporting year, they should notify SEPA and obtain agreement to cease sampling.

Facilities likely to be in scope:

- Material Recovery Facilities (MRFs) receiving and sorting;
 - Mixed dry recyclable waste and/or,
 - Separately collected dry recyclable waste.
- Commercial waste treatment operations and transfer stations where materials similar to mixed dry recyclable waste are sorted into two or more output materials (e.g. a MRF sorting plastics and cans would be in scope).

Facilities not likely to be in scope:

- Waste transfer stations acting only as bulking points (with no sorting activities).
- Household Waste Recycling Centres (Civic Amenity Sites).
- MRFs receiving and sorting residual waste only (so called 'Dirty' MRFs).
- Mechanical Biological Treatment (MBT) plants, including those used at autoclave facilities unless mixed dry recyclable waste is accepted for any MRF operations that form part of the process.
- Refuse Derived Fuel (RDF) production facilities.
- WEEE management facilities.

Note: should any of the aforementioned facilities receive and sort mixed dry recyclable waste or separately collected dry recyclable waste above the threshold levels, even for a limited period, they would fall within the scope of the Code.

1 Aim of this guidance

2 Definitions

3 Facilities in scope

4 Materials to be sampled

5 Sample size and sample frequency

6 Sampling options for inputs and outputs

7 Material testing procedure

8 Sampling and testing equipment

9 Statistical reporting

10 Information required by SEPA

11 Enforcement of the regulations

12 Staff training

13 Q&A

Appendix

4 Materials to be sampled

4.1 Input materials

Input material (mixed dry recyclable waste and separately collected dry recyclable waste received for sorting) must be sampled to identify the types of target, non-target and non-recyclable materials. Target material must, as a minimum; be separately identified by reference to glass, paper, cardboard, metal and plastic. Cartons that include cardboard as a composite material should be included in the cardboard category. Whilst there is no requirement to sort and record incoming material into further sub-categories, it is recommended that this is done in order to provide comprehensive management information and maximise the benefits of sampling.

There is no requirement for MRF licence or permit holders to sample rejected loads, however the suppliers details, the reason for rejection, the weight of the load, the location of where it was sent and where appropriate, the buyers details; must be recorded and reported.

Loads that are received but not sorted at the facility (and are instead sent to another facility for separating) also do not need to be sampled, however the suppliers details, the reason for transfer, the weight of the load, the location of where it was sent and where appropriate, the buyers details; must be recorded and reported.

4.2 Output materials

Sampling of output material must be undertaken with consideration given to the grade of material output from the MRF. Example grades would include clear PET bottles and green glass. Some examples of output material grades are laid out in Table 1 of the Code and a more comprehensive list is provided in Appendix A of this guidance document.

It should be noted that material streams received already separated, and are not exposed to any further sorting or processing before being sent onto the next destination would not fall within the output sampling requirements of the Code.

The following may be target materials unless they are classed as a contaminant in the purchase specification:

- Aluminium aerosols in UBCs.
- Aluminium foils in UBCs.
- PET trays in PET bottles (of the required colour and quality).
- HDPE trays in HDPE bottles (of the required colour and quality).
- Plastic bottle tops in grades containing plastic bottles.
- Caps, screw tops and neck rings in grades containing glass bottles and jars.
- Wet paper grades unless the material is degraded to the point where it is not fit for recycling.

MRF residues:

Sampling of MRF residues is not required under the Code; however, it is considered good practice. Sampling and testing of the residual waste fraction (post sorting) allows MRF licence or permit holders to:

- Identify the types and quantity of target materials that are being lost during processing. This information can be used to improve operational practice and identify shifts where the equipment is being operated incorrectly and where additional training may be required. It can also be used to identify where new or additional sorting technologies may be beneficial.
- Identify common types of non-target and non-recyclable material. This information can be passed back to suppliers for use in communication campaigns.
- Perform mass balance calculations which might be used for business planning purposes.

1 Aim of this guidance

2 Definitions

3 Facilities in scope

3 Materials to be sampled

5 Sample size and sample frequency

6 Sampling options for inputs and outputs

7 Material testing procedure

8 Sampling and testing equipment

9 Statistical reporting

10 Information required by SEPA

11 Enforcement of the regulations

12 Staff training

13 Q&A

Appendix

For all output materials, each MRF must define the types of target, non-target and non-recyclable materials based on the purchase specification, as referenced in Table 1 of the Code; they have agreed with the reprocessor or company acting on their behalf. Purchase specifications should be kept on record to support decisions made on the categorisation of the different material fractions. Details of the categorisation should also be documented and included within the relevant forms used for sampling and testing materials.

Materials should only be defined as target material if:

- The reprocessor has not classified the fraction as a contaminant in their specification, even if the contaminant is acceptable within defined limits. By defining a material as a contaminant, the reprocessor is stating it is non-target or non-recyclable; and
- The fraction can be recycled by the reprocessor directly. SEPA may request evidence that a particular fraction is being recycled if it is being classed as a target material. For the avoidance of doubt, output materials cannot be classified as recycled where they are used for energy recovery or reprocessed for use as fuels or for backfilling operations; and
- Their inclusion is permitted from a legal perspective, for example, their inclusion is consistent with the requirements of the Waste Shipment Regulations if the material is to be exported to a given destination country.



1 Aim of this guidance	2 Definitions	3 Facilities in scope	3 Materials to be sampled	5 Sample size and sample frequency	6 Sampling options for inputs and outputs	7 Material testing procedure	8 Sampling and testing equipment	9 Statistical reporting	10 Information required by SEPA	11 Enforcement of the regulations	12 Staff training	13 Q&A	Appendix
------------------------	---------------	-----------------------	----------------------------------	------------------------------------	---	------------------------------	----------------------------------	-------------------------	---------------------------------	-----------------------------------	-------------------	--------	-----------------

5 Sample size and sampling frequency

The composition and quality of input material can fluctuate depending on the supplier, collection round and even season. These variations, combined with MRF operating factors such as the throughput speed and quality/sophistication of the sorting process, can impact on the end quality of output materials. It is therefore important that sampling and testing of materials is an ongoing process and that inputs from different suppliers are assessed.

Markets for the outputs from MRFs are diverse, and material quality (contamination levels) is an on-going concern for MRF licence or permit holders and customers. Setting in place robust sampling procedures to test the contamination levels of output bales will provide information on the performance of sorting processes to produce clean, high quality material streams for the market.

This information will help MRF licence or permit holders, SEPA and contractors understand the performance of co-mingled collection systems, and any issues around compliance with the Waste (Scotland) Regulations 2012 duty on co-mingled systems producing materials of similar quality and quantity to that collected separately at kerbside.

The number of samples a MRF needs to take depends on the overall weight of input material delivered by each supplier and how much output material is produced. In order that an appropriate sampling schedule can be established, the weight of input material (by supplier) and weight of output material needs to be monitored and recorded.

The specific sample weights and sampling frequencies required are detailed in the Code.

5.1 Input materials

5.1.1. Sample weights

The average sample weight for mixed dry recyclable waste or separately collected dry recyclable waste inputs must be 60kg or more. It is permissible for the sample to be collected in smaller parts (as a control measure for manual handling risks), but each part must weigh no less than 20kg and be collected one after the other.

The purpose of sampling is to illustrate the variation of input and output material, 25 samples of 60kg will exhibit one level of variation whereas 150 samples of 10kg will exhibit greater variability which is not related to the actual incoming materials. The size of the samples affects the amount of variation that the sampling will show and larger samples will have less variability and will be more representative of the actual material. It is therefore important that all samples meet the minimum sampling requirements and are of a standard size.

5.1.2 Sampling frequency

Until 1st October 2016, one sample must be taken for every 160 tonnes of input material delivered to the MRF by each supplier. From 1st October 2016 onwards, a sample must be taken more frequently, for every 125 tonnes of input material delivered by each supplier.

For some small suppliers this may mean that sampling does not take place during every reporting period or even every reporting year. In recognition of the commercial and operational benefits that can be obtained from frequent sampling, some MRFs may choose to implement more rigorous sampling procedures than required by the Code.

Where a supplier is likely to take a significant time to deliver the quantity of input material required to trigger a sample being taken and tested, then more frequent sampling for that Supplier should be considered in order to effectively control input and output quality at the MRF. Facilities in scope are expected to continue sampling

1 Aim of this guidance

2 Definitions

3 Facilities in scope

4 Materials to be sampled

5 Sample size and sample frequency

6 Sampling options for inputs and outputs

7 Material testing procedure

8 Sampling and testing equipment

9 Statistical reporting

10 Information required by SEPA

11 Enforcement of the regulations

12 Staff training

13 Q&A

Appendix

between different reporting periods and reporting years, rather than waiting to receive 160 tonnes of input material from each individual supplier in that new reporting period/year.

5.2 Output materials

5.2.1 Sample size

Sample weights for output materials are different for each material grade produced at the MRF. The minimum required sample weights are shown in Table 1. All samples of output materials must be equal to or greater than the sample weight required by the Code. It is permissible for paper and cardboard samples to be collected in smaller parts, but each part must weigh no less than 20kg and be collected one after the other.

Table 1: Required Sample Size for Output Materials

Material	Sample Size (kg)
Glass	10
Paper	50
Cardboard	50
Metal	10
Plastic	20

5.2.2 Sampling frequency

There are different sampling frequency requirements for output materials depending on the material grade. The minimum frequencies at which point a sample must be taken are shown in Table 2 below.

Table 2: Sampling Requirements for Output Materials including sample size

Material	Sampling Frequency until 1 st October 2016	Sampling Frequency from 1 st October 2016	Sample Size (kg)
Glass	Every 50 tonnes produced	Every 50 tonnes produced	10
Paper	Every 80 tonnes produced	Every 60 tonnes produced	50
Cardboard	Every 80 tonnes produced	Every 60 tonnes produced	50
Metal	Every 20 tonnes produced	Every 20 tonnes produced	10
Plastic	Every 20 tonnes produced	Every 15 tonnes produced	20

Figure 1 below gives a summary of the input and output sample weight and frequency requirements under the Code until 1st October 2016.

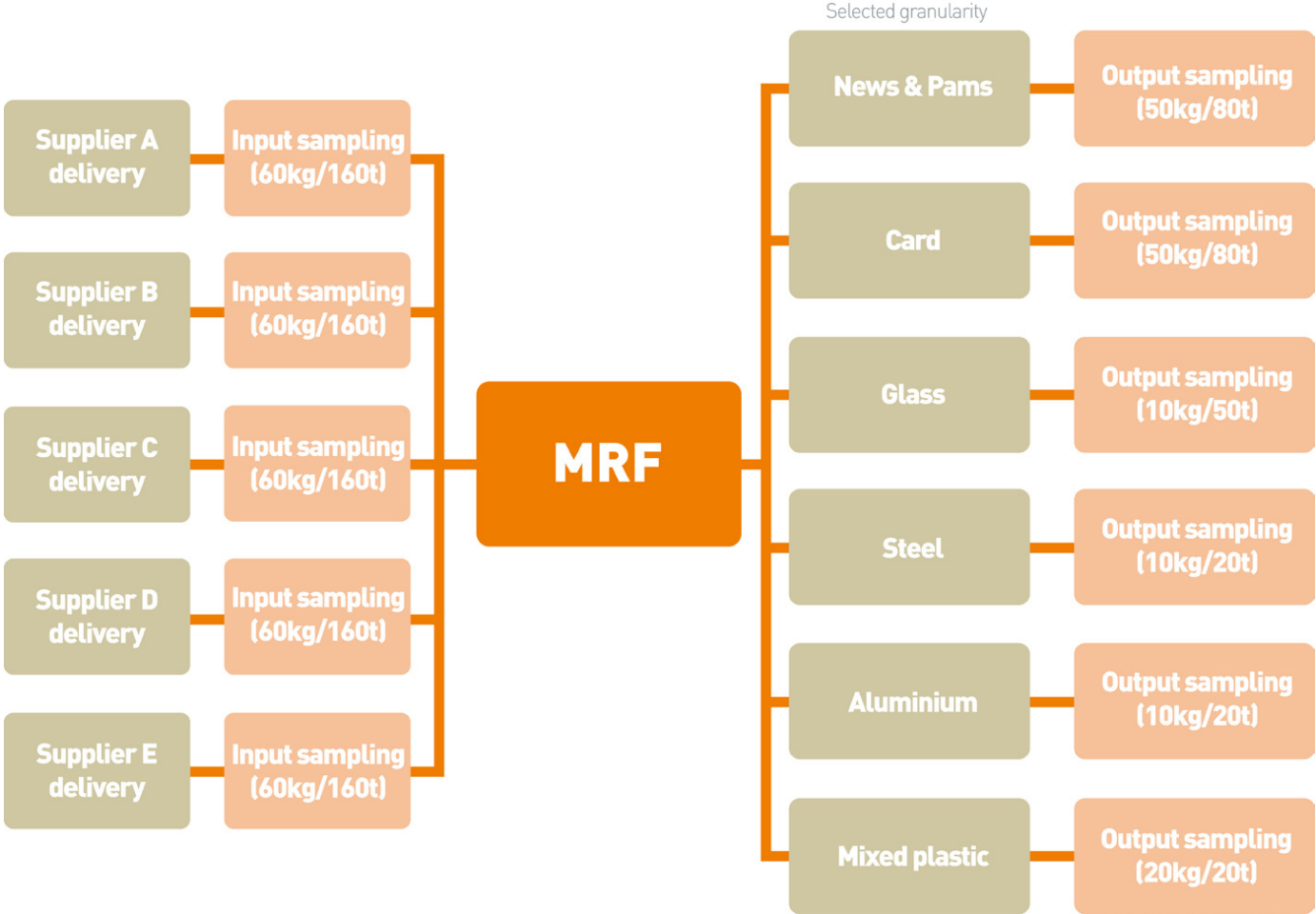


Figure 1: MRF sampling requirements until 1st October 2016.

Indicative annual sampling schedules are provided in Appendix B for illustrative purposes.

1 Aim of this guidance	2 Definitions	3 Facilities in scope	4 Materials to be sampled	5 Sample size and sample frequency	6 Sampling options for inputs and outputs	7 Material testing procedure	8 Sampling and testing equipment	9 Statistical reporting	10 Information required by SEPA	11 Enforcement of the regulations	12 Staff training	13 Q&A	Appendix
------------------------	---------------	-----------------------	---------------------------	---	---	------------------------------	----------------------------------	-------------------------	---------------------------------	-----------------------------------	-------------------	--------	-----------------

6 Sampling options for inputs and outputs

This section provides step by step guidance on suitable minimum methods for obtaining a representative sample of input and output materials. Each MRF should select the most suitable methodology to use according to the available equipment, space and presentation of the materials (e.g. loose, bagged or baled).

Each MRF operator should develop a safe sampling system that adheres to applicable legal requirements, makes use of relevant Health and Safety Executive (HSE) guidance, incorporates appropriate risk assessments (specific to their operations), implements required control procedures and where necessary, they should seek further advice from bodies such as the HSE. It is recommended that sampling and testing of materials should be undertaken only by staff that have received full training, both from a practical and H&S perspective.

6.1 Step one: plan a sampling schedule

It is recommended that MRFs develop a quarterly plan for sampling of input materials from different suppliers and for output materials based on the requirements set out in the Code. Sampling should be scheduled to ensure it is as representative as possible. This can be achieved by scheduling sample taking so that:

- For each given supplier, input material samples represent as many of the different collection routes as possible. This can be achieved by working with individual suppliers to identify the source of all incoming loads and then arranging for sample taking to be at different times and on different days.

- Output material samples are taken at different times and on different days. Samples should also be taken from all shifts, including night and weekend shifts where applicable.

The MRF licence or permit holder should be able to demonstrate to SEPA that the sampling regime being implemented is robust, structured and able to provide representative results.

6.2 Step two: isolate the material

Input or output materials for sampling should always be isolated. This should be done in an area that has been cleared of all other material (or in the storage bay for output materials). Care should be taken to prevent cross contamination of the sample with materials from other sources. Any exceptional items, e.g. particularly large or heavy items that might damage equipment or impact on the sorting process and that would ordinarily be removed, should be removed at this stage and do not need to be weighed. No other picking of the waste should occur prior to the sample being taken.

6.3 Step three: taking a sample

When collecting a sample, it is imperative its' composition remains representative of the load from which it came. Following one of the methods detailed below will help prevent over selectivity when collecting the amount of material required for the sample, as specified in the Code.

It is beneficial when developing a sampling regime, to select a suitable container that is marked accordingly or when full, contains the required amount of material for sampling. This will prevent avoidable selectivity that can be introduced through collection of too little or too much material. When collecting samples in smaller parts, i.e. 3x 20kg samples to make up the required 60kg sample for input material; it is imperative that each part is collected at the same time.

1 Aim of this guidance

2 Definitions

3 Facilities in scope

4 Materials to be sampled

5 Sample size and sample frequency

6 Sampling options for inputs and outputs

7 Material testing procedure

8 Sampling and testing equipment

9 Statistical reporting

10 Information required by SEPA

11 Enforcement of the regulations

12 Staff training

13 Q&A

Appendix

6.3.1 Sampling loose input materials

- 1 Randomising the sample. An example approach for input material would be to tip the load on the floor and mix it with a loading shovel or similar plant. This can be achieved by separating a proportion of the material (approximately four times greater than the required sample size) and lifting it up and dropping it back on the floor at least twice using a loading shovel. This will help redistribute heavier items that have settled to the bottom of the load. A push wall will help with the mixing process. Clearly a 'gentler' approach will be needed where the input material includes glass. This step is not necessary for output material.
- 2 Either of the following techniques can then be used to take a sample:
 - a) Slice of pie: use shovels and brooms to remove a whole section of waste, i.e. a slice of pie or a section from each end of the sample. Shovel the sample into sample containers (e.g. containers or bulk bags) taking care that all material fragments are captured.
 - b) Direct input: tip the sample directly into a robust container with the loading shovel. The container should be of a size that when full (or filled to a certain known level) will contain the correct sample weight.

Some larger MRFs may choose to sample input material using a divert conveyor at the start of the sorting process. If this is done, then the line must be cleared of all other material so that a supplier specific sample can be taken. The sample must be taken prior to any removal of material, including material fragments.

6.3.2 Sampling bagged input materials

- 1 Push the bagged material into a circular pile with the loading shovel.
- 2 Then use either of the following techniques:

- a) Points of a compass: take one bag from north, south, east, west and then north-east, north-west, south-east and south-west. Take a mixture of large and small bags and repeat this until the desired sample size is reached.
- b) Bagged section: remove one whole section of the pile from top to bottom, centre to outside edge. The decision on which section will be taken should be made prior to the material being pushed into the pile to ensure the sample is random and not influenced by how the material looks.

Good practice in sampling

- Ensure that staff taking samples are fully trained (as per section 12 of this guidance) and each MRF should have more than one person fully trained. This will provide cover during periods of staff absence and will enable sampling results carried out by different people to be compared. The latter may highlight anomalies and the need for additional training.
- Modify the day and time that samples are taken from suppliers so that samples are not always taken from the same collection route, which may have particular quality characteristics. Likewise, modify the day and time that output samples are taken to ensure that variances in staffing, operations and input materials are reflected.
- Automate the sampling wherever possible to ensure samples are taken randomly and without human intervention, for example by taking samples directly from a suitable conveyor. For larger facilities, this may also prove cost effective as it may reduce labour costs.
- When sampling bagged materials pick a range of bags sizes and weights.
- Ensure that samples are correctly labelled and stored in a way that protects them from cross contamination with other materials and wind, rain or snow.
- Containers can be marked with the approximate level to which they must be filled to get the required sample weight. This will vary depending on the material (and grade) and whether the material has been compacted or baled.
- Undertake regular spot checks to ensure that sampling is being undertaken correctly.

1 Aim of this guidance

2 Definitions

3 Facilities in scope

4 Materials to be sampled

5 Sample size and sample frequency

6 Sampling options for inputs and outputs

7 Material testing procedure

8 Sampling and testing equipment

9 Statistical reporting

10 Information required by SEPA

11 Enforcement of the regulations

12 Staff training

13 Q&A

Appendix

Bad practice in sampling

- Avoid taking a sample from only the top or bottom of a pile of material as heavier items may have settled.
- Do not include large, heavy items of contamination that would need to be removed manually prior to processing, e.g. items that might damage equipment such as bricks, large metal items, etc.
- A sample should not be taken from an input load that is rejected by the MRF.
- Avoid relying on built in scales on equipment such as loading shovels, tele handlers, mechanical grabs etc, when assessing the sample size as they tend to be inaccurate. These scales can be used for estimation but the final weights must be determined from a calibrated bench or platform scale
- Do not test more than one sample at a time due to the risk of cross contamination of different samples.
- Staff should not adjust the composition of the sample in an attempt to make it 'representative'.
- Under no circumstances should fictitious results be reported.

6.3.3 Sampling loose output materials

The most representative, and often the easiest way, of taking a sample of output material is to collect it directly from a conveyor at a point in the MRF when all sorting processes are complete (i.e. the material is representative of that which would be delivered to the reprocessor). There are two main options:

- 1 Output material is diverted from the end of the conveyor leading to the storage bay:
 - a) Diverts should be added to the conveyors taking sorted output material to the storage bays.
 - b) When a sample is required, the diverter should be activated until the required sample weight is collected.

- 2 Output material is taken as it falls from the conveyor into the storage bay:

- a) At a convenient time, typically after the bay has been emptied, a suitable container or bulk bag should be placed under the conveyor that feeds the storage bay.
- b) The required sample weight should be taken prior to the container or bulk bag being removed.

In option 2, the sorting line should be turned off whilst the container is placed under the feed conveyor and also when it is removed. Picking should stop whenever the conveyor is stationary to ensure the sample is representative.

In both options, care must be taken that throughput rates when the sample is taken are typical for the MRF as the speed at which the sorting line is run can impact on the sorting efficiency of the equipment and therefore the output material quality. Sampling should be carried out at the last point possible in the MRF, to represent the output quality accurately.

For H&S reasons, it is not recommended that samples are taken from feed conveyors to balers unless this can be automated.

Where sampling of output material is not possible directly from a conveyor, then a sample can be taken from the storage bay (option 3). Where this is done, the sample should be taken using the slice of pie method in Section 6.3.1.

It is recognised that some MRF's produce \leftarrow 12mm output material as a discrete grade, notably of glass where it has been collected and processed co-mingled with other materials; and that sampling this type of material is difficult and time consuming. If a MRF is producing two or more output material streams of glass, for example, a \leftarrow 12mm glass fraction and \rightarrow 12mm fraction, then it may be possible to apply the composition of the larger glass fraction size stream to that of the smaller size stream. However, this should only be done where the Operator can provide evidence that the composition and contamination within the two streams is similar. If levels of contamination in the glass streams are different (or appear different to

1 Aim of this guidance

2 Definitions

3 Facilities in scope

4 Materials to be sampled

5 Sample size and sample frequency

6 Sampling options for inputs and outputs

7 Material testing procedure

8 Sampling and testing equipment

9 Statistical reporting

10 Information required by SEPA

11 Enforcement of the regulations

12 Staff training

13 Q&A

Appendix

the regulator) then a suitable testing procedure applicable to the particle size should be developed by the MRF operator. It is unlikely that a sieving technique would be appropriate for a $\leq 12\text{mm}$ output material due to the likelihood of the sieve becoming blocked, particularly if the material contains relatively high levels of moisture.

6.3.4 Sampling baled material (input or output material)

It is envisaged that most sampling will be of loose or bagged material; however, it is possible that some suppliers may deliver baled material or that it is not possible to safely sample loose output material. In these instances, the following process should be followed:

- 1 A bale of material is chosen at random after production and prior to it entering stock.
- 2 The bale is safely broken open and a weight of material equivalent to 4 times the normal sample size (to be determined by the MRF operator based on knowledge of supplier and composition) is taken. This should include material from the middle as well as one end of the bale (the latter picked at random).
- 3 The material should be mixed manually with shovels to ensure it is randomised.
- 4 The slice of pie technique (see Section 6.3.1) should be used to take the sample.

It should be noted that SEPA will compare output material quality data submitted to them with both loose and baled stock held on site. Where sampling of output material occurs prior to baling, the operators must ensure that contamination is not introduced downstream of the sampling location and/or during the baling process to ensure that testing results are representative of the actual output material leaving the MRF.

6.3.5 Sampling from bulking points

It may be desirable to take samples of input material from bulking points or waste transfer stations prior to it being mixed with other supplier’s material, thereby losing its identity. This may in particular be a requirement for local authority suppliers. Sampling at a bulking point is acceptable so long as it is undertaken by suitably trained staff using best practice techniques, such as those detailed in this guidance. All samples taken at a bulking point must be transported to the MRF (where the remaining waste will be delivered) for testing. When samples are transferred to the MRF for testing, additional care should be taken to avoid cross contamination and / or losing the details of the sample. The sample should be transported in a sealed container or bulk bag which is clearly labelled. It is recommended that samples are transferred for testing within 24 hours to prevent loss of samples and minimise the risk of cross contamination with materials from other sources. Particular care will need to be taken when managing sample taking at a separate location.

6.4 Step four: label the sample

Once the sample has been taken it should be labelled with the required information; date of sample, time of sample and sample weight. Care should be taken that the samples are labelled securely to prevent labels becoming damaged during transit or due to inclement weather. If a sample is not to be tested immediately, it should be stored in a sealed or covered container to avoid cross contamination with other material. Ideally, samples should be tested as soon as possible after being taken to prevent degradation.

6.5 Step five: transport to testing area

Once appropriately labelled, the sample should be moved to the testing area. This can be done using a pallet truck or fork lift truck. If the container in which the sample was taken has wheels, then it can simply be pushed.

1 Aim of this guidance	2 Definitions	3 Facilities in scope	4 Materials to be sampled	5 Sample size and sample frequency	6 Sampling options for inputs and outputs	7 Material testing procedure	8 Sampling and testing equipment	9 Statistical reporting	10 Information required by SEPA	11 Enforcement of the regulations	12 Staff training	13 Q&A	Appendix
------------------------	---------------	-----------------------	---------------------------	------------------------------------	--	------------------------------	----------------------------------	-------------------------	---------------------------------	-----------------------------------	-------------------	--------	-----------------

7 Material testing procedure

This section provides step-by-step guidance on suitable minimum methods for testing sampled materials. Sorting and weighing of materials should be carried out in a separate undercover area and away from moving equipment and vehicles, including, fork lift trucks and loading shovels, etc.

7.1 Step one: prepare the area and equipment

- 1 Ensure that all required equipment is available and ready for use (a summary of the equipment required is provided in Section 8 of this guidance).
- 2 Prepare appropriate sample record sheets. The name of the supplier (and source, e.g. the bulking point if applicable), grade of material, delivery vehicle registration, incoming weighbridge ticket number as well as the date and time the sample was taken is entered onto the sheet. Details of the person who has taken the sample and who tests it should also be recorded.
- 3 Ensure that the area and containers to be used for sorting are clean, dry and free from any material that might cross contaminate the sample to be sorted.
- 4 Calibrate platform and/or bench scales with a 1kg and 5kg weight on a daily basis to ensure accuracy.

7.2 Step two: weigh the entire sample

Weigh the entire sample prior to any sorting taking place and enter the weight into the sample sheet. This is to ensure that the sample weight meets the requirements of the Code and to allow the combined weight of sorted materials to be cross checked with the original sample weight.

7.3 Step three: sort the sample

- 1 Tip the sample onto a sort screen ensuring no loss of material from the sides. It is recommended that a maximum size steel mesh of 55mm x 55mm should be used for all materials other than glass, where a maximum size steel mesh of 13mm x 13mm should be used. See Figure 2 (below) for an example picture of a sort screen.



Figure 2 - Example of a sort screen

- 2 Any containers with liquid contents should be left intact, moved to the non-recyclable fraction and weighed accordingly. It is not recommended that liquids (either known or unknown) are removed and mixed due to the potential risks, and any containers containing liquids should be managed in line with COSHH guidance.
- 3 Any clumped materials should be broken apart into their component parts.

1 Aim of this guidance	2 Definitions	3 Facilities in scope	4 Materials to be sampled	5 Sample size and sample frequency	7 Material testing procedure	8 Sampling and testing equipment	9 Statistical reporting	10 Information required by SEPA	11 Enforcement of the regulations	12 Staff training	13 Q&A	Appendix
------------------------	---------------	-----------------------	---------------------------	------------------------------------	-------------------------------------	----------------------------------	-------------------------	---------------------------------	-----------------------------------	-------------------	--------	-----------------

- 4 Hand sort the materials that have not fallen through the screen into the correct containers based on the categories on the sampling sheet (split under the headings of target, non-target and non-recyclable materials).
- 5 Each hand-sorted category of waste should be weighed on scales with taring¹ of the scales between each weighing. The weights should then be recorded on the sampling sheet against the appropriate category.
- 6 All materials that fall through the screen are classed as material fragments. The material fragments should be captured directly within a container, if possible.
- 7 The total weight of material fragments is recorded and allocated as target, non-target and non-recyclable materials in the same proportions as the non-fragment fraction. For further details regarding this apportionment please see Section 14 (Q&A) of this document.
- 8 The total weight of target, non-target and non-recyclable materials should be added and a check made that the combined weight of the three fractions equals the original weight of the sample to ensure no errors have been made. There may be a small difference in the two weights caused by, for example, rounding but the weights should be within 5% of each other. If this is not the case, then weights and calculations should be checked before deciding whether to re-sample.

It may be possible to automate the testing of samples to some degree and for larger facilities this may have cost benefits. Where this is done, then the MRF operator must be able to demonstrate to SEPA that the test results are as accurate as would be expected if testing was done by hand. This may, for example, involve verifying that the sorted fractions only contain the intended fractions and the correction or any automated sorting errors with manual intervention. Where an automated approach is used, the original sample weight should still be taken prior to the material being batch fed into the testing equipment.

¹ Taring means removing the weight of the container used to hold the materials for measurement, usually by setting the scales to zero once the empty container is in position.

7.4 Step four: clear up

The area should be thoroughly cleared ready for testing the next sample. Target materials should be placed back in the incoming material bay and the other fractions in the residual bay. Equipment should be cleaned and stored correctly ready for next use.

Good practice in testing

- Ensure that the ergonomics of the testing area are optimal by locating containers for sorted materials close to the operatives (this will also increase sorting speed) and use a suitably sized table set at a height where sorting can be done comfortably.
- Provide a sufficient number of containers for each operative to sort the sample into all the required material categories.
- Ensure the operatives undertaking the testing are fully trained (including being trained in safe systems of work) and understand the different material categories.
- Place full containers near the scales ready for weighing and do not overfill the containers.
- Containers used for sorting and weighing different fractions should be clean and dry. From time to time they should be washed to remove any residue that might distort the weight of the samples.

Bad practice in testing

- Not clearing the containers and work area between sample testing.
- Using untrained staff.
- Not isolating the testing from other activities on site leading to H&S risks and cross contamination of materials.
- Forcing or persuading materials to fall through the sorting mesh during testing.
- Weighing samples in a windy area or where there are a lot of vehicle movements. This may introduce weighing errors and is also a H&S risk.

1 Aim of this guidance	2 Definitions	3 Facilities in scope	4 Materials to be sampled	5 Sample size and sample frequency	7 Material testing procedure	8 Sampling and testing equipment	9 Statistical reporting	10 Information required by SEPA	11 Enforcement of the regulations	12 Staff training	13 Q&A	Appendix
------------------------	---------------	-----------------------	---------------------------	------------------------------------	-------------------------------------	----------------------------------	-------------------------	---------------------------------	-----------------------------------	-------------------	--------	-----------------

8 Sampling and testing equipment

Table 3 summarises the typical equipment used to undertake the sampling and testing of materials as outlined in Sections 6 and 7 of this guidance.

In addition to equipment, suitable areas for sampling and testing are required.

Sampling area: the area used to take and mix samples should allow for staff to be protected from vehicle movements while samples are taken and should be of a suitable size to allow materials to be isolated to avoid cross contamination. Ideally a pushing wall will be available to allow samples to be more easily mixed with a loading shovel. The area should be sheltered and protected from the elements.

Testing area: the area used to sort the sample should be covered and protected from the elements with good lighting (ideally a cabin). It should protect staff from vehicle movements and protect the sample from cross contamination.

Table 3: Equipment for sampling and testing materials

Equipment Type	Detail	Sample Taking	Sample Testing
Platform scales	With a calibration certificate and a minimum accuracy of +/- 500g	Yes	Yes
Bench scales	With a calibration certificate and an accuracy of +/- 10g	No	Yes
1kg and 5kg weights	To check calibration of scales	No	Yes

Equipment Type	Detail	Sample Taking	Sample Testing
Shovels, brooms and containers	For mixing samples, cleansing areas of spillages and sweeping up material fragments for measurement	Yes	No
Long handled wire cutters	For cutting straps on baled material	Yes (if baled material is sampled)	No
Containers	Stillages, bulk bag, other containers suitable for storing, transporting and weighing materials	Yes	Yes
Pickers	To remove hazardous items such as hypodermic needles	Yes	Yes
Sharps bins	For safely disposing of sharps	Yes	Yes
Fork lift truck or hydraulic trolleys	For transporting material from the sampling area to the testing area	Yes	Yes
Loading shovel / tele handler	For mixing samples and loading containers	Optional	Optional
Waterproof labels and pens	For labelling samples	Yes	Yes
Screens	With a maximum 55mm and 13mm mesh sizes	No	Yes

1 Aim of this guidance

2 Definitions

3 Facilities in scope

4 Materials to be sampled

5 Sample size and sample frequency

6 Sampling options for inputs and outputs

7 Material testing procedure

8 Sampling and testing equipment

9 Statistical reporting

10 Information required by SEPA

11 Enforcement of the regulations

12 Staff training

13 Q&A

Appendix

Equipment Type	Detail	Sample Taking	Sample Testing
Sorting table	Either with built in mesh or trestle legs to support screens. The table should be solidly constructed and easy to clean (e.g. stainless steel topped)	No	Yes
Flat table	For containers and bench scales	No	Yes
Mini sort conveyors	May be used to aid the sorting process	No	Yes
Automated bin lift	For emptying samples collected in wheeled bins onto the sorting area	No	Yes
Sample sheets	To record the outcomes of the testing	Yes	Yes
Personal Protective Equipment (PPE)	Overalls, hi-visibility jacket, puncture resistant gloves, boots (steel sole and toe), ballistic trousers, hard hat, ear protection, eye protection, dust masks	Yes	Yes
Safety equipment	Fire extinguisher and spill kit	Yes	Yes

1 Aim of this guidance

2 Definitions

3 Facilities in scope

4 Materials to be sampled

5 Sample size and sample frequency

6 Sampling options for inputs and outputs

7 Material testing procedure

8 Sampling and testing equipment

9 Statistical reporting

10 Information required by SEPA

11 Enforcement of the regulations

12 Staff training

13 Q&A

Appendix

9 Statistical reporting requirements

In order to make sure the information collected from sampling is interpreted and used in the most appropriate way, analysis of the data is required. This is done by calculating key statistics (e.g. the mean and standard deviation) from the sampling data.

The Code requires that the mean and standard deviation of sampled target materials is reported at the end of each reporting period.

The reporting form will automatically calculate both the mean and standard deviation for licence or permit holders.

Standard deviation describes the amount of variation in a set of samples. A low standard deviation indicates that there is little variation between the amount of target material across samples, whereas a high standard deviation indicates there is a lot of variability in the sampling results. This could indicate a real variation in the measured variable, or it may reflect the random error related to the number of items in the individual samples. As a rule of thumb variability reduces as sample size increases.

All statistical results must be treated with caution as they carry a degree of uncertainty. High levels of variation and low volumes of data, give more uncertain results. Care must therefore be taken when interpreting statistical data from suppliers where a small number of samples have been taken in a reporting period. The same principal also applies to calculating standard deviations for the percentage of target material in output materials.

Suppliers and MRF licence or permit holders can work together to reduce the standard deviation of their sampling by improving the target material content or (to a lesser extent) increasing the number of samples taken. The lower the standard deviation and standard error, the more certain a MRF can be of the true content of material passing through the MRF.

Benefits of Statistical Reporting

Systematically collecting information on the level of contamination will be useful to MRF licence or permit holders from an operational and commercial perspective, as well as for regulatory compliance. These statistics give the operator a robust indication of contamination rates, variability and seasonality for both the material they receive from their suppliers and the output material grades that they produce.

By monitoring this variability, MRF licence or permit holders will be able to feedback to suppliers on the quality of their inputs with confidence, and compare their performance against contractual agreements. Such a granular view of contamination will allow sorting processes to be optimised and the value of output material to be maximised.

The statistics will also help MRFs to both quality assure and market their output material grades. The quality of output material can be carefully monitored, allowing measures to improve the performance of different grades to be targeted. The controls will also allow MRF licence or permit holders to demonstrate the quality and consistency of their products to their end market customers.

MRF licence or permit holders are required to keep a database of their sampling and the statistics that are calculated from the results. They can then use reports from this database to support the above activities.

1 Aim of this guidance

2 Definitions

3 Facilities in scope

4 Materials to be sampled

5 Sample size and sample frequency

6 Sampling options for inputs and outputs

7 Material testing procedure

8 Sampling and testing equipment

9 Statistical reporting

10 Information required by SEPA

11 Enforcement of the regulations

12 Staff training

13 Q&A

Appendix

10 Information required by SEPA

10.1 Reporting of test results

The Code requires reports to be submitted to SEPA every 3 months. Reports must be submitted to SEPA electronically, in the format prescribed by SEPA; within one month of the end of the reporting periods set out below.

Under the Code, the first reporting period will commence on 1st October 2015. The four reporting periods are:

- 1st October to 31st December, with reports to SEPA due by 31st January.
- 1st January to 31st March, with reports to SEPA due by 30th April.
- 1st April to 30th June, with reports to SEPA due by 31st July.
- 1st July to 30th September, with reports to SEPA due by 31st October.

The following information must be recorded and reported for incoming mixed dry recyclable waste or separately collected dry recyclable waste (input material) in any given reporting period:

- The total weight in tonnes of input material received at the MRF, from each named supplier.
- The total number of samples taken, for each named supplier.
- The total weight in kilograms of all samples taken, for each named supplier.
- The weight and composition of each sample taken, for each named supplier; by reference to target, non-target and non-recyclable materials. Target material fraction must be separately identified, as a minimum; by reference to glass, paper, cardboard, metal and plastic.
- The mean percentage composition of target glass, metal, paper, cardboard and plastic in input material delivered by each supplier, based on all applicable sample results.

- The mean percentage composition levels of target materials, non-target material and non-recyclable materials delivered by each supplier, based on all applicable sample results.
- The standard deviation of the mean percentage composition level of target materials, for each supplier; based on all applicable sample results.
- For rejected loads and loads transferred to another facility for sorting, the suppliers details, the total weight in tonnes of the load, the reason for rejection/transfer, the date the load was rejected/transferred and where the load was sent, and where applicable, the buyers details.

The following information must be recorded and reported for material leaving the MRF (output materials) in any given reporting period:

- The total weight in tonnes of output material that leaves the MRF by reference to the type of target, non-target and non-recyclable materials.
- The weight and composition of each sample taken, by reference to the type of target, non-target and non-recyclable materials. Target material fraction must be separately identified, as a minimum; by reference to the grade of glass, paper, cardboard, metal and plastic.
- The total number of samples taken for each output material.
- The total weight in kilograms of all samples taken for each output material.
- The mean percentage composition levels of all of the samples taken for output material, by reference to the grades of glass, metal, paper and plastic identified within those samples.
- The mean percentage composition levels of target, non-target and non-recyclable materials in the output materials, based on all of the applicable sample results.
- The standard deviation of the target materials for each material output, based on all of the applicable sample results.
- The total weight in tonnes of mixed dry recyclable waste transferred to other MRFs for the purposes of separating into output materials.

SEPA will provide MRF permit or licence holders with the electronic reporting form in advance of the first reporting period. **The reporting form will automatically calculate the mean and the standard deviation.**

1 Aim of this guidance

2 Definitions

3 Facilities in scope

4 Materials to be sampled

5 Sample size and sample frequency

6 Sampling options for inputs and outputs

7 Material testing procedure

8 Sampling and testing equipment

9 Statistical reporting

10 Information required by SEPA

11 Enforcement of the regulations

12 Staff training

13 Q&A

Appendix

10.2 Next and end destination reporting

For each type of material exiting the MRF in any given reporting period, MRF licence or permit holders must record and report:

- The end destination or, where this is not available; the next destination for the materials leaving the facility (including the relevant authorisation / permit / licence numbers and where appropriate export destination details).
- The use to which the material will be put and/or the treatment to which the material will be subjected (at the end or next destination).
- The location (country, region, city) of where the materials are to be sent.

10.3 Record keeping

All recorded information, as set out above; must be kept for a minimum of four years from the date it was recorded and made available to SEPA upon request. It is advisable for data to be backed up daily to avoid data loss.



1 Aim of this guidance	2 Definitions	3 Facilities in scope	4 Materials to be sampled	5 Sample size and sample frequency	6 Sampling options for inputs and outputs	7 Material testing procedure	8 Sampling and testing equipment	9 Statistical reporting	10 Information required by SEPA	11 Enforcement of the regulations	12 Staff training	13 Q&A	Appendix
------------------------	---------------	-----------------------	---------------------------	------------------------------------	---	------------------------------	----------------------------------	-------------------------	--	-----------------------------------	-------------------	--------	-----------------

11 Enforcement of the regulations

The requirements of the Code will be a condition of a relevant Waste Management Licence or PPC permit and will be enforced by SEPA. Licence or permit holders of MRFs currently or expecting to process the requisite quantity of qualifying input material are required under the Code to notify SEPA accordingly.

SEPA's on-site inspections will include mapping and understanding MRF processing capabilities relative to inputs and outputs from the MRF, sampling of outputs to independently assess quality against MRF licence or permit holder reports, and assessment of whether staff are adequately trained and whether appropriate equipment and facilities are available on site to enable testing to be undertaken in line with the Code.

SEPA may undertake additional inspections of MRFs based upon intelligence, outcomes of previous inspections or quarterly returns data. The targeting of site inspections will change once the sampling and reporting regime is established to focus more on poor performing sites.

Inspections may also check related obligations are being properly implemented, for example, related to Duty of Care and Transfrontier Shipments of wastes.



1 Aim of this guidance

2 Definitions

3 Facilities in scope

4 Materials to be sampled

5 Sample size and sample frequency

6 Sampling options for inputs and outputs

7 Material testing procedure

8 Sampling and testing equipment

9 Statistical reporting

10 Information required by SEPA

11 Enforcement of the regulations

12 Staff training

13 Q&A

Appendix

12 Staff training

It is recommended that all staff involved in sampling and testing be fully trained in its operational aspects. This training should cover as a minimum:

- Background information on the benefits of sampling and testing.
- The requirements of the Code.
- Use of equipment and its maintenance.
- Taking a representative sample.
- Maintaining the integrity and identity of a sample (i.e. labelling, storage and transport).
- Sample testing.
- Recording and reporting of results.

It is recommended that records of training are kept and that staff receive regular refresher courses at least once a year.

A copy of this guidance and the summary diagrams along with any MRF specific training documents should be available to staff at all times. This should include H&S training material and copies of safe systems of work. Images of common target, non-target and non-recyclable materials should also be provided.

Good practice

High performing MRFs will recognise the importance of training staff in sampling and testing methodologies. This is likely to include:

- Training for all staff, upon induction and as part of refresher training; on the purpose and importance of sampling and testing and the use of the data to improve operations.
- A live or video demonstration showing the methodology that should be used for sampling and testing, supported with simple written documentation for reference.
- The importance of robust sampling and testing regimes, including the use of the data gathered.
- Inclusion of information in all appropriate documents and activities (e.g. training handbooks, risk assessments, customer service policies and training sessions).
- Adaptation of training materials for staff that do not speak English as a first language, e.g. through the use of images or translation.
- Providing on-going reminders to support the training e.g. images of common target, non-target and non-recyclable materials displayed on the wall of the sorting area.
- Including staff performance in relation to sampling and testing as part of Continued Professional Development plans and performance appraisals (or similar).

1 Aim of this guidance

2 Definitions

3 Facilities in scope

4 Materials to be sampled

5 Sample size and sample frequency

6 Sampling options for inputs and outputs

7 Material testing procedure

8 Sampling and testing equipment

9 Statistical reporting

10 Information required by SEPA

11 Enforcement of the regulations

12 Staff training

13 Q&A

Appendix

13 Q&A

What are the benefits of sampling MRF inputs and outputs?

Sampling and testing of input and output materials can deliver a number of benefits for MRF licence or permit holders:

- **Addressing contamination.** Assessing contamination within the input stream allows:
 - Feedback to be provided to suppliers in order that they can adapt their operations and communication activities to improve the quality of materials.
 - Consideration to be given to procedures used at the MRF to assess and remove contamination before materials are processed, as well as to whether the MRF operations and equipment are suitable to manage the type and quantity of contamination entering the MRF.
 - The MRF operator to identify whether suppliers are meeting contractual requirements related to objectionable and prohibited materials.
 - In the worst cases, MRF operators may reject badly contaminated loads if the material will not be effectively separated at their MRF.
- **Understanding input composition.** Assessing the type and weight of input materials can inform:
 - How the mix of materials may change seasonally allowing for operations to be adjusted to manage fluctuations efficiently and effectively.
 - An understanding of the value of the materials flowing in to the MRF in order to ensure that value is retained and enhanced during processing.
- **Understanding output composition.** Assessing the type and weight of material outputs from the MRF can:
 - Ensure that operations are effectively sorting materials to provide a clean end product, free of contamination and cross contamination of other output materials, and inform operational improvements where this is not the case.

- Demonstrate the quality of the product to reprocessors and assist in gaining higher prices for products.
- Ensure that outputs remain consistent over time without significant variation in output quality.

- **Understanding the composition of the residual fraction.** Assessing the type and weight of residual materials can:
 - Help identify whether target materials are being lost due to sub-optimal sorting.

Who is responsible for choosing the sampling regime / technique I use?

MRF licence or permit holders have the flexibility to select and implement a sampling regime best suited to available equipment, space, staffing, input quality and presentation of the materials (e.g. loose, bagged or baled). The MRF may use a combination of techniques as appropriate, for example where MRFs receive bagged as well as loose material from suppliers or where the configuration of the MRF means that different methods are required to sample input and output materials. Any new method used to sample materials should produce representative results to the standards and rigour outlined in this document. SEPA will check sampling and reporting procedures during inspections.

What wastes need to be sampled?

Only material that meets the definition of mixed dry recyclable waste, separately collected recyclable waste and output material needs to be sampled, regardless of what other wastes are handled at the MRF. Input material will predominantly be mixes of household dry recyclables, although waste from other municipal and commercial sources that is similar in composition must also be sampled.

Output materials must be sampled by reference to the grade of material being produced, for example, as newspapers and magazines or cardboard as opposed to simply paper.

What will happen to the data I report?

Test data reported to SEPA will be checked (with missing data chased up), collated and reviewed. Discussions are ongoing to decide how, in due course, information on material quality may be made public.

What if I change my output material?

If an output material is changed then the types of target, non-target and non-recyclable materials must be re-defined to reflect the changes. If it is a completely new output material for the MRF, which is significantly different from previous grades (for example a new material is being recovered from the input material); then it should be considered that zero tonnes have previously been produced and sampling scheduled accordingly. Where the change is minor, for example as a result of a change in the purchase specification of a reprocessor; then the tonnage of the related output material produced since the last sampling was carried out should be considered when scheduling the next sampling exercise.

What if I supply output material to more than one reprocessor and each has a separate purchase specification?

Where the purchase specifications are broadly similar and the output material is supplied to each of the reprocessors interchangeably, a common sense approach should be taken to define the target, non-target and non-recyclable material that will satisfy all reprocessors. The decisions taken regarding the definitions should be documented. Where a reprocessor’s specification differs significantly from the norm for that grade of material, then it should be classified as a separate output material.

How do I class wastes derived from trade waste collections (or similar) that meet the definition of mixed dry recyclable waste or separately collected dry recyclable waste, but is made up of collections from many small premises?

The input material should be sampled in accordance with the requirements of the Code and the supplier should be considered to be the waste management company

or local authority that operates the trade waste collection service. There is no need to sample materials from individual shops or premises.

What is the maximum weight that can safely be lifted manually while sampling and testing?

The Manual Handling Operations Regulations 1992 (as amended) set no specific requirements such as weight limits. An ergonomic approach shows clearly that such requirements are based on too simple a view of the problem and may lead to incorrect conclusions.

This is backed up by modern medical and scientific opinion that emphasises the importance of an ergonomic approach to remove or reduce the risk of manual handling injury. Ergonomics is about ‘fitting the job to the person, rather than the person to the job’. It looks at manual handling as a whole. It takes into account the nature of the task, the load, the working environment, individual capability and requires worker participation. Further guidance on Manual Handling can be found in the HSE guidance note L23: Guidance on the Manual Handling Regulations.

How do I allocate the weight of Material Fragments?

For the purposes of reporting, it should be assumed that the composition of material fragments reflect the overall composition of material being tested. Therefore the weight of material fragments should be allocated as target material, non-target material and non-recyclable material in the same proportions as the non-particle fraction. For example, if 7% of the material sorted is assumed to be non-target material then 7% of the material fragments should also be assumed to be non-target material. An example of this is provided in table 5 on the next page.

1 Aim of this guidance	2 Definitions	3 Facilities in scope	4 Materials to be sampled	5 Sample size and sample frequency	6 Sampling options for inputs and outputs	7 Material testing procedure	8 Sampling and testing equipment	9 Statistical reporting	10 Information required by SEPA	11 Enforcement of the regulations	12 Staff training	11 Q&A	Appendix
------------------------	---------------	-----------------------	---------------------------	------------------------------------	---	------------------------------	----------------------------------	-------------------------	---------------------------------	-----------------------------------	-------------------	-------------------	-----------------

Table 5: Example categorisation of Material Fragments

Allocation	Total retained weight (kg)	Fragment weights (kg)	Total weight (kg)	Total percentages (%)
Total weights	50	5	55kg	100
Target Material	40	4	44kg	80
Non-Target Material	7	0.7	7.7kg	14
Non-Recyclable Material	3	0.3	3.3kg	6

How does the Code align with other waste policies in Scotland, such as the Waste (Scotland) Regulations 2012?

The Waste (Scotland) Regulations 2012 include a derogation permitting materials to be collected co-mingled, but only where it delivers comparable performance to separate collection in terms of quantity of material captured and quality of material. The requirement to ensure that a comparable quantity and quality of material is captured is a statutory duty. The duties set out in the Code have in part been introduced in order to provide the necessary evidence that facilities accepting and sorting these co-mingled materials are indeed able to produce outputs that are comparable to those captured by separate collection.

Where can I get help if I have further questions?

For advice and help on material sampling, reporting requirements, inspections or enforcement matters, please contact SEPA's zero waste mailbox at:

zerowaste@sepa.org.uk

Appendix A: Example output material grades

Sampling of output materials must be undertaken with consideration given to the grade of material output from the MRF. Example grades of Output Materials are presented within the tables below.

Paper and Cardboard Grades	
Grade	Comment
Cardboard	Corrugated and non-corrugated cardboard.
Newspapers and Magazines	Including pamphlets.
Mixed Paper	A mix of household paper and board grades. This would include office type paper grades.

Plastic Grades	
Grade	Comment
High Density Polyethylene (HDPE) bottles	Not colour sorted.
Natural HDPE bottles	Only natural HDPE bottles.
Coloured HDPE bottles	Predominantly coloured HDPE bottles.
Polyethylene Terephthalate (PET) bottles	Not colour sorted.
Clear PET bottles	Typically clear and light blue tint PET bottles.
Coloured PET bottles	Predominantly coloured PET bottles.
Polypropylene (PP)	Sorted PP pots, tubs, trays and bottles.
Mixed plastic bottles	Plastic bottles only.
Pots, tubs and trays (PTT)	A mixture of pots, tubs and trays that has not been polymer sorted.
Mixed rigid plastic	A mixture of rigid plastic packaging including bottles, pots, tubs and trays.
Mixed plastic	A mixture of rigid and flexible plastic packaging including plastic bottles, pots, tubs, trays and films. Carrier bags may be likely to also be acceptable.
Household plastic film	A mixture of household derived films including carrier bags.

1 Aim of this guidance

2 Definitions

3 Facilities in scope

4 Materials to be sampled

5 Sample size and sample frequency

6 Sampling options for inputs and outputs

7 Material testing procedure

8 Sampling and testing equipment

9 Statistical reporting

10 Information required by SEPA

11 Enforcement of the regulations

12 Staff training

13 Q&A

Appendix

Metal Grades	
Grade	Comment
Aluminium	Aluminium drinks cans. This may include aluminium aerosols and foils if permitted by the reprocessor.
Steel	Steel drinks cans and food tins. This may include steel aerosols if permitted by the reprocessor.

Glass Grades	
Grade	Comment
Mixed coloured glass (container /glass fibre)	A mix of glass bottles and jars that has not been colour sorted.
Mixed coloured glass (aggregate /glass sand)	A mix of glass bottles and jars that has not been colour sorted.
Green glass	Green glass bottles and jars.
Clear (flint) glass	Clear glass bottles and jars.
Brown (amber) glass	Brown glass bottles and jars.

1 Aim of this guidance

2 Definitions

3 Facilities in scope

4 Materials to be sampled

5 Sample size and sample frequency

6 Sampling options for inputs and outputs

7 Material testing procedure

8 Sampling and testing equipment

9 Statistical reporting

10 Information required by SEPA

11 Enforcement of the regulations

12 Staff training

13 Q&A

Appendix

Appendix B: Indicative annual sampling schedule

Indicative schedules based on sampling frequencies and weights required between 1 October 2015 and 1 October 2016 have been provided below for MRF's with 1,000, 10,000 (three suppliers), 45,000 and 100,000 (five suppliers) tonne inputs of mixed dry recyclable waste or separately collected dry recyclable waste.

Input material tonnage is shown in table B1 for each Supplier. The MRFs in the example cases are all assumed to have the following output grades: newspaper and magazines, cardboard, mixed glass, steel, aluminium UBCs and mixed plastics. It should be noted that these schedules are examples of what would be required in these specific circumstances and are for illustrative purposes only.

The taking of samples should be scheduled so that they give representative data on the supplier. This can be achieved by changing the day of the week and time of the day that sampling occurs so that material is tested from a range of different collection routes.

The sampling requirements for the first year, as specified by the Code; are shown in Table B2 for each supplier. To make the scenario more realistic each supplier is presumed to be delivering a different tonnage to the MRF. The sample frequencies are then multiplied by the required sample size to demonstrate the tonnage of material that would need to be sampled on a weekly and annual basis (shown in the bottom table). Weekly figures are averages based on sampling throughout the year.

Table B1: Assumed tonnes input material from each supplier

throughput (t)	MRF size (tpa)			
	1,000	10,000	45,000	100,000
Supplier 1	500	5,000	15,000	50,000
Supplier 2	300	3,000	10,000	15,000
Supplier 3	200	3,000	10,000	15,000
Supplier 4		-	5,000	10,000
Supplier 5		-	5,000	10,000

1 Aim of this guidance

2 Definitions

3 Facilities in scope

4 Materials to be sampled

5 Sample size and sample frequency

6 Sampling options for inputs and outputs

7 Material testing procedure

8 Sampling and testing equipment

9 Statistical reporting

10 Information required by SEPA

11 Enforcement of the regulations

12 Staff training

13 Q&A

Appendix

Table B2: MRF input sampling schedule (based on sampling every 160 tonnes)

MRF size (tpa)				
(# samples pa)	1,000	10,000	45,000	100,000
Supplier 1	3	31	93	312
Supplier 2	1	18	62	93
Supplier 3	1	12	62	93
Supplier 4	-	-	31	62
Supplier 5	-	-	31	62

MRF size (tpa)				
(summary)	1,000	10,000	45,000	100,000
Sample t/pa	0.3	3.7	16.7	37.3
Sample #/wk	0.1	1.2	5.4	12.0
Sample kgs/wk	6	71	321	717

Table B3 shows the number of output material samples required under the Code for this example in first year. Firstly the number of samples required for each material grade per week is shown in the top table and this is then scaled up to the number of samples per quarter and year shown in the bottom table on the minimum required sample sizes under the Code. The taking of output samples should be spread across the different operating shifts (e.g. day and night shifts, weekends and weekdays etc) to ensure the testing results are representative of the output of the MRF.

Table B3: MRF Output material sampling schedule

(# Samples/wk)	MRF size (tpa)				
	1,000	10,000	45,000	100,000	
Granular output					
News & Pams	40%	0.10	1.0	4	10
Cardboard	15%	0.04	0.4	2	4
Glass	22%	0.08	0.8	4	8
Steel	3%	0.03	0.3	1	3
Aluminium	1%	0.01	0.1	0.4	1
Mixed Plastic	11%	0.11	1.1	5	11
Residual	8%	-	-	-	-

MRF size (tpa)				
Summary	1,000	10,000	45,000	100,000
Samples (#)/wk	0.37	3.7	16.4	37
Tonnes/wk	0.01	0.1	0.45	1
Samples/Q	4.8	48	213	481
Tonnes/Q	0.14	1.4	6	14
Samples/annum	19.3	192	853	1924
Tonnes/annum	0.54	5.4	24	54

1 Aim of this guidance

2 Definitions

3 Facilities in scope

4 Materials to be sampled

5 Sample size and sample frequency

6 Sampling options for inputs and outputs

7 Material testing procedure

8 Sampling and testing equipment

9 Statistical reporting

10 Information required by SEPA

11 Enforcement of the regulations

12 Staff training

13 Q&A

Appendix

Figure B1 below shows an example monthly schedule for both input and output material sampling at a 45,000 tpa MRF.

Figure B1: Example monthly sampling schedule for input material in a 45,000 tpa MRF

Action	Week 1				Week 2				Week 3				Week 4			
Sample Supplier 1 Comingled Input																
Sample Supplier 2 Comingled Input																
Sample Supplier 3 Comingled Input																
Sample Supplier 4 Comingled Input																
Sample Supplier 5 Comingled Input																

Action	Week 1				Week 2				Week 3				Week 4			
Sample Card Output																
Sample Glass Output																
Sample Steel Output																
Sample Aluminium Output																
Sample Mixed Plastics Output																
Sample News & Pams Output																

1 Aim of this guidance	2 Definitions	3 Facilities in scope	4 Materials to be sampled	5 Sample size and sample frequency	6 Sampling options for inputs and outputs	7 Material testing procedure	8 Sampling and testing equipment	9 Statistical reporting	10 Information required by SEPA	11 Enforcement of the regulations	12 Staff training	13 Q&A
------------------------	---------------	-----------------------	---------------------------	------------------------------------	---	------------------------------	----------------------------------	-------------------------	---------------------------------	-----------------------------------	-------------------	--------

For further information visit
www.zerowastescotland.org.uk

or contact
helpline@zerowastescotland.org.uk



Zero Waste Scotland Ground Floor, Moray House Tel: 01738 433 930
Forthside Way E-mail: info@zerowastescotland.org.uk
Stirling FK8 1QZ www.zerowastescotland.org.uk