



Adelaide Brighton Cement Ltd

an **ADBRI** company

adelaidebrighton.com.au

Adelaide Brighton Cement Ltd
ABN 96 007 870 199
PO Box 77
Port Adelaide SA 5015
+61 8 8300 0300

RDF Recovered Product Plan Birkenhead Works (EPA licence 1126)

November 2020

Prepared by: Craig Mackenzie
Sustainability/Environmental Engineer,

Approved by: Matthew Dixon
Technical Manager

Paul Brewer
SA Operations Manager

Issued to: Environment Protection Authority
211 Victoria Square
Adelaide SA 5000

INTRODUCTION

The Recovered Products Plan (RPP), has been reviewed and revised by Adelaide Brighton Cement Ltd (ABC) as part of the approval by the Environment Protection Authority (EPA) for the increase in the feed rate of “Refuse Derived Fuel” (RDF), to a maximum of 25 tonnes per hour (with a maximum of 20% plastic contamination by weight).

Trials were conducted and a post-trial report submitted to the EPA according to schedule W-1 of Birkenhead site licence 1126.

The Recovered Product Plan has been prepared in alignment with the Refuse Derived Fuel Standard, February 2010 (the RDF Standard) referenced in the Environment Protection (Waste to Resources) Policy 2010.

The Recovered Products Plan demonstrates that the supply and use of the RDF complies with the RDF Standard. This is a summary document, following extensive tests and approvals conducted over several years, and is not intended to be a technical document. Listed in section 9 below are technical documents that are available for review if required.

MANAGEMENT OF THE RECEIVAL AND USE OF REFUSE DERIVED FUEL

1. USE OF RDF IN THE BIRKENHEAD CEMENT KILN

Cement kilns are not disposal routes for waste. Cement production is a carefully controlled process, where exact end product specifications must be met for quality and safety reasons. Waste materials, that have been processed into a homogeneous RDF meeting defined quality specification, will only be accepted or considered for use if there is sufficient evidence of energy or mineral content recovery. ABC believes this requirement is aligned with the EPA Waste Hierarchy, as described in the RDF standard.

Fundamentally, ABC commenced the burning of RDF, and will continue to try to maximise its usage, for economic reasons. Best practice cement kilns in Europe achieve over 80% fuel substitution rate using RDF. Based on European experience, there is substantial opportunity for ABC to increase its usage of RDF. In summary, the outcomes are as follows:

- The energy recovered from the RDF reduces natural gas consumption, giving substantial cost savings and environmental benefits
- The high process temperatures and long residence time ensures total destruction of any organic components of the RDF
- Any inorganic components of the RDF are incorporated into the kiln product, usefully replacing as-mined raw materials and giving further cost savings
- RDF has a significant content of biomass materials. This is considered to be renewable energy and hence reduces the sites carbon footprint
- The RDF and the process raw materials, primarily limestone, are in physical contact within the kiln process. This gives a natural scrubbing action, with heavy metals captured and incorporated into the kiln product
- RDF has a lower flame temperature than natural gas. This reduces the generation of thermal NOx
- Rapid quenching of the process gases, for energy recovery purposes, ensures no possibility of “de novo” formation of dioxins and furans

2. RDF INPUTS

ABC will only accept RDF from suppliers who have an approved Environmental Management Plan (EMP), which must conform with the requirements of the RDF Standard and be approved by the EPA. Details of how the suppliers manage their inputs to produce RDF to the ABC standard (this RPP), will be detailed in their EMP.

The RDF will be produced at Material Recovery Facilities that are receiving inputs from two main sources:

1. Construction and Demolition: Multiple bins and source separation maximises recycling from this source of waste. However, there is a residual mixed waste, particularly as a result of demolition activities, that cannot economically be post-separated at the point of generation
2. Commercial and Industrial: This stream is primarily mixed, dry waste from a wide range of commercial producers. These producers have multiple bins to keep their disposal costs to a minimum. As a result, the only waste stream currently landfilled is comingled and contains large amounts of discarded goods made of composite materials and mixed packaging, both of which cannot be economically recycled

The input streams inevitably contain varying quantities of mixed plastics. This is beneficial to ABC, as plastics have a higher calorific value (CV) than the various biomass-based materials. However, ABC insists that its suppliers do not add neat streams of recyclable plastic to the RDF. ABC recognises that there is a legislative requirement to support the waste hierarchy and does not believe this practice would do so, with a material that could be "Recycled" being used in the lower category of "Recovery".

3. ACCEPTANCE CRITERIA

Approved RDF suppliers must comply with a specification, which will define quality limits expected and will clearly specify exclusions. Table 1 below outlines the various characteristics of the RDF and commentary on the impact for ABC.

Table 1: Characteristics of RDF

Characteristic	Limits and Discussion
Calorific Value (CV)	Fuel replacement is the purpose for using RDF. In accordance with the RDF standard, and EPA approvals already granted, the material will have a suitable net calorific value
Wood and other cellulose-based materials	This must be the major component of the RDF. High levels ensure acceptable CV and reduced carbon footprint
Plastic	Various mixed plastics will improve CV but ABC will insist neat recyclable plastic streams are not added to the RDF. Complete destruction of these materials has been verified in previous plant trials. The plastic contamination (content) is limited to a maximum of 20% by weight.
Moisture Content	As specified in the RDF standard, moisture is undesirable. A maximum limit will be specified to ensure CV requirements are achieved.

Characteristic	Limits and Discussion
Inorganic Material	Beneficial as raw material inputs reduce. However, it is preferable to minimise as CV is reduced, and so a maximum level will be specified in accordance with EPA approvals already given.
CCA Timber	It is inevitable that some CCA timber ends up in the RDF. However, ABC will insist that no CCA timber will be purposely added and, in all cases, the level must be less than 5%.
Heavy Metals	Limits are imposed on the input level of all heavy metals specified in schedule Y of the site licence. ABC has demonstrated that heavy metal emissions comply with the EPP (Air Quality) 2016 ground level concentrations.
Physical Properties	In order to ensure rapid and complete burnout, the maximum particle size of the RDF will be specified and will conform with EPA approvals already given.
Homogeneity	Inputs to the kiln process are carefully controlled to ensure process stability, efficiency and product quality. Like any other raw material, RDF must be produced to ensure process stability. It is critical that the variability of RDF is comparable to as-mined raw materials

4. EXCLUSIONS

Some waste materials are not suitable for incorporation into RDF and will be excluded. The onus is on the RDF supplier to specify, through their EMP, how they will exclude these materials from the RDF. With reference to section 4 of the RDF standard, specific exclusions are listed in the following table 2, with commentary when necessary.

Table 2: Materials Excluded from RDF

Material	Discussion
Asbestos	Asbestos must be excluded to minimise the risk of exposure in handling and storage before the kiln
CCA Treated Timber	As mentioned above, some content is inevitable but CCA timber must not be purposely added
Wastes with high mineral content	As the intent of RDF usage is to maximise CV, a maximum mineral content will be specified
Wastes with a higher order use according to the waste hierarchy	ABC insists that suppliers do not add materials with a higher order reuse. In particular, neat recyclable plastic will not be added just to maximise plastic content
Sodium and Potassium	These alkali metals have adverse process effects and must be limited. The practical outcome is that levels of high alkali materials must be minimised in the RDF by managing supplier inputs

Material	Discussion
Sulphur and Chlorine	Oxidation of chemicals containing sulphur and chlorine, and subsequent bonding with calcium, sodium and potassium, ensures the emission of associated compounds is negligible. However, in order to minimise adverse process effects, levels of these elements are controlled by managing supplier inputs
Other exclusions	All other prohibited wastes listed in section 4 of the RDF Standard are specifically excluded from the RDF. Additionally, there will be no direct addition of green waste

5. RDF QUALITY CONTROL AND QUALITY ASSURANCE

ABC ensures RDF quality meets its requirements by sampling and testing at the Birkenhead site. ABC has a NATA registered laboratory and suitably qualified personnel on the site and has implemented sampling and testing plans and protocols. Summary details as follows:

- Samples are collected from the on-site storage facility by ABC personnel
- Every sample is tested for moisture and inorganic content, this allows producer conformance to be monitored and calorific value to be verified
- Selected samples are tested for size, plastic content and heavy metal concentration
- All testing is completed by NATA registered laboratories. A permanent record of all test results is held in the ABC laboratory management system
- All results are reported to the RDF supplier and form a standing topic for RDF supplier management meetings. Additionally, excursions are followed up immediately, with expectations of supplier corrective action

6. TRANSPORT AND STORAGE

ABC expects the RDF supplier to maintain appropriate levels of stocks, with transport services being provided by a third party. The RDF receipt facility at Birkenhead is programmed so that vehicles cannot be unloaded unless the facility doors are closed, to prevent the egress of any fugitive dust. Important issues are described in table 3 below.

Table 3: Management of Transport and Storage

Issue	Requirement
Vehicle Selection	Use of suitable roadworthy, rapid loading and unloading trucks. A major consideration must be covered loads and suitable trailer maintenance, to ensure no fugitive emissions of RDF
Weighbridge Access	The RDF supplier will ensure the weight of every load leaving their site on the transport vehicles is recorded and reported to ABC
Traffic Management	Delivery of RDF must comply with the ABC site management plan for traffic control and contract conditions agreed with the RDF transport provider

Issue	Requirement
Stockpile Management	ABC has two fully enclosed bunkers on site that have the storage capacity for approximately one day of RDF usage. There will be no other RDF storage on site
ABC Reveal Facility	This facility is highly automated and has programming interlocks to prevent fugitive dust from entering the local environment. Additionally, the transport company must report all problems, and clear up any spillage from vehicles, before exiting the facility. Their performance in this area is audited regularly by ABC personnel.

7. ENVIRONMENTAL MONITORING

Twice per year, stack testing is undertaken for a range of pollutants, including heavy metals, PAHs, dioxins and furans. During the test work critical kiln operating conditions, including rate of RDF burning, are recorded. ABC chooses to use an accredited external testing company to perform this specialist work. Results of stack testing are then modelled, by qualified external personnel, to determine ground level concentrations (GLC), which allows performance to be assessed against the South Australian EPA, Environment protection Policy (Air Quality) 2016.

Significantly more than a decade of this testing has been completed and reported to the EPA and the local community. In all cases, pollutants are a tiny fraction of the GLC guidelines. International industry experience has shown that the emission of analytes of environmental concern from kilns burning RDF is not statistically different to the emissions from kilns not burning RDF. ABC has confirmed this in previous reports to the EPA. The data proves that all organic components of RDF are destroyed, and that the inorganic fraction is incorporated into the kiln products.

8. ASSESSMENT OF NEW RDF SUPPLIERS

ABCL will only accept RDF from suppliers who have an approved EMP. Such an EMP must conform with the requirements of the EPA RDF Standard and be approved by the EPA. Once this criterion has been satisfied, ABC will conduct trials with the new RDF and assess the supplier performance with respect to the requirements specified in tables 1, 2 and 3 above.

9. DOCUMENTATION

ABC holds electronic copies of all documentation produced to the EPA over the history of the RDF project. Any of these documents are available for review as required. In summary, the documentation consists of:

- Pre-trial and post-trial submissions to the EPA for the 10t/h, 15t/h, 20% plastic trials
- The 25t/h pre-trial and post-trial reports, 25 t/h trial additional information report
- Stack reports and stack modelling reports for each of the trials listed above
- Presentations made to the local community
- All regular twice-yearly stack monitoring and modelling work done according to the requirements of the site licence