Western Australia Container Deposit Scheme

Material Recovery Facility Sampling Plan

September 2020

CONTENTS

1. INTRODUCTION

This document is the sampling plan prepared by the Coordinator and approved by the CEO pursuant to regulation 4ZD of the *Waste Avoidance and Resource Recovery (Container Deposit Scheme) Regulations 2019* (**Regulations**) made under the *Waste Avoidance and Resource Recovery Act 2007* (**Act**).

This sampling plan sets out the Coordinator's proposed arrangements for engaging independent auditors (including the frequency of audits and the responsibility for the costs of the audits) to undertake sampling in order for the Coordinator to determine eligible container factors (ECFs) under regulation 4ZG(1) of the Regulations.

The sampling plan process outlined herein is aimed at providing state-wide ECFs for aluminium, PET and glass material types with 95% confidence intervals of +/-10% (meaning 95% confidence intervals for estimates are required to lie within +/-10% of the estimate itself i.e. equivalent to a relative standard error of approximately 5%) for the aggregated output at each participating material recovery facilities (MRF) for the quarter whilst also avoiding excessive sampling costs and operational disruption. The sample sizes for smaller material fractions (e.g. HDPE) will target a 95% confidence level. However due to the higher variability in throughput the confidence level for these materials may be slightly lower in practice.

The sampling plan also sets out the verification requirements for material recovery facility operators (MRFOs) which elect to use an exact count method

Any amendments to this sampling plan must be approved by the CEO under regulation 4ZE of the Regulations before taking effect.

2. DEFINITIONS

Except as otherwise defined or expressly stated in this sampling plan, terms within this sampling plan have the same meanings as in the Act or the Regulations.

A reference to "MRF operator" in this sampling plan does not include bottle crushing machine operators as defined in regulation 4ZL(1) of the Regulations.

In this sampling plan:

CDS	means the Western Australian container deposit scheme established under Part 5A of the Act
Chief Executive Officer	means the Chief Executive Officer of the department that administers the *Waste Avoidance and Resource Recovery Act 2007* – currently the Department of Water and Environmental Regulation.
Commencement Date	means 1 October 2020; the date fixed by the Minister by order published in the Gazette to be the appointed day for the purposes of section 47E of the Act.
First Quarter	means: The period from 1 October 2020 to 31 December 2020.

HDPE	means high-density polyethylene
LGA	means local government authority
Mixed Plastics	means an output material type at a MRF that may include PET (1), HDPE (2) and other plastic types (3-7). A MRF operator may segregate PET and HDPE outputs from other plastic types or PET and HDPE may be combined with other Plastic Types.
PET	means polyethylene terephthalate
Plastic Types	means plastic types as per the Society of the Plastic Industry (SPI) or resin identification code: 1 – Polyethylene terephthalate (PET) 2 – High-density polyethylene (HDPE) 3 – Polyvinyl chloride (PVC) 4 – Low-density polyethylene (LDPE) 5 – Polypropylene (PP) 6 – Polystyrene (PS) 7 – Miscellaneous plastics (such as polycarbonate, polylactide, acrylic, acrylonitrile, butadiene, styrene, fibreglass and nylon)

2.1 Eligible Container Factor (ECF)

Determination of an ECF under regulation 4ZG(1) is necessary to allow a MRFO to use the weighing method to estimate the number of eligible containers collected.

The ECF specifies the number of eligible containers per tonne of a specific material type and will be determined and applied on a state-wide basis. ECFs will be determined for each material type when at least one MRF has nominated to use the weighing method for the quarter.

The sampling to determine the ECF will be statistically based, such that it may not be necessary to sample every MRF using the weighing method for the quarter. The state-wide ECF for each material type will be determined by allocating a weighting to the sampling results of the MRFs audited for the quarter, according to the proportion of the tonnage of that material collected by all MRFs.

It is anticipated that it will not be necessary to sample every MRF using the weighing method for the quarter. If a MRF is not sampled that quarter but is making a recovery amount claim for that quarter, then the results from the previous sampling audit from that MRF will be used, with an adjustment to reflect the increase or reduction in CDS containers observed from the sampled MRFs.

The ECF for the first quarter will be determined using the sampling conducted during the first quarter and the throughput figures provided with the MRF's recovery amount claim. Consequently, the ECF will not be available until after the first quarter has finished and MRFs have provided details of tonnes to be claimed for each material type for the first quarter. The Coordinator will then determine the state-wide ECF and notify this to MRFs so that their recovery amount claim for the first quarter can be processed.

To provide clarity and certainty for MRFs after this time, ECFs will be determined using the preceding quarter's data. Under this approach the quarter one ECF will also be used for the second quarter. In the third quarter, the ECF will be determined using the sampling and throughput figures from the second quarter – an approach that will then continue each quarter thereafter.

MRFOs are required to nominate their chosen method for calculating containers recovered for each material type, being either the Exact Count Method or the Weighing Method. For the first recovery amount claim, the MRFO needs to advise WARRRL before submitting the claim. For subsequent claims, the MRFO needs to advise WARRRL not less than 20 business days prior to the commencement of the quarter to which the claim relates.

To ensure sampling can be conducted with minimal disruption, MRFOs will be encouraged to nominate their method for calculating containers recovered during the first period as soon as possible after entering a Material Recovery Agreement.

3. GLASS CDS CONTAINERS - WEIGHING METHOD

This section 3 details the sampling process which will be used to determine the ECF that will be applied when a MRF operator makes a recovery amount claim for glass using the weighing method.

For MRFs where glass is mechanically sorted the estimate of the number of eligible glass containers per tonne of glass is to be determined by sample audits of recyclable waste at kerbside prior to the collection by the recyclables collection contractor. This is the point at which there will be the least amount of glass breakage. To determine the ECF an adjustment will be made to account for the level of contamination in processed glass at the MRF, as detailed below. If glass containers are to be counted by hand the exact count method should be nominated by the MRFO and applied.

MRFs receive recyclable glass containers from the recyclable waste kerbside systems as well as glass from bulk recycling bins which sometimes form part of the local government recycling services and also from recyclable waste collectors of other commercial recyclable waste.

To determine the average number of eligible glass containers per tonne, the sample audits, which will be conducted by a third party sampling auditor appointed by the Coordinator, will only be conducted for the recyclable waste kerbside services. These results from the recyclable waste kerbside sample audits will be used for all glass containers regardless of whether they are from recyclable waste, bulk bin or other commercial sources.

The auditor undertaking the sampling, must engage with the relevant MRF, local government(s) or third party waste collection entity prior to commencing sampling whether at the MRF or the kerbside component of glass sampling to ensure:

1. Any safety policies of the MRF and kerbside collections are adhered to and any safety concerns addressed to the satisfaction of both the MRF operator and auditor prior to undertaking sampling.
2. Where possible that any operational disruption to the MRF during sampling is minimised whilst ensuring sampling is sufficient to achieve a 95% confidence interval of +/- 10% in sampling accuracy and therefore integrity in the ECFs arising from the sampling as possible, whilst also avoiding excessive sampling costs.

3.1 Kerbside sample audit process for the estimation of eligible glass containers

A kerbside sample audit of 100 households from each of 10 demographically representative LGAs in the metropolitan area in each sample quarter will be undertaken to calculate the ECF for glass

Following the first year after the Commencement Date, the number of LGAs to be sampled quarterly may be reduced subject to approval from the CEO based on evidence that the state-wide glass ECF is expected to provide 95% confidence intervals of +/-10%.

The metropolitan LGAs will be grouped and selected based on demographic representation considering factors that influence recycling behaviours such as:

- the proportion of dwellings that are separate dwellings (%);
- the median household income ($); and
- the per capita recycling generation per year (tonnes/person).

The number of feeder LGAs per metropolitan MRF will be determined based on the proportion of metropolitan recyclables throughput for each such MRF. For example, if MRF 1 accepts 30% of metropolitan recyclables, 3 LGAs, from demographically representative LGAs that contribute to that MRFs throughput, will be sampled.

All metropolitan LGAs may be included in the random selection of the LGAs for the kerbside audits regardless of whether a MRF that accepts the Recyclable waste from such LGAs is included in the physical sampling for that quarter. This will ensure that the glass results are demographically representative of the metropolitan area when the results are extrapolated across all MRFs.

Regional LGAs will not be included in the sample as glass is primarily hand sorted at those MRFs. If a regional MRF is undertaking mechanical sorting of glass, resulting in increased glass breakage, then an audit of a feeder LGAs to that MRF will be undertaken to assist in determining the ECF. This will be in addition to the metropolitan LGAs sampled.

3.3 Glass sample audit selection

It will be important to select a number of samples that will be representative of the total throughput of CDS glass containers through each MRF. An incorrect sample mix could adversely affect the average number of glass containers which could disadvantage:

- MRF operators;
- Local governments;
- The beverage industry; and/or
- The CDS in general.

It is assumed that the samples from all 100 households the subject of the sampling for each LGA will be collected and aggregated on one day. Key considerations include:

- If the LGA includes more than 5% high density housing then the matching proportion of high density households will be included in the sample audit.
- As all samples are being collected on one day, a minimum of 3 suburbs and 10 streets will be included.
- Every second household will be collected, to avoid contamination from neighbouring bins.
- All recycling bins at a property will be collected and included as one household (for example there may be 2 x 240L bins, or 1 x 360L bin.
- If the recycling collection truck would normally collect a bin, it will be collected, if the bin would normally be rejected (eg over-full) it will be left.
- Audits will not be undertaken during major events, public holidays and during the period from 1 December to 1 February.

3.4 Sample audit methodology

3.4.1 Collection of samples

The auditor will arrange the collection of the samples with the LGAs and/or collection contractor. The auditor will independently verify that 100 residential households recycling bins from the designated sample streets are collected in accordance with the above-mentioned requirements.

Only these CDS samples are to be placed in the sample collection vehicle. The collection vehicle operator will minimise the breakage of the glass as much as possible by the method of emptying the bins, minimising compaction etc.

3.4.2 Sorting and counting of samples

The collected comingled recyclables collected from the total number of bins required for that particular sample will be taken to the relevant MRF, or other suitable sample site, where all of the glass will be separated from the other recyclables.

The glass will be sorted into three categories:

- intact eligible glass containers;
- identifiable, eligible glass bottle necks;
- other non-eligible glass containers including all broken glass.

The Coordinator does not require any additional sorting categories for the purposes of these sampling audits. However, it is recognised that there may be benefits to the MRFs or LGAs to use the sampling audits as an opportunity to capture additional sampling categories and reporting. If this is to occur it should be arranged and funded separately.

Intact eligible CDS containers

The number of intact eligible CDS containers will be counted (**Intact CDS Glass Container Numbers)** and the total kilogram weight of all intact containers will be determined (**Total Intact CDS Glass Container Weight**).

Eligible CDS container necks

The number of eligible container necks, excluding intact glass containers, will be counted (**CDS Glass Container Neck Numbers)**. The kilogram weight of eligible container necks will be determined by weighing all eligible container necks (**Total CDS Glass Container Neck Weight**).

Non-CDS glass containers and glass fines

All non-CDS glass containers including glass fines (which will include CDS glass particles but exclude the glass that has been identified as eligible CDS glass containers and eligible glass container Necks) will be weighed to determine their total kilogram weight (**Total Weight of Non-CDS Glass Containers**).

Total glass sample weights

The **Total Glass Weight** will be the sum of:

1. The Total Intact CDS Glass Container Weight;
2. The Total CDS Glass Container Neck Weight; and

3. The Total Weight of Non-CDS Glass Containers.

3.4.3 Determination of the average number of eligible glass containers per tonne of glass

The average number of CDS Containers per tonne of glass will be determined by dividing the sum of the Intact CDS Glass Container Numbers and CDS Container Neck Numbers by Total Glass Weight and multiplying the result by 1000.

The following table is an example of a sample audit of 100 kerbside bins and the resultant average number of eligible glass containers per tonne of glass that would be sold for recycling. Note there is a further step to be applied to this calculation to account for the contamination in the glass product sold by MRFs. The additional step is outlined in section 3.4.4.

EXAMPLE OF CALCULATIONS FROM A SAMPLE AUDIT		
Intact CDS Glass Container Numbers	a	2,837.00
Total Intact CDS Glass Container Weight	b	675.00 kg
CDS Glass Container Neck Numbers	c	564.00
Total CDS Container Glass Neck Weight	d	38.71 kg
Total Weight of Non-CDS Glass Containers (including CDS Glass fines)	e	403.00 kg
Total Glass Weight	f = b + d + e	1,116.71 kg
Average number of CDS Containers per tonne of glass	**g = (a + c)/f*1000**	**3,045.55**

3.4.4 Sampling audits of MRF glass output to determine non-glass materials

To establish the percentage of non-glass contamination included in the glass material being produced by MRFs, sampling of glass output will take place at MRFs during the sampling audits for the other CDS (non-glass) material types as detailed in section 4.

These sampling audits will be conducted such that two metropolitan area MRFs and two regional MRFs will be subject to CDS sampling audits each quarter and used to determine the percentage that will be deducted from the total tonnes of glass material sold from each MRF to calculate the recovery amount claim for that quarter.

Samples of the glass material stream will be selected by the sampling auditors that will best give an overall average of the mix of material in this glass stream. These samples will preferably be collected from the end of the conveyor before the glass material is dumped into the holding bunker. However due to health and safety considerations, if the material is taken from the bunker, the glass fines in the bunker should be mixed prior to selecting the sample and samples should be taken from different parts of the bunker.

Each sample should be 10L with 3 glass samples collected from each facility each quarter.

The glass material stream will need to be sorted into glass and non-glass and each of the two streams weighed. The percentage of non-glass contamination will then be determined by dividing the non-glass material into the total material stream.

EXAMPLE OF CALCULATIONS TO DETERMINE THE NON GLASS CONTAMINATION		
Weight of the glass in the samples	a	280 kg
Weight of the non-glass material in the samples	b	40 kg
Total sample weight	c = a + b	320 kg
Percentage of non-glass contamination	**d = b/c*100**	**12.5%**

This percentage as determined from the sample audit of the non-glass component will be used by the Coordinator to calculate that tonnes of glass sold by the MRF to which the average number of eligible glass containers will be applied to arrive at the container payable amount as per the following example.

Tonnes of glass sold by a MRF	a	20.00 tonnes
Percentage of non-glass contamination	b	12.5%
Reduced tonnes of glass sold	c = a - (a*b)	17.50 tonnes
Average Number of CDS Containers per tonne of Glass	d	3,045.55
Total number of eligible glass containers	e = c * d	53,297
CDS recovery amount (including GST)	**f = e * $0.1**	**$5,329.70**

4. NON-GLASS CDS CONTAINERS - WEIGHING METHOD

This section 4 details the sampling data which will be used to determine the ECF that will be applied when a MRF operator makes a recovery amount claim for eligible containers other than glass using the weighing method.

4.1 MRF sample audit process for the estimation of eligible non-glass containers

The sampling audits to determine the eligible non-glass containers will need to take place at each MRF. The sampling audits will be taken from a location as close as possible to the baling process and after the completion of any automated or manual quality control processing. This will ensure that the samples represent the material produced by the MRF. In determining the quantum of eligible non-glass containers, the ECF process and calculation described in section 4.4.3 will be followed.

The sampling audits are to be performed only at MRFs where the materials are processed and despatched directly to the end markets for recycling and or reuse. This includes MRFs that send baled material to a secondary handler prior to the end market. It does not include a MRF that sends semi sorted materials to another MRF for further processing or more refined sortation and despatch to the end markets.

4.2 MRF sample audit frequency

The initial MRF sampling audits will commence during the first two months after the Commencement Date, however as the kerbside recycling system operates on a fortnightly frequency the first sampling audits will not commence until two weeks after the Commencement Date.

The sampling plan frequency is aimed at providing state-wide ECFs for key material types with accuracy of 95% confidence intervals of +/-10% for the aggregated output at each participating MRF for the quarter whilst also avoiding excessive sampling costs. To achieve this, a minimum of two

metro and two regional MRFs will be subject to CDS sampling audits each quarter with the results used to determine the ECFs.

4.3 MRF sample audit selection

When undertaking the sampling audit, consideration should be given by the auditor to ensure that any atypical feedstocks are avoided, such as material from the Perth Royal Show, Australia Day Skyworks or significant stadium events that may create an anomaly in the materials received by the MRF. It is expected that the auditor and MRF operators will identify and mitigate against planning a sampling on a day that will be impacted by a significant quantity of atypical material. However if during the nominated sampling days atypical material affects the sampling results, or significant operational issues affects the number or quality of samples able to be collected, the auditor should contact the Coordinator immediately to determine whether an alternative sample or sampling day should be considered noting there may be additional sampling cost incurred.

Sampling of at least two of the large (20,000+ tonne per annum capacity) metropolitan MRFs is essential to determine an ECF at the required confidence level. If major operational issues at one of these MRFs during the sampling period impairs effective sampling, an alternative large metropolitan MRF will be substituted for the quarter.

The auditor undertaking the sampling must engage with the MRF prior to commencing sampling to ensure:

1. Any safety policies of the MRF are adhered to and any safety concerns addressed to the satisfaction of both the MRF operator and auditor prior to undertaking sampling.
2. Where possible that any operational disruption to the MRF during sampling samples is minimised whilst ensuring sampling is sufficient to given as high level of confidence in sampling accuracy and therefore integrity in the ECFs arising from the sampling as possible, whilst also avoiding excessive sampling costs.

4.3.1 Total sample requirements

The number of samples required through the sampling audit is set out in the table below, and is intended to provide a 95% confidence interval of +/-10%.

Sampling audit sizes expected to achieve required level of accuracy

	PET (1m3)	HDPE (1m3)	Aluminium (0.5m3)	Mixed Plastic (1m3)	Any other eligible material (1m3)
Metro MRF	4	10	4	10	3
Regional MRF	4	10	4	5	3

4.3.2 Individual sample size and quantity

There will need to be a number of individual samples taken for each material stream at different times during the sample audit process in an effort to select material from different areas, local governments, commercial and times of receipt at the MRF. It is anticipated that the sampling will be undertaken over 2-3 consecutive sampling days at each facility and at least one of each material sample should be taken each sampling day.

4.4 Sample audit methodology

The auditor appointed by the Coordinator will collect samples of each of the material types required for that MRF facility progressively throughout the sample audit period and in line with the sample sizes and total required sample size as detailed in sections 4.3.1 and 4.3.2 above.

4.4.1 Collection of audit samples

The collection of samples can be carried out by using wheelie bins; the front end loader bucket or other methods suitable at the individual MRFs. MRF operators could also run CDS materials into the baler and push them out of the baler chamber without baling the containers.

4.4.2 Sorting and counting of audit samples for non-glass containers

The audit samples are to be separated into:

- eligible containers of each material type eg aluminium;
- non eligible containers of each material type;
- other materials (other recyclable items and non-recyclable waste).

Eligible CDS containers

The number of eligible containers for each output type will be counted **(CDS Container Numbers)** and the total kilogram weight of all eligible containers will be determined **(Total CDS Container Weight)**.

Non-CDS materials

All non-CDS materials will be weighed to determine their kilogram weight (**Total Weight of Non-CDS Materials)**.

Total sample weights

For each non-glass material type, the **Total Material Weight** for each stream will be the sum of:

1. The Total CDS Container Weight; and
2. The Total Weight of Non-CDS Materials.

4.4.3 Determination of the average number of eligible containers per tonne.

The average number of eligible CDS containers per tonne for each material type will be determined by dividing the CDS Container Numbers by Total Material Weight and multiplying the result by 1000.

The following table is an example of a sample audit of 542 Kilograms of PET and the resultant average number of eligible PET containers per tonne of PET that would be sold for recycling.

EXAMPLE OF CALCULATIONS FROM A PET SAMPLING AUDIT		
PET CDS Container Numbers	a	8,750
PET CDS Container Weight	b	369.00 kg
PET Total Weight of Non-CDS Materials	c	173.00 kg
Total weight of PET samples	d = b + c	542.00 kg
Average number of eligible CDS containers per tonne of PET	**e = (a/d)*1000**	**16,143.91**

5. ALL ELIGIBLE CONTAINERS - EXACT COUNT METHOD

This section 5 details the quality assurance requirements if the exact count method is used.

If using automatic counting machinery, the machinery must be able to read the barcode of each eligible container and be able to clearly differentiate eligible containers from ineligible containers.

Automatic counting machinery must be maintained according to the manufacturer's recommendations and its counting accuracy verified by an independent and appropriately licensed third party once per year.

Records specifying the exact count and the location of the counted eligible containers must be maintained for audit purposes and must be submitted monthly to the Coordinator.

The area where exact counts take place, whether by manual count or using an automatic counting machine, must include coverage by video cameras that can accurately discern eligible containers. The video footage must be retained for a minimum of one month and made available to auditors appointed by the Coordinator for review at any time.

MRFs must undertake a monthly manual recount for each material type they nominate that they will determine the number of containers using the exact count method. The recount, of a known quantity of containers, must be of a day's throughput for the material type, avoiding days with abnormal volume (e.g. after a local festival). Recounts must be undertaken by personnel not involved in the initial count.

For audit purposes, all eligible containers being subject to manual recount must be stored separately by container type between initial counting and recounting taking place, prior to baling. Documentary evidence of all recounts must be submitted to the Coordinator monthly.

6. ALLOCATION OF COSTS OF SAMPLING PLAN

The costs incurred by the Coordinator in engaging an auditor for the purposes of undertaking the sampling plan and determining the ECFs include, but are not exclusive, to costs of physically sampling eligible material, preparing calculations to determine MRF specific and state-wide ECFs, travel, accommodation, preparing a report for the Coordinator and ancillary costs.

These costs will be distributed by material type and will be allocated across all the MRFs making a recovery amount claim in that quarter and who have nominated the weighing method for the material type, for that quarter. The costs will be allocated on a per container claimed basis.

This will result in a sampling plan cost per container to be deducted from all MRFs using the weighing method in the quarter in which the sampling costs are incurred. This includes allocation of a share of sampling costs to MRFs for whom a sampling audit was not conducted during the quarter but who made a recovery amount claim during the quarter. An example of how the sampling plan cost is allocated is included in Appendix A.

7. REVIEW OF SAMPLING PLAN

The level of sampling will be continually monitored and if in a number of consecutive sampling quarters, the ECF for any material type is showing minimal variation, the sample sizes required may be reviewed to potentially reduce the sampling required whilst maintaining a 95% confidence interval.

Conversely, if the ECF for any material type is showing significant variation, the sample sizes may need to be increased to obtain a 95% confidence interval.

It is intended that the Coordinator will undertake a broad review the sampling plan within two years of scheme commencement. If during this review or for any other reason, the Coordinator proposes amendment to the sampling plan, the amended plan must be approved by the CEO under regulation 4ZE of the Waste Avoidance and Resource Recovery (Container Deposit Scheme) Regulations 2019 (Regulations) before it comes into effect.

APPENDIX A - EXAMPLE CALCULATION OF STATE-WIDE ECF

MRF ECF Sampling Plan Example V 02 09