ResourceCo RRF Pty Ltd

Energy from Waste Management Plan

Wetherill Park RRF

January 2025

1. Document Information

The following table contains administrative metadata.

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Version History

The following table details the published date and amendment details for this document.

Date Published	Version Detail	Reason for issue of amendments	Author or Document Owner (Program)
09 March 2018	Version 6	Approval by DPE 17/03/2018	GHD
May 2023	Version 7	Update after IEA and OEMP audit. Update site data.	Gary Salway
Jan 2025	Version 8	Update following rebrand to ResourceCo	Ben Whitehouse

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Definitions

Term	Definition
Accredited laboratory	a testing laboratory accredited by the National Association of Testing Authorities, Australia (NATA) or a similar accreditation authority, or otherwise granted recognition by NATA, either solely or in conjunction with one or more other persons.
Applicant	ResourceCo RRF Pty Ltd
C&D	Construction and demolition
Construction and Demolition Waste	Waste arising from commercial or industrial premises, refurbishments and demolition and construction work
EfWP	NSW Energy from Waste Policy
EfWMP	Energy from Waste Management Plan
EIS	Environmental Impact Statement titled *Waste and Resource Management Facility* SSD 15-7256, ResourceCo Pty Ltd, 35-37 Franck Street, Wetherill Park, prepared by Nexus Environmental Planning Pty Ltd dated 8 March 2016
EMS	Environmental Management System
EPA	Environment Protection Authority
EPL	Environment Protection Licence issued by the EPA under the POEO Act
Load	the quantity of waste material delivered to the stockpile by truck, bin, or trailer
Minister	Minister for Planning (or delegate)
NATA	National Association of Testing Authorities
OEMP	Operational Environmental Management Plan
Operation	The receipt, removal, or processing of waste
PEF	Process Engineered Fuel
Personal Protective Equipment (PPE)	equipment and clothing that is used or worn by an individual person to protect themselves against, or minimise their exposure to, workplace risks. It includes items such as facemasks and respirators, coveralls, goggles, helmets, gloves, and footwear
POEO Act	*Protection of the Environment Operations Act 1997*
PROC	Procedure
Processing	the complete recycling process, including inspection of incoming loads, removal of extraneous material, crushing and blending of different materials to create a recycled product.
QC	Quality control
RTS	Response to Submissions titled *Response to Submissions Waste and Resource Management Facility* SSD 15-7256, ResourceCo Pty Ltd, 35-37 Frank Street, Wetherill Park, prepared by Nexus Environmental Planning Pty Ltd, dated 28 November 2016
SOP	Standard operating procedure
Waste	As defined in the POEO Act and includes any materials receive or processed on the site

2. Introduction

2.1 Overview

ResourceCo RRF Pty Ltd (ResourceCo) is the operator of the Wetherill Park Resource Recovery Facility (the facility) located at 35-37 Frank Street, Wetherill Park.

The facility comprises a waste and resource management operation which processes relevant waste materials to recover products including aggregates, metal, timber and to manufacture solid recovered fuel (Processed Engineered Fuel or PEF).

This Energy from Waste Management Plan (EfWMP) is one of a suite of plans that governs the operation of the facility.

2.2 Purpose

This EfWMP has been developed to address and manage the compliance with the NSW 'Energy from Waste Policy'. The key principles of the EfWMP are to provide:

- Details of how the receipt of incoming waste (feedstock) from waste processing facilities or collection systems complies with the resource recovery criteria specified in Table 1 of the EPA's 'Energy from Waste Policy Statement' for each waste stream.
- Details of how ResourceCo will compile and calculate percentages of incoming waste streams every three months and retain this information for submission to the EPA on request
- A procedure for providing evidence to the EPA that incoming material was previously going to landfill
- A procedure for the management of out of specification PEF
- A requirement that out of specification PEF materials would not be reprocessed until further analysis demonstrates that it meets the relevant criteria.
- Define calibration procedures and operating thresholds for the online analyser that will be used to measure real-time chlorine, calorific value and moisture content of the PEF

The EfWMP provides an overall framework for adherence to the NSW 'Energy from Waste Policy' during operation. It has been developed to satisfy the requirements of:

- Condition B8 of the Development Consent for SSD 7256 dated 10 April 2017
- the commitments made in the Environmental Impact Statement titled 'Waste and Resource Management Facility' SSD 15-7256, ResourceCo Pty Ltd, 35-37 Frank Street, Wetherill Park, prepared by Nexus Environmental Planning Pty Ltd dated 8 March 2016 (EIS)
- the commitments made in the Response to Submissions titled 'Response to Submissions Waste and Resource Management Facility' SSD 15-7256, ResourceCo Pty Ltd, 35-37 Frank Street, Wetherill Park, prepared by Nexus Environmental Planning Pty Ltd, dated 28 November 2016 (RTS)
- ResourceCo's Environmental Management System (EMS), including ISO14001.
- applicable legislation and regulatory requirements
- requirements of relevant government agencies

In the event of any inconsistency in the above documents, the Development Consent prevails.

2.3 Project description

The Waste and Resource Management Facility Project, as defined in the EIS includes the following key built elements:

- Industrial sheds for housing the facility operations.
- Processing equipment capable of converting up to 250,000 tonnes of relevant waste materials per year into approximately 150,000 tonnes of PEF and over 75,000 tonnes of reusable commodities such as metal, aggregates, and timber.
- Workshop, office, and staff amenities
- Vehicular access and internal roadways, weighbridge and 42 car parking spaces in two car parking areas
- Stormwater management system for collection of water for reuse in the processing system, and dust suppression or treatment and discharge from the site, including a 300-kL underground stormwater storage tank and two above ground tanks with combined capacity of 27 kL.
- 30 kL diesel fuel tank

2.4 Environmental management system

2.4.1 ResourceCo corporate EMS

This EfWMP has been developed and will be implemented in accordance with ResourceCo's corporate EMS. This EMS has been developed, implemented, and certified in accordance with the International Standard for Environmental Management Systems AS/NZS ISO 14001 (Certification No. 2012017).

Throughout the operation of the facility, ResourceCo will undertake periodic reviews and audits of the works to ensure the corporate commitments are fulfilled. ResourceCo's EMS, as implemented at the facility, will be periodically audited as part of the corporate EMS re-certification and ongoing validation process.

2.4.2 Wetherill Park Resource Recovery Facility OEMP

This EfWMP is a sub-plan to the Wetherill Park Resource Recovery Facility Operational Environmental Management Plan (OEMP). The OEMP is based on the ISO14001 Environmental Management System, which provides for continual improvement in environmental performance.

The OEMP is intended as an over-arching environmental management document that forms the basis for development of detailed sub plans (such as this) and procedures for managing specific environmental aspects and impacts. It includes a number of subordinate environmental planning and management instruments (e.g. sub plans, procedures, instructions, forms etc.) that will be implemented during operation of the facility.

The scope and interaction of this document within the OEMP document framework is illustrated in Figure 1.

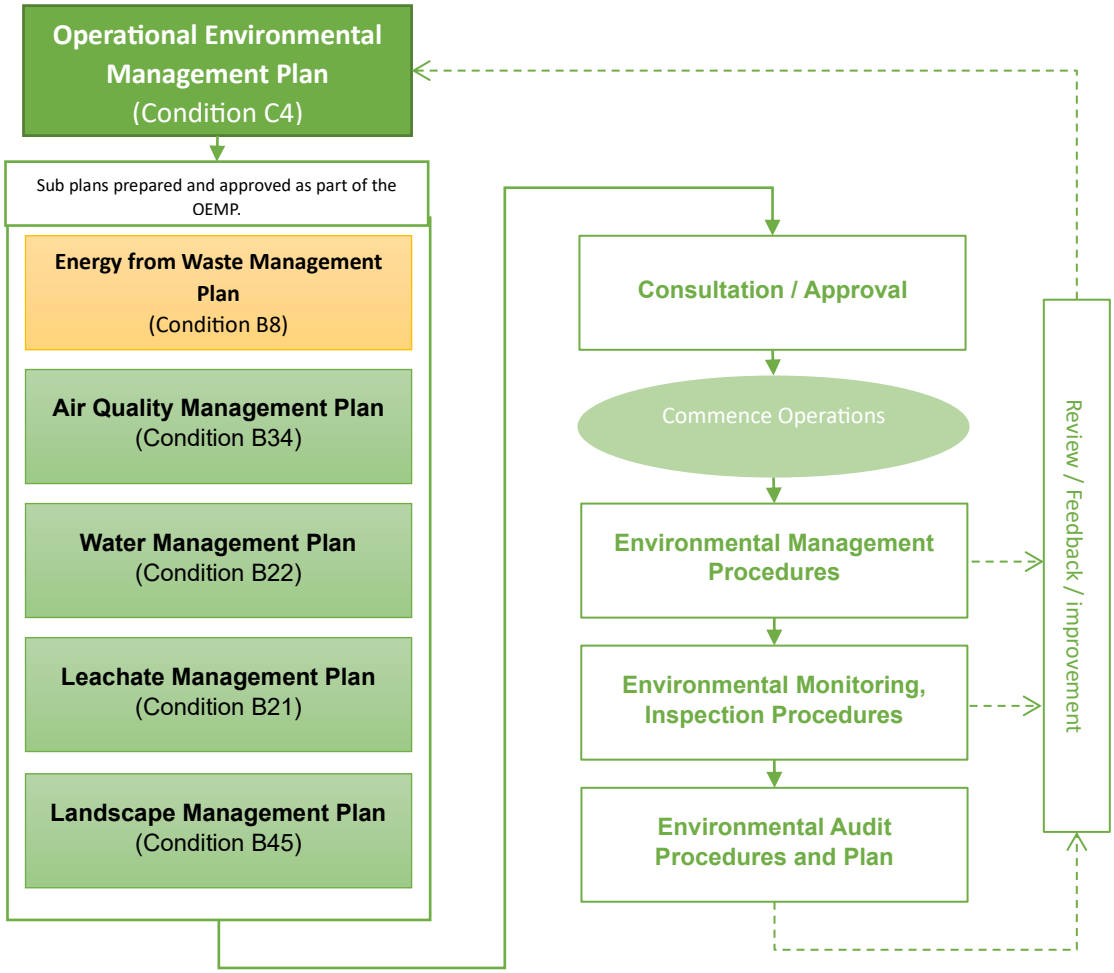

Figure 1 Operational environmental management document structure

2.4.3 Sub plans

In accordance with the Conditions of Approval, a number of sub plans are required to document ResourceCo's management approach to identified risks (e.g. air quality, water and leachate). These sub plans identify potential impacts as they relate to the operation of the facility (as defined in the EIS and RTS) and outline the physical and management safeguards, mitigation measures, responsibilities and monitoring requirements to be implemented to minimise potential impacts on the environment.

The sub plans (including this plan) required according to the Conditions of Approval are shown in Figure 1. Additionally, this shows the sub plans that are to be approved as part of the OEMP and those that are to be approved and/or consulted upon separately.

2.4.4 Procedures and forms

In addition to the environmental management documents nominated above, ResourceCo uses a suite of additional processes and procedures for its EMS. These management tools (described below) are referred to in this EfWMP and/or the individual sub plans:

- Procedures (PROC) and Safe Operating Procedures (SOP) – provide instructions to ResourceCo staff and subcontractors to guide the completion of tasks required during the operation of the facility. The implementation of these PROCs and SOPs

will ensure consistency in approach and quality of results. Specific procedures are developed for management issues including Job Safety and Environmental Analysis (JSEA) for reviewing works to identify hazards and appropriate control measures, and environmental monitoring etc.

- Environment-related forms (FORM) are used to document environmental issues, actions and/or performance against requirements. Typical forms include incident reporting, inspection checklists, audit protocols, complaints/feedback reports etc.

2.5 Consultation and approval process

2.5.1 EfWMP compliance with the Conditions of Approval

Table 1 lists the key requirements of Condition B8 and indicates where these requirements are addressed within this EfWMP or other documents.

Table 1 Conditions of Approval requirements

Condition requirements	Response/reference
Condition B8	
Prior to the commencement of operations, the Applicant must prepare an Energy from waste Management Plan (EfWMP). The EfWMP must:	
(a) be prepared in consultation with the EPA and to the satisfaction of the Secretary	Section 2.5.2
(b) detail the procedures to ensure full and ongoing compliance with the NSW *Energy from Waste Policy*, including:	
(i) details of how the receipt of incoming waste (feedstock) from waste processing facilities or collection systems complies with the resource recovery criteria specified in Table 1 of the EPA's 'Energy from Waste Policy Statement' for each waste stream	Section 4
(ii) details of how ResourceCo will compile and calculate percentages of incoming waste streams every three months and retain this information for submission to the EPA on request	Section 5
(iii) a procedure for providing evidence to the EPA that incoming material was previously going to landfill	PROC 28 (refer Appendix B)
(iv) a procedure for the management of out of specification PEF	Section 9
(v) a requirement that out of specification PEF materials would not be reprocessed until further analysis demonstrates that it meets the relevant criteria	Section 9.2
(c) define calibration procedures and operating thresholds for he online analyser that will be used to measure real-time chlorine, calorific value, and moisture content of the PEF.	PROC 34 (refer Appendix C)

2.5.2 Consultation and approval

In accordance with Condition B8, this EfWMP is required to be prepared in consultation with the EPA and to the satisfaction of the Secretary of the Department of Planning and Environment.

A draft version of this document was sent to the NSW EPA for review and comment. Issues raised by NSW EPA have been addressed in the revised version of this document and documented in correspondence shown in Appendix H.

3. Energy from Waste Policy Statement requirements

Table 2 shows the resource recovery criteria for energy recovery facilities as a direct extract from Table 4 of the *NSW Energy from Waste Policy Statement*. The *NSW Energy from Waste Policy Statement* states that energy recovery facilities may only receive feedstock from waste processing facilities or collection systems that meet the criteria outlined in this table.

Table 2 Resource recovery criteria for energy recovery facilities

Mixed waste stream	Processing facility	% residual waste allowed for energy recovery
Mixed municipal waste (MSW)	Facility processing mixed MSW waste where a council has separate collection systems for dry recyclables and food and garden waste	No limit by weight of the waste stream received at a processing facility
	Facility processing mixed MSW waste where a council has separate collection systems for dry recyclables and garden waste	Up to 40% by weight of the waste stream received at a processing facility
	Facility processing mixed MSW waste where a council has a separate collection system for dry recyclables	Up to 25% by weight of the waste stream received at a processing facility
Mixed commercial and industrial waste (C&I)	Facility processing mixed C&I waste	Up to 50% by weight of the waste stream received at a processing facility
	Facility processing mixed C&I waste where a business has separate collection systems for all relevant waste streams	No limit by weight of the waste stream received at a processing facility
Mixed construction and demolition waste (C&D)	Facility processing mixed C&D waste	Up to 25% by weight of the waste stream received at a processing facility
Residuals from source-separated	**materials**	
Source-separated recyclables from MSW	Facility processing source-separated recyclables from MSW	Up to 10% by weight of the waste stream received at a processing facility
Source-separated Garden waste	Facility processing garden waste	Up to 5% by weight of the waste stream received at a processing facility

Source-separated food waste (or food and garden waste)	Facility processing source-separated food or source-separated food and garden waste	Up to 10% by weight of the waste stream received at a processing facility

Notes

The EPA may consider increases to the maximum allowable percentage of residuals from facilities receiving mixed municipal and commercial and industrial waste where a facility intends to use the biomass component from that process for energy recovery, rather than land application. The facility must be able to demonstrate they are using best available technologies for material recovery of that stream.

Waste streams proposed for energy recovery should not contain contaminants such as batteries, light bulbs or other electrical or hazardous wastes.

Bio-char or char materials produced from facilities using mixed waste streams will not be able to be considered for land application as a soil amendment or improvement agent.

The C&I 'no limit' category is likely to apply only to mixed waste collected from single generators of large volumes of waste (e.g. supermarkets) or precinct-based businesses (e.g. shopping centres). Proponents will need to demonstrate that each entity generating waste has effective and operating collection systems for all waste streams they generate that have reuse or recycling opportunities (e.g. paper/cardboard collection; organic collection; and residual waste collection). Proponents wishing to use the C&I 'no limit' category will need to contact the EPA to determine the eligibility of each entity.

Note: the "no limit mixed C&I" category cannot be used until approval is granted from the EPA.

4. Receipt of incoming waste (feedstock)

This section provides details of how the receipt of incoming waste (feedstock) from the waste processing facilities or collection systems will be managed to comply with the resource recovery criteria specified in Table 4 of the EPA's *NSW Energy from Waste Policy Statement* for each waste stream (as shown in Table 2).

4.1 Waste control

4.1.1 Permitted wastes.

The facility is licensed by the NSW EPA to accept general solid waste (non-putrescible) as defined by Schedule 1 Part 3 of the *Protection of the Environment Operations Act 1997* (POEO Act). Only wastes expressly permitted by the Environment Protection Licence (EPL) are to be accepted for processing.

ResourceCo will target the following landfill-destined waste streams:

- C&D recycling residuals from a facility which recycles mixed C&D waste. This waste stream comprises lighter materials leftover once the C&D recycler has extracted metal, aggregates, soil and some timber from waste stream and typically includes plastics, papers, textiles, timber (clean and unclean) and unrecovered C&D materials.
- Mixed C&D wastes from C&D collectors that is free of organics, wet, liquid, hazardous or radioactive waste
- Mixed commercial and industrial (C&I) waste from C&I collectors that is free of organics, wet, liquid, hazardous or radioactive wastes

4.1.2 Excluded wastes.

Specific waste types not permitted to be accepted into the facility include the following:

- Liquid wastes (paint, chemicals, oils, solvents etc)
- Listed wastes.
- Household or kerbside collected green and general waste.
- Explosives
- Poisons
- Radioactive materials
- Medical waste (syringes, clinical and related waste)
- Asbestos
- Scheduled pharmaceuticals.
- Contaminated soils

In addition, in accordance with Condition B5, any waste generated outside the site must not be received at the site for storage, treatment, processing, reprocessing, or disposal, except as expressly permitted by the EPL.

4.1.3 Waste screening and acceptance

Pre-qualification

As outlined in Section 6.2.3 of the OEMP, all potential customers will be required to be pre-qualified before being allowed to bring waste to the facility in accordance with the Incoming Waste Customer Pre-Qualification Procedure (PROC 28). This pre-qualification process will determine if the potential customer's waste meets the approved acceptance criteria for the site, if it will enable high quality PEF product to be produced and which category it meets for the PEF processing criteria, which are:

- mixed C&D
- C&D recycling residues
- mixed C&I waste

If the customer's pre-qualification meets the C&D recycling residues category, the customer will be required to complete a declaration stating that their residuals being sent to ResourceCo is no more than 25% of their incoming waste by weight and that ResourceCo is the only energy recover facility to which they are sending their residuals. This declaration will be required to be completed on a quarterly basis to allow ResourceCo to submit this declaration with its quarterly allowable PEF percentage calculation to the NSW EPA.

At the facility

Signs at the entrance clearly indicate the types of wastes that are and are not accepted at the facility.

As outlined in Section 6.2.3 of the OEMP, when a vehicle enters the weighbridge, the Customer Service and Weighbridge Operator will check with the driver if the waste meets the acceptance criteria, and will visually inspect the load for waste types not accepted or to be excluded from the production process (as outlined Section 4.1.2 above). If part or all of the load is identified as not be approved for tipping in the facility the truck will not be unloaded and will be directed to leave the site immediately. The Customer Service and Weighbridge Operator will also ensure that all waste that is controlled under a tracking system has the appropriate documentation prior to acceptance at the site.

If the waste meets the acceptance criteria, then the waste delivery truck will be directed to the waste tipping area inside the manufacturing building. Once the load is tipped the Waste Receival Inspection Officer will inspect the load for waste types not accepted or to be excluded from the production process, and to ensure that all waste that is controlled under a tracking system has the appropriate documentation prior to acceptance at the site.

Wastes that are not able to be accepted will either be sent back out of the site on the same waste delivery truck (if it is able to be) or removed from site as soon as possible by a licenced collector at the customers expense (if the incoming waste truck has left the site or if it is not able to be reloaded). Section 4.1.5 below outlines the approach to handling and disposal of hazardous materials such as asbestos, sharps and chemical/biological materials that, despite the waste acceptance procedures, have been delivered to site.

4.1.4 Waste monitoring program

Incoming waste

The following details will be recorded and kept on file for all incoming waste received on the site:

- Quantity, type, and source of waste
- Date and time of receival
- PEF processing criteria category
- Copies of all documentation relating to tracking for controlled waste brought to the site
- Details of any hazardous or other prohibited materials (including asbestos) brought to the site, along with handling and disposal activities undertaken and a record of any related documentation

4.1.5 Hazardous materials

Any materials listed in Section 4.1.2 will be immediately rejected from the site where safe to do so and staff will be trained to ensure that these materials are first quickly identified and secondly safely removed from the waste stream. Specific management techniques for key hazardous waste types are provided below.

Asbestos

The following will be implemented to manage the potential for asbestos in the waste stream:

- Full-time traffic control/waste inspector on tipping floor at all times during operational hours
- Direct education with the customer base to ensure that only materials that are asbestos free will be accepted at the site. This is particularly focussed upon in the pre-qualification process (refer Section 3.1.3) with a potential new customer.
- Well positioned, appropriate signage at the entrance, weighbridge on weight dockets and at the drop off point.
- Asbestos identification training for all relevant staff on site. Please see Appendix I of the OEMP for the Asbestos Management Plan
- Safe asbestos management and removal training for all relevant staff on site.
- Safe asbestos management and removal procedures are outlined in the Asbestos Management Plan (CR-MP004).

Sharps and medical waste

Sharps and medical waste identification training for all relevant staff on site. Refer to CR-SP001 Handling Sharps.

Chemicals and oils

Hazardous Chemicals identification training for all relevant staff on site. Refer to CR-PR236 Hazardous Substances and Dangerous Goods.

Oil spill kits will be kept on site at all times and staff will be trained in its appropriate use.

Chemicals will be managed on an as needs basis with supervisors with dangerous goods training quickly assessing if the spill can be safely managed internally of if external assistance is required i.e., NSW Fire and Rescue.

5. Calculation of percentages

The following procedure will be implemented to calculate the PEF production target and demonstrate compliance with the *Energy from Waste Policy Statement* Resource Recovery Criteria:

Formula:

PEF % ≤ (25% x C&D recycling residuals) + (50% x C&I recycling residuals) + (100% x "no limit mixed C&I" waste) + (50% x"50% mixed C&I" waste) + (25% x mixed C&D waste)

Formula component details:

- All measures are by weight.
- The ResourceCo facility weighbridge is the point of measurement.
- Incoming waste stream volumes are measured when they enter the site over the weighbridge over the 3-month period
- PEF volume is measured when it leaves the site over the weighbridge over the 3-month period
- Incoming waste is classified into the following waste streams:
  - C&D recycling residuals
  - "No limit mixed C&I" waste from C&I sources
  - "50% mixed C&I" waste from C&I sources
  - C&D waste from C&D sources
- C&D recycling residuals will be from a facility which recycles mixed C&D waste and can produce a declaration stating that the residuals being sent to ResourceCo are less than 25% of the mixed C&D waste intake for the facility and that ResourceCo is the only offtake for their residuals for energy recovery purposes.
- "No limit C&I" will be those C&I waste sources which have been approved by the EPA as meeting the no limit criteria
- "50% mixed C&I" will be those C&I waste sources which do not meet the "no limit" criteria
- Mixed C&D will be raw mixed C&D waste that has not gone through a resource recovery process

The frequency of calculation will be 3 monthly (quarterly).

6. Records and reporting

6.1 Reporting

The weighbridge data including type, PEF category and amount of waste (in tonnes) received on the site and all material produced on site and transported off-site (as product or waste) will be recorded and retained.

6.2 Record keeping

PEF calculations and records generated will be identified, collected, and stored in accordance with ResourceCo's quality management system.

Compiled calculations of percentages of incoming waste streams (as per Section 5) as well as Quarterly C&D recycling residuals declarations will be retained on site for the life of the facility and be kept readily available for submission to the EPA on request.

8. Review and improvement

8.1 Review of the Energy from Waste Management Plan

The EfWMP will be reviewed on a regular basis to ensure that it accurately reflects the ResourceCo EMS and conforms to applicable legislative and other requirements. The frequency of review will be at least annually as part of the OEMP review, or more frequently, as a result of a significant non-conformance or as directed by the Secretary of the Department of Planning and Environment or other authority.

At the conclusion of the review process, any recommendations for change, or improvement, to EMS will be reflected through amendments to the relevant system element including the OEMP, other sub plans, procedures or forms.

An assessment will be undertaken of the proposed documentation change against the Conditions of Approval (including development consent, EIS and RTS). Minor changes to the documentation will be recommended by the appropriate manager. The revised documents will be managed in accordance with ResourceCo's quality management system – including approval, document control and communication of changes to relevant staff.

Major documentation changes to the documentation will be reviewed by senior management and if deemed necessary, approval will be sought from the Department of Planning and Environment. Approved revised documents will be managed in accordance with ResourceCo's quality management system – including document control and communication of changes to relevant staff.

Table 3 lists the types of amendments that would be considered minor and major, and the approval process.

Table 3 EfWMP approval process

Review trigger	Amendment type	DPE approval	Examples
Minor amendments and corrections	-	No	Changes to system processes without change to environmental outcome. Minor changes to operational processes without change to environmental outcomes
In response to environmental incidents	Minor	No	Hazardous materials removal
	Major	Yes	Non-compliance with EPL
Audit findings	Minor	No	Change to procedure to improve a process
	Major	Yes	Non-compliance with a Condition of Approval
Request by government agency	Minor or major	Yes	-
Annual review findings	Minor	No	Non-compliance with a target
	Major	Yes	Non-compliance with a Condition of Approval

8.2 Non-conformance, corrective, and preventative action

Non-conformances, including those of an environmental nature, shall be identified through verification processes such as monitoring, inspections, audits and reviews as well as through the receipt of complaints and incidents and near misses. Non-conformances shall be identified through verification processes aimed at ensuring

compliance with NSW Energy from Waste Policy Statement, in particular the resource recovery criteria, the OEMP and this EfWMP. All ResourceCo personnel can raise a non-conformance. In summary, the management process is:

- When a non-conformance issue is detected, the corrective and preventative actions are entered on a CAR (Corrective Action Request) form. In addition, the CAR assigns responsibilities for actions to a manager for close-out and the timing for completion.
- The CAR is entered into the CAR register for recording and tracking progress of follow-up and close-out.
- Upon satisfactory completion of all corrective actions and follow-on preventative actions (e.g., revision of documented procedures), the CAR is closed-out by the responsible staff member.
- The environmental CARs will be reviewed monthly and during the regular review meetings.
- During the annual environmental review, CAR statistics will be assessed and trends analysed.

9. PEF quality management

9.1 Quality control

Quality control for PEF will comprise:

- Control of the wastes accepted into the facility, as described in Section 3 (and Section 6.2.3 of the OEMP), to minimise contaminants, and in particular PVC plastics through:
  - Pre-qualification of customers
  - Waste screening and acceptance processes including visual inspection.
- Development of PEF sampling and testing procedures in conjunction with customers
- Physical separation of the incoming waste stream to remove materials from the PEF product.
- Physical testing in accordance with test procedures
- Online analyser on the low PEF finished product output line.

Note: There are two distinct grades of PEF manufactured, namely Low CV PEF and High CV PEF, which have independent finished product output lines. The online analyser is installed on the Low CV PEF finished product output line only.

Customer Service Officer ton the weighbridge and the Waste Receival Inspection Officer are responsible for ensuring that the waste delivered meets the pre-approved criteria for acceptance.

PEF specification and test procedures will be determined in conjunction with each specific customer (typically cement kilns). Currently, the required specification and test procedures for PEF are summarised in Appendix A. The facility's PEF will be produced to meet these specifications. This will be achieved by:

- Inspection of the incoming waste by the Waste Receival Inspection Officer to ensure inappropriate items are taken out of the waste stream at the tipping floor and do not enter the production line
- Physical separation of incoming wastes with multiple magnets, screens, air separators and manual QC stations to ensure that the following materials do not go into the PEF product:
  - Aggregates such as concrete, rocks, bricks and other heavy inert materials
  - Metals

The physical testing regime, including specific test methods, is attached in Appendix A. The physical testing regime will be performed by a third party, Australian based NATA accredited laboratory.

The online PEF analyser will be designed to provide real time feedback on the major parameters of chlorine content (Cl), calorific value (CV) and moisture (H_2O). The real time feedback on key elements enables continual refinement of the process to help ensure that the key parameters remain within specification.

The online analyser calibration procedures and operating thresholds are provided in PROC 34 attached as Appendix C.

9.2 Management of out of specification PEF

The online analyser compares the real time measured values of the major parameters of chlorine content (Cl), calorific value (CV) and moisture (H_2O) against those detailed in Specification A in Appendix A, namely:

Chlorine (Cl)	≤ 0.2% m/m
Calorific Value (CV)	≥15%
Moisture (H_2O)	≤15% m/m

to determine if the PEF is out of specification.

The operating threshold range of the online analyser is detailed in Appendix C (PROC 34 *On-line Analyser Calibration Procedure*)

Out of specification PEF is managed as per Appendix D (PROC 40 *Managing Out of Specification Solid Recovered Fuel*).

9.3 Managing out of specification PEF – monthly combined composite sample

In the unlikely event that the monthly combined composite sample routine test returned an out of specification result on any of the parameters in the specification then ResourceCo will implement the following procedure:

1. ResourceCo will send the retained duplicate monthly combined composite routine sample to an independent NATA accredited laboratory for testing to all parameters specified in the specification.

If the test results of the retained duplicate monthly combined composite routine sample conform to specification, then:

1. No further action.

If the test results of the retained duplicate monthly combined composite routine sample verify the out of specification, then:

2. ResourceCo will conduct a root cause analysis to determine the source of the out of specification, utilizing information from:
    a. Customer pre-qualification processes.
    b. Waste Inspection processes.
    c. Routine testing.
    d. Trend analysis; and
    e. Any other relevant sources

    as detailed above.
3. ResourceCo will implement corrective and preventive actions to prevent a reoccurrence.
4. ResourceCo will increase routine testing until it is confirmed that the product is able to satisfactorily meet specification on an on-going basis.

10. References

Nexus Environmental Planning Pty Ltd (2016) Environmental Impact Statement titled ‘Waste and Resource Management Facility’ SSD 15-7256, ResourceCo Pty Ltd, 35-37 Frank Street, Wetherill Park

Nexus Environmental Planning Pty Ltd (2016) Response to Submissions titled ‘Response to Submissions Waste and Resource Management Facility’ SSD 15-7256, ResourceCo Pty Ltd, 35-37 Frank Street, Wetherill Park

NSW EPA (2015) ‘NSW Energy from Waste Policy Statement’

Appendices

Appendix A – PEF Specification and Test Procedures

The below table is typical is what is requested by ResourceCo's end users. These specifications are subject to change and non-conformances are punished by financial penalties.

Analyte	Specification A	Specification B	Test Procedure
Moisture	≤ 15%	≤ 15%	ISO 21660-3:2021Solid recovered fuels — Determination of moisture content using the oven dry method
Ash Content	≤ 15%	≤ 15%	ISO 21656:2021Solid recovered fuels — Determination of ash content
Calorific Value	≥ 15 MJ/kg	≥ 17 MJ/kg	ISO 21654:2021 Solid recovered fuels - Determination of calorific value
Chlorine Content	≤ 0.2%	≤ 0.8%	EN ISO 15408:2011 Solid Recovered Fuels - Methods for the Determination of Sulphur (S), Chlorine (Cl), Fluorine (F) and Bromine (Br) Content
Particle Size	≤ 50 mm in any direction ≥ 95% passing 35 mm	≤ 50 mm in any direction	EN 15415-1:2011 Solid recovered fuels - Determination of particle size distribution - Part 1: Screen method for small dimension particles
Biomass Content	As per customer specification	As per customer specification	EN ISO 21644:2021 Solid Recovered Fuels – Methods for the determination of biomass content

Appendix B – CR-PR225 – Incoming Waste Customer Pre-Qualification Procedure

11. CR-PR225 - INCOMING WASTE CUSTOMER PRE-QUALIFICATION

Purpose

The purpose of this procedure is to ensure that only those new customers with allowable waste materials are accepted by Cleanaway ResourceCo's Wetherill Park RRF (CRRRF). Through this process, it must be identified which NSW EfW Policy Resource Recovery Criteria their waste will fit into. It must be ensured that new customers understand the conditions by which CRRRF will accept their allowable waste streams

Scope

This procedure is to be used when assessing all new potential incoming waste customers for CRRRF.

References

NSW Energy from Waste Policy Statement (June 2021)
NSW EPA Eligible Waste Fuel Guidelines (December 2016)

Definitions

C&I	Commercial and Industrial Waste
C&D	Construction and Demolition Waste
EfW	Energy from Waste
RRF	Resource Recovery Facility

Assessment

1. The potential customer will be assessed against a set of criteria to determine the following:
    a. Appropriately licensed EPA waste facility
    b. Commitment to WHS
    c. Control measures are in place for the control of Hazardous Waste Materials, to ensure that Hazardous waste materials are not delivered to CRRRF
2. The potential customer's waste will be assessed to determine whether it is:
    a. Currently being sent to landfill, or
    b. Currently being sent to a competitive resource recovery facility, and if it wasn't sent to this facility, would it be sent to landfill, or
3. The potential customer's waste will be assessed against a set of criteria to determine the following:
    a. Are there any materials in the potential customer's waste stream that the facility is either not licensed to accept or do not meet the facility's limit as listed in Tables 1 and 2. If yes, then the potential customer will not be allowed to deliver waste to the facility
    b. Which NSW EfW Policy Resource Recovery Criteria the waste will fit into. The allowable criteria for the facility are listed in Table 3.
    c. The estimated volumes of waste materials for each NSW EfW Policy Resource Recovery Criteria

4. The potential customer's waste will be assessed against a set of criteria to determine the following:
    a. Calorific value
    b. Levels of inert material
    c. Moisture
5. The completed Incoming Waste Pre-Qualification Form (FORM 49) is to then be submitted to the General Manager who will make the ultimate decision as to whether the waste can be accepted to the facility, and if so which Resource Recovery Criteria the waste fits into

Criteria to Determine Waste Material Acceptability

At the highest level of waste definition, the facility can accept the following:

- Dry Mixed Commercial and Industrial waste materials
- Dry Mixed Construction and Demolition waste materials
- Source separated Waste

In terms of the general characteristics of the waste materials being sought they are as follows:

- Solid
- Dry
- Non-putrescible
- Non-hazardous
- High calorific value
- Low levels of inert material
- Able to meet the NSW EfW Policy's Resource Recovery Criteria

In terms of the specific constituent materials in these waste categories, the following tables outline the degrees of acceptability of various waste materials for CRRRF

Table 1: Unacceptable Waste Materials

Unacceptable Waste Material	Details
Asbestos	Zero allowance
Liquid wastes	Zero allowance
Listed wastes	Zero allowance
Chemical wastes	Zero allowance
Medical wastes	Zero allowance
Contaminated soils	Zero allowance
Municipal Solid Waste (MSW)	Zero allowance
Explosives	Zero allowance
Poisons	Zero allowance
Radioactive wastes	Zero allowance
Pharmaceutical wastes	Zero allowance
Food wastes	Zero targeted, <5% allowable in a mixed load
Green wastes	Zero targeted, <5% allowable in a mixed load
Electronic wastes	Zero targeted, <1% allowable in a mixed load
CCA preservative treated timber	<10% allowable in a mixed load
PVC Plastics	<1% allowable in a mixed load

Table 2 specifies materials which will be accepted but are unable to be processed, and therefore will incur additional fees for handling and/or disposing of to a licensed receival facility.

Table 2: Non-Processable Waste Materials

Unacceptable Waste Material	Details
End of life tyres	Sent off site to a tyre recycler
Car batteries	Sent off site to a battery recycler
Mattresses	Sent off site to a mattress recycler
Gas cylinders	Sent off site to a gas cylinder recycler

NSW EfW Policy's Resource Recovery Criteria

It is important to ensure that the waste materials being delivered to materials CRRRF are appropriately categorized from the NSW EfW Policy Resource Recovery Criteria. This is because CRRRF must comply with the limits of PEF able to be manufactured from these various criteria of waste streams.

Table 3: Non-Processable Waste Materials

Waste Stream	Processing Facility	% Residual Waste Permitted for Energy Recovery
Mixed commercial and industrial waste (C&I)	Facility processing mixed C&I waste	50%
Mixed commercial and industrial waste (C&I)	Facility processing mixed C&I waste where a business has separate collection systems for all relevant waste streams	100%(1)
Mixed construction and demolition waste (C&D) waste	Facility processing mixed C&D waste	25%
Source separated waste		100%(2)

(1) NSW EPA is required to approve any waste streams that request this classification

(2) Source separated waste streams are sourced directly from the waste generator. These streams that fall within the CRRRF acceptance criteria can include residual waste wood, residual textiles, end of life tyres

Note: Completed Incoming Waste Pre-Qualification Forms (FORM 49) are to be collected and stored in accordance with CRRRF's quality management system. FORM 49 records evidence of compliance to NSW EfW Policy and evidence that incoming waste was previously going to landfill, and must be provided to the EPA on request, in the format requested by the EPA

Documentation

FORM 49 Incoming Waste Pre-Qualification Form

Appendix C – CR-PR216 Online Analyser Calibration Procedure

12. CR-PR216 - ON-LINE ANALYSER CALIBRATION

Purpose

The purpose of this procedure is to describe the calibration methodology for the proposed on-line analyser that will be used to measure chlorine, calorific value and moisture content of the finished Processed Biomass Fuel (PBF).

Scope

This procedure is to be used for calibration of the on-line analyser for the measurement of chlorine, calorific value and moisture at Cleanaway ResourceCo's Wetherill Park Resource Recovery Facility (CRRRF).

References

I.S. EN 15442:2011	Solid Recovered Fuels – Methods for Sampling
SOP 2130	Routine PEF Sampling
SOP 2108	Daily Sample Preparation

Definitions

CRRRF	Cleanaway ResourceCo Resource Recovery Facility
PEF	Processed Engineered Fuel

Introduction

The proposed analyser that will be used to measure chlorine, calorific value and moisture content of the finished Processed Biomass Fuel (PBF) is:

Tomra AUTOSORT[NIR1-NIR2][H-600][X-L]

Background

With the Tomra AUTOSORT for PBF online analysis, it is possible to continuously determine quality parameters for final product. The TOMRA Online analyser continuously scans the surface of the product on the conveyor underneath the scanner. Near-infrared sensors detect the chlorine and water content – as well as the calorific value. The DUOLINE® scanning technology automatically detects the materials contact-free during the production process.

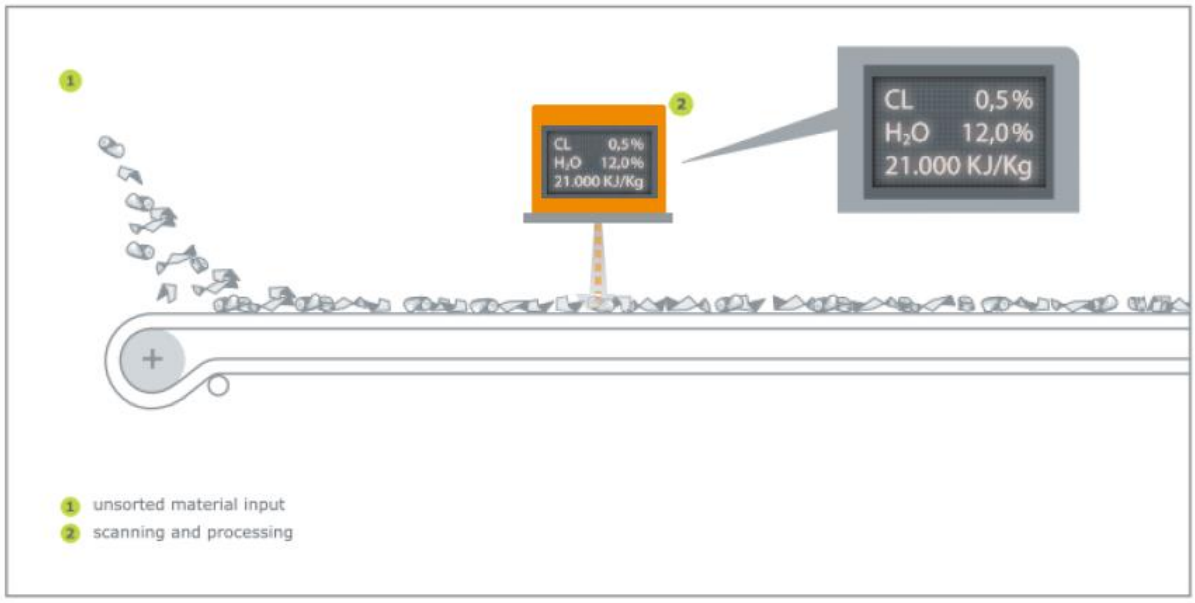

Figure 2 - Functional Principle of a Typical On-Line Analyser

Operating Thresholds

The operating thresholds of the TOMRA Online analyser will be commensurate to the finished PBF specifications. The proposed thresholds are:

Parameter	Threshold Range
Chlorine w/w	0.05% - 1.50%
Calorific Value (MJ/kg)	5 - 40
Moisture w/w	5% - 40%

Calibration

The AUTOSORT analyser includes Tomra's unique FLYING BEAM® technology which performs a self-calibration with every scan. Parameterization of the estimated chlorine, moisture content and calorific value must be adapted to the finished PEF stream through comparison of the AUTOSORT measured values against laboratory samples for the same time period.

Chlorine

Adaptation – measurement of chlorine content in the range of 0.05% - 1.50 %

Samples will be taken of the finished PBF for laboratory analysis, and comparison against the AUTOSORT analyser at the time the online measurements were recorded. Sampling will be performed as per EN 15442:2011 Solid Recovered Fuels – Methods for Sampling. This is achieved in the following way:

1. Gather the sample as per SOP 2130 - Routine PEF Sampling, for at least one minute of production, taking note of precisely the start time and the finish time
2. Prepare the sample as per SOP 2108 – Daily Sample Preparation
3. Run the chlorine result as per SOP 2105 – Determination of Calorific Value and SOP 2101 – Determination of Chlorine
4. View the chlorine data on the TOMRA analyser for the same time interval as the sample taken in 1. and compare

Based on the samples' laboratory analysis, TOMRA will optimize the parameterization of the analysis. Adaptation needs to be performed in steps of 0.05%, with every measurement to be repeated at least 3 times. A TOMRA field technician assists with this process.

Acceptance test for reproducibility of area measurements:

The TOMRA Online analyser continuously scans the surface of the product on the conveyor underneath the scanner and measures the surface area of PVC in the total material stream. This measured area is presented in % of the total material stream (surface area) and in cm2. By entering average values for the thickness and other relevant properties of the different materials into a database, the unit is able to calculate the mass of the materials and then the calorific value and PVC content of the total sample.

A minimum of 3 different samples will be taken of the described finished PEF material. Sampling will be performed as per EN 15442:2011 Solid Recovered Fuels – Methods for Sampling. Each sample should be at minimum 10 kg. Each sample will be scanned 7-10 times by the AUTOSORT analyser. It is necessary that the samples are presented to the machine in a monolayer and with constant speed of the conveyor.

Total measured area and area of PVC will be logged, and deviation from the average measured value will be calculated. The reproducibility of the measurements will be a maximum of 5% average deviation compared to the average measured value.

Moisture

Adaptation – measurement of moisture content in the range of 5% - 40 %

Samples will be taken of the finished PBF for laboratory analysis, and comparison against the AUTOSORT analyser at the time the online measurements were recorded. Sampling will be performed as per EN 15442:2011 Solid Recovered Fuels – Methods for Sampling. This is achieved in the following way:

1. Gather the sample as per SOP 2130 - Routine PEF Sampling and Sample Preparation, for at least one minute of production, taking note of precisely the start time and the finish time
2. Prepare the sample as per SOP 2108 – Daily Sample Preparation
3. Run the chlorine result as per SOP 2103 – Determination of Total Moisture Content in PEF
4. View the moisture data on the TOMRA analyser for the same time interval as the sample taken in 1. and compare

Based on the samples' laboratory analysis, Tomra will optimize the parameterization of the analysis. Adaptation needs to be performed in steps of 5 %, with every measurement to be repeated at least 3 times.

Calorific Value

Adaptation – measurement of calorific value in the range of 5 MJ/kg – 40 MJ/kg

Calorific value will be checked against known, pre-defined test materials, with the weight and specific properties of the material known in advance. The test material will be scanned a minimum of 5 times by the AUTOSORT analyser. It is necessary that the test materials are presented to the machine in a monolayer and with constant speed of the conveyor.

Testing and Review

This procedure will be reviewed and updated to reflect the actual calibration practices developed and used during the calibration of the on-line analyser.

Appendix D – CR-PR217 Managing Out of Specification PEF

CR-PR217 - MANAGING OUT OF SPECIFICATION PEF

Purpose
The purpose of this procedure is to describe the procedure to be used for managing out of specification Processed Engineered Fuel.

Scope
This procedure is to be used for the managing of out of specification Processed Engineered Fuel (PEF) at Cleanaway ResourceCo's Wetherill Park Resource Recovery Facility (CRRRF).

References

I.S. EN 15443:2011	Solid Recovered Fuels - Methods for the Preparation of the Laboratory Sample
I.S. EN 15442:2011	Solid Recovered Fuels – Methods for Sampling
SOP 2130	Routine PEF Sampling
SOP 2108	Daily Sample Preparation

Definitions

RRF	Resource Recovery Facility
PEF	Processed Engineered Fuel
PBF	Processed Biomass Fuel

Documentation

FORM 01	Corrective Action Request Form

Introduction
Cleanaway ResourceCo's Wetherill Park resource recovery process converts relevant waste materials into reusable commodities such as metal, aggregates and timber, and manufactures two different Process Engineered Fuel's. The resource recovery process is depicted in Figure 1.

The two distinct grades of Process Engineered Fuel that are manufactured are:

- Processed Biomass Fuel (PBF). This is produced through the hammer mill, is the heavier fraction of the recovered material, and is predominantly timber based. The PBF is manufactured to Specification A as detailed in Appendix 1.
- Processed Engineered Fuel. This is produced through the secondary shredder, is a lighter fraction of the recovered material, and is predominantly plastic based. The PEF is manufactured to Specification B as detailed in Appendix 1

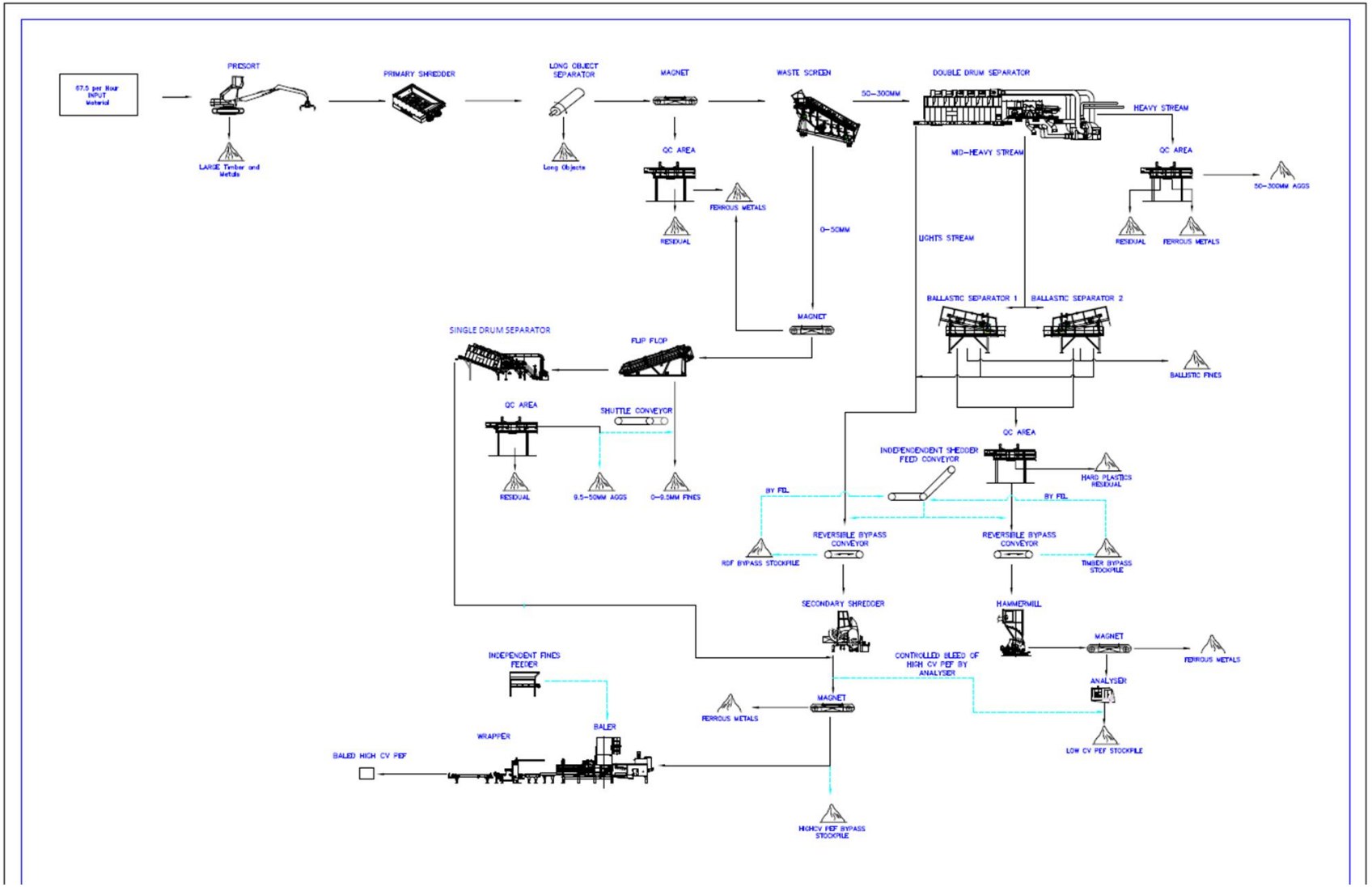

Figure 3 Process Flow Diagram

Quality Control

The online analyzer provides real time feedback on the major parameters of chlorine content (Cl), calorific value (CV) and moisture (H2O) for the PBF. Should the online analyzer detect that any of these major parameters are out of specification then the operational team is able to investigate immediately and potentially identify the failure in the process that has resulted in the change in quality.

Should the root cause be visually identified, and depending on the severity of the quality impact, the Supervisor can work with the team to remove the out of spec material from the PBF storage bay for reprocessing or mixing. This will ensure that any out of specification PBF is separated and quarantined from finished in-specification PBF.

Managing Out of Specification Results

Both the PBF and PEF stockpiles are to be sampled for the purpose of in-house laboratory testing every day as a part of internal quality control processes. Should the operational team report that the online analyser has detected potential non-conformances, the Laboratory Technician will report back the results from the laboratory specifically addressing the reported detections.

The laboratory result takes precedence over the online analyser results. Should divergences between the Laboratory and the online analyser results endure, a recalibration process must be followed, as per PROC 34 - On-line Analyser Calibration.

The samples are to be taken and prepared in-house as per SOP 2130 - Routine PEF Sampling and SOP 2108 - Daily Sample Preparation.

The sample is to be in-house tested for the following parameters and compared against both specifications – Specification A and Specification B as detailed in Appendix 1.

- Gross Calorific Value (CV)
- Moisture (as H2O)
- Chlorine (Cl)
- Ash
- Particle Size Distribution

Assessment of the laboratory analysis against the specifications in Appendix 1 will determine which of the following categories the quarantined PEF falls into, and the associated course of action:

- PBF meets specification A
- PBF doesn’t meet Specification A
- PEF meets specification B
- PEF doesn’t meet Specification B

PBF Meets Specification A

In the event that the laboratory analysis determines that the PBF sample complies with Specification A requirements the material can be arranged for delivery to the appropriate customer.

PBF doesn't meet Specification A

In the event that the laboratory analysis determines that the initial PBF sample (Part A1 in SOP 2130) does not comply with Specification A requirements, the retain sample (Part A2 in SOP 2130) must be in-house tested as well. The average parameter results across the Part A1 and A2 must then be analysed.

In the event that the average results comply with Specification A requirements the material can be arranged for delivery to the appropriate customer.

In the event that the average results do not comply with Specification A requirements but comply with Specification B requirements, then all of the relevant PBF material can be moved into the PEF stockpile for mixing and eventual baling for export.

In the event that the average PBF results (Part A1 and A2) do not comply with Specification A requirements or Specification B requirements, and if the stockpile remains in compliance with the storage limitations, cancel all customer deliveries for the PBF. On the next day of production, conduct the same daily testing for PBF in-house and include these results in the average score calculation with the previous day's failed results. Assess the updated average against the Specifications in Appendix 1.

Repeat this stockpiling and continuous testing process until:

a) The average PBF laboratory results satisfy Specification A or Specification B requirements and arrange for delivery accordingly. Or
b) If the continuous testing does not yield a favourable result before the stockpile reaches its allowable limit, remove the failed PBF material from the PBF storage bay for reprocessing.

PEF Meets Specification B

In the event that the laboratory analysis determines that the PEF sample complies with Specification B requirements the material can be baled and arranged for export to the appropriate customer.

PEF doesn't meet Specification B

In the event that the laboratory analysis determines that the initial PEF sample (Part A1 in SOP 2130) does not comply with Specification B requirements, the retain sample (Part A2 in SOP 2130) must be in-house tested as well. The average parameter results across the Part A1 and A2 must then be analysed.

In the event that the average results comply with Specification B requirements the material can be arranged for delivery to the appropriate customer.

In the event that the average PEF results (Part A1 and A2) do not comply with Specification B requirements, and if the stockpile remains in compliance with the storage limitations, cancel baling of the material. On the next day of production, conduct the same daily testing for PEF in-house and

include these results in the average score calculation with the previous day's failed results. Assess the updated average against the Specification B.

Repeat this stockpiling and continuous testing process until:

a) The average PEF laboratory results satisfy Specification B requirements and arrange for the material to be baled and sent for export.
b) If the continuous testing does not yield a favourable result before the stockpile reaches its allowable limit, remove the failed PEF material from the PEF storage bay for reprocessing.

In the event that the laboratory analysis determines that the PEF does not comply with Specification B, and for whatever reason can't be salvaged through mixing or reprocessing, then all material will be disposed of at an EPA approved facility for the receipt of such material.

A non-conformance is to be raised, with a CAR (Corrective Action Request) form (Form 1) to be completed.

Appendix 1 Solid Recovered Fuel Specifications

Parameter	Specification A	Specification B
Gross Calorific Value (MJ/kg)	15	17
Moisture (as H_2O)	≤15.0% m/m	<15.0%
Chlorine (as Cl)	≤0.2% m/m	<0.8% m/m
Ash	≤15.0% m/m	<15.0%
Particle size	95% ≤ 50 mm in any direction	95% ≤ 50 mm in any direction
Total Fluorine, Bromine, Iodine (as F, Br, I)	≤0.2% m/m	Not specified
Sulphur (as S)	≤3.0% m/m	<3.0%
Bulk density (kg/m3) baled	Not specified	Not specified
K2O (%)	Not specified	Not specified
Na2O (%)	Not specified	Not specified
Mercury (Hg) (mg/kg)	≤1.2	<1.0
Cadmium (Cd) (mg/kg)	≤20	<100
Thallium (Tl) (mg/kg)	≤20	<100
Total Group II metals (mg/kg) Cadmium (Cd) + Thallium (Tl)	≤30	<100
Copper (mg/kg)	≤500	<3,000
Lead (mg/kg)	≤1000	<10,000
Zinc (mg/kg)		<30,000

Total Group III metals (mg/kg) Antimony (Sb) + Arsenic (As) + Cobalt (Co) + Copper (Cu) + Chromium (Cr) + Lead (Pb) + Manganese (Mn) + Nickel (Ni) + Vanadium (V)	≤3000	<10,000
PCB's (Polychlorinated	< 10 mg/kg	< 5 mg/kg
PCP's (Phencyclidines)	< 100 mg/kg	
Biomass Content	>90%	>50%

Appendix E CR-PR201 – Routine PEF Sampling Procedure and Sample Preparation

CR-PR201 - Routine PEF Sampling and sample Preparation

Purpose

The purpose of this procedure is to describe the sampling and sample preparation used to generate a representative sample of Processed Engineered Fuel (PEF), for the purpose of routine testing.

Scope

The procedure covers the requirements to obtain a representative test sample from the production process and reduce the sample quantity while ensuring that the composition of the final sample used for testing is not changed.

References

EN ISO 21637:2020	Solid recovered fuels – Vocabulary
EN ISO 21645:2021	Solid recovered fuels – Methods for sampling
EN ISO 21646:2022	Solid recovered fuels – Sample preparation

Definitions

PEF	Processed Engineered Fuel
LCV	Low Calorific Value
HCV	High Calorific Value
Increment	Quantity of PEF extracted in a single sampling operation
Lot	A defined quantity of PEF for which the quality is to be determined and to which contractual compliance applies
Sample A	Sample prepared for laboratory testing, approximately 2kg in mass
Sample Part A1	Sample prepared from Sample A for daily testing, approximately 500g
Sample Part A2	Sample prepared from Sample A for retest as required, approximately 500g
Sample B	Sample prepared and retained for Weekly Particle Size testing and Composite samples, approximately 2kg in mass
Sample C	Sample prepared and retained for the Monthly Composite sample, approximately 6kg in mass
Sample D	Sample prepared for Weekly Particle Size testing, at least 2.5kg in mass
Sample E	Sample prepared and retained for external laboratory testing, approximately 6kg in mass
Sample F	Sample prepared for Monthly Compositional analysis, approximately 6kg in mass

Introduction

The sampling principle under EN ISO 21645:2021 is that sampling shall be conducted by a means wherein every particle in the production process stream has an equal probability of being included in the sample.

The sampling principle under EN ISO 21646:2022 is that the composition of the sample taken from the production process stream shall not be changed during each step of the sample preparation process. Each sub-sample and the final sample used for testing shall be representative of the original sample.

General Requirements

Requirements for lot size, number of increments, increment size and sample size, are specified in EN ISO 21645:2021. This procedure interprets these requirements of the standard to provide practicable outcomes.

Lot size

EN ISO 21645:2021 recommends a maximum lot size of 1500 tonnes. An agreed lot size is a workable alternative without detriment to the final testing outcome. A practicable outcome is a monthly time-based lot size.

Number of increments

EN ISO 21645:2021 recommends a minimum number of increments of 24. With a time-based monthly lot size a sample taken daily over the course of a month leads to a minimum 20 sample increments which is a practicable outcome without detriment to the final testing outcome.

Increment size

EN ISO 21645:2021 makes no specific recommendation on increment size. What it does say is that the *"the size of an increment shall be large enough so that all particles have a chance to be part of the increment. Besides this for increments of material flows and conveyors the particles over the whole breadth of the material flow or conveyor shall have an equal chance of ending up in the increment"* the practicable outcome is that when sampling from a moving conveyor the full width and breadth of the material being conveyed must be captured which is then reduced by cone and quartering to the minimum sample size.

Sample size

EN ISO 21645:2021 provides a methodology for calculating minimum sample size. A formula is provided that takes into account the characteristic particle size, particle size distribution, particle shape, particle density and inhomogeneity of the material. Using this formula the minimum sample size calculates to 1.8 kg. A practicable outcome is a sample size of approximately 2kg. This is the sample size after cone and quartering the increment.

Tools and Equipment

- Heavy Duty storage container with lid (150L)
- Trolley Scale
- Shovel
- Laboratory Dispensing Scoop – 450ml
- Riffle splitter
- Sample bag and labels

- Sample trays
- Permanent marker

Safety

PPE – as per site requirements

- Notify all personnel of your presence in the area
- Use 2-way radio for all entry to the plant floor

Sampling

Samples shall be taken at a random time during each day of plant operation.

1. Before taking an increment sample, the process must have been in consistent operation for a minimum of 30 minutes.
2. An increment sample is to be taken from the entire flow from the relevant PEF finished product conveyor. The material can be captured in the bucket of a front-end loader. The quantity captured should not exceed 40 kg
3. The contents of the front-end loader bucket is discharged onto a clean area of the storage shed and mixed with a shovel then formed into a roughly circular heap.
4. Quarter the heap using the shovel and transfer one quarter to the heavy duty storage container, at least 8kg

Sample Preparation

Transfer the sample back to the laboratory and use the cone and quartering method to further reduce the sample size

1. Place the sample on a clean, hard surface.
2. Shovel the sample into a conical pile, placing each shovelful on top of the preceding one in such a way that the PEF runs down all sides of the cone and is evenly distributed and different particle sizes become well mixed.
3. Repeat this process three times, forming a new conical pile each time.
4. Flatten the third cone by inserting the shovel repeatedly and vertically into the peak of the cone to form a flat heap that has a uniform thickness and diameter. The flat heap should be no more than 200mm high.
5. Quarter the flat heap along two diagonals at right angles by inserting the shovel head into the heap. See Figure 1.
6. Discard one pair of opposite quarters.
7. Repeat the coning and quartering process until a quarter of approximately 2 kg in weight is obtained.

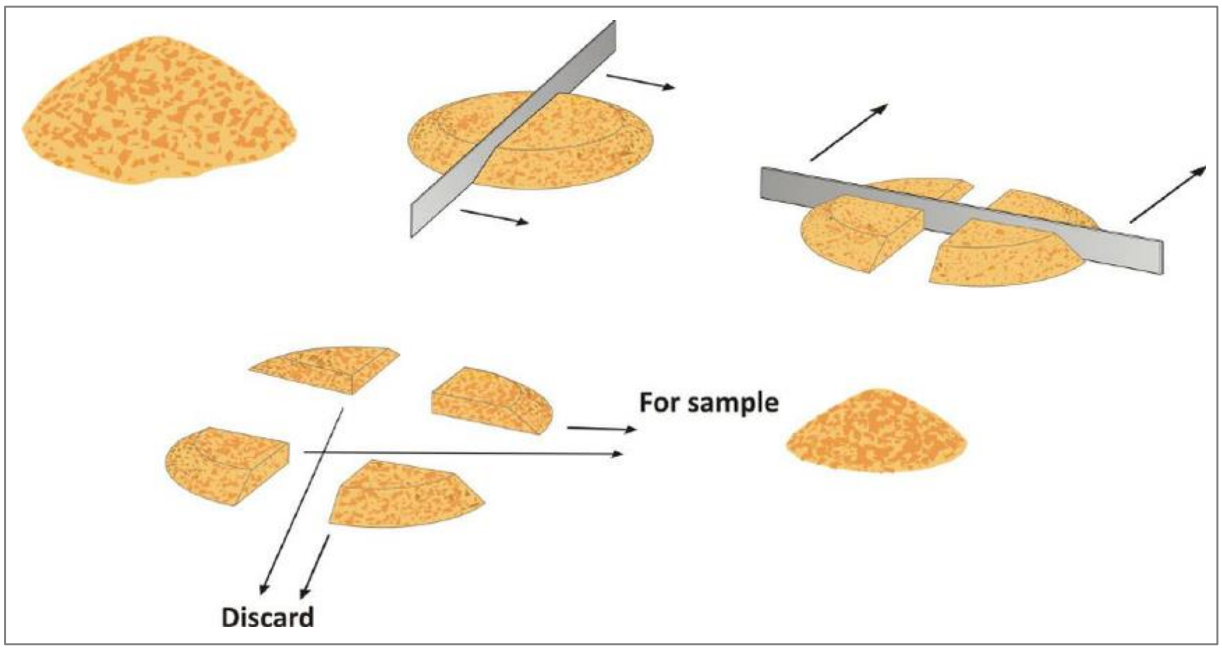

Figure 4 - Coning and Quartering Method

Daily Sample

Two opposite corners are taken to produce two laboratory samples; Part A and Part B, of approx. 2 kg each

- Part A is further size reduced, through the riffle splitter, into subsamples A1 and A2 so that both are approximately 500g each. A1 is submitted for the daily on-site lab analysis while A2 is retained in case a re-test is required. For the continuation of this process, refer to SOP 2108
- Part B is retained to produce the Weekly Particle Size and Composite samples

Weekly Sample

At the end of each week the daily samples are combined to form two weekly samples. With at least six daily samples per week, Part C is approximately 6kg and Part D is approximately 3kg.

- Part C is retained to produce the Monthly Composite sample
- Part D is submitted for the weekly particle size measurement

The daily samples must be thoroughly mixed in the cement mixer to form a homogeneous sample. Coning and quartering is then used to produce two opposite quarters, of approximately 3kg each, that are combined to make Part C a total of approximately 6kg.

The remaining 2 quarters of approximately 3kg each, are re-combined and are applied to the riffle splitter to produce Part D. Part D must be at least 2.5kg to be submitted for the particle size test. Part C and D are sealed in separate sample bags and marked with the appropriate identifiers. These bags are then stored in the laboratory fridge.

When the end of month and calendar week don't finish together the following practice applies:

For the last week of such months, Sample B must be doubled (2+2kg = 4kg) so that half can combine with the closest week of the relevant month to complete the composite (Sample B1) and the other half can go towards the weekly PSD Analysis (Sample B2).

Example - when the last day of the month is a Wednesday: B1 from Mon-Wed combine with the daily samples from the week before, to make the final weekly composite for that month (Sample C). B1 from Thurs-Sun eventually combine with the daily samples from the first full-week to come, which will result in first weekly composite for the new month (Sample C). B2 from Mon-Sun are then combined and then coned and quartered to make the PSD Analysis Sample (D).

Monthly Sample

At the end of each month, the weekly samples are combined to form two monthly samples, Part E and Part F of approximately 6kg each.

Part E is submitted for external testing
Part F is submitted for compositional analysis

The weekly samples must be thoroughly combined and mixed in the cement mixer, for at least 3 minutes, to form a homogeneous sample. Coning and Quartering is then used to produce four quarters of approximately 6kg each. Two opposite quarters are discarded. One of the remaining two quarters is used to form Part E and the other Part F. Both monthly samples are sealed in separate sample bags and marked with the appropriate identifiers. These bags are then stored in the laboratory fridge.

Note: All samples shall be placed into separate sample bags and sealed, with the following identification on each sample bag:

- Date and time of sampling
- Sample material
- Sample weight
- Sample Identification
- Source of Supply
- Name of person performing sampling
- Sampling performed in accordance with EN ISO 21645:2021, EN ISO 21646:2022

Labelling

Label all samples as per the CRRRF Sample ID Plan

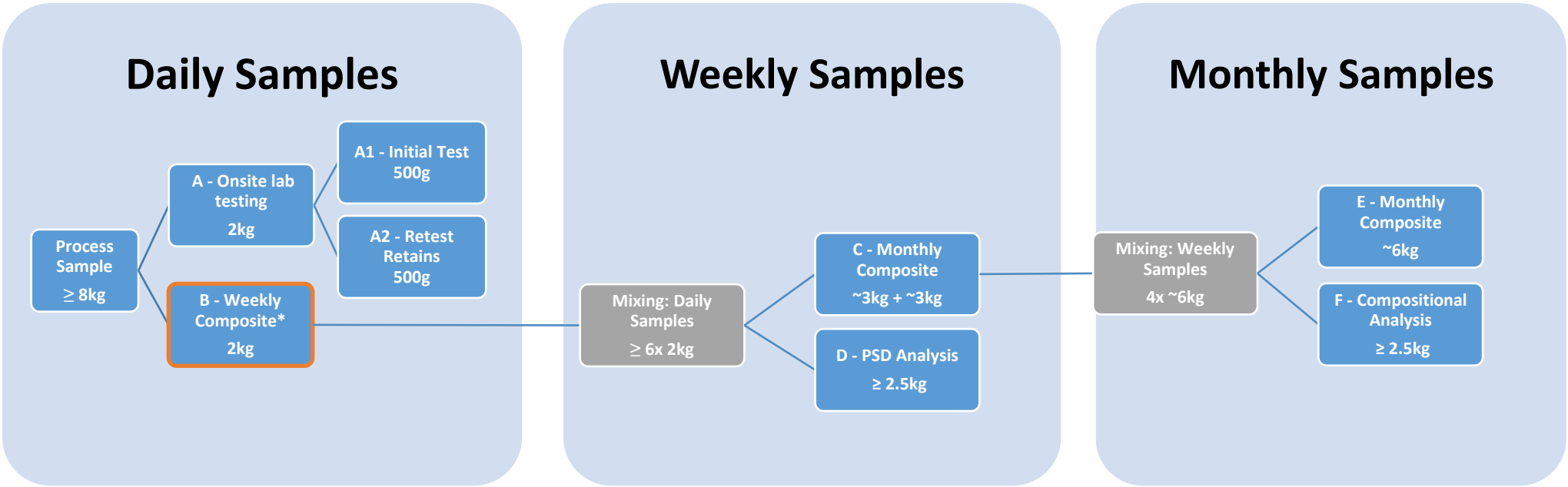

Figure 5 - Sampling process flow diagram

Appendix F – Test Methods

Test Methods

Parameter	Reporting unit	Test Method
Gross Calorific value	MJ/kg	I.S. EN 15400:2011
Ash	%	I.S. EN 15403:2011
Moisture	% H2O	I.S. EN 15414:2011
Chlorine	% Cl	I.S. EN 15408:2011
Fluorine	% F	I.S. EN 15408:2011
Bromine	% Br	I.S. EN 15408:2011
Iodine	% I	I.S. EN 15408:2011
Sulphur	% S	I.S. EN 15408:2011
Potassium	% K_2O	I.S. EN 15410:2011
Sodium	% Na_2O	I.S. EN 15410:2011
Mercury	mg/kg Hg	I.S. EN 15411:2011
Cadmium	mg/kg Cd	I.S. EN 15411:2011
Thallium	mg/kg Tl	I.S. EN 15411:2011
Copper	mg/kg Cu	I.S. EN 15411:2011
Lead	mg/kg Pb	I.S. EN 15411:2011
Antimony	mg/kg Sb	I.S. EN 15411:2011
Arsenic	mg/kg As	I.S. EN 15411:2011
Cobalt	mg/kg Co	I.S. EN 15411:2011
Chromium	mg/kg Cr	I.S. EN 15411:2011
Manganese	mg/kg Mn	I.S. EN 15411:2011
Nickel	mg/kg Ni	I.S. EN 15411:2011
Vanadium	mg/kg V	I.S. EN 15411:2011
Polychlorinated biphenyls	mg/kg PCB	SW846 USEAP
Phencyclidines	mg/kg PCP	SW846 USEPA
Particle Size 50 mm, 35 mm	% passing 50 mm % passing 35 mm	I.S. EN 15415-1:2011

Appendix G – Layers of Control

ResourceCo

ResourceCo has a long history of the manufacture of PEF for use as alternative fuel in cement kilns.

Adelaide:

Working closely with Adelaide Brighton Cement Limited, ResourceCo developed Processed Engineered Fuel (PEF) as a partial replacement for fossil fuels in the Adelaide Brighton cement kiln. The process harnessed the energy contained in combustible material that would have traditionally gone to landfill and resulted in the commissioning of Australia's first PEF manufacturing plant in South Australia in 2007.

Malaysia:

ResourceCo is an industry leader in waste recycling and waste management in Malaysia and Asia. It is a pioneer in the region for converting commercial and industrial waste into alternative energy; specifically, alternative fuels for the cement industry.

ResourceCo own the region's first waste to energy processing plant in Ipoh Malaysia, designed for the production of Processed Engineered Fuel (PEF). ResourceCo is in a long-term partnership to supply Lafarge Malaysia - a leading global cement manufacturer with approximately 70,000 tonnes per annum of alternative fuels for its cement kilns.

ResourceCo's approach to minimise any potential environmental impact or harm to human health by customers using PEF in their cement kiln involves six levels of risk protection as follows:

Customer Pre-Qualification

All potential waste customers will be required to be pre-qualified before being allowed to bring waste to the facility. This pre-qualification process will determine if the potential customers' waste meets the approved acceptance criteria for the site, whether it will enable high quality PEF products to be produced, and which category it meets for the PEF processing criteria.

Refer to attached document:

PROC 28 – *Incoming Waste Customer Pre-Qualification Procedure*

Waste Screening and Acceptance

1. Screening

   A comprehensive waste screening process is undertaken prior to receipt of all incoming waste.

   As outlined in Section 3 of the EfWMP, when a vehicle enters the weighbridge, the Weighbridge Operator will check with the driver if the waste meets the acceptance criteria and will visually inspect the load for waste types not accepted or to be excluded from the production process. If part or all of the load is identified as not be approved for tipping in the facility the truck will not be unloaded and will be directed to leave the site immediately. The Weighbridge Operator will also ensure that all

waste that is controlled under a tracking system has the appropriate documentation prior to acceptance at the site.

If the waste meets the acceptance criteria then the waste delivery truck will be directed to the waste tipping area inside the manufacturing building. Once the load is tipped the Waste Receival Inspection Officer will inspect the load for waste types not accepted or to be excluded from the production process, and to ensure that all waste that is controlled under a tracking system has the appropriate documentation prior to acceptance at the site.

Wastes that are not able to be accepted will either be sent back out of the site on the same waste delivery truck (if it is able to be) or removed from site as soon as possible by a licenced collector at the customers expense (if the incoming waste truck has left the site or if it is not able to be reloaded). Item 3 below outlines the approach to handling and disposal of hazardous materials such as asbestos, sharps and chemical/biological materials that, despite the waste acceptance procedures, have been delivered to site.

2. Monitoring

   As outlined in Section 3 of the EfWMP, the following details will be recorded and kept on file for all incoming waste received on the site:

   - Quantity, type, and source of waste
   - Date and time of receival
   - PEF processing criteria category
   - Copies of all documentation relating to tracking for controlled waste brought to the site
   - Details of any hazardous or other prohibited materials (including asbestos) brought to the site, along with handling and disposal activities undertaken and a record of any related documentation

   Each vehicle load of PEF dispatched from ResourceCo's facility shall be assigned a transport certificate detailing the following.

   - Delivery date.
   - Time of departure.
   - Description of the Goods (e.g., Solid Recovered Fuel).
   - Gross/tare weights of the delivering/exporting vehicle.
   - Vehicle registration number; and
   - Unique reference number assigned to the load.

3. Hazardous Materials

   As outlined in Section 3 of the EfWMP, any specific waste types not permitted to be accepted into the facility will be immediately rejected from the site where safe to do so and staff will be trained to ensure that these materials are first quickly identified and secondly safely removed from the waste stream.

   Specific management techniques for key hazardous waste types are provided below.

Asbestos

The following will be implemented to manage the potential for asbestos in the waste stream:

- Traffic control/waste inspector on tipping floor during operational hours.
- Direct education with the customer base to ensure that only materials that are asbestos free will be accepted at the site. This is particularly focussed upon in the pre-qualification process with a potential new customer.
- Well positioned, appropriate signage at the entrance, weighbridge on weight dockets and at the drop off point.
- Asbestos identification training for all relevant staff on site.
- Safe asbestos management and removal training for all relevant staff on site.
- Safe asbestos management and removal procedures are outlined in the Asbestos Management Plan (PROC 204).

Sharps and medical waste

Sharps and medical waste identification training for all relevant staff on site. Refer to PROC 205 Hazardous Materials Response Management Plan

Hazardous Chemicals identification training for all relevant staff on site. Refer to PROC 205 Hazardous Materials Response Management Plan

Oil spill kits will be kept on site at all times and staff will be trained in its appropriate use.

Chemicals will be managed on an as needs basis with supervisors with dangerous goods training quickly assessing if the spill can be safely managed internally of if external assistance is required i.e., NSW Fire and Rescue.

Characterization / baseline testing

Characterization or baseline testing is used to identify and quantify chemicals or other attributes, and to determine the physical properties of a material, to provide scientific understanding of the said engineered material. A characterization study is designed to determine how a process performs under actual operating conditions, to capture the variations in materials and operations, and to understand process capability. Knowing process capability allows one to predict, quantitatively, how well a process will meet specifications.

The comprehensive initial (baseline) sampling and testing of the PEF will enable the characterization of the PEF in terms of its typical composition and variability. This will allow for a quantitative assessment of the PEF and knowing its ability to meet specification, and how well the PEF will meet specification, prior to its use by new customers. Based on ResourceCo's experience and history of PEF manufacture, the characterization study will demonstrate that the PEF will be well within specification, and the process is very capable of manufacturing PEF to the specification, providing reassurance that the risk of producing out of specification PEF is low.

Routine testing

Routine testing of the PEF is undertaken to demonstrate ongoing compliance with the specification, and confirms the product's ability to meet specification, and how well it meets specification, on an ongoing or regular basis.

Monitoring

The monitoring of the on-line analyser, and analysis of the on-site laboratory results will allow changes to be implemented both short term and long term to prevent PEF from going out of specification. As detailed in Section 8.1 of the EfWMP, real time feedback from the on-line analyser will enable continual refinement of the process to ensure that the key parameters remain within specification.

If monitoring of the on-line analyser and analysis of on-site laboratory results demonstrate abnormalities in the PEF, then a one-off sample may be sent to an independent NATA accredited laboratory for testing of all the parameters specified in the specification, to demonstrate compliance with the specification.

Trend Analysis

Trends in the composition of the PEF material will be monitored through:

- On-line analyser
- Spread sheet analysis.

Analysis of data, particularly,will:

- Capture the variations in the PEF, and to understand process capability.
- Capture changing trends in the composition of PEF over time.

This analysis will enable continual refinement of the process to ensure that all parameters remain within specification.