

Standard for the production and use of Refuse Derived Fuel



Environment Protection Authority



Standard for the production and use of Refuse Derived Fuel

For further information please contact:

Information Officer
Environment Protection Authority
GPO Box 2607
Adelaide SA 5001

Telephone: (08) 8204 2004

Facsimile: (08) 8124 4670

Free call (country): 1800 623 445

Website: <www.epa.sa.gov.au>

Email: <epainfo@epa.sa.gov.au>

ISBN 978-1-921495-07-6

February 2010

Disclaimer

This publication is a guide only and does not necessarily provide adequate information in relation to every situation. This publication seeks to explain your possible obligations in a helpful and accessible way. In doing so, however, some detail may not be captured. It is important, therefore, that you seek information from the EPA itself regarding your possible obligations and, where appropriate, that you seek your own legal advice.

© Environment Protection Authority

This document may be reproduced in whole or part for the purpose of study or training, subject to the inclusion of an acknowledgment of the source and to it not being used for commercial purposes or sale. Reproduction for purposes other than those given above requires the prior written permission of the Environment Protection Authority.

Table of contents

Abbreviations	1
Summary	3
PART ONE INTRODUCTION	5
1 Introduction	6
1.1 Scope	7
1.2 Process outline	7
1.3 Using this standard	9
PART TWO EPA POLICY AND BACKGROUND INFORMATION	10
2 EPA statutory framework	11
2.1 Objects of EP Act and role of the EPA	11
2.2 Regulatory tools provided by the EP Act	11
2.3 South Australia's Waste Strategy	12
3 Key considerations for beneficial production and use of WDF	13
3.1 Support for the waste hierarchy	13
3.2 An immediate market	13
3.3 A risk-based approach	14
3.4 Prevention and minimised potential for harm	15
3.5 Demonstration of beneficial purposes	16
3.6 No dilution of waste or chemical substances	17
3.7 A consistent approach to regulation	17
PART THREE TECHNICAL INFORMATION AND APPROVAL REQUIREMENTS	18
4 Wastes and suitability for use as WDF	19
4.1 Prohibited wastes	19
4.2 Inputs versus outputs	20
4.3 Important characteristics of RDF	21
5 Approvals and licensing	24
5.1 Pilot trial	24
5.2 EPA licensing trial	24
6 EPA submissions—required information	26
6.1 Minimum information to be submitted to the EPA	26
6.2 General responsibilities	28
PART FOUR REFERENCES	30
7 Further information	31
EPA guidelines	31
Other publications	31
National	32
Legislation	32
8 GLOSSARY	33

Appendix 1	Material sampling, assessment and certification requirements.....	38
Appendix 2	Checklist	41

List of figures

Figure 1	Process for developing an RDF including obtaining approvals.....	8
Figure 2	RDF and the waste hierarchy.....	12

List of tables

Table 1	Prohibited wastes	19
Table 2	Characteristics of RDF	22

Abbreviations

AQIS	Australian Quarantine and Inspection Service
BATEA	best available technology economically achievable
CCA	copper chromium arsenic
CO	carbon monoxide
CO₂	carbon dioxide
DGLC	design ground level concentrations
EP Act	Environment Protection Act 1993
EPA	South Australian Environment Protection Authority
EPP	environment protection policy
HCL	hydrogen chloride
NATA	National Association of Testing Authorities, Australia
NGER	National Greenhouse and Energy Reporting
NO_x	oxides of nitrogen
OCPs	organochlorine pesticides
PAHs	polyaromatic hydrocarbons
PCBs	polychlorinated biphenyls
PIRSA	Department of Primary Industries and Resources SA
PM₁₀	particles with an equivalent aerodynamic diameter of less than 10 micrometres, as passed by a size selective inlet
PVC	polyvinyl chloride
QA/QC	Quality Assurance (eg including independent review or audit of methods and testing of samples) and Quality Controls (eg procedures including sampling, monitoring and management)
RDF	refuse derived fuel
RPP	recovered products plan
SO_x	oxides of sulphur
W2R EPP	Environment Protection (Waste to Resources) Policy 2010
VOCs	volatile organic compounds

Summary

This standard describes the information and processes that are required by the South Australian Environment Protection Authority (EPA) to support resource efficiency and the beneficial recovery of energy from waste by the combustion of refuse derived fuel (RDF) in an industrial process.

The standard takes a risk-based approach and aims to provide clarity to industry and the broader community on the issues that need to be addressed to demonstrate the suitability of both the production and the use of RDF, including quality assurance and quality control measures, beneficial properties and minimising the risk of harm.

All proposals for production and use of RDF will need to be approved by the EPA.

This standard will be used to assess proposals and help determine compliance with the *Environment Protection Act 1993* (EP Act) to ensure that proposals constitute genuine energy recovery activities, as distinct from waste disposal.

It is the responsibility of the proponents to ensure that they comply with all requirements of this standard.

This standard is designed to minimise the risk of potential harm to the environment and human health and will form an approved standard and specification for the purposes of the *Environment Protection (Waste to Resources) Policy 2010* (see clause 4). However, the EPA does not endorse or guarantee that use of a refuse derived fuel will confer any benefit stated by the producer. All obligations and responsibilities imposed by the EP Act continue to apply and a proponent may still be liable if harm arises from the use of refuse derived fuel.

Failure to meet the requirements of this standard may result in the EPA determining that the material being used remains a waste and is subject to regulation as such in accordance with the EP Act.

PART ONE

INTRODUCTION

1 Introduction

The South Australian Environment Protection Authority (EPA) promotes the sustainable management of waste¹ materials and recognises that particular waste streams may be suitable for beneficial recovery as refuse derived fuel (RDF). However, there are potential risks to the environment² and human health associated with the production and use of RDF. Therefore, in order for the EPA to support the sustainable³ production and use of RDF, and for the use of RDF to be considered a recovery process rather than the disposal of waste, proponents are required to address the considerations and comply with the processes outlined in this standard.

This standard has been drafted to support the objects of the *Environment Protection Act 1993* (EP Act)⁴ and in order to complement the *Environment Protection (Waste to Resources) Policy 2010* (W2R EPP). The EP Act and W2R EPP define waste and set out regulatory requirements for waste management activities. To support the beneficial reuse, recycling and recovery of wastes, the W2R EPP provides a mechanism by which a waste that meets specifications or standards published or approved in writing by the EPA will be considered a product (instead of a waste). The EPA will decide whether the material is a RDF product or a waste when considering whether there has been a breach of the General Environmental Duty⁵, the W2R EPP or other relevant provisions of the EP Act. The standard will also assist in determining the licensing requirements for activities that include the production and combustion of RDF.

This standard, including its requirements for submission of information to and approval from the EPA, will form a published standard under the W2R EPP [see clause 4(a) of the W2R EPP]. When the W2R EPP becomes operational⁶, materials that meet the standard, including composition specifications and all handling and approval obligations, will be considered products rather than wastes.

In the meantime, there will be a transitional period where the existing processes will remain in place for facilities wanting to receive and use RDF to apply for a licence or limited purpose declaration⁷ to be able to receive, store, treat or dispose of that waste. Facilities that accept waste for the purposes of producing RDF will be licensed under activity 3(3) Waste or Recycling Depot of Schedule 1 of the EP Act. Facilities that use RDF will require a licence for their main activity and possibly for activity 8(2) Fuel Burning.

This standard outlines a risk-based approach to address the issues and considerations of producing and using RDF. Key components of the standard include the:

- information that must be provided to the EPA to ensure an appropriate level of regulation
- need to demonstrate the suitability of a proposal including full assessment of risks and the requisite quality assurance and quality controls (QA/QC)
- need to demonstrate genuine recovery of energy from waste
- requirement to undertake stakeholder consultation as a vital part of any proposed production and use of RDF.

¹ The term waste is defined under clause 3(1) of the EP Act and is reflected in the Glossary.

² The term environment is defined under clause 3(1) of the EP Act and is reflected in the Glossary.

³ Principles of ecologically sustainable development are described under section 10 of the EP Act.

⁴ <www.austlii.edu.au/au/legis/sa/consol_act/epa1993284>.

⁵ Refer section 25 of the EP Act.

⁶ The W2R EPP will become operational on 1 September 2010.

⁷ In accordance with Part 6 and Schedule 1 of the EP Act.

1.1 Scope

This standard applies to both the production and the beneficial use of RDF to produce energy for an industrial process within a known market. Applications for RDF therefore need to identify the producer or supplier and the RDF user(s) and where both parties are newly undertaking the activities (production or use), then these should be submitted concurrently.

Raw untreated timber produced as firewood, and recycled oil that meets the specifications and standards set out in the *Product Stewardship (Oil) Regulations 2000* are recognised as legitimate fuels and are not subject to the requirements specified in this standard. Sawdust from untreated timber directly used as fuel within a sawmill activity is also acceptable and does not require specific assessment in accordance with this standard. This does not exempt these fuels from any other requirements under the EP Act or any other relevant legislation⁸.

This standard does not apply to fuels produced for or used in the domestic market (eg compressed sawdust logs produced from untreated timber).

1.2 Process outline

The flowchart in Figure 1 out the process that proponents need to follow in order to gain approval for the production and use of an RDF.

Figure 1 demonstrates the scenario where both the RDF user and producer are newly undertaking the activities. Not all aspects will need to be completed in the other scenarios, for example, when:

- the producer is newly undertaking an activity to supply RDF to an existing user (or the producer wants to change the RDF specification):
 - an application to the EPA as specified in this standard is required
 - the producer must clearly identify the user and demonstrate the suitability of the RDF
 - although the user already has approval, the user must demonstrate that the newly proposed RDF is suitable for use at their existing facility (either instead of or in addition to the currently RDF used).
- the producer exists and a new user wishes to undertake the activity of RDF combustion (or the user changes their combustion process):
 - the producer must provide the RDF specification details to the user and is not required to make an additional application to the EPA unless changes to the RPP are needed
 - the user must make an application to the EPA that identifies the supplier, demonstrates that benefit will be achieved and demonstrates that the proposed RDF is suitable for use at their facility.

⁸ The EPA may exclude other fuels from the requirements of this standard provided they are able to be traded as a standard commercial fuel and are subject to controls and standards such as nationally applicable regulations.

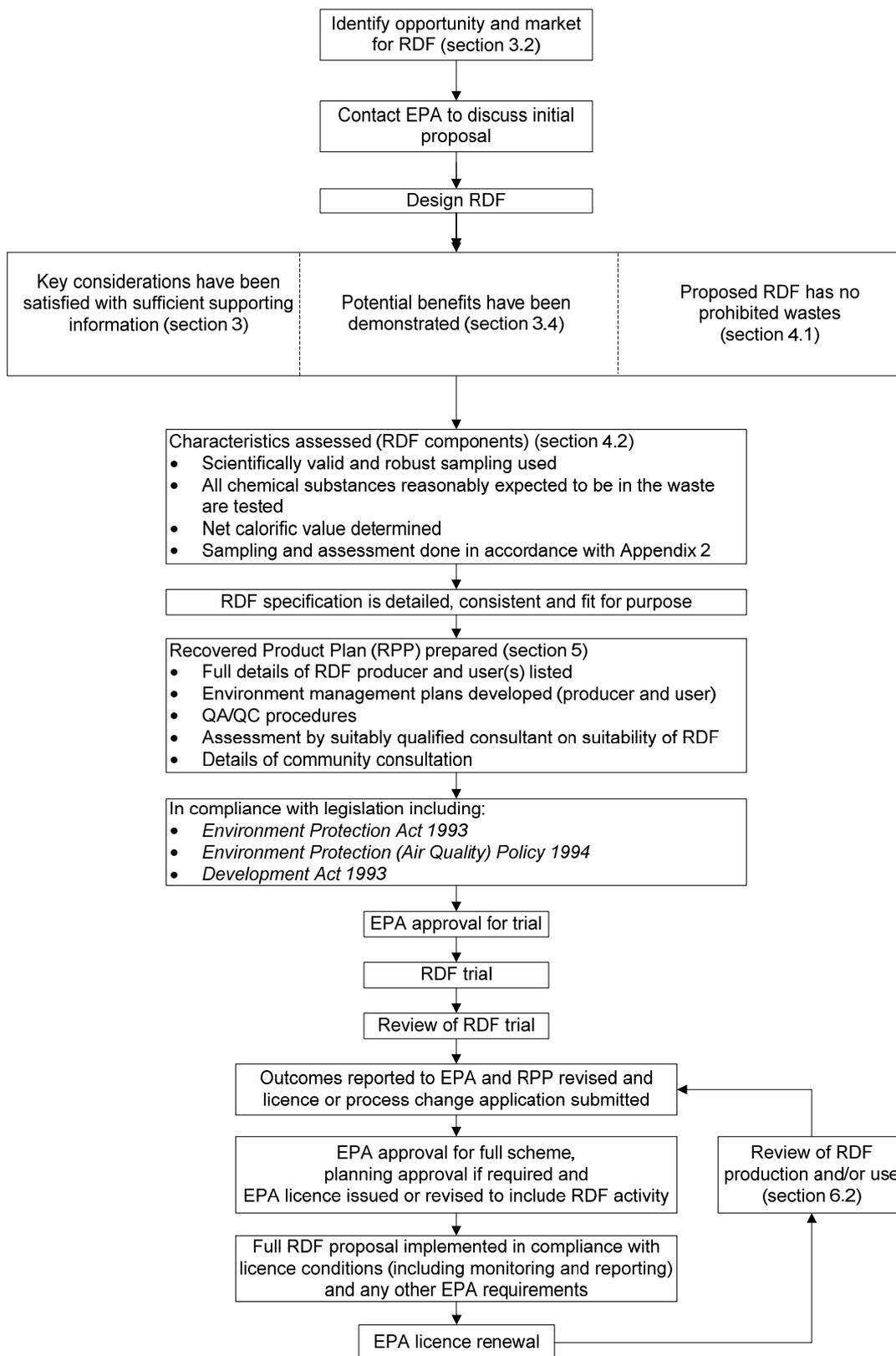


Figure 1 Process for developing an RDF including obtaining approvals⁹

⁹ Sections referred to within the flowchart reference sections in the standard.

1.3 Using this standard

This standard is divided into four parts. Part One (section 1) is the introductory information.

Part Two (sections 2 to 3) outlines relevant legislation and describes the principles and the factors that need to be considered for the EPA to support any proposal to produce and use RDF. This section includes clarification on why the factors are important.

Part Three (sections 4 to 6) includes a list of wastes prohibited from use in RDF and outlines the specific testing and approval requirements for the production and use of RDF.

Part Four (sections 7 and 8) is the reference section and includes sources for further information and a glossary.

PART TWO

EPA POLICY AND BACKGROUND INFORMATION

2 EPA statutory framework

2.1 Objects of EP Act and role of the EPA

The objects of the EP Act¹⁰ include to prevent, minimise and, where practicable, eliminate harm to the environment by regulating activities, products, substances and services that cause environmental harm by pollution or the production of waste¹¹. The role of the EPA is to administer the EP Act and to have regard to and seek to further its objects.

The EPA's key objectives in regulating waste recycling, reuse and recovery¹² are:

- to prevent or minimise the risk of harm to the environmental and human health; and
- to support the most preferable use of waste and secondary materials¹³ in accordance with the waste management hierarchy (Figure 2).

The EPA documents entitled *Waste management—regulatory framework and objectives* (2008) and *Waste-derived materials—guiding principles for determining approval processes and product standards* (2008) outline the regulatory and policy framework and the key principles that need to be considered in addressing waste recycling, reuse and recovery issues to ensure that the objectives are met.

The *EPA Position Statement on the Role of EPA in Attaining Sustainability* (2005) further outlines EPA's purpose as an environmental regulator and its contribution to achieving state Government policy including achieving sustainability.

2.2 Regulatory tools provided by the EP Act

The EP Act includes a range of provisions which allow the EPA to further the objects of the Act. These provisions include the general environmental duty¹⁴:

A person must not undertake an activity that pollutes, or might pollute, the environment unless the person takes all reasonable and practicable measures to prevent or minimise any resulting environmental harm.

The EP Act also specifies that certain activities¹⁵ must only be carried out under licence or other form of environmental authorisation granted by the EPA¹⁶. These activities include the receipt, storage, treatment or disposal of waste. Waste is defined in Part 1 of the EP Act and includes waste material whether it is of value or not. Facilities which accept waste for the purposes of producing RDF require a licence in accordance with activity 3(3) Waste or Recycling Depot of Schedule 1 of the EP Act. Facilities that use RDF will be required to be licensed for their main activity and possibly for activity 8(2) Fuel Burning.

The EP Act provides for the development of Environment Protection Policies (EPPs) which can set out detailed requirements for protecting particular aspects of the environment, or protecting the environment from particular activities. The EPPs contain penalties for the breach of mandatory provisions, relating to required behaviours or causing certain types of environmental harm.

¹⁰ Refer section 10 of the EP Act.

¹¹ The terms environmental harm, environment, activity, pollution/pollute/pollutant and waste are defined under clauses 3(1) and (5) of the EP Act and are reflected in the Glossary.

¹² These objectives were identified by the EPA following a review of its waste regulation activities in 2007.

¹³ This refers to secondary or residual materials resulting from waste processing or industrial activities.

¹⁴ Refer section 25 of the EP Act.

¹⁵ Refer Schedule 1 of the EP Act.

¹⁶ Refer Part 6 of the EP Act.

The W2R EPP provides clarification of the point at which a material resulting from the treatment of waste constitutes a product that is no longer waste. It provides, in effect, that a waste or a material resulting from the treatment of waste will not be considered a waste when:

- it meets specifications or standards published or approved in writing by the EPA or
- if no specification or standard applies, it is ready and intended for imminent use without the need for further treatment to prevent any environmental harm that might result from such use.

The EPA recognises that there may be acceptable and beneficial uses for waste including the production and use of RDF. Therefore, for the purposes of the W2R EPP ¹⁷, this will be the standard that will be used by the EPA in determining whether the material is a RDF product and no longer subject to regulation as a waste. However, until the W2R EPP is operational, the existing processes will remain in place for facilities wanting to receive and use an RDF to apply for licence or limited purpose declaration to be able to receive, store, treat or dispose of that waste.

Where RDF is produced or used contrary to this standard, the EPA will consider that it continues to be a waste and regulate it accordingly under the EP Act.

The *Environment Protection (Air Quality) Policy 1994* is also relevant to this standard and must be considered in the assessment of suitability of the production and use of RDF as it relates to potential emissions to air.

2.3 South Australia’s Waste Strategy

South Australia’s Waste Strategy 2005–2010 sets the overall framework and aims for sustainable waste management in the state. It aims for the diversion of waste, in accordance with the waste hierarchy (Figure 2), to more sustainable options. This means that the production and combustion of RDF, which is viewed as a recovery of energy activity, should be an alternative to disposal (the least preferable option) but should not be at the expense of more preferable options, including waste avoidance or closed loop recycling. However, RDF should only be used where it is safe and sustainable to do so. This standard therefore describes the requirements for demonstrating the suitability of RDF.



Figure 2 RDF and the waste hierarchy

¹⁷ See clause 4(a) of the W2R EPP.

3 Key considerations for beneficial production and use of WDF

This section outlines the EPA's position and rationale on the production and use of RDF. It describes the key considerations that must be addressed in proposals to produce and use RDF and will guide decisions made by the EPA in relation to RDF. The considerations are based on the EPA's Guiding Principles for waste-derived products¹⁸. This includes the need for RDF to be a replacement or supplement for an existing fuel being used in an industrial activity and the need to distinguish between combustion of RDF and the incineration of waste.

3.1 Support for the waste hierarchy

- The waste production should first be avoided or minimised.
- Where possible and feasible, segregate the waste at the source or at the processing facility to maximise the options for reuse or recycling of various components.
- Investigate opportunities higher up in the waste hierarchy (Figure 2), in preference to energy recovery from combustion of RDF.
- Ensure the proposed activity constitutes recovery by combustion of RDF rather than disposal of waste by incineration.

The EPA supports the waste hierarchy and proponents should be able to demonstrate that the waste proposed for production of RDF does not have a practical higher-order option according to the waste hierarchy (Figure 2). For example, avoiding the waste production.

Production of industrial waste should be minimised and the EPA encourages the adoption of cleaner production and eco-efficiency programmes for waste minimisation¹⁹. Proponents should also consider, based on risk, if treatment and/or disposal (eg to an authorised landfill) is the more appropriate waste management technique.

Production and combustion of an RDF is considered a recovery activity as it is the energy that is the key component being recovered from the waste (although subsequent recycling may occur where residual products of combustion may be incorporated into a product). Incineration of waste is considered disposal (further explained in section 3.5) and cannot be deemed use of RDF (refer section 3.6). Waste proposed for processing into RDF should only be from waste that would normally be destined for disposal and not otherwise recoverable.

3.2 An immediate market

- There must be an immediate market for the RDF.
- There needs to be appropriate materials flow and stockpile management.

The production of RDF must not be speculative and an immediate market must exist for the RDF. This is demonstrated by the existence of a known customer or user with an available, suitable and beneficial use for the RDF on an ongoing basis. However, the production of a RDF should not lead to a demand for wastes such that the market would support a

¹⁸ Waste-derived materials—guiding principles for determining approval processes and product standards, 2008, <www.epa.sa.gov.au/xstd_files/Waste/Information%20sheet/waste_principles.pdf>.

¹⁹ <www.epa.sa.gov.au/businesses/eco-efficiency>.

lesser preferred option in the waste hierarchy and inhibit more sustainable opportunities for waste avoidance, reduction, reuse or recycling.

Appropriate materials balance and flow management need to be in place to ensure there is a systematic approach and to demonstrate responsible and sustainable management rather than continuous production and stockpiling.

Where stockpiling is necessary, this should be conducted in accordance with the *EPA Guideline for Stockpile Management—Waste and waste derived products for recycling and reuse* (2009)²⁰ with specific consideration given to:

- the need for stockpiling to be conducted with materials flow and capacity of the site in mind and
- the storage time and market availability to avoid inappropriate and speculative stockpiling of material and to minimise the risk of abandonment.

3.3 A risk-based approach

- | |
|--|
| <ul style="list-style-type: none">• Ensure sound science is used to assess risk.• Ensure the use of RDF has acceptable and manageable risks considering both short and long term impacts.• Ensure appropriate quality assurance and quality controls are proposed to manage the risks. |
|--|

The EP Act requires that in the assessment of risk, a precautionary approach must be applied to ensure that all aspects of environmental quality affected by pollution and waste, including ecosystem sustainability and valued environmental attributes, are considered.

Therefore, in order to support the production and use of RDF, the EPA expects relevant parties²¹ to apply scientifically sound and robust methods for quality assurance and control, including sufficient sampling, characterisation, risk assessment and monitoring in order to demonstrate the suitability of the proposal. The level of assessment required for RDF will vary depending on the risk.

This standard outlines the expectations, standards and processes in this regard which support the need to apply sound scientific practices. Sound science is 'organised investigations and observations conducted by qualified personnel using documented methods and leading to verifiable results and conclusions²²'. For more complex or novel proposals, third party scientific peer review should be considered by proponents and may be specifically required by the EPA to ensure sound scientific methodology has been used in assessments.

Any required risk assessment and sampling should occur prior to use of the refuse derived fuel to ensure that the proposed RDF is of acceptable quality.

Therefore, while the EPA promotes and supports genuine and sustainable waste recovery opportunities, due to the potential environmental and human health risks from the combustion of RDF, a robust risk assessment of both the production and combustion of RDF is a key requirement.

²⁰ <www.epa.sa.gov.au/xstd_files/Waste/Guideline/guidelines_stockpile.pdf>.

²¹ Relevant parties include the producer, processor and user of the waste. All relevant parties must be considered in the proposal with responsibilities clearly specified.

²² Source: US Environmental Protection Agency, '2003–2008 EPA Strategic Plan Direction for the Future', September 30, 2003, quoting Society of Environmental Toxicology and Chemistry 1999, *Sound Science Technical Issue Paper*. Pensacola, Florida..

3.4 Prevention and minimised potential for harm

- The proposal must not cause harm to human health and/or the environment.
- There must be no increase in emissions or the risk of causing harm as a result of the combustion of RDF as a replacement or supplement to fossil or other standard commercial fuel sources.

Both the production and use of RDF have the potential to harm the environment. Potential harm can result from:

- impacts from the receipt and incorporation of inappropriate materials in production of RDF
- improper management of residual waste from the production of RDF
- potential adverse impacts from the combustion of the RDF including gaseous and particulate emissions as well as residual contaminants in the ash.

Proponents need to fully address human health and environmental risks and demonstrate how the RDF will be produced to meet a consistent and agreed specification that is fit for purpose. Any waste proposed for inclusion in the production of RDF must not contain Prohibited Wastes (refer section 4.1). Proposals should include assessment of existing systems, literature and technical assessment of the proposed RDF and industrial facility, including closely monitored pilot trials and ongoing monitoring to demonstrate to the regulator and community at large, continued performance for any full scale activity.

Proponents are required to consider and comply with the Environment Protection (Air Quality) Policy 1994. Maximum permitted emissions or ground level concentrations should not be seen as levels to which increases will be permitted. As such, combustion of RDF should not result in increased emissions to the environment, despite where these increases are below maximum permissible levels, as this could be viewed as decreased environmental performance.

Where the resulting emissions vary, for example with some pollutants²³ decreasing at the expense of other increases, the EPA will make a determination of suitability on balance. In this case, a comparative risk assessment, considering the various risks and impacts versus benefits, must be provided by the proponent with whom the onus remains to demonstrate the suitability of the proposal.

Any increase in volumes of, or contaminants within, residual ash will also need to be considered by proponents with the ash's destination being a key factor (eg is it for final disposal or for use as part of another product). Any decrease in environmental or public health performance of a facility as a result of the combustion of RDF will not be viewed favourably.

Other relevant government agencies, such as the Department of Health, may be involved in the review of applications.

²³ The term pollutant is defined under clause 3(1) of the EP Act and is reflected in the Glossary.

3.5 Demonstration of beneficial purposes²⁴

- There must be an acceptable and genuine benefit demonstrated by the proposal.
- RDF use must constitute beneficial energy recovery via combustion in an industrial activity rather than disposal via incineration.
- The RDF must have a valuable net calorific value.
- RDF combustion must be efficient (including that the fuel is produced to maximise net calorific value and burn rate).
- RDF combustion must be beneficial and effective (such that it will replace or supplement the use of a fossil or other standard commercial fuel in an industrial process).

The EPA expects that proponents are able to demonstrate the beneficial aspects of both the production and use of RDF.

The primary function provided to the industrial process that must be demonstrated by the proposed RDF, is an energy benefit. Once produced, a proposed RDF must be able to be used without further processing to replace or supplement a fossil or other fuel with which it is otherwise comparable. An RDF must meet a defined, consistent and agreed specification that is fit for purpose. This must be demonstrated prior to the use of the RDF. If a waste is proposed for use as an RDF and requires some treatment or processing prior to use as RDF, then this does not preclude it from being proposed for use as RDF, it simply means that that waste will only be considered as an RDF product once that further processing is complete.

The producer of RDF will need to demonstrate how each particular waste selected as a component of RDF will contribute to the overall benefit and use of RDF as a fuel replacement.

For the purposes of this standard, incineration means the thermal destruction (with or without energy recovery) of wastes for the primary purpose of disposal. Incineration of waste usually requires a supplementary fuel to ensure efficient combustion and usually occurs for unsorted wastes that are not produced to a specification such as municipal solid wastes, commercial and industrial wastes or hazardous wastes (for example, medical wastes are incinerated in South Australia). The recovery of energy as a secondary benefit from waste incineration activities, while encouraged as good environmental practice, does not result in the waste being classified as RDF.

In comparison, the primary purpose of producing and combusting an RDF is for the beneficial recovery of energy from waste by the replacement or supplement of fossil or other standard commercial fuels in an industrial process such as an industrial furnace or boiler for power generation²⁵. As such, an RDF is processed to meet a specification has a valuable net calorific value.

The EPA considers that the primary function of waste destruction techniques by incineration is the disposal of the waste and thus not classed as a beneficial use of RDF.

²⁴ The diversion of waste from landfill in and of itself is not considered to be sufficient grounds for demonstration of a benefit.

²⁵ This is most likely to be on a smaller scale due to the volume of RDF that would be required for a large power station.

3.6 No dilution of waste or chemical substances

- Ensure that the components of the RDF are demonstrated as suitable and contribute to its production to the appropriate specification.
- Ensure that the production of RDF does not constitute dilution of waste or chemical substances²⁶.

The EPA considers that dilution is the combining of materials for the purpose of reducing contamination levels, for example as a means to avoid disposal costs. Dilution is not a suitable waste management approach and is not supported by the EPA. Components should not be added to RDF for the purpose of diluting the waste or chemical substances where, without dilution, the component would not be suitable for use in RDF. The EPA's position on dilution aims to prevent disposal by inappropriate means where this is done to avoid relevant regulation.

However, mixing by combining of two or more wastes specific components may be suitable in the production of an RDF. Such mixing must only occur if it is first demonstrated that each component is a suitable ingredient as part of an RDF product specification prior to their mixing. This includes net calorific value, being prepared in a manner to result in efficient combustion, not having a higher-order option according to the waste hierarchy, not containing prohibited wastes and not containing chemical substances at concentrations that would compromise the use of the RDF.

3.7 A consistent approach to regulation

- Ensure that the level of community consultation is suitable given the nature of the product and that details are included in the proposal.
- The environmental performance history of the proponent and user needs to demonstrate they are suitable person. The EPA may refuse to issue an environmental authorisation if it is not satisfied that the applicant is a suitable person under Sections 47(3) and 47(4) of the EP Act.
- Ensure appropriate approvals have been obtained prior to undertaking the activity.

This standard is designed to provide a consistent approach to the production and combustion of RDF. Receipt, processing and management of waste material used for the production or use of RDF must be conducted with the relevant approvals and specific authorisations in place in accordance with Schedule 1 of the EP Act, prior to undertaking any such activities. This includes relevant authorisation from planning authorities.

The production and combustion of RDF will require environmental authorisation as described in section 5. Section 6 outlines the information proponents will need to supply to the EPA for assessment of a proposal to produce and/or use RDF. The production and combustion of RDF must not simply amount to a means of avoidance of regulation or convenient disposal of waste.

RDF projects should include a requirement for the proponent to consult appropriately with, and have regard to the views of, the Council and community who are potentially affected by the project. The proposal must align with the relevant environment regulatory framework and principles (refer section 2).

²⁶ The term chemical substance is defined under clause 3(1) of the EP Act and is reflected in the Glossary.

PART THREE

TECHNICAL INFORMATION AND APPROVAL REQUIREMENTS

4 Wastes and suitability for use as WDF

This section lists those wastes that are prohibited for use as or in the production of RDF. Silence on a particular waste stream for use does not imply approval and the EPA will need to be contacted in these cases. It also describes the chemical and physical nature of RDF that must be addressed to demonstrate that the RDF will be produced to a suitable specification that is beneficial, fit for purpose and will not cause harm.

4.1 Prohibited wastes

Table 1 lists the wastes that must not be used for the production of RDF, and need to be managed and treated or disposed of at suitably authorised facilities. In extenuating or specific circumstances where a proponent believes they can demonstrate why a prohibited waste is suitable for the production and combustion as an RDF or can be treated or processed in some way to render it appropriate, then a thorough case will need to be put to the EPA in order to consider variation from this list.

Table 1 Prohibited wastes²⁷

Prohibited waste	Management requirements
Asbestos	This waste must be managed and disposed in accordance with relevant guidelines due particularly to health risks (refer section 7).
CCA treated timber	The EPA does not support the combustion of commercial quantities of CCA timber due to the emission of potentially harmful products. RDF production by sourcing CCA specifically is not permitted. It is acknowledged that some CCA may be inadvertently received in timber loads such as from construction and demolition sites, although steps should be implemented to avoid its inclusion and remove it from the production line. To account for this, RDF users should ensure the pollution controls and monitoring can account for this possibility and ensure emissions remain acceptable.
Hazardous wastes	These wastes must be managed in accordance with the Hazardous Waste Strategy ²⁸ and relevant national legislation.
Wastes with high mineral content, eg soils containing Polycyclic aromatic hydrocarbons	High mineral content wastes have little calorific value and low burn efficiency, produce more ash and should be able to be managed to attain a higher-end reuse or recycling option.
Medical waste	Medical waste must be disposed of in accordance with relevant EPA legislation. Due to its potentially hazardous nature, medical waste cannot be processed into an RDF and has specific handling requirements (refer section 7).
Radioactive wastes	These wastes require specific management according to the requirements of the EPA.

²⁷ Refer to the Glossary for definitions of terms used within this table.

²⁸ <www.epa.sa.gov.au/xstd_files/Waste/Report/hws.pdf>.

Prohibited waste	Management requirements
Quarantine waste and waste of biosecurity concern ²⁹	These wastes must be managed according to the requirements of relevant agencies including Australian Quarantine and Inspection Service (AQIS) and Department of Primary Industries and Resources, South Australia (PIRSA).
Scheduled wastes ³⁰	These wastes must be managed according to the requirements of National Scheduled waste management plans ³¹ . It is noted however that dioxins are scheduled wastes and are also products of incomplete combustion. In this case, industrial facilities must ensure pollution control equipment can control emissions including dioxins.
Wastes that have an available and practical higher-order recovery or reuse or recycling option according to the waste hierarchy	The production and use of RDF must not compromise other efforts to meet the waste hierarchy. This may include wastes included or intended in programmes such as extended producer responsibility or other take back schemes. RDF should only be produced from waste that is otherwise destined for treatment or disposal.
Waste treated by immobilisation or containerisation	Treated waste requires either secure storage or disposal to a suitably engineered landfill.

4.2 Inputs versus outputs

It is important to focus on both the inputs to the production of the RDF as well as the outputs and outcomes from combustion of RDF for a variety of reasons.

Inputs

This standard requires proponents to address various aspects regarding inputs to production of RDF including prohibited waste, suitability of wastes and product specification. In addition to the aims for the sustainable management of waste supported by government there are several important technical reasons for ensuring that the inputs to the process are known and managed including.

- to give assurance that a consistent product is produced from a known waste (or range of wastes) which subsequently means that:
 - the combustion process will be effective and efficient
 - the expected emissions are known
 - the emissions are able to be effectively monitored and controlled with appropriate facility design and pollution control equipment
 - the product is not highly variable or unpredictable.

²⁹ See 'Biosecurity Wastes' in glossary.

³⁰ RDF should not contain Scheduled Wastes being OCPs, PCBs, chlorinated hydrocarbons, dioxins or ozone depleting substances as dioxins are a product of incomplete/ineffective combustion, combustion activities will require dioxins monitoring and control. Special conditions will be required for the combustion of RDF including a purpose-built facility, high temperature burning, monitoring and rapid cooling to prevent reformation of dioxins (De Novo effect). Refer to ANZECC *National Strategy for the Management of Scheduled Wastes*, 1992.

³¹ <www.environment.gov.au/settlements/chemicals/scheduled-waste/index.html>.

- to ensure the RDF production facility is designed appropriately for the wastes received and the required processing and storage
- to ensure that the diversion of waste for production of RDF will meet a matching market demand
- to ensure wastes that are used to produce RDF have a beneficial net calorific value and contribute to other benefits within the industrial process that uses the RDF such as efficient combustion and reduced reliance on fossil or other standard commercial fuels
- to ensure sustainable management of wastes in accordance with the waste hierarchy.

Outputs

The outputs are directly related to the inputs, the technology used in the industrial combustion process and their pollution control and monitoring regime. Therefore this standard requires proponents to also consider various aspects of outputs and outcomes for important reasons including:

- implementation of appropriate emissions control:
 - monitoring systems should be incorporated during design to provide online monitoring of emissions of concern. Such monitoring devices can provide timely information for managing plant failure and regulating performance and provide supporting data for regulatory compliance needs.
- ensuring the prevention of harm
- ensuring valuable and beneficial energy recovery
- ensuring an overall positive impact in relation to environmental outcomes.

4.3 Important characteristics of RDF

Table 2 lists some of the important characteristics that should be assessed, including the chemical and physical nature of the RDF, in order to demonstrate that the RDF will be produced to a suitable specification that is beneficial, fit for purpose and will not cause harm.

The *National Greenhouse and Energy Reporting System* (NGERS)³² includes some useful information and guidance that may assist in calculations and assessments related to the production and combustion of RDF. For example, the *National Greenhouse and Energy Reporting (Measurement) Determination* (the determination) refers to technical specification CEN/TS 15400:2006 *Solid recovered fuels—Methods for the determination of calorific value*³³. The specification can be used to calculate the calorific value of fuel, which can then be used as a factor in the calculation of the total energy content of fuel used over one year³⁴. There are also other related technical specifications in the series that may be useful for providing standardised assessment and measurement for solid recovered fuels (RDF) including determining ash content, major elements, moisture content, sampling and sample preparation.

³² Including the *National Greenhouse and Energy Reporting Act 2007*, *National Greenhouse and Energy Reporting Regulations 2008* and related supporting information including *The National Greenhouse and Energy Reporting (Measurement) Determination* which can all be found at <www.climatechange.gov.au/reporting/index.html>

³³ This specification is available from the British Standards Online <www.standardsuk.com> and is produced in accordance with the European Committee for Standardisation (CEN) <www.cen.eu/cenorm/homepage.htm>.

³⁴ Chapter 6 of the determination.

Table 2 Characteristics of RDF

Characteristic	Detail
Waste and other components of the RDF	<p>The types of wastes and their contribution to the RDF need to be addressed. Wastes will have different net calorific values and combustion efficiency and will vary in their ability to perform as a suitable fuel. Combustion of some substances can release undesirable chemicals and should be avoided (eg PVC). In addition, some specific wastes are prohibited from inclusion in RDF as listed in section 4.1.</p>
Calorific value and combustion efficiency	<p>In order to be beneficial, viable and effective as a fuel supplement or replacement, the RDF will need to have a sufficiently high net calorific value (or consistently high range of values) and be produced to a specification that will result in effective and efficient combustion. Applicants will need to provide the RDF specification including specifying the net calorific value of the RDF (including contributions by different components if it is produced from more than one waste type to assist in demonstrating their suitability for inclusion) and identify and report the organic and volatile content of the RDF. In addition, the suitability and combustion efficiency of the RDF user's facility including furnace technology and pollution controls must be addressed.</p> <p>Some use of standard fuels may still be required to optimise the combustion process and to ensure that improved emissions outcomes are consistently achieved, as products of incomplete combustion are likely to predominate particularly during start up and shut down operations.</p>
Water content	<p>The moisture content of RDF can reduce the effectiveness of combustion in the initial stages, as energy is taken up by the creation of steam. Thus the calorific value, or heating value, and burn efficiency must account for the moisture content which detracts from the overall amount of energy that can be extracted and thus needs to be stated as the net calorific value. Additionally, a higher moisture content means the material will burn at a lower temperature and thus increase the likelihood of dioxin and furan formation.</p>
Sulphur and chlorine content	<p>The content of chlorine and sulphur and resulting emissions from the combustion of RDF needs to be considered. For example, chlorine content can contribute to dioxin formation. Best Available Technology Economically Achievable (BATEA) should be implemented to ensure effective capture of chlorine gas and other pollutant emissions.</p>

Characteristic	Detail
Emissions, heavy metals and residual wastes	<p>The combustion of the RDF must be subject to risk assessment—addressing the potential for harm to human health and the environment, and modelling and monitoring—undertaken to determine the resulting emissions to atmosphere of gas and particulates. The risk assessment should include volatile and non-volatile metals, considering and detailing both the odour and design ground level concentrations, stack emission limits and the requisite pollution control equipment. Pollution control equipment includes cooling temperature of exhaust gases and controls for polychlorinated dioxins and furans³⁵.</p> <p>The combustion of RDF should have similar or reduced emissions to atmosphere in comparison to the emissions from the fossil or other standard commercial fuel it replaces. Compliance with the Environment Protection (Air Quality) Policy 1994 is mandatory.</p> <p>The composition, destination³⁶ and potential risks of the residual ash must also be assessed. Any heavy metals that are present may be concentrated in the ash and therefore this must be addressed by proposals to produce and use RDF.</p>
Physical properties	Consistency of physical properties such as particle size distribution will need to be appropriate for efficient combustion (ie fit for its intended use).

³⁵ <www.environment.gov.au/atmosphere/airquality/publications/sok/furans.html>; <www.npi.gov.au/database/substance-info/profiles/73.html>.

³⁶ Eg disposal to a suitably EPA authorised landfill or inclusion in product such as clinker.

5 Approvals and licensing

5.1 Pilot trial

Prior to approval of any full-scale production and use of RDF, a successful, closely controlled and monitored pilot trial that has been approved by the EPA will be required. The information described in section 6 is required for a pilot trial proposal.

In pilot trials and during operation, monitoring is essential to provide validation of modelling assumptions and findings in order to guide any adjustments that need to be made to the RDF, combustion process or facility design and to provide information to support the ongoing suitability of the RDF and its use.

5.2 EPA licensing trial

Obtaining a licence

Both the production and use of RDF requires specific approval by the EPA and proposals should be a joint or concurrent submission by the producer and user(s)..

The producers of RDF who receive and process waste will be required to be licensed as a waste or recycling depot [activity 3(3)] in accordance with Schedule 1 of the EP Act] to undertake this process. Licence applications will need to address the requirements of this standard. Some commercial or industrial activities that are not waste or recycling depots may, as part of their manufacturing process, produce a waste that is suitable for use as RDF (subject to relevant assessment and monitoring), and hence they will not require licensing as a waste depot. However they must still gain approval from the EPA for their waste to be used as an RDF in accordance with this standard.

A prescribed industrial activity that wishes to use RDF requires an EPA licence for their main activity in accordance with Schedule 1 of the EP Act and will need to apply to and gain approval from the EPA, in the form of amending an existing licence via a process change, prior to proceeding. In addition, depending on the amount of heat released, users of RDF may require the activity of fuel burning [activity 8(2) of Schedule 1 of the EP Act] to be included on their licence.

Conditions of licence will be applied to ensure ongoing operations meets the required technical, operational and quality assurance standards for both the production and combustion of RDF and are likely to include the need for specific quality assurance procedures and quality control monitoring.

An EPA licence is not required for the transport of an approved RDF, however there are responsibilities that are specified in section 6.2 which outline the general expectations to ensure transporters meet their general environmental duty.

Renewal of licence

Renewal of any specific approval will need to occur periodically for RDF production and use activities that are ongoing. This detail will be provided at the time of approval. Expiry and renewal of any specific authorisation including EPA licence will be specified on that document when issued. Renewal may depend on results of any monitoring and reporting that is required and the level of compliance with approved management plans in the conduct of the activity.

Furthermore, at renewal, proponents licensed for the production of RDF will be required to review their operation, to determine whether :

- there has been any progress over time that would render some wastes being used for RDF more suitable to a higher-order option in accordance with the waste hierarchy and instigate measures to prevent further receipt of such wastes
- whether there are any proposed changes to the waste streams to be used to produce RDF (note: changes will need to be assessed to demonstrate that the requirements of this standard will be met)
- the benefit is still available and maintained

- there is still an immediate market (section 3.2)
- there is any harm to the environment or human health
- aspects such as emissions and authorisation requirements comply with relevant legislation accounting for any changes that may have occurred
- the QA/QC and monitoring programmes require amendment.

Compliance and improving performance

Revisions should be made to the Recovered Products Plan and Environment Management Plan (refer section 6) including QA/QC procedures and monitoring and reporting programmes as required following the review that occurs upon renewal (specified above), and submitted to EPA for approval.

Compliance with this standard is required if a proponent operates an existing facility that produces or receives an RDF. Where the EPA believes this is not the case, an Environment Improvement Plan or other action may be required to achieve improved environmental performance to a level satisfactory to the EPA.

6 EPA submissions—required information

EPA approval is required for all production and use of RDF. Proponents will need to ensure they provide sufficient details and evidence to demonstrate the suitability of the proposal in order for the EPA to make a determination³⁷. Proponents will need to ensure applications address the suitability of the wastes (refer to section 4) and the key considerations raised in section 3.

The level of detail that will be required will depend on each individual case. The EPA will need to be satisfied that a full and scientifically sound assessment has been undertaken and sufficient details provided. A pilot trial period is likely to be required prior to approval for full production and use of an RDF. EPA approval will be required for any such pilot trial.

The information listed below is a guide to the details the proponent must submit to the EPA for assessment purposes. In some cases, the EPA may require submission of further information in addition to the information listed below. For more complex or novel proposals, third party scientific peer review should be considered by proponents and may be specifically required by the EPA to ensure sound scientific methodology has been used in assessments.

The EPA expects early consultation on specific requirements for a proposal.

Applications for the production and/or combustion of an RDF need to include the following information as a 'Recovered Products Plan'.

6.1 Minimum information to be submitted to the EPA

Part 1: Full details of RDF producer and RDF users(s) including:

- 1 Full legal name, registered and site addresses and authorised contact personnel
- 2 Locality, titles and ownership
- 3 Development authorisation details
- 4 Existing EPA authorisation(s)
- 5 Proximity to sensitive receptors (such as surface water, groundwater, residential zones and schools)
- 6 Proposed timeframe for the activity
- 7 Roles and responsible parties (proponents should ensure this is clear in any contractual arrangements between parties)
- 8 Details of proposed stakeholder consultation. This will be required particularly for the user of RDF including at the pilot trial stage.

Part 2: Production of RDF (including pilot trials)

- 1 Describe how the RDF will meet the requirements of this standard including:
 - a confirmation of the suitability of the sources and waste types for production of RDF and confirmation that both the sources and the proposed RDF³⁸:
 - i display the beneficial properties for use as an RDF (section 3.5)

³⁷ The EPA strongly recommends proponents contact the Authority to have an initial discussion of the broad proposal in order to determine the suitability of proceeding to a full application.

³⁸ The stage in the process where the suitability of the RDF is demonstrated must be determined based on the specific circumstances of the proposal and, in some circumstances, the user may be responsible for this.

- ii are not prohibited (section 4.1)
 - iii will contribute to production of a fit-for-purpose RDF in relation to required and consistent physical and chemical composition, net calorific value and combustion efficiency (section 4.3).
- b address the immediate market for the RDF including level of demand (section 3.2).
- 2 Provide an Environment Management Plan for the RDF Production Facility that details:
- a the RDF processing facility design, construction and operation specifications including the receipt, processing, storage and waste management areas
 - b quality assurance and quality control (QA/QC) processes to produce RDF to ensure acceptability and consistency of RDF including:
 - i procedures for management of waste receipt, temporary storage and processing, including segregation processes as required
 - ii RDF production methodology—detail what processing of RDF components is required and how the process will target specific wastes required for the production of the RDF to specification
 - iii QA/QC procedures and monitoring for ongoing suitability of RDF and its components:
 - 1) a sampling and assessment programme³⁹ to ensure suitability over time. The nature and frequency of the sampling and assessment will depend on the consistency of the RDF and hence the consistency and risks posed by the nature of the waste components, their source and process used to produce the RDF. The specific sample methods and test methodology that will be used to measure the components (as required) and the RDF product properties must be specified
 - 2) appropriate materials flow (of RDF components and product), stockpile management and material quality to match RDF market.
 - iv residual waste management
 - v contingency plans for materials management, including management of unsuitable RDF and RDF user plant shut down
 - vi records maintenance and reporting.
- 3 An assessment conducted by a suitably qualified consultant to demonstrate the suitability of the RDF and the risk of harm. The assessment must be based on representative sampling and testing and should include:
- a a comment on the suitability for use
 - b confirmation that the levels and nature of chemical substances in the RDF, the RDF components, the potential combustion by-products and the residuals ash (for inclusion in product or for disposal) will not pose an unacceptable level of environmental risk
 - c sufficient justification, rationale and evidence for 3(a) and 3(b), evaluated based on robust research, scientific literature and established criteria.

Part 3: Combustion of RDF (including pilot trials)

- 1 Provide details to confirm the benefit that will result from the combustion of the RDF (refer section 3.5). Include:
- a the type and amount of fuel the RDF will replace
 - b net calorific values and combustion efficiencies that will be achieved
 - c the facilities that will use the RDF

³⁹ Refer to Appendix 1 for further details.

- d ongoing volumes required to meet the likely demand.
- 2 Provide a risk based assessment demonstrating how the RDF will not have any net potential for adverse impacts on the environment or human health from its combustion, considering both short and long term potential impacts. The assessment⁴⁰ needs to include:
 - a potential emissions to atmosphere: gaseous and particulate
 - b the residual components: for example, ash for use in a product or requiring disposal (and thus consideration of potential harm due to toxicity, persistence, accumulation and exposure, and the potential for contaminants to mobilise and leach)
 - c information on the energy produced and emissions in comparison with the fuel it replaces.
- 3 Provide an environment management plan that addresses:
 - a RDF materials flow management
 - b contingency plans for materials management, including management of unsuitable RDF and/or plant shut-down
 - c RDF quality assurance (details of any sampling and assessment to ensure RDF is consistent and fit for purpose and meets requisite specification)
 - d use of BATEA pollution controls & design:
 - i combustion process controls and monitoring including rapid cooling, wet scrubbers, etc
 - ii ongoing emissions monitoring and controls (particulates, odour, gaseous chemicals) to confirm continued suitability of RDF combustion
 - iii plant maintenance.
 - e the RDF combustion facility design, construction and operation specifications including the RDF receipt, storage and residual waste management areas and procedures eg of ash.

6.2 General responsibilities

Producer—Person authorised to produce RDF
--

- ensure relevant approvals are obtained
- implement appropriate QA/QC procedures and management plans
- ensure only suitable approved wastes are received for processing
- ensure that RDF is consistently produced to the approved RDF specification
- ensure that RDF is only transported to facilities authorised to receive and combust the RDF
- responsibly manage residual waste by transporting it to an authorised waste management facility (or other approved facility) for further recycling, treatment or disposal
- maintain and be able to provide records to demonstrate the points above including relevant sampling, testing and monitoring of the process and the RDF produced:
 - to the user prior to transport of the RDF
 - upon request from the EPA.

⁴⁰ Refer section 4, the *Environment Protection (Air Quality) Policy (1994)*, *Air quality impact assessment using design ground level pollutant concentrations (DGLCs) [2006]* and *Odour assessment using odour source modelling (2007)*.

Transporter—Person engaged to transport RDF⁴¹

- ensure the vehicle is suitable for transport of RDF
- only receive RDF for transport from persons producing an approved RDF product
- transport the RDF only to premises approved to receive and combust RDF
- maintain and provide records of transport to the producer and user of the RDF and EPA as required or upon request, to demonstrate the above.

User—Person authorised to receive and combust RDF

- ensure relevant approvals are obtained
- implement appropriate QA/QC procedures and management plans
- ensure RDF is only received from approved sources being persons authorised to produce the RDF that is suitable for that receiving facility
- ensure only suitable RDF is received and combusted at the premises
- ensure that emissions from the combustion process are monitored to ensure any failures are identified, notified and rectified in a timely manner to minimise harm in accordance with a risk management plan
- ensure the facility is maintained such that combustion remains effective and efficient and that pollution controls are operational and well maintained
- ensure they maintain records to demonstrate the points above and make them available to the EPA upon request.

It is the responsibility of the proponents to ensure that they comply with all requirements of this standard.

This standard is designed to minimise the risk of potential harm to the environment and human health. It will form a published standard under clause 4 of the W2R EPP and. However, the EPA is not in any way endorsing or guaranteeing that the use of this RDF will confer any benefit stated by the producer. All obligations and responsibilities imposed by the EP Act continue to apply and a proponent may still be liable if harm arises from the use of refuse derived fuel.

Failure to meet the requirements of this standard may result in the EPA determining that the material being used remains a waste and is subject to regulation as such in accordance with the EP Act.

⁴¹ Once the W2R EPP is operational and the RDF is an approved product, an EPA licence is not required for its transport.

PART FOUR

REFERENCES

7 Further information

EPA guidelines

Air quality impact assessment using design ground level pollutant concentrations (DGLCs), 2006, <www.epa.sa.gov.au/xstd_files/Air/Guideline/guide_airquality.pdf>.

Copper chromated arsenate (CCA) timber waste storage and management, 2004, <www.epa.sa.gov.au/xstd_files/Waste/Guideline/guide_cca.pdf>.

EPA Guidelines for compliance and enforcement of the Environment Protection Act 1993, 2007, <www.epa.sa.gov.au/xstd_files/Licensing/Guideline/guide_compliance.pdf>.

EPA Position Statement on the Role of EPA in Attaining Sustainability, 2005, <www.epa.sa.gov.au/xstd_files/Corporate/Other/position_statement_sustainability.pdf>.

Guidelines for separation distances, publication 2007, <www.epa.sa.gov.au/xstd_files/Industry/Guideline/sepguidepcd.pdf>.

Liquid waste classification test, 2003, <www.epa.sa.gov.au/xstd_files/Waste/Guideline/guide_liquidwaste.pdf>.

Medical waste—storage, transport and disposal, 2003, <www.epa.sa.gov.au/xstd_files/Waste/Guideline/guide_medical.pdf>.

Odour assessment using odour source modelling, 2007, <www.epa.sa.gov.au/xstd_files/Air/Guideline/guide_odour.pdf>.

Presentation of air pollution modelling outputs, 2005, <www.epa.sa.gov.au/xstd_files/Air/Guideline/guide_apm.pdf>.

Stockpile management—waste and waste derived products for recycling and reuse, 2009, <www.epa.sa.gov.au/xstd_files/Waste/Guideline/guidelines_stockpile.pdf>

Wastes containing asbestos—removal, transport and disposal, 2009, <www.epa.sa.gov.au/xstd_files/Waste/Guideline/guide_asbestos.pdf>.

Waste definitions, 2008, <www.epa.sa.gov.au/xstd_files/Waste/Guideline/guide_waste_definitions.pdf>.

Waste tracking form, 2007, <www.epa.sa.gov.au/xstd_files/Waste/Guideline/guide_wastetracking.pdf>.

Waste transport certificate, 2007, <www.epa.sa.gov.au/xstd_files/Waste/Guideline/guide_wastetransport.pdf>.

Other publications

Approved Codes of Practice under the *Occupational Health, Safety and Welfare Act 1986*

- *Code of Practice for the Safe Removal of Asbestos 2nd Edition [NOHSC:2002 (2005)]*
- *Code of Practice for the Management and Control of Asbestos in the Workplace [NOHSC:2018 (2005)]*
- *Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres 2nd Edition [NOHSC:3003 (2005)]*
- *South Australia's Waste Strategy 2005–2010*, <www.zerowaste.sa.gov.au>.
- Waste Reform Project, <www.epa.sa.gov.au/environmental_info/waste/waste_reform_project>:
 - *EPA Board Waste to Resources Subcommittee Report*, <www.epa.sa.gov.au/xstd_files/Corporate/Report/CommitteeReport.pdf>.

- *Waste management—regulatory framework and objectives*,
<www.epa.sa.gov.au/xstd_files/Waste/Information%20sheet/waste_objectives.pdf>
- *Waste-derived materials—guiding principles for determining approval processes and product standards*,
<www.epa.sa.gov.au/xstd_files/Waste/Information%20sheet/waste_principles.pdf>.

National

Australian Government Department of Climate Change, <www.climatechange.gov.au>.

Australian Quarantine Inspection Service, <www.daff.gov.au/aqis>.

British Standards Institution, <www.standardsuk.com>.

European Committee for Standardisation (CEN), <www.cen.eu/cenorm/homepage.htm>.

National Association of Testing Authorities, <www.nata.asn.au>.

National Greenhouse and Energy Reporting Regulations 2008 and *NGER (Measurement) Determination 2008*,
<www.climatechange.gov.au/reporting/index.html>.

National Strategy for the Management of Scheduled Wastes 1992, <www.environment.gov.au;
www.environment.gov.au/settlements/chemicals/scheduled-waste/index.html>.

Standards Australia, <www.standards.com.au>.

Legislation

Environment Protection Act 1993

Environment Protection (Air Quality) Policy 1994

Environment Protection (Waste to Resources) Policy 2010

Radiation Protection and Control Act 1982

Radiation Protection and Control (Transport of Radioactive Substances) Regulations 2003

Legislation may be viewed on <www.legislation.sa.gov.au>

Copies of legislation are available for purchase from:

Service SA Government Legislation Outlet
EDS Centre
108 North Terrace
Adelaide SA 5000

Telephone: 13 23 24
Facsimile: (08) 8204 1909
Website: <service.sa.gov.au>

8 GLOSSARY

Activity	<p>Includes the storage or possession of a pollutant.</p> <p>Schedule 1 of the <i>Environment Protection Act 1993</i> prescribes activities of environmental significance.</p>
Asbestos	<p>The fibrous form of mineral silicates belonging to the serpentine and amphibole groups of rock-forming minerals, including actinolite, amosite (brown asbestos), anthophyllite, chrysotile (white asbestos), crocidolite (blue asbestos), tremolite or any mixture containing one or more of the mineral silicates belonging to the serpentine and amphibole groups.</p> <p>Asbestos-containing material is any material, object, product or debris that contains asbestos.</p> <p>Friable asbestos means:</p> <ul style="list-style-type: none"> (a) non-bonded asbestos fabric, or (b) asbestos-containing material that: <ul style="list-style-type: none"> (i) is in the form of powder, or (ii) can be crumbled, pulverised or reduced to powder by hand pressure when dry. <p>Non-friable asbestos means asbestos-containing material in which the asbestos fibres are bonded by cement, vinyl, resin or other similar material, eg asbestos cement.</p> <p>Asbestos waste means waste asbestos-containing material (ACM) including all removed ACM, as well as disposable items used during asbestos removal work, such as plastic sheeting and disposable coveralls, respirators and cleaning rags.</p> <p><i>Advice on the requirements for handling and transport of this waste can be found in EPA Guideline, Wastes containing asbestos: removal, transport and disposal.</i></p> <p><i>See also Approved Codes of Practice under the OHS&W Act 1986.</i></p>
Biosecurity waste	<p>Biosecurity is the protection of people, animals, horticultural industries and ecological systems against disease and other biological threats.</p> <p>Biosecurity waste may also be called quarantine waste determined by relevant state authorities (including Primary Industries and Resources SA, Department of Environment and Heritage, and the Department of Water, Land and Biodiversity Conservation) as related to biosecurity including plant and animal health risk and disease or pest control.</p> <p>The Biosecurity Strategy for South Australia aims to protect South Australia's favourable pest and disease status from the increased risk of exotic pest, disease and weed incursions and to maintain and enhance access by South Australian industries to international animal and plant-related markets.</p> <p><www.pir.sa.gov.au/pirsa/biosecurity>.</p>
Chemical substance	<p>Any organic or inorganic substance, whether a solid, liquid or gas (or combination thereof), and includes waste.</p>

Commercial and Industrial Waste (C&I)	Commercial and Industrial Waste (General) The solid component of the waste stream arising from commercial, industrial, government, public or domestic premises (not collected as Municipal Solid Waste), but does not contain Listed Waste, Hazardous Waste or Radioactive Waste. Commercial and Industrial Waste (Listed) The solid component of the waste stream arising from commercial, industrial, government, public or domestic premises (not collected as Municipal Solid Waste), that contains or consists of Listed Waste.
Consultant	See Suitably qualified consultant
Environment	Land, air, water, organisms and ecosystems, and includes— (a) human-made or modified structures or areas; and (b) the amenity values of an area.
Environmental harm	As prescribed in section 5 of the <i>Environment Protection Act 1993</i> Any harm, or potential harm, to the environment (of whatever degree or duration) and includes: (a) an environmental nuisances; and (b) anything declared by regulation (after consultation under section 5A) or by an environment protection policy to be environmental harm.
Hazardous Waste	Listed waste having a characteristic described in schedule A list 2 of the National Environment Protection (Movement of controlled waste between States and Territories) Measure. <i>Note: Hazardous Waste includes any unwanted or discarded material (excluding radioactive material), which because of its physical, chemical or infectious characteristics can cause significant hazard to human health or the environment when improperly treated, stored, transported, disposed of or otherwise managed.</i>
Incineration	The thermal destruction of waste for the primary purpose of disposal, with or without recovery of energy. <i>Note: The term incineration generally means 'the act of burning to ashes' however the above definition is the meaning used by the EPA in relation to waste.</i>
Liquid Waste	Waste classified as liquid waste in accordance with the assessment process set out in the guideline Liquid waste classification test, (2003). <i>Note: Liquid waste includes any waste that is liquid at 20°C regardless of whether or not it is packaged or otherwise contained, and irrespective of whether or not the packaging or container is to be disposed of together with the liquid that it contains.</i>
Listed Waste	Wastes listed in Part B of Schedule 1 of the Environment Protection Act 1993.
Medical waste	means medical wastes listed in Part B of Schedule 1 of the <i>Environment Protection Act 1993</i> .

Municipal Solid Waste	<p>Municipal Solid Waste—Hard Waste</p> <p>The solid component of the waste stream arising from domestic premises which is not suitable for collection using a kerbside bin system, but does not contain Commercial and Industrial Waste (General), Listed Waste, Hazardous Waste, Radioactive Waste or waste that is not deemed suitable for collection by local councils.</p> <p><i>Note: MSW (Hard Waste) is typically collected in campaigns by local councils, which also advise on what wastes are suitable for that collection.</i></p> <p>Municipal Solid Waste—Kerbside bin collection</p> <p>The solid component of the waste stream arising from mainly domestic but also commercial, industrial, government and public premises including waste from council operations, services and facilities that is collected by or on behalf of the council via kerbside collection, but does not contain Commercial and Industrial Waste (General), Listed Waste, Hazardous Waste or Radioactive Waste.</p>
Pollutant	<p>(a) any solid, liquid or gas (or combination thereof) including waste, smoke, dust, fumes and odour; or</p> <p>(b) noise; or</p> <p>(c) heat; or</p> <p>(d) anything declared by regulation (after consultation under section 5A) or by an environment protection policy to be a pollutant,</p> <p>but does not include anything declared by regulation or by an environment protection policy not to be a pollutant.</p>
Pollute	<p>(a) discharge, emit, deposit or disturb pollutants; or</p> <p>(b) cause or fail to prevent the discharge, emission, depositing, disturbance or escape of pollutants,</p> <p>and pollution has a corresponding meaning.</p>
Putrescible Waste	<p>The component of the waste stream liable to become putrid.</p> <p><i>For example: organic matter which has the potential to decompose with the formation of malodorous substances; usually refers to vegetative, food and animal products.</i></p>

Quarantine Waste	<p>Quarantine Waste means material or goods of quarantine concern as determined by the Australian Quarantine and Inspection Service (AQIS) and which is subject to and or identified under Commonwealth Legislation (<i>Quarantine Act 1908</i>) and associated regulations and proclamations. This includes:</p> <ul style="list-style-type: none">(a) material used to pack and stabilise imported goods(b) galley food and other waste from overseas vessels(c) human, animal or plant waste brought into Australia(d) refuse or sweepings from a hold of an overseas vessel(e) any other waste or other material, which comes into contact with Quarantine Waste(f) contents of AQIS airport amnesty bins(g) articles seized by AQIS and/or not collected by clients. <p><i>Quarantine Act 1908:</i> <www.austlii.edu.au/au/legis/cth/consol_act/qa1908131.txt/cgi-bin/download.cgi/download/au.legis/cth/consol_act/qa1908131.rtf></p> <p><i>Quarantine Regulations 2000:</i> <www.comlaw.gov.au/comlaw/Legislation/LegislativeInstrumentCompilation1.nsf/0/DA413F48F8983E81CA257472007FAF66?OpenDocument></p>
Radioactive Waste	<p>Any radioactive substance in the form of a solid, liquid or gas (or combination thereof) that is left over, surplus or an unwanted by-product from any business or domestic activity, whether of value or not, but excluding the following:</p> <ul style="list-style-type: none">(a) substances to which the regulations under the <i>Radiation Protection and Control Act 1982</i> do not apply(b) substances which have been exempted from regulatory control under provisions of the Radiation Protection and Control Act(c) material containing activities or activity concentrations of radioactive elements below the exemption levels specified in the <i>National Directory for Radiation Protection</i> published by the Australian Radiation Protection and Nuclear Safety Agency.
Refuse Derived Fuel	<p>A fuel material produced from waste that is otherwise destined to landfill and which will not cause harm to the environment or human health when used to beneficially replace or supplement a fossil or other standard commercial fuel in an industrial process.</p> <p>RDF must be produced to an approved consistent and fit for purpose specification with sufficiently high net calorific value by segregating, targeting and processing specific wastes.</p>
Scheduled waste	<p>A material or article containing a chemical, or mixture of chemicals, exceeding the threshold concentration and threshold quantity (see the relevant specific scheduled waste management plan), which is:</p> <ul style="list-style-type: none">• organic in nature;• resistant to degradation by chemical, physical or biological means;• toxic to humans, animals, vegetation or aquatic life;• bioaccumulative in humans, flora and fauna; and• listed on Schedule X. <p><i>Note: For scheduled wastes, their management plans and Schedule X, refer to Australian Government Department of Environment and Water Resources,</i> <www.environment.gov.au/settlements/chemicals/scheduled-waste/index.html>.</p>

Solid Waste Any waste that is not gaseous and is not a Liquid Waste as determined by EPA Guideline *Liquid waste classification test (2003)*.

Suitably qualified consultant A person who holds relevant qualifications, has demonstrated professional experience and expertise which encompasses an appropriate range of competencies and is either a full member, or eligible for full membership, of one of the following organisations or equivalent organisations:

1. The Institution of Engineers Australia
2. The Association of Consulting Engineers Australia
3. The Australian Contaminated Land Consultants Association Incorporated.

Waste As defined under the *Environment Protection Act 1993*.

Waste means—

(a) any discarded, rejected, abandoned, unwanted or surplus matter, whether or not intended for sale or for recycling, reprocessing, recovery or purification by a separate operation from that which produced the matter; or

(b) anything declared by regulation (after consultation under section 5A) or by an environment protection policy to be waste,

whether of value or not.

Appendix 1 Material sampling, assessment and certification requirements

Sampling and analysis

RDF and waste used to produce it should be sampled for the key elements that affect efficiency of combustion and potential contaminants in emissions.

Sampling programmes should be based on standardised, scientifically valid procedures and methodologies. They should consider factors such as waste volume and heterogeneity, and knowledge of the activity and level of consistency of the process from which the waste is produced. This includes prior use or treatment of the waste, as well as the difference between the sample concentration and the appropriate criteria. The standard ISO 11648-1:2003: Statistical aspects of sampling from bulk materials can be referred to for guidance on statistically valid sampling is conducted on relevant waste materials.

To ensure sound scientific practices are used, peer-review by separate research group eg CSIRO or university-based research group, may be required including where pilot trials are being used to prove suitability.

When designing a sampling programme and selecting a testing laboratory, the following information must be considered.

Characterisation

The sampling methodology for characterising waste (and waste derived products) must be representative of the entire stream and must accurately and reliably characterise the waste (or waste derived product).

The sampling methodology for characterising the material must be representative of the waste, RDF or residual ash as relevant, and must accurately and reliably characterise the material both chemically and physically. The series of Technical Standards for Solid Recovered Fuels produced in accordance with the European Committee for Standardisation (CEN) may provide guidance in this regard.⁴²

Characterisation needs to include quality assurance and quality control procedures in the sampling program.

Number of samples:

The number of samples to be collected should be determined on a case-by-case basis, based on investigation of the site history or the process producing the waste as applicable, combined with visual inspection to determine the homogeneity of the waste being characterised. The chemical composition of the RDF based on a specification and control of the waste materials used to produce it should be well understood for full characterisation.

For an industrially produced waste stream, the variability of that stream and process over time must be considered when determining the appropriate number of samples that will accurately characterise the waste.

Note: All sampling needs to be conducted by an independent, suitably qualified and experienced person with the relevant expertise.

Duplicate samples:

A minimum of one internal-laboratory field duplicate and one external-laboratory field duplicate per 20 primary samples (or part thereof) is recommended.

⁴² Available from British Standards Online <www.standardsuk.com>.
CEN: <www.cen.eu/cenorm/homepage.htm>

Composite sampling (not recommended):

The EPA does not recommend composite sampling for heterogeneous waste streams. The use of composite sampling may be acceptable in situations where waste is from a single source and has been shown by previous sampling and analysis to be homogeneous (refer EPA guideline Composite soil sampling in site contamination assessment and management).

Composite sampling should not be used for sampling when volatiles are known, likely or suspected to be present.

Laboratory selection:

All analyses must be conducted by a laboratory that is accredited by the National Association of Testing Authorities⁴³ (or equivalent testing authority) for the requisite test methods. The detection limits of the testing laboratory need to be sufficiently below the criteria listed in this protocol for confidence in the results. If detection limits are above the protocol criteria, then that detection limit will be considered as the result for the analyte in question.

Chemical analysis:

The RDF, the waste used as components of RDF and the residual ash from combustion of RDF must be analysed for all chemical substances that are reasonably expected to be present based on knowledge of that waste including the expected variability.

Solid waste streams can vary significantly in their nature. The testing regime should focus on chemical substances reasonably expected to be present in the waste, provided there is sufficient knowledge and homogeneity in that waste stream and process producing it (based on a desktop assessment documenting the waste generation process and potential sources of chemical substances and contaminants). In addition, a supporting desktop assessment should be made to document the waste generation process and describe potential sources of chemical substances and contaminants. Alternatively a broad analysis needs to be conducted. Consideration is required for those substances listed in part B of Schedule 1 of the EP Act.

Frequency of sampling:

Initially, the RDF, the waste used as components of RDF and the residual ash from combustion of RDF should be regularly and thoroughly tested to gain confidence in its consistency of composition. Depending on the results of the initial assessment, a more limited ongoing assessment programme may be suitable if there is confidence in the consistency as well as in the process producing the waste over time.

Assessment and reporting of results:

All assessment of results needs to be conducted by an independent, suitably qualified and experienced environmental consultant or auditor as required, with the relevant expertise. Where there are no specified total chemical criteria and only leachate criteria, then specific consideration of any potential human health risks including Occupational Health and Safety (OH&S) must be included in the assessment of suitability for use.

When providing the data to the EPA, proponents must specify:

- the standard sampling and analysis methodologies that were used
- the total concentrations of chemical substances in each relevant material (in milligrams per kilogram)
- analysis of the properties of RDF (and its sources) as specified in section 4.3)

Statistical assessment

A specific statistically sound sampling programme will need to be developed for each producer/user based on the consistency or variability of the RDF and must be described in the site environment management plan. It may also be

⁴³ <www.nata.asn.au>

required by conditions of licence. The standard ISO 11648-1:2003: Statistical aspects of sampling from bulk materials can be referred to for guidance on statistically valid sampling.

Appendix 2 Checklist

<ul style="list-style-type: none"> • Support for the waste hierarchy—no other practical higher-order reuse, recycling or waste avoidance option 	<input type="checkbox"/>
<ul style="list-style-type: none"> • Risk-based approach—risk has been assessed 	<input type="checkbox"/>
<ul style="list-style-type: none"> • Prevent environmental harm—assured avoidance or minimised risk of harm to the environment or human health 	<input type="checkbox"/>
<ul style="list-style-type: none"> • Beneficial purposes—benefit has been demonstrated 	<input type="checkbox"/>
<ul style="list-style-type: none"> • Demonstrated that process is RDF combustion (and not incineration) 	<input type="checkbox"/>
<ul style="list-style-type: none"> • No prohibited wastes used in RDF 	<input type="checkbox"/>
<ul style="list-style-type: none"> • Characteristics of the RDF and the waste sources assessed — scientifically valid and robust sampling is used, and all chemical substances reasonably expected to be in the waste are tested for 	<input type="checkbox"/>
<ul style="list-style-type: none"> • Full details of RDF producer and user known 	<input type="checkbox"/>
<ul style="list-style-type: none"> • RDF specification is known, consistent and fit for purpose 	<input type="checkbox"/>
<ul style="list-style-type: none"> • Recovered Product Plan has been produced — includes Environment Management Plans (for producer and user), QA/QC procedures and assessment by suitably qualified consultant on suitability of RDF 	<input type="checkbox"/>
<ul style="list-style-type: none"> • Roles and responsibilities of producer, transporter and user are clearly defined 	<input type="checkbox"/>
<ul style="list-style-type: none"> • Has sought necessary approvals prior to commencing an RDF activity 	<input type="checkbox"/>
<ul style="list-style-type: none"> • Representative sampling and assessment done in accordance with Appendix 1 	<input type="checkbox"/>
<ul style="list-style-type: none"> • In compliance with other legislation [including Environment Protection (Air Quality) Policy 1994] 	<input type="checkbox"/>