Waste to Energy and Water Plant, Lot 15 Mason Road, Kwinana

Global Olivine Western Australia

Report and recommendations of the Environmental Protection Authority

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Summary and recommendations

Global Olivine Western Australia (GOWA) proposes to build and operate a Waste to Energy and Water Plant at Lot 15 Mason Road, Kwinana. This report provides the Environmental Protection Authority's (EPA's) advice and recommendations to the Minister for the Environment on the environmental factors relevant to the proposal.

Section 44 of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for the Environment on the environmental factors relevant to the proposal and on the conditions and procedures to which the proposal should be subject, if implemented. In addition, the EPA may make recommendations as it sees fit.

Relevant environmental factors

In the EPA's opinion, the following are the environmental factors relevant to the proposal, which require detailed evaluation in the report:

(a) air emissions;

(b) marine discharges; and

(c) wastes and by-products.

Conclusion

The EPA has considered the proposal by GOWA to build and operate a Waste to Energy and Water Plant at Lot 15 Mason Road, Kwinana.

The EPA notes the potential benefits of the proposal in terms of producing substantial quantities of electricity, potable water and other useful materials from a waste stream that would otherwise be disposed of in a landfill.

The EPA further notes that the proposal is one of the technologies that are being considered to help achieve the State Governments goal of "Towards zero waste by 2020" and that it achieves important reductions in greenhouse gas and reactive organic compound emissions.

Air emissions are the main environmental issue associated with waste to energy plants and the EPA recognises that stringent emission limits are required to be met to ensure that air quality is not compromised. The EPA notes the incorporation of 'best practice' air pollution control equipment in the proposal to minimise emissions in accordance with the requirements of the *Environmental Protection Act 1986.*

Another more general issue is the uncertainty associated with the introduction of new technology. The EPA wishes to encourage the use of new technology which can achieve better environmental outcomes. Safeguards are needed, however, if the technology does not achieve its design predictions. A number of measures have been incorporated into this assessment to address this issue, such as an independent design audit, staged commissioning with achievement of performance benchmarks before subsequent stages can proceed, specialised training requirements and contingency plans if design predictions are not met.

The EPA has therefore concluded that it is unlikely that the EPA's objectives would be compromised, provided there is satisfactory implementation by the proponent of the proponent's commitments and the recommended conditions set out in Appendix 5 and summarised in Section 4.

Other Advice

In considering this proposal, the EPA has provided other advice. This includes the Minister for the Environment seeking advice on the compatibility of the Global Olivine technology with the WAste 2020 strategy, and the implications of relying on one facility to handle a substantial part of Perth's municipal waste. The EPA also notes the potential for future sulphur dioxide emission reductions through GOWA treating flare gas from the BP refinery.

Recommendations

The EPA submits the following recommendations to the Minister for the Environment:

1. That the Minister notes that the proposal being assessed is for a Waste to Energy Plant with a potential to also produce potable water;
2. That the Minister considers the report on the relevant environmental factors as set out in Section 3;
3. That the Minister notes that the EPA has concluded that it is unlikely that the EPA's objectives would be compromised, provided there is satisfactory implementation by the proponent of the recommended conditions set out in Appendix 5, and summarised in Section 4, including the proponent's commitments.
4. That the Minister imposes the conditions and procedures recommended in Appendix 5 of this report.
5. That the Minister notes the other advice provided by the EPA, particularly in relation to seeking advice on the proposed technology and the strategic waste management implications for achieving the Waste 2020 vision.

Conditions

Having considered the proponent's commitments and information provided in this report, the EPA has developed a set of conditions which the EPA recommends be imposed if the proposal by GOWA to build and operate a Waste to Energy and Water Plant at lot 15 Mason Road, Kwinana is approved for implementation. These conditions are presented in Appendix 5.

The conditions make it legally enforceable that the proponent shall fulfil the commitments in the Consolidated Commitments statement set out as an attachment to the recommended conditions in Appendix 5. The commitments address the management of air emission monitoring and control, marine water and sediment quality, dust control, odour control, noise regulation compliance, greenhouse gas mitigation, site contamination, stormwater and equipment performance. In addition, the EPA has set conditions requiring the preparation and implementation of an Environmental Management System.

In relation to cooling water discharges, conditions require the proponent to:

- provide full detail of the chemistry of the ocean discharge prior to construction of the desalination plant; and
- refer details of a relocated ocean discharge should port development in the vicinity of James Point be likely to take place.

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1. List of submitters
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3. Identification of relevant environmental factors
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Acronym List

CCWA	Conservation Council of Western Australia
ECWA	Environment Centre of Western Australia
EMP	Environmental Management Plan
GLC	Ground Level Concentration
GOWA	Global Olivine Western Australia
HDWA	Health Department of Western Australia
HRA	Health Risk Assessment
JPPL	James Point Pty Ltd
KIA	Kwinana Industrial Area
MACT	Maximum Achievable Control Technology
MSW	Municipal Solid Waste
MWh	Mega Watt hour
NEPM	National Environmental Protection Measure
NHMRC	National Health and Medical Research Council
OU	Odour Unit
PAH	Polyaromatic hydrocarbon
PEM	Plasma Enhanced Melter
PCB	Polychlorinated biphenyls
REL	Reference Exposure Level
SNCR	Selective Non Catalytic Reduction
UHTC	Ultra High Temperature Combustor
WTE	Waste to Energy

1. Introduction and background

This report provides the advice and recommendations of the Environmental Protection Authority (EPA) to the Minister for the Environment on the environmental factors relevant to the proposal by GOWA to build and operate a Waste to Energy and Water Plant at Lot 15 Mason Road, Kwinana, approximately 30 kilometres south of the Perth central business district (Figure 1).

GOWA propose to combust up to a maximum of 1.45 million tonnes per annum of Municipal Solid Waste (MSW) in twelve Ultra High Temperature Combustors (UHTC's) installed in parallel trains. Heat from the combustion process would be used to produce steam and drive turbines (which generate electricity). Waste heat from this process is further used in a desalination plant to produce potable water. The proposal incorporates Plasma Enhanced Melters (PEMs) to process flyash (which would otherwise be sent to landfill) and some hazardous wastes into glass products. A compost facility is also included to process greenwaste.

As well as the electricity, glass products, potable water and compost produced, the project allows for the recovery and sale of ferrous and non ferrous metals, hydrochloric acid, sulphur and bed ash aggregate.

The proposal provides an alternative to the usual Western Australian practice of landfilling MSW. At 1.2 million tonnes per annum, the plant could process a major portion of the MSW produced in the Perth metropolitan area while providing energy and useful products.

The level of assessment was set at Public Environmental Review (PER) in September 1999. The proponent's public review document (Barker & Assoc. 2000) was released for four weeks public review which commenced on 1 April 2000 and closed on 1 May 2000. Six submissions were received from government agencies and four submissions were received from the public. The public submissions indicate support for this type of waste management project in principle.

Further details of the proposal are presented in Section 2 of this report. Section 3 discusses environmental factors relevant to the proposal. The Conditions and commitments to which the proposal should be subject, if the Minister determines that it may be implemented, are set out in Section 4. Section 5 provides Other Advice by the EPA, Section 6 presents the EPA's conclusions and Section 7, the EPA's Recommendations.

Appendices 1 to 5 contain relevant supporting information.

A summary of submissions and the proponent's response to submissions is available separately in the DEP library. It is available as a matter of information only and does not form part of the EPA's report and recommendations. Issues arising from this process and which have been taken into account by the EPA appear in the report itself.

2. The proposal

The proposal is for a regional waste processing facility within the Kwinana Heavy Industrial Estate. The site is located on the Swan Coastal Plain approximately 30 kilometres south west of the Perth Central Business District and 3 kilometres north-west of the Town of Kwinana (Figure 1).

The site is a large undeveloped piece of land which is adjacent to the British Petroleum (BP) refinery (Figure 2). The nearest residences are located to the north east in Hope Valley (approximately 2.6 kilometres) and to the east in Medina (approximately 2.5 kilometres).

The main component of the proposal is a Waste to Energy (WTE) plant. A number of additional components are incorporated to allow production of potable water and other products as shown in the process overview (Figure 3).

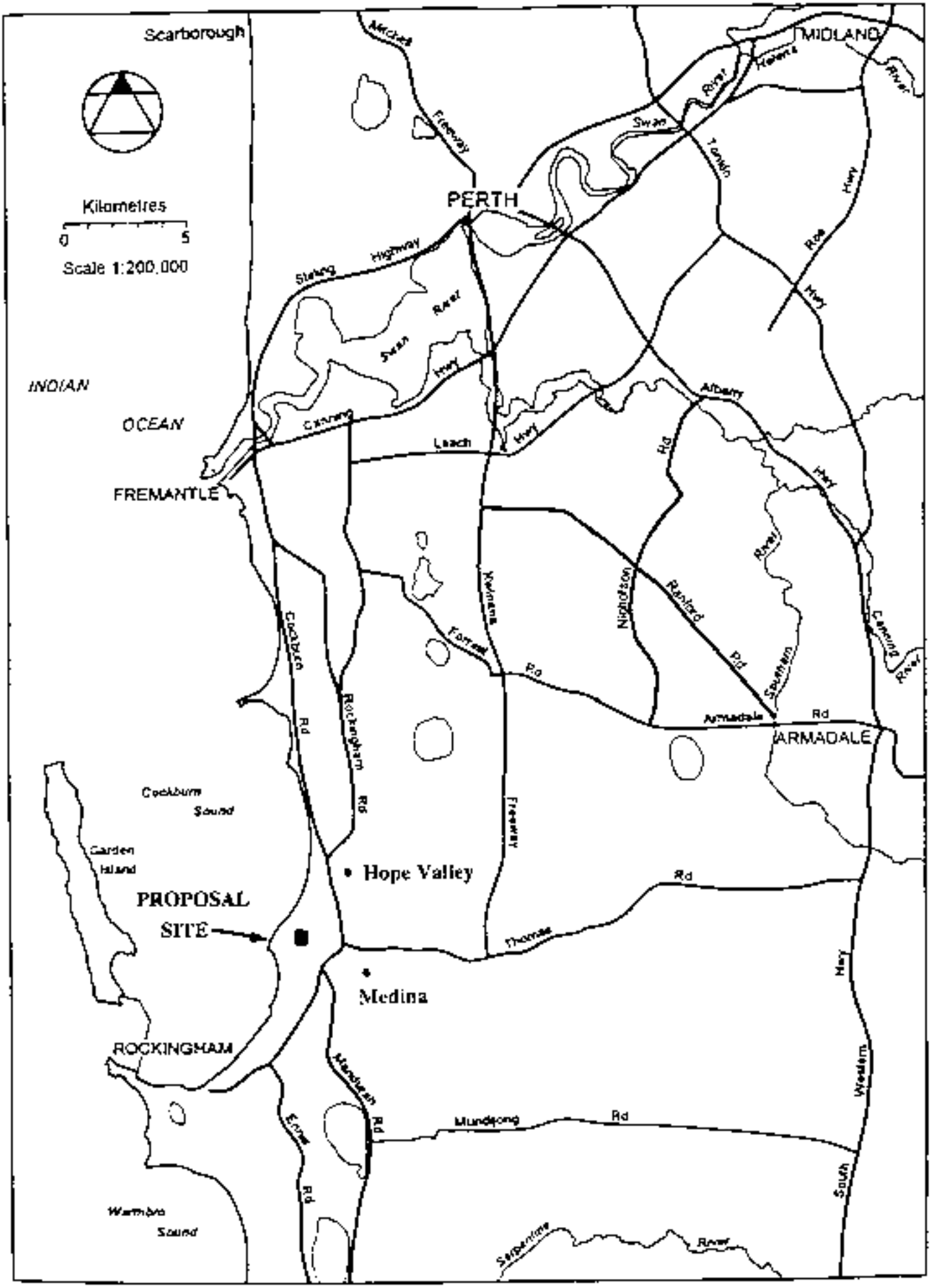

Figure 1. Regional Location.

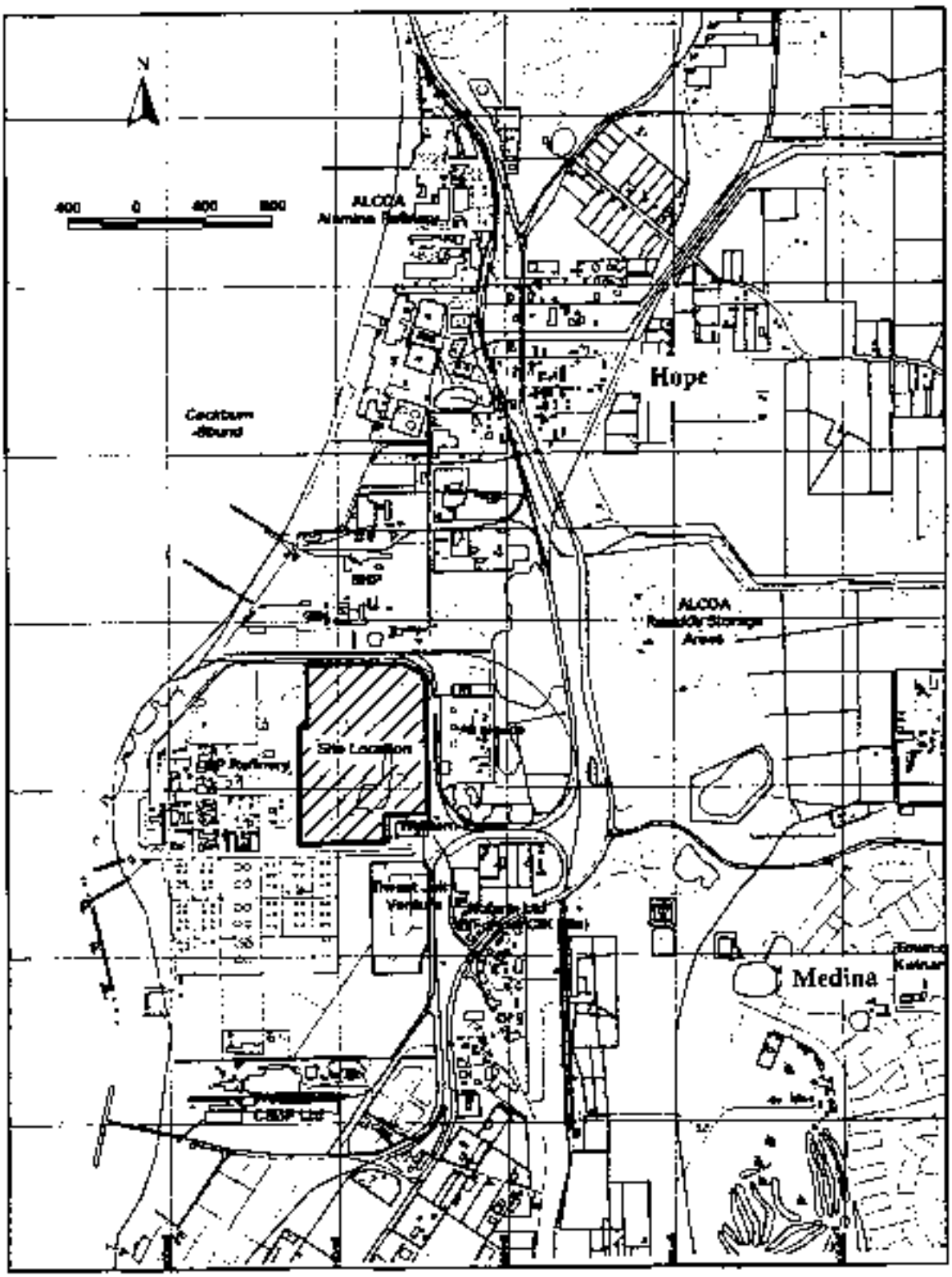

Figure 2. Site location and plant layout.

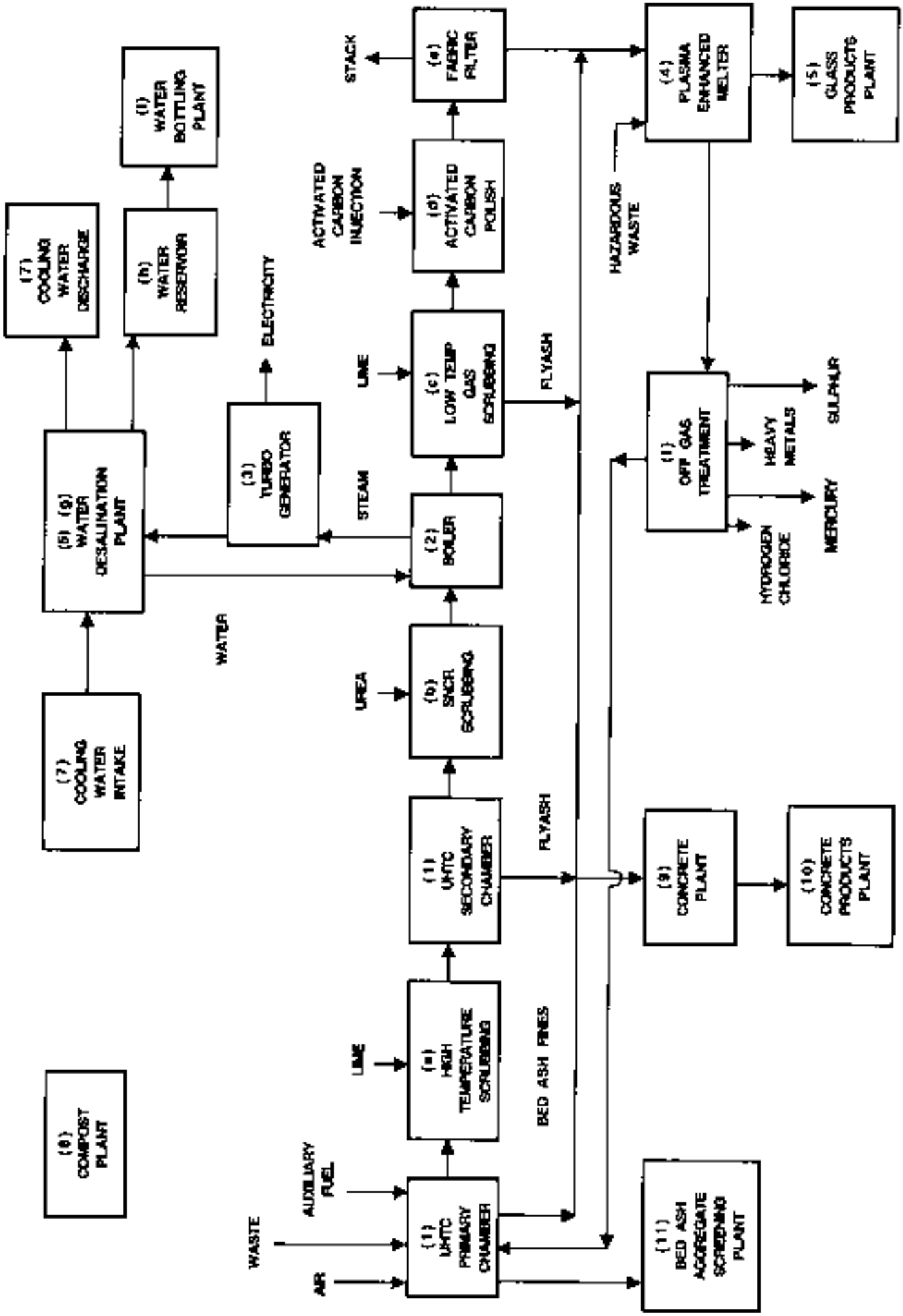

Figure 3. Process overview.

Waste-to-Energy Plant

The central component of this proposal is the WTE plant which will use household municipal solid waste as a fuel to produce electricity. The production of electricity from municipal waste combustors is a well established industry and many hundreds of plants are in use producing electricity throughout the world. There are various types of combustors in use and GOWA propose to use their own Olivine refractory Ultra High Temperature Combustors (UHTCs) which have been developed from their wood waste combustors.

Heat from the combustion is used to make steam in boilers and this steam is used to power turbines which produce electricity. The boilers and turbines are standard commercial equipment which are in widespread use in WTE plants.

The proposal differs from typical existing WTE plants in its capacity to process large quantities of waste, utilising a modular design consisting of twelve individual UHTCs, each with its own boiler and air pollution control equipment. This allows each UHTC to be operated independently and provides flexibility in operation and for maintenance. Often, WTE plants have only one to three combustors which can cause a significant drop in waste and electrical generation capacity when one combustor is down for maintenance.

The GOWA proposal also incorporates a number of additional components which are less common in existing WTE plants. These provide the ability to recover or produce useful products and further minimise the need for disposal of waste to landfills.

Plasma Enhanced Melters

GOWA propose to install Plasma Enhanced Melters (PEMs) to process the flyash into saleable products instead of the usual practice of landfilling the flyash. These PEMs operate at 3000 to 6000 degrees Celsius and melt the flyash into glass products such as paving stones, railway ties and road safety barriers. The PEMs would also allow the destruction of some types of hazardous wastes such as household hazardous waste, agrochemicals and PCBs.

Desalination Plant

GOWA propose to construct a desalination plant to utilise waste heat from the combustion process to produce potable water. A bottling plant would also be included to package the water.

Compost Plant

The proposal incorporates an enclosed composting facility to process greenwaste into compost.

Aggregate Screening Plant

The proposal includes a bed ash screening plant to crush, wash and screen the bed ash so that it is suitable for reuse as an aggregate.

Concrete Products Plant

A proprietary packaged concrete plant will be established on-site to provide the necessary construction product. Following construction, the concrete plant would be retained to produce concrete products and Olivine refractory panels.

The main characteristics of the proposal are summarised in Table 1. A detailed description of the proposal is provided in Section 3 of the PER (Barker and Associates, 2000). Mass flow diagrams for sulphur, mercury and dioxin are included in Appendix 4. Mass flow diagrams for other materials are included in the proponent's response to public submissions.

Table 1 - Summary of key proposal characteristics

ELEMENT	DESCRIPTION
Waste to Energy Building	Roof Area – approximately 17,200m^2. Total floor area (upper-basement and upper-level)– approximately 31,200m^2. Fully enclosed and tightly sealed. Constructed on a large concrete pad with internal drainage system. Storage – approximately 6 days waste storage: Direct truck access to upper basement (containers) and upper level (containers and loose MSW). 2 stacks approximately 70 m in height, each discharging treated flue gases from 6 Ultra High Temperature Combustors
Up to 12 Ultra High Temperature Combustors (1)	Processing an average of 1.2 million tonnes of municipal solid waste and maximum of 1.45 million tonnes of municipal solid waste per annum. Constructed in two plants (6 units per plant) within the WTE building. Producing approximately: • 220,000 – 260,000 tonne of bed ash aggregate and ferrous and non ferrous metal clinker per annum; • 35,000 tonne of bed fines per annum; • 24,000 tonne of fly ash per annum. Each UHTC will be fitted with the following air emission controls (or equipment of equivalent performance): • High Temperature Gas Scrubbing (a) (reduces SO_x and also expected to decrease de novo synthesis). • Selective Non-Catalytic Reduction (b) (SNCR) (reduces NO_x). • Low Temperature Gas Scrubbing (c) (reduces acid emissions and dioxins). • Activated Carbon Injection (d) (reduces remaining SO_x, HCl, heavy metals and de novo synthesis dioxins). • Fabric Filter (e) (for control of particulate material). Each UHTC will be fitted with plant and monitoring controls to ensure optimum combustion temperature and residence time and emissions monitoring.
Boilers (2)	One water tube conventional boiler for each UHTC. Two spare boilers to be stored on-site in boiler workshops.
5 Turbo Generators (3)	780 GWh per annum average. Three turbines each with 35MWe capacity Two turbines each with 17MWe capacity Housed within a separate, enclosed turbine hall.
4 Plasma Enhanced Melters (4)	Processing approximately 100,000 tonnes per annum. Housed within a separate, enclosed building. Processing the following products into glass: • Bed ash fines (up to approximately 94 tonnes per day). • Fly ash (approximately 68 tonnes per day). • Boiler ash. • Hazardous wastes, excluding radioactive substances and explosives. Each Plasma Enhanced Melter will be fitted with the following off gas treatment (f): • Baghouse • Water Scrubber • Activated carbon filter • LO-CAT Scrubber Off-gas fuel vented to UHTCs after scrubbing and removal of by-

ELEMENT	DESCRIPTION
	products.
Glass Products Plant (5)	Approximately 88,000 tonnes/annum average
Water desalination plant (6)	Producing up to approximately 30 million tonnes per annum average from up to 8 units. Including: • Condenser (g) • Water Reservoir (h) • Water Bottling Plant (i)
Cooling water inlet and discharge (7)	Intake approximately 4.2 m^3/s. Water discharge (summer) – approximately 3.34 m^3/s Water discharge (winter) – approximately 1.42 m^3/s.
Compost Plant (8)	Processing up to approximately 56,000 tonnes green waste per annum and producing 30,000 tonnes compost per annum. Housed within a separate, enclosed building. Vented to UHTCs.
Concrete Plant (9)	CON-E-Co proprietary packaged unit or similar. Approximately 80,000m^3 per annum. Fitted with specification extraction hoods and bag filters.
Concrete Products Plant (10)	For moulding of concrete products including olivine panels.
Bed Ash Aggregate Screening Plant (11)	Approximately 220,000 – 260,000 tonnes per annum Housed within a separate, enclosed building 24hr ash storage Ventilated to UHTC's Ash transfer point fitted with fabric filter.
Dangerous Goods Store	To store all hazardous wastes for vitrification and dangerous goods used on-site. Designed in accordance with EDGA 1961 or updated regulations.
Ancillary Works	Stormwater drainage designed to separate clean and potentially contaminated water; Internal roads; Truck wash; Truck weighbridge Main site office
Workforce	Construction – up to approximately 300 people at one time (2 year period) Operation – up to approximately 50 people full time

Since release of the PER, a number of modifications to the proposal have been made by the proponent. These include:

- The original proposal specified four 30 MW steam turbines. This has been changed to three 35 MW turbines plus two 17 MW turbines to allow greater flexibility in commissioning and load following.
- The PER showed the ocean intake attached to the BHP jetty. The proposed location has been revised to a stand alone intake located south of the BHP jetty.

These changes have been incorporated into Table 1 above. Further changes are possible as the design is finalised and provision is needed to review the environmental implications of any design change.

3. Relevant environmental factors

Section 44 of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for the Environment on the environmental factors relevant to the proposal and the conditions and procedures, if any, to which the proposal should be subject. In addition, the EPA may make recommendations as it sees fit.

It is the EPA's opinion that the following are the environmental factors relevant to the proposal which require detailed evaluation in this report:

(a) air emissions – control of emissions and the acceptability of their impacts;

(b) marine discharges – effect of cooling water discharges on Cockburn Sound; and

(c) wastes and by-products – the management of wastes and the recovery of materials.

The above relevant factors were identified from the EPA's consideration and review of all environmental factors (preliminary factors) generated from the PER document and the submissions received, in conjunction with the proposal characteristics.

The identification process for the relevant factors is summarised in Appendix 3.

Details on the relevant environmental factors and their assessment is contained in Sections 3.1 - 3.3. The description of each factor shows why it is relevant to the proposal and how it will be affected by the proposal. The assessment of each factor is where the EPA decides whether or not a proposal meets the environmental objective set for that factor.

3.1 Air Emissions

Description

Air emissions are the major issue associated with municipal waste combustors due to older combustors having a deservedly poor reputation in this regard. While modern waste combustors routinely achieve much better performance, it is important to ensure that solving problems associated with disposal of waste to landfill does not result in an air quality problem, especially since the proposed location is in the Kwinana Industrial Area (KIA) where there are already a number of sources of oxides of sulphur (SOx) and oxides of nitrogen (NOx).

The US EPA undertook a study of municipal waste combustors to determine the air pollution control technology employed and the air emissions achieved. From this study they determined the "Maximum Achievable Control Technology (MACT) floor" for new and existing municipal waste combustors. The MACT floor for new combustors is set equal to the best controlled source in the study and is required of all new combustors.

When these MACT controls are incorporated in well designed and operated combustors, they can be expected to meet the US EPA emission standards for new combustors. The GOWA facility incorporates all of these MACT controls which are:

- selective non-catalytic reduction (SNCR) technology for NOx control,
- spray dryer, typically using lime, primarily for the control of acid gas and dioxin emissions,
- activated carbon injection, primarily for the control of dioxins and mercury emissions, and
- fabric filter, for control of particulate material, dioxins, mercury and heavy metal emissions.

The GOWA facility also incorporates a number of enhancements that are expected to further lower air emissions including:

- high temperature lime scrubbing,
- long residence times for combustion gases in the primary and secondary combustion zones,
- extensive monitoring and control of combustion and pollution control systems, and
- the absence of "cold paths" by eliminating the need for water walls.

Table 2 - Proposed air emission limits.

Maximum emission concentration (mg/m^3 at 11% O_2, 0^oC, dry)	Maximum emission rates per stack (g/sec)	Remarks
Sulphur dioxide (SO_2)		
For 1 or 2 UHTCs operating per stack		(for commissioning)
200	10	Half hour average limit
50	2.6	24-hour average limit
For 3 to 6 UHTCs operating per stack		
200	31	Each stack not to exceed 98% of time
100	15	Each stack not to exceed 95% of time
50	7.7	Each stack not to exceed 85% of time
25	3.9	Each stack not to exceed 70% of time
15	2.3	Each stack not to exceed 50% of time
Oxides of nitrogen (NO_x expressed as NO_2)		
400	62	Half hour average limit
200	31	24-hour average limit
Daily NO_x mass emission limit from whole plant 2.7 tonnes/day		
Hydrogen chloride (HCl)		
60	9.2	Half hour average limit
10	1.5	24-hour average limit
Hydrogen fluoride (HF)		
4	0.62	Half hour average limit
1	0.15	24-hour average limit
Particulates		
30	4.6	Half hour average limit
10	1.5	24-hour average limit
Carbon monoxide (CO)		
90	14	4 hour average
Mercury (Hg)	(Concentrations $\mu g/m^3$ and emission rates mg/sec)	
50	7.7	Any test or average of triplicate test
Cadmium (Cd)	(Concentrations $\mu g/m^3$ and emission rates mg/sec)	
14	2.2	Any test or average of triplicate test
Lead (Pb)	(Concentrations $\mu g/m^3$ and emission rates mg/sec)	
140	22	Any test or average of triplicate test
Arsenic (As)	(Concentrations $\mu g/m^3$ and emission rates mg/sec)	
5	0.77	Any test or average of triplicate test
Dioxins/furans	(Concentrations ng I-TEQ/m^3 and emission rates μg I-TEQ/sec)	
0.1	0.015	Any test or average of triplicate test

Emissions

The proponent has proposed a set of air emission limits that the plant that the proponent believes the plant would be capable of complying with (Table 2).

SO_2

Air quality modelling was undertaken by the proponent to predict the sulphur dioxide (SO_2) Ground Level Concentrations (GLCs) from the proposal alone and in combination with existing emission sources and to compare them with the Kwinana Environmental Protection Policy (EPP) Standard. The predicted GLC for the plant in isolation is 3 to 6% of the Kwinana EPP (1 hour) Standard and there is only a very minor change to the cumulative SO_2 levels (Figures 4, 5 and 6) when the proposed plant is considered in combination with existing sources. The actual monitored levels from existing sources are typically around half the predicted levels in Figure 4 due to industry emitting SO_2 at less than the licence limit, however, to clarify the SO_2 situation the key points are:

- the SO_2 discharges are controlled by an EPP which sets SO_2 standards and limits for the buffer zone and residential areas;
- the EPP also requires a determination of the acceptable SO_2 discharges to ensure ambient standards are met:
- the airshed is currently fully allocated and the licence limits are set so that ambient standards are not exceeded;
- actual discharges are below licence limits and ambient air quality is within the standard.

NO_2

Air quality modelling has predicted that the cumulative nitrogen dioxide (NO_2) GLCs would be less than half of the National Environmental Protection Measure (NEPM) standard. The predicted GLC for the plant in isolation is predicted to be less than 20% of the NEPM standard and the increase in cumulative NO_2 would be 5% of the NEPM standard (Table 3). The DEP has advised that while the methodology used is non-standard, the results of this modelling are acceptable.

Table 3 - NO_2 predictions

	99.9%ile 1-hour average nitrogen dioxide (ug/m^3)			Percentages of NEPM Standard		
	Plant in isolation	Existing sources	Cumulative	Plant in isolation	Existing sources	Cumulative
Hope Valley	45	60	72	18%	24%	29%
Abercrombie Rd	34	No data	No estimate	14%	No data	No estimate
North Rockingham	22	62	68	9%	25%	28%

Other emissions

The air quality modelling also predicts that the GLC of particulates and carbon monoxide (CO) would be 1% and 0.4% of the respective NEPM standards. The GLC of hydrogen chloride (HCl) is predicted to be 11% of the Victorian EPA Design GLC and the hydrogen fluoride (HF) GLC is predicted to be 2.5% of the 90 day average ANZECC goal for fluoride sensitive vegetation. HCl and HF concentrations are also well below the 1 hour average Californian Reference Exposure Levels (RELs).

Odour

There are two main odour sources, the compost plant and the main MSW hall. Both of these sources are fully enclosed and under negative pressure. The extracted air is vented to the combustors where the odours would be destroyed. The only residual odour discharge would

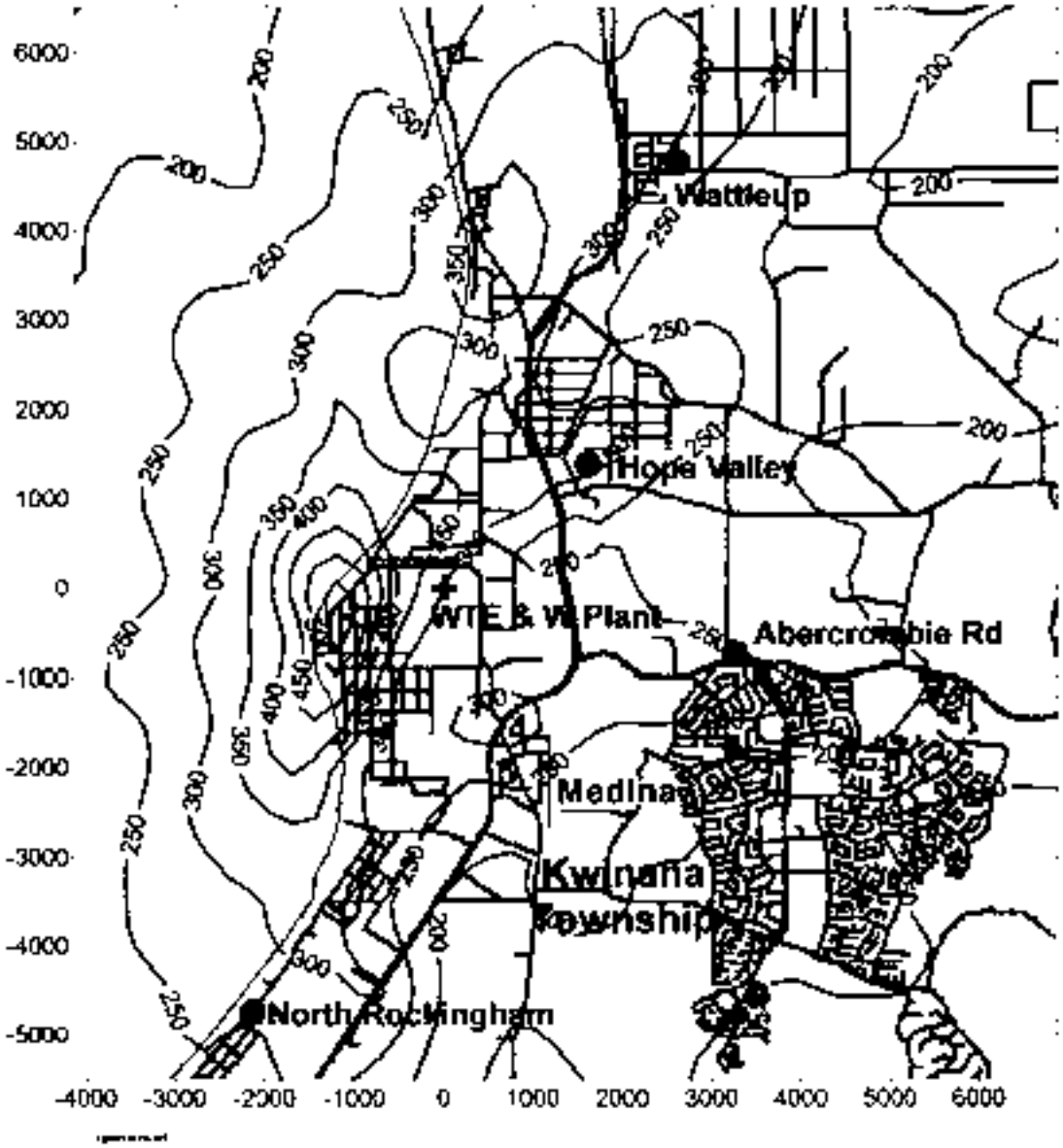

Figure 4. 99.9%ile 1-hour average concentration of sulphur dioxide for emissions from existing sources.

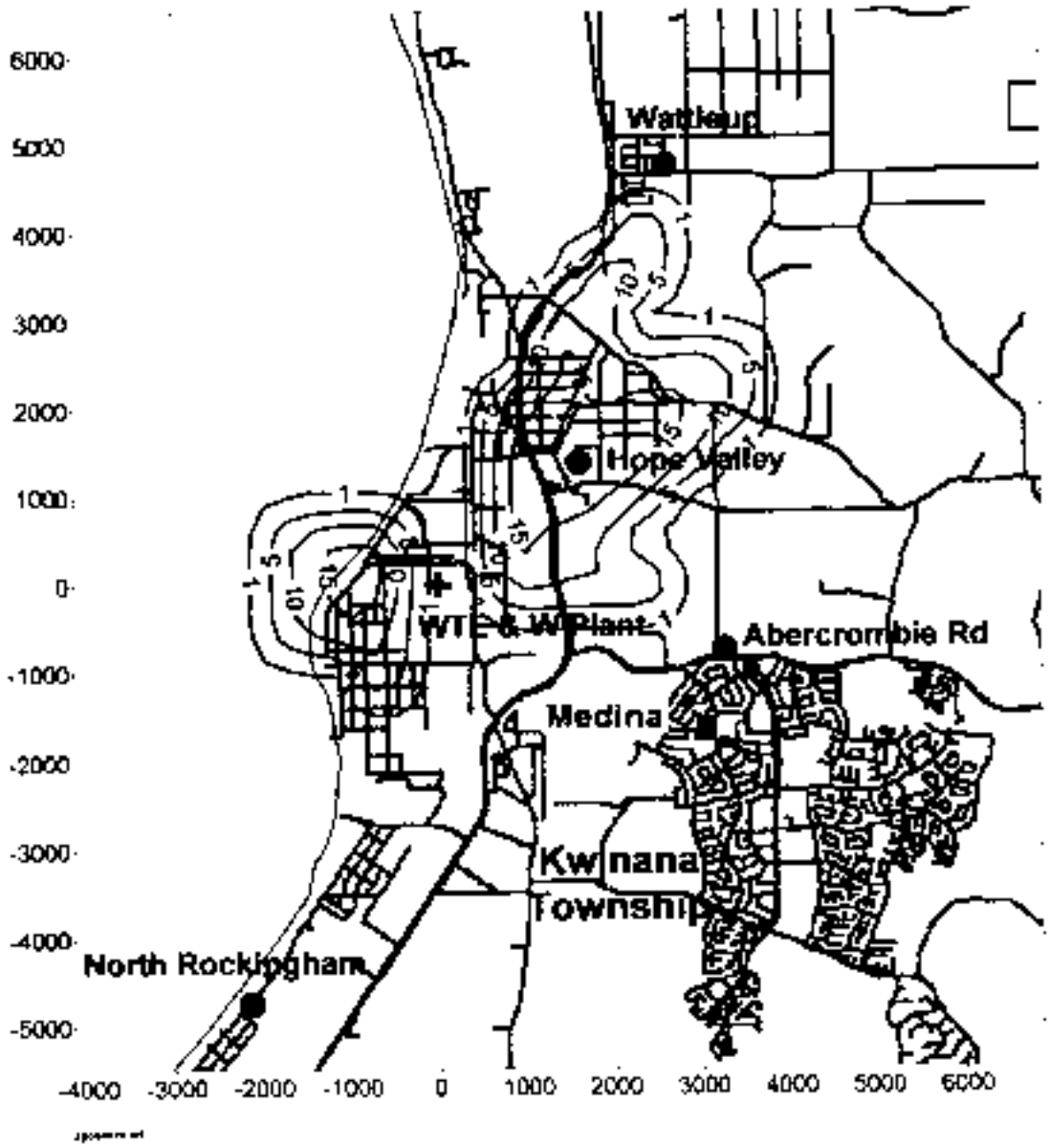

Figure 5. 99.9%ile 1-hour average concentration of sulphur dioxide from WTE&W plant in isolation with probabilistic emission rates.

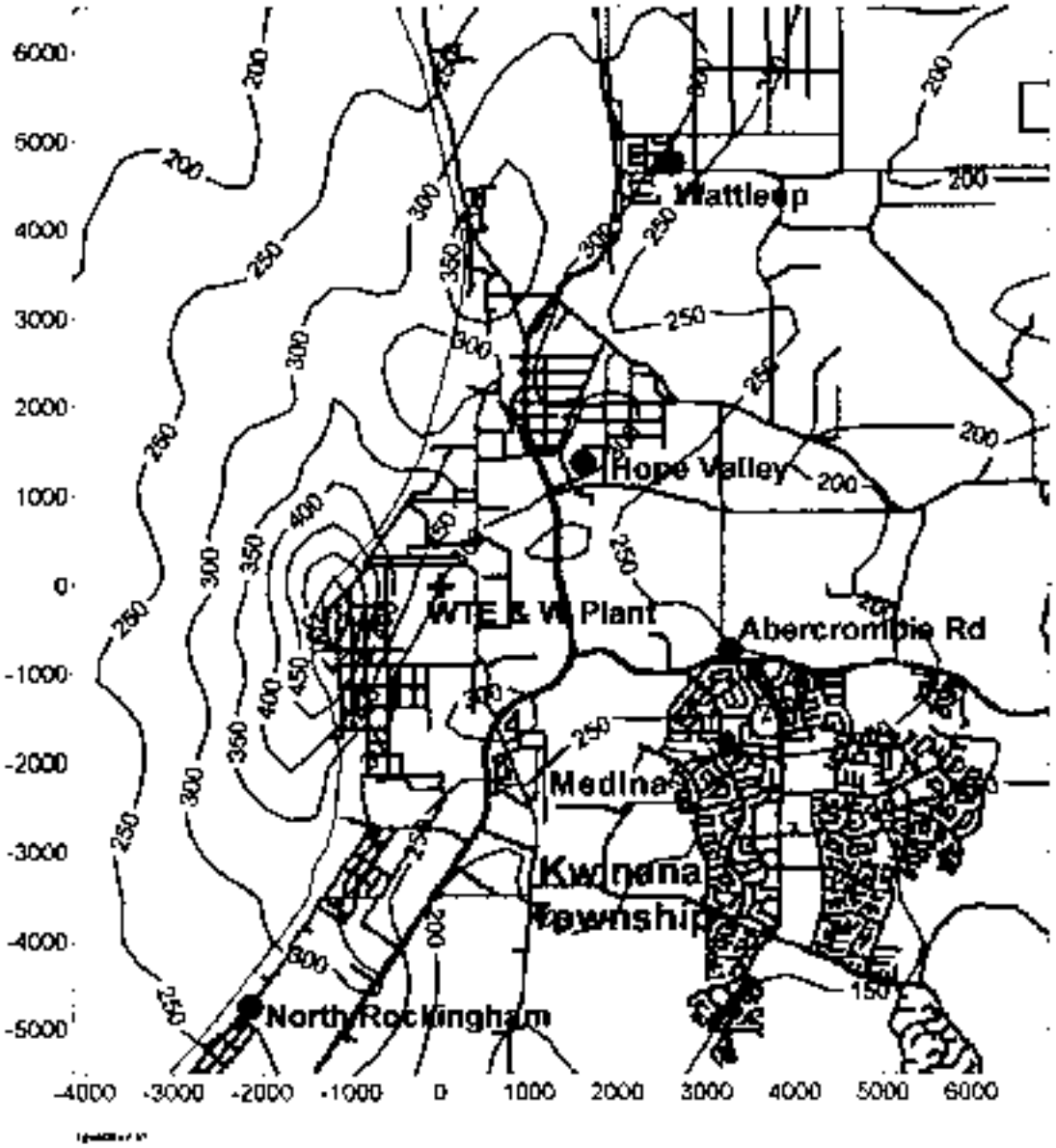

Figure 6. 99.9%ile cumulative 1-hour average concentration of sulphur dioxide from existing sources andWTE&W plant.

be from the combustion gases and the odour from the stacks is predicted to result in GLCs of less than 0.5 Odour Units (OUs).

Dust (fugitive)

There are several potential sources of fugitive dust emissions from the storage and handling of powdered limestone, ash, aggregate, and cement dust.

Greenhouse gases

Implementation of the proposal would result in a significant reduction in greenhouse gas emissions due to the production of power from biomass and the diversion of waste from landfill. The reduction is estimated at between 0.9 and 2.8 million tonnes of carbon dioxide (CO_2) equivalents per annum. The variation depends on the Global Warming Potential (GWP) factor used and whether steel recovery is credited.

Dioxins

The dioxin present in the municipal waste stream is destroyed by an efficient combustion process, however dioxin can reform in the flue gas and thus needs to be removed by air pollution control equipment. The majority of this dioxin ends up in the flyash and is collected by the fabric filters. The GOWA proposal incorporates Plasma Enhanced Melters to process the flyash and these operate at a temperature where the dioxin in the flyash would be destroyed.

Health Risk Assessment (HRA)

The proponent undertook a HRA (ESR, 2000) to predict the exposures for people in the area that could potentially be affected by the emissions and to predict the health implications of these exposures. The HRA predicts that for probable average emissions, the increase in exposure for the general population would not be discernible.

Submissions

The DEP had some concerns regarding the HRA methodology and these have been addressed in the proponent's response to submissions.

The Health Department of Western Australia (HDWA) advised that the approach adopted for the HRA can be considered valid.

The HDWA notes that both PCB's and PAH's have been excluded from the risk assessment as emission levels are considered to be very low. The HDWA would expect the predicted low levels to be confirmed by monitoring. The proponent advised that PCB's and PAH's were included in the HRA but the results were not presented because they were low.

Com-Net suggests that the Kwinana SO_2 airshed is full and there is no room for further industry unless tradeable emissions have been allowed.

Assessment

The area considered for assessment of this factor is the proposal area and surrounding properties including nearby residences.

The EPA's environmental objective for this factor is to ensure that gaseous emissions from the new plant in isolation and in combination with neighbouring sources and background concentrations:

- meet the air quality standards and limits stated in the Kwinana EPP and other relevant air quality standards/guidelines, including the NEPM for ambient air quality;
- do not cause an environmental or human health/amenity problem; and
- meet the requirement of Section 51 of the Environmental Protection Act 1986, to take all reasonable and practicable measures to minimise all discharges.

Table 4 ***Proposed emission limits and limits from regulatory agencies***

Proposed limits	Averaging time	EC	US EPA	NHMRC		Victoria		a
mg/m³ at 11% O_2, 0°C, dry				11% O_2	7% O_2	11% O_2	7% O_2	
Sulphur dioxide (SO_2)								
200 (98%)[+] 100 (95%) 50 (85%) 25 (70%) 13 (50%)	1/2 hour[++] 24-hour[++]	200 50	- 60/80%[#]					
Oxides of nitrogen (NO_x expressed as NO_2)								
400 200	1/2 hour 24-hour	400 200	- 220	571	800	357 713	500 1000	H G
Hydrogen chloride (HCl)								
60 10	1/2 hour 24-hour	60 10	- 29/95%	285	400			
Hydrogen fluoride (HF)								
4 1	1/2 hour 24-hour	4 1	- -	36	50	36	50	
Particulates								
30 10	1/2 hour 24-hour	30 10	- 17	178	250	178 357 32 36	250 500	H G H G
Opacity								
10%	6 minute	-	10%	20%				
Carbon monoxide (CO)								
90	4-hour	-	89	713	1000	1783	2500	B
µg/m³ at 11% O_2, 0°C, dry				11% O_2	7% O_2	11% O_2	7% O_2	
Mercury (Hg)								
50	Any test*	50	57/85%	2140	3000	-	-	
Cadmium (Cd)								
14	Any test*	30[##]	14	2140	3000		3000	B
Lead (Pb)								
140	Any test*		140	-	-	7133	10000	B
Nickel (Ni)								
	-	-	-	14265	20000	14265	20000	B
Antimony (Sb)								
	-	-	-	-	-	7133	10000	B
Arsenic (As)								
5	-	-	-	-	-	7133	10000	B
Miscellaneous heavy metals								
	Any test*	500[###]		7132[++]	10000	7132[^^]	10000	B
ng I-TEQ/m³ at 11% O_2, 0°C, dry								
Dioxins/furans								
0.1	Any test*	0.1	0.14	-	-	-	-	

\+ % figures are percentages of toxic emissions are not to exceed stated concentration

++ applies to EC and US EPA limits only. Proposed percentage of time limits for WTE&W plans are more stringent than either EC or US EPA limits

a. Schedule of Victoria Emission Limits
G Emission limits for stationary sources
H Emission limits for new stationary sources in Air Quality Control Regions
B Both of the above Schedules

* concentration/optional % removal from raw flue gas

\+ any test or average of triplicate test

\## total of cadmium plus thallium

\### total of antimony, arsenic, lead, chromium, cobalt, copper, manganese, nickel and vanadium

++ total of arsenic, cadmium, lead, mercury and vanadium

^^ total of antimony, arsenic, cadmium, lead and mercury

In considering this objective the EPA is mindful that in terms of sulphur dioxide the Kwinana airshed has been fully allocated and in terms of nitrogen oxides (which are one of the key precursors to photochemical smog formation) the Perth airshed occasionally exceeds NEPM standards for ozone as an indicator of smog. Thus, for new industries locating in the area, the most stringent controls, operated to best practice standards, are needed.

Emissions

The suggested emission limits have been compared with national and international limits (including the US EPA and the European Commission) and are summarised in Table 4. The limits were also compared with the EPA Guideline for the Assessment of Environmental Factors No. 13 "Biomedical Waste Incinerators" and recent conditions placed on a WTE plant in NSW. The EPA considers that the proposed air emission limits represent best practice and are deliverable by the proposal.

The EPA notes the MACT controls and enhancements included in the GOWA proposal and the information that plants fitted with the MACT controls can be expected to meet the US EPA limits (US EPA, 1995).

SO_2

The EPA notes that the predicted cumulative SO_2 GLCs show that the plant will have a minimal impact on ambient SO_2 air quality. To estimate the level of comfort in the figures, the proposed limits have been compared with the emission rate that would be necessary for the GOWA facility to cause an exceedance of the Kwinana EPP Standard (Table 5). This emission rate has been back calculated from the ambient monitoring data.

Table 5 - Comparison of emission limits and rate necessary to exceed the Kwinana EPP ambient standard for SO_2.

EC limits for municipal waste combustion. (proposed GOWA limit) mg/m^3	Standard practice. mg/m^3	Emission concentration which would exceed Kwinana EPP Standard. mg/m^3	Kwinana existing ambient monitoring (Abercrombie Road 99.9%ile). ug/m^3	Kwinana EPP ambient Standard (Abercrombie Road). ug/m^3	Kwinana EPP ambient Limit (Abercrombie Road). ug/m^3
200 (1/2 hr)	not specified	649	110*	350 (1 hr)	700 (1 hr)
50 (24 hr)	160-300	1908	31*	125 (24 hr)	200 (24hr)

* Note that the airshed is fully allocated so that in terms of the "potential" cumulative impacts the entries would be 350 and 125 ug/m^3 respectively.

Table 6 compares the SO_2 emissions per Mega Watt hour (MWh) of electricity produced by the proposal with the existing Kwinana Power Station. The pollution controls employed on the GOWA facility allow it to produce electricity at a fraction of the SO_2 emissions of the Kwinana Power Station. If the GOWA facility displaced electricity generated from the Kwinana Power Station, the SO_2 load to the Kwinana airshed would be reduced by over 1200 tonnes per annum.

Table 6 - Comparison of SO_2 emissions per MWh

FACILITY	kg SO_2/MWh
GOWA plant (at probable average).	0.08
GOWA plant (at emission limit).	0.27
Kwinana Power Station.	1.84

However, the EPA notes that with respect to emissions of SO_2 to the Kwinana airshed, the facility would still be a new contributor and would require 'reallocation' of the SO_2 emission limits already allocated to existing industry.

The EPA has been advised by the DEP that in view of the cumulative air dispersion results, the relatively small SO_2 emissions from the proposal, and a commitment by BP Kwinana to an SO_2 compliance program which will progressively reduce BP's maximum SO_2 emissions, the proposal can be accommodated within the Kwinana airshed without causing any exceedances of the Kwinana air quality EPP.

This will be further confirmed through a "redetermination" process currently being undertaken to reallocate SO_2 airspace on a probabilistic basis.

NO_2

The EPA notes that the predicted cumulative NO_2 GLCs show that the plant will have a small impact on NO_2 ambient air quality. To estimate the level of comfort in the figures, the proposed limits have been compared with the emission rate that would be necessary for the GOWA facility to exceed the NEPM ambient criteria (Table 7). This emission rate has been back calculated from the ambient monitoring data.

Table 7 - Comparison of emission limits and rate necessary to exceed the NEPM ambient standard for NO_2.

EC limits for municipal waste combustion (proposed GOWA limit). mg/m^3	Standard practice mg/m^3	Emission concentration which would exceed NEPM criteria at Hope Valley. mg/m^3	Ambient monitoring (Hope Valley) ug/m^3	NEPM ambient criteria. ug/m^3
400 (1/2 hour)	571 (NHMRC)	1650 to 2150	60 (1 hour,99.9%ile)	246 (1 hour)
200 (24 hour)	361 to 571	~10214	14.4 (1 year, max)	62 (1 year)

Table 8 compares the NOx emissions per MWh of electricity produced by the GOWA facility with that of the Kwinana and Pinjar Power Stations. Again the pollution controls employed allow the GOWA facility to produce electricity with substantially less NOx emissions.

Table 8 - Comparison of NOx emissions per MWh

FACILITY	kg NOx/MWh
GOWA plant (at probable average).	1.04
GOWA plant (at 24hr emission limit).	2.08
Kwinana Power Station.	3.19
Pinjar Gas Turbine Power Station.	2.81

The emission of NOx is linked to the formation of photochemical smog. However, the formation of smog is also dependent on the presence of Reactive Organic Compounds (ROCs), sunlight, warm temperatures and time for reactions to occur. A significant, current source of ROCs is the decomposition of municipal waste in existing landfills. The diversion of waste from landfill to the GOWA facility would result in a decrease in ROCs of about 1.5%, which is likely to provide a small beneficial effect in reducing smog formation.

The DEP has advised the EPA that the overall effect of the GOWA facility on smog formation, be it positive or negative, is likely to be small.

Odour

The DEP has advised the EPA that the odour assessment is acceptable and the results are below the DEP's criterion of 0.5 OUs.

Dust (fugitive)

The DEP has advised that dust can be readily managed by normal best practice.

Greenhouse gases

The EPA notes that implementation of the GOWA proposal would provide significant savings in greenhouse gas emissions, as a result of elimination of hydrocarbons released from landfilling wastes and CO_2 savings from generating power from waste instead of fossil fuel.

Dioxins

The EPA notes that the facility has been designed to minimise dioxin formation and emissions. The EPA notes that the proposal incorporates Plasma Enhanced Melters which would destroy the dioxin effectively making the facility a dioxin sink.

The EPA notes that while a modern WTE plant can achieve low emission levels due to its pollution control equipment, the backyard burning of household waste in 200 litre drums can be a significant source of dioxins (Lemieux et al, 2000). Waste management authorities should use their education programs to continue to discourage the practice of backyard burning of domestic waste.

Health Risk Assessment (HRA)

At the DEP's request, the deposition modelling used in the HRA was peer reviewed by an independent expert who reported that the modelling had been performed using appropriate methodology for the circumstances (Pacific Air & Environment 2000).

The HRA predicts that emissions of dioxins (one of the main emissions associated with older combustors) from the facility would cause a negligible increase in daily intake.

The EPA notes that on the basis of the NPI data, the facility would be a significant emission source of heavy metals (beryllium, lead and mercury) to the Kwinana airshed. However, the HRA predicts that for probable average emissions, given the available buffer area, the increase in exposure for the general population would not be discernible.

The EPA notes the HDWA advice that the approach adopted for the HRA can be considered valid. The EPA also notes that the DEP is in the process of developing preferred HRA methodology for use in future proposals and that the HRA for this proposal would assist in the development of the guidelines.

The proponent has also made an additional commitment to undertake a revision of the HRA using actual monitoring data within 12 months of the GOWA plant reaching half production capacity, and in accordance with DEP/Health Department requirements at that time.

Ensuring performance standards are achieved

The EPA recognises that with the introduction of any new technology there is some risk that the process may not operate as expected. Some concern has been expressed that if Perth was dependent on the GOWA facility to process large quantities of waste, there may be pressure to allow it to continue to operate even if it could not meet the required air emission limits. However the EPA notes that a) the GOWA plant is modular in design and consists of 12 independent UHTCs and associated pollution control equipment and b) any major problems are most likely to show up in commissioning.

The proponent has advised that the UHTCs would be commissioned two at a time. This means that there would be a gradual buildup in the amount of waste processed but more importantly it provides the DEP with the opportunity to ensure through licensing via Part V of the EP Act, that the emission limits are adequately demonstrated by the first UHTC pair before allowing further units to be commissioned. In this way the potential for a large plant that doesn't meet emission limits during commissioning (and operation) is avoided.

The EPA notes that due to the absence of the averaging effect (from twelve combustors), a single UHTC or pair of UHTCs per stack may require more flexible SO_2 emission levels to be demonstrated (at the completion of commissioning) and suitable SO_2 limits are provided in Table 2. For three or more UHTCs per stack, the overall plant SO_2 emission concentration limits could apply.

For the other pollutants, a single UHTC would need to demonstrate compliance with the emission concentrations (and 1/12 of the emission rates) and two UHTCs per stack would need to demonstrate compliance with the emission concentrations (and 1/6 of the emission rates) in Table 2.

The EPA expects the operators of the GOWA facility to be diligent in operating the facility to ensure it fully complies with the limits in Table 2.

The proponent has made an additional commitment for a third party review of the detailed design of the plant prior to construction and this provides added assurance that the facility and in particular the pollution control systems will operate as described.

The proponent has also made a commitment to ensure that suitably qualified plant operators are on duty at all times and that all operators will be adequately trained prior to working on the plant.

Location

The KIA already contains a number of large emission sources which place a constraint on the siting of new sources in the area. The justification provided by GOWA for the site selection includes:

- requirement to be close to the waste source,
- access to high capacity electrical and water mains,
- access to main transport links,
- close to ocean for cooling water intake,
- adequate buffer, and

- close proximity to industries with operational synergies.

The site was independently reviewed in a report commissioned by the Department of Resources Development (Welker, 2000). This report supports the proponent's economic justification of the plant site being chosen in the Kwinana Industrial area and notes that "It seems doubtful that an alternative coastal location for such a facility with a seawater cooling system could be found close to Perth."

Comment

The EPA is aware that an efficient combustion process is important in minimising air emissions and notes that the degree of automation, monitoring and computer control proposed for the UHTCs, gives an added assurance that the combustion process can be maintained at or near optimum efficiency when compared to a manually controlled, older system. However, there is still a need for the proponent to exercise utmost diligence in managing and operating the facility. Adequate training of staff through an accredited course would be important to ensure good management and operation of the facility.

The EPA recommends that the emission limits in Table 2 be considered for adoption in the DEP's works approval and licence process as acceptable emission limits required under Part V of the Environmental Protection Act (EP Act) 1986 for this proposal.

Commitments

The proponent has made a number of commitments to ensure that the plant will be designed, built and operated in a diligent manner to minimise emissions and meet or better proposed limits. These include:

- obtain an third party audit of the final engineering design to ensure pollution control equipment will achieve the PER emission levels;
- investigate and establish the lowest practical level of NOx and SO_2 emissions with a view to reducing licence limits in future;
- ensure that a suitably qualified plant operator is on duty at all times, and
- undertake a revision of the HRA.

The EPA recognises the importance of third party audit following detailed design and training to ensure that the plant would deliver the expected performance and considers that these are essential for this type of proposal.

Summary

Having particular regard to:

(a) the incorporation of MACT control features which can be expected to meet stringent air emission limits;

(b) air emission design enhancements which are expected to further lower emissions;

(c) the air quality modelling results which predict acceptable GLCs;

(d) the DEP's advice on the SO_2 redetermination;

(e) the results of the HRA showing negligible increase in risk;

(f) proponent's commitments: and

(g) the ability of Part V of the *Environmental Protection Act 1986* to control the progressive introduction of each UHTC pair,

it is the EPA's opinion that the proposal can be managed to meet the EPA's environmental objective for this factor, provided that the proponent's commitments are made legally enforceable and can be successfully implemented.

3.2 Marine Discharges

Description

A significant aspect of the proposal is the requirement for a cooling water and desalination feed intake of seawater and an ocean discharge to the waters of Cockburn Sound. Two scenarios for the discharge location were considered by the proponent, 1) a shore discharge point, and 2) a relocated discharge point if a new harbour facility in Cockburn Sound by James Point Pty Ltd (JPPL) Stage 2 was to proceed.

Scenario 1

The PER included modelling of heat and salinity for the Scenario 1 discharge point. The modelling predicts that the temperature and salinity would reach ambient levels within 50 metres of the discharge point. The PER included limited information on an anti-scalant in the discharge.

Scenario 2

The proposed marine discharge point would need to be relocated should Stage 2 of the JPPL port development proceed. However, the JPPL Stage 2 proposal has not been formally submitted to the EPA at this time and final details of the design are not available.

Should JPPL Stage 2 proceed, GOWA suggest that this would most likely involve the discharge of a combined BP Kwinana/GOWA effluent from a new location that depends on the Stage 2 JPPL development. At this time GOWA do not have access to information regarding the final JPPL Stage 2 port layout or contaminants in the BP discharge.

Submissions

The DEP and HDWA had questions about the plume's buoyancy and the effect of this on the modelling results.

The DEP requested information on other possible contaminants and more detail on the chemistry of the anti-scalant in order to fully estimate the effects on the marine environment.

Assessment

The area considered for assessment of this factor is Cockburn Sound.

The EPA's environmental objective for this factor is to ensure that the quality of marine water and sediment in Cockburn Sound are maintained or improved, by ensuring that the effluent quality and water quality at and beyond the boundary of the mixing zone comply with the following statutory and acceptable standards:

- the environmental values and environmental quality objectives recommended in the Perth's Coastal Waters (EPA, 2000b); and
- environmental guidelines recommended in the draft WA Water Quality Guidelines for Fresh and Marine Waters Report (EPA, 1993).

Scenario 1

In response to questions about the plume's negative buoyancy, the proponent provided information to the DEP's satisfaction that the plume would mix throughout the water column within 50 metres of the discharge. On this basis, the DEP advised that the Scenario 1 heat and salinity modelling and results are acceptable.

The DEP has advised the EPA that the proposed discharge of heat and salinity to Cockburn Sound is acceptable.

The proponent has advised that the discharge would not contain significant concentrations of heavy metals. The proponent has recently provided further information on a likely anti-scalant

and also advised that it may be possible to operate without an anti-scalant altogether. However, due to the lack of definitive information on the anti-scalant, the EPA has decided to recommend a condition requiring the proponent to provide information on the discharge chemistry prior to construction of the desalination plant to ensure the discharge meets acceptable criteria.

Scenario 2

In the absence of firm information about the JPPL Stage 2 layout, it is difficult to evaluate the environmental effects that may result from a relocated and combined discharge point. The EPA has thus decided to recommend a condition requiring the proponent to refer the relocation to the EPA if Stage 2 of the JPPL project were likely to go ahead.

The EPA notes the proponent has committed to cooperate with BP and undertake a detailed assessment of a combined discharge.

The proponent has made commitments to ensure the marine discharge would be acceptable. These include:

- undertake model validation of the Western Power and BP plumes;
- prepare a risk assessment and contingency plan for the possibility of contamination of the cooling water with hazardous substances;
- undertake a field survey to determine dilution and extent of GOWA plume;
- undertake eco-toxicological testing of effluent to establish toxicity levels;
- undertake periodic surveys of sediment quality in vicinity of discharge;
- provide an EMP on the likely chemistry of the cooling water discharge and management of the discharge to ensure an acceptable level of impact;
- undertake a detailed assessment of the combined GOWA and BP Kwinana discharge if Stage 2 of the JPPL port proceeds; and
- cooperate with JPPL and BP Kwinana to fully assess the impacts of their discharges if Stage 2 of the JPPL port proceeds.

Summary

Having particular regard to:

(a) the advice from the DEP on the acceptability of the heat and salinity discharge modelling;

(b) the proponent's commitments;

(c) the recommended conditions; and

(d) the provisions for further control of the proposal via Part V of the *Environmental Protection Act 1986*,

it is the EPA's opinion that the proposal is capable of being managed to meet the EPA's environmental objective for this factor, provided that the proponent's commitments and EPA's conditions are made legally enforceable and successfully implemented.

3.3 Wastes and By-products

Description

The proposal is for a waste processing facility that the proponent believes makes the best possible use of the municipal solid waste stream. It has been specifically designed to maximise the recovery of energy and materials and minimise the need for landfill.

As part of their waste minimisation strategy, the proponent proposes to use the bed ash aggregate material as concrete aggregate, road base and fill.

The proponent also proposes to use the vitrified glass from the PEMs to make a number of products including paving stones, railway ties and road safety barriers.

Submissions

In response to questions by the HDWA and the DEP, the proponent has advised that they have no intention of sourcing MSW or hazardous waste from outside WA.

In response to HDWA questions about possible contamination of the water produced, the proponent has advised that both water reservoirs would be fully enclosed and that they will design and implement a monitoring program to demonstrate the quality of the desalinated product.

The Conservation Council of Western Australia (CCWA) suggests the proposal does not promote waste reduction and recycling, however they welcome the proposal as an improvement over current practices.

The CCWA requested that the proponent prepare a vermin control program which avoids the heavy use of pesticides that could find their way into the Sound. The proponent has advised that they will engage a professional pest control organisation to report on vermin. Additionally, due to the enclosed nature of the operations, any baiting would not be exposed to the marine environment.

The Environment Centre of Western Australia (ECWA) stated that they were keen to see this type of project undertaken as they believe there is a need to demonstrate that incineration is safe, effective and economically viable.

The ECWA notes that a poor attitude to cleanliness often develops in waste handling facilities and suggests that stringent training and supervision will be required to avoid this and associated safety problems occurring.

The ECWA expressed concern over radioactive material in domestic smoke detectors. The Radiation Health Branch of the HDWA has advised that low yield radioactive sources such as domestic smoke detectors (commonly found in domestic waste) are not considered a hazard.

Com-Net notes that while they support landfill and greenhouse gas reduction, other waste to energy plants have failed to meet their environmental objectives.

In response to concerns raised by submitters, the proponent has advised that if a market could not be found for the aggregate and glass, the project would still be viable and the aggregate and glass would be disposed to landfill.

Assessment

The area considered for assessment of this factor is the proposal site, and disposal areas.

The EPA's environmental objective for this factor is to ensure wastes are managed in accordance with the DEP's waste management hierarchy (ie. avoid, minimise, recycle, treat and dispose).

The EPA notes that implementation of the proposal would be a step towards the State Governments goal of "Towards zero waste by 2020".

The EPA notes that the proposal allows for the recovery of energy and materials such as ferrous and non ferrous metals, hydrochloric acid, sulphur, bed ash aggregate and glass products and also leads to an important decrease in greenhouse gas and ROC emissions.

The potential for the reuse of the aggregate and vitrified glass is also noted. Much of the bottom ash from municipal waste combustors in Europe is used for similar purposes. Information on ash quality from the Bellingham, USA plant supports the potential for reuse.

While not common, there are WTE plants that use arc furnaces to process flyash such as the Saitama plant in Japan which has two arc furnaces, each processing 80 tonnes per day (Caddet, 1996). On the basis of available information, the vitrified glass should be suitable to make the glass products proposed.

However, since these materials may contain traces of heavy metals and dioxins, it will be necessary for the proponent to carry out appropriate tests to quantify the leaching potential of any contaminants and meet any conditions specified in a licence issued by the Department of Environmental Protection. The results of these tests would allow an assessment of the materials suitability for use in various environments to be made. This will provide the mechanism to ensure that the use does not cause contamination or adverse impacts on the environment.

The proponent has made a commitment to prepare an Environmental Management Plan (EMP) for the use of the aggregate and vitrified materials. As part of the plan the proponent will demonstrate the suitability of the material for the proposed use, undertake leaching trials and dioxin testing, as well as evaluate disposal options.

The EPA notes the support for the proposal from the CCWA and ECWA.

The relevant proponent commitments are:

- to prepare an EMP to demonstrate acceptability of vitrifier glass and bed ash aggregate for reuse;
- to undertake routine testing of bed ash aggregate
- to undertake leaching trials of vitrifier glass;
- to undertake dioxin testing of bed ash aggregate and vitrifier glass; and
- where tests show variations from expected values the proponent has also committed to develop contingency plans to address any issuers raised.

Summary

Having particular regard to:

(a) the significant reduction in waste disposed to landfill;

(b) the recovery of energy;

(c) the conversion of waste outputs to useful products;

(d) the proponent's commitments; and

(e) the provisions for control of the proposal via Part V of the *Environmental Protection Act 1986*,

it is the EPA's opinion that the proposal can be managed to meet the EPA's environmental objective for this factor, provided that the proponent's commitments are made legally enforceable and successfully implemented.

4. Conditions and commitments

Section 44 of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for the Environment on the environmental factors relevant to the proposal and on the conditions and procedures to which the proposal should be subject, if implemented. In addition, the EPA may make recommendations as it sees fit.

In developing recommended conditions for each project, the EPA's preferred course of action is to have the proponent provide an array of commitments to ameliorate the impacts of the proposal on the environment. The commitments are considered by the EPA as part of its assessment of the proposal and, following discussion with the proponent, the EPA may seek additional commitments.

The EPA recognises that not all of the commitments are necessarily written in a form which makes them readily enforceable, but they do provide a clear statement of the action to be taken as part of the proponent's responsibility for, and commitment to, continuous improvement in environmental performance. The commitments, modified if necessary to ensure enforceability, then form part of the conditions to which the proposal should be subject, if it is to be implemented.

4.1 Proponent's commitments

The proponent's commitments as set in the PER and subsequently modified, as shown in Appendix 5, should be made enforceable.

4.2 Recommended conditions

Having considered the proponent's commitments and the information provided in this report, the EPA has developed a set of conditions which the EPA recommends be imposed if the proposal by GOWA to build and operate a Waste to Energy and Water Plant at Lot 15 Mason Road, Kwinana, is approved for implementation.

These conditions are presented in Appendix 5. Matters addressed in the conditions include the following:

(a) that the proponent shall fulfil the commitments in the Consolidated Commitments statement set out as an attachment to the recommended conditions in Appendix 5;

(b) that the proponent be required to provide full detail of the chemistry of the ocean discharge prior to construction of the desalination plant; and

(c) that the proponent be required to refer details of a relocated ocean discharge should port development in the vicinity of James Point be likely to take place.

It should be noted that other regulatory mechanisms relevant to the proposal are:

- requirements of the DEP for the proponent to comply with the provisions of the EP Act, notably Part V, and the noise regulations and to maintain a licence.
- requirements of the Department of Minerals and Energy for the transport and storage of dangerous goods.

5. Other Advice

Management of new technology

When new technologies are proposed, there are many technical and engineering issues to consider to ensure that the technology functions as intended. It is clearly the EPA's role to ensure the environment is protected, and the EPA's interest in the functionality of the technology is limited to the technologies' ability to meet environmental outcomes. It is appropriate that the Minister seek the advice of the WAste 2020 taskforce, which is currently examining appropriate secondary waste processing technologies, in relation to the compatibility of the GOWA technology with the implementation of the WAste 2020 vision for waste management in Western Australia.

Strategic Issues – risk managed approach to waste

The EPA notes that there are both pro's and con's to relying heavily on the possibility of utilising one facility for waste disposal for the metro area. The EPA recommends that the WAste 2020 committee review and provide advice on this issue.

Possible SO_2 reduction – BP flare

The EPA understands that there is the potential for the reduction of SO_2 emissions to the Kwinana airshed by GOWA treating flare gas from the BP refinery and that further discussions between GOWA and BP would be undertaken on this possibility.

6. Conclusions

The EPA has considered the proposal by GOWA to build and operate a Waste to Energy and Water Plant at Lot 15 Mason Road, Kwinana.

The EPA notes the potential benefits of the proposal in terms of producing substantial quantities of electricity, potable water and other useful materials from a waste stream that would otherwise be disposed of in a landfill.

The EPA further notes that the proposal is one of the technologies that are being considered to help achieve the State Governments goal of "Towards zero waste by 2020" and that it achieves important reductions in greenhouse gas and reactive organic compound emissions.

Air emissions are the main environmental issue associated with waste to energy plants and the EPA recognises that stringent emission limits are required to be met to ensure that air quality is not compromised. The EPA notes the incorporation of 'best practice' air pollution control equipment in the proposal to minimise emissions in accordance with the requirements of the *Environmental Protection Act 1986.*

Another more general issue is the uncertainty associated with the introduction of new technology. The EPA wishes to encourage the use of new technology which can achieve better environmental outcomes. Safeguards are needed, however, if the technology does not achieve its design predictions. A number of measures have been incorporated into this assessment to address this issue, such as an independent design audit, staged commissioning with achievement of performance benchmarks before subsequent stages can proceed, specialised training requirements and contingency plans if design predictions are not met.

The EPA has therefore concluded that it is unlikely that the EPA's objectives would be compromised, provided there is satisfactory implementation by the proponent of the proponent's commitments and the recommended conditions set out in Appendix 5 and summarised in Section 4.

7. Recommendations

Recommendations

The EPA submits the following recommendations to the Minister for the Environment:

1. That the Minister notes that the proposal being assessed is for a Waste to Energy Plant with a potential to also produce potable water;
2. That the Minister considers the report on the relevant environmental factors as set out in Section 3;
3. That the Minister notes that the EPA has concluded that it is unlikely that the EPA's objectives would be compromised, provided there is satisfactory implementation by the proponent of the recommended conditions set out in Appendix 5, and summarised in Section 4, including the proponent's commitments.
4. That the Minister imposes the conditions and procedures recommended in Appendix 5 of this report.
5. That the Minister notes the other advice provided by the EPA, particularly in relation to seeking advice on the proposed technology and the strategic waste management implications for achieving the Waste 2020 vision.

Appendix 1

List of submitters

Organisations:

Com-Net

Community Advisory Committee

Conservation Council of Western Australia

Department of Minerals and Energy

Department of Resources Development

Environment Centre of Western Australia

Health Department of Western Australia

Town of Kwinana

Water Corporation

Westrail

Individual:

No individual submissions received.

Appendix 2

References

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Appendix 3

Summary of identification of relevant environmental factors

Identification of relevant Environmental Factors

PRELIMINARY ENVIRONMENTAL FACTOR	RELEVANT AREA	PROPOSAL CHARACTERISTICS	GOVERNMENT AGENCY AND PUBLIC COMMENTS ON PER DOCUMENT	IDENTIFICATION OF RELEVANT ENVIRONMENTAL FACTORS
POLLUTION				
Air emissions	Proposal site and surrounding areas.	Plant emissions to air under normal operating conditions are predicted to be: Nitrogen oxides (NOx) – 820 t/yr Sulphur dioxide (SO_2) – 60 t/yr Carbon monoxide (CO) – 161 t/yr Hydrogen chloride (HCl) – 41 t/yr Hydrogen fluoride (HF) – 1.6 t/yr Particulates – 41 t/yr Dioxins – 63 milligrams/yr Lead (Pb) – 98 kg/yr Mercury (Hg) – 202 kg/yr Cadmium (Cd) – 8 kg/yr Chromium VI (Cr VI) – 7 kg/yr Nickel (Ni) – 179 kg/yr Arsenic (As) – 3.6 kg/yr	**Government**: The Department of Environmental Protection (DEP) had numerous questions and comments regarding the dispersion modelling, the mass balance and the plant's air emissions. The Health Department of Western Australia (HDWA) notes that the benefits of treatment of MSW by high temperature combustion come at a cost, which is reduced regional air quality. The question the PER attempts to answer is "what level of compromise in air quality is acceptable to the Perth community?" **Public:** Com-Net suggests that the Kwinana SO_2 airshed is full and there is no room for further industry unless tradeable emissions have been allowed (which they do not support).	**Considered to be a relevant factor.**
Greenhouse gases	Proposal site and surrounding areas.	Greenhouse gas – the production of electricity from biomass and the diversion of waste from landfill means an overall reduction of between 0.9 million and 2.8 million tonnes of CO_2 equivalents per year	**Government**: The DEP notes the reduction in greenhouse emissions. **Public:** No comments received.	**Considered to be a relevant factor. It will be assessed under the factor Air Emissions.**
Odour	Proposal site and surrounding areas.	There are two main potential sources of odour from the plant: • compost plant, and • MSW hall. These sources are fully enclosed and ventilated to the combustors where any odorous compounds would be destroyed.	**Government**: The DEP considered odour to be manageable, but sought clarification and further information relating to odour emissions and odour management. **Public:** No comments received.	**Considered to be a relevant factor. It will be assessed under the factor Air Emissions.**
Dust (fugitive)	Proposal area and surrounding properties including nearby residences.	There are several potential sources of fugitive dust emissions from the storage and handling of: • powdered limestone, • ash and aggregate, and • cement dust. These are proposed to be managed by normal industry practice.	**Government:** The DEP considered dust to be manageable, but sought clarification and further information relating to dust emissions and dust management. **Public:** No comments received.	**Considered to be a relevant factor. It will be assessed under the factor Air Emissions.**

PRELIMINARY ENVIRONMENTAL FACTOR	RELEVANT AREA	PROPOSAL CHARACTERISTICS	GOVERNMENT AGENCY AND PUBLIC COMMENTS ON PER DOCUMENT	IDENTIFICATION OF RELEVANT ENVIRONMENTAL FACTORS
POLLUTION				
Noise	Proposal area and surrounding properties including nearby residences.	The facility has numerous operational noise sources which include steam turbines, fans, mobile equipment etc. Construction noise would also be present during the 2 year construction period. The PER presented modelling which predicted that construction noise could comply with the assigned noise levels at all times and that operational noise would exceed the assigned noise levels. The proponent has proposed additional acoustic treatment for the turbine hall and committed to: • remodel the final design to demonstrate compliance, and • undertake measurements to confirm predicted levels.	**Government**: The DEP notes that the modelling has been performed in accordance with the Draft "Guidance for EIA No. 8 - Environmental Noise". The DEP notes that the initial modelling shows non-compliance but accepts that with the proposed additional acoustic treatment of the turbine hall, the proposal can comply with the noise regulations at all times by meeting noise levels which are 5 dB(A) below the assigned levels. The DEP questioned whether steam would be dumped noisily to atmosphere if grid power was lost. The DEP questioned whether the processing of explosive items such as LPG bottles could cause excessive noise. **Public:** The ECWA notes that large fans are a common source of noise pollution. The PER makes no mention of noise reduction initiatives for the combustor fans and this should be addressed.	The proponent advised that the dumping of steam would be a very infrequent operation and the LAmax criteria would therefore apply. The steam dump exhaust would also be fitted with a silencer. The proponent advised that explosive items would be removed wherever possible, however the combustors are designed to cater for the risk. Any explosive noise would be attenuated by the furnace and the building. The proponent advised that the underfire and overfire fans are situated deep within the building within a concrete enclosure and the induction fans are fitted with silencers. **Factor does not require further EPA evaluation**

PRELIMINARY ENVIRONMENTAL FACTOR	RELEVANT AREA	PROPOSAL CHARACTERISTICS	GOVERNMENT AGENCY AND PUBLIC COMMENTS ON PER DOCUMENT	IDENTIFICATION OF RELEVANT ENVIRONMENTAL FACTORS
Wastes	Proposal site and disposal areas.	The facility is designed primarily to process Municipal Solid Waste (MSW). Greenwaste and some hazardous waste would also be processed. **Inputs:** • 1.2 million tpa of MSW • 56,000 tpa of greenwaste **Outputs:** • 780 GWh of electricity • 260,000 tpa of bed ash aggregate • 88,000 tpa of glass product • 30,000 tpa of compost • 35,000 tpa of ferrous metal • 3,500 tpa of non ferrous metal • 26,000 tpa of 22% HCl	**Government:** The DEP had a number of questions relating to waste management, the end use of the aggregate and the likelihood of marketing the recovered products. The HDWA notes that the possibility of the facility accepting waste from interstate and international sources has not been addressed. **Public:** The CCWA suggests the proposal does not promote waste reduction and recycling, however they welcome the proposal as an improvement over current practices. The CCWA requests that the proponent prepares a vermin control program, which avoids the heavy use of pesticides that could find their way into the Sound. The ECWA is keen to see this type of project undertaken as they believe there is a need to demonstrate that incineration is safe, effective and economically viable. The ECWA notes that a poor attitude to cleanliness often develops in waste handling facilities and suggests that stringent training and supervision will be required to avoid this and associated safety problems occurring. Given the proposed end use of the vitrified ash, the ECWA notes the extreme folly of excluding smoke alarms from the prohibited radioactive substances (Dangerous Goods Class 7). Com-Net notes that while they support landfill and greenhouse gas reduction, other waste to energy plants have failed to meet their environmental objectives. Com-Net is not convinced that there is an available or on-going market for the ash and other products.	**Considered to be a relevant factor. It will be assessed under the factor Waste and by-products.**
By-products – water (Desalination plant)	Proposal site.	The facility is proposed to incorporate a desalination plant to produce up to 29 million tpa of fresh water.	**Government:** The HDWA state that total enclosure of the water reservoirs is necessary to prevent contamination from onsite waste material and airborne pollutants. The HDWA notes that both proposed seawater intake points are exposed to existing contamination from heavy metals and hydrocarbons. The HDWA is concerned that this contamination could find it way into the fresh water product. **Public:** No comments received.	**Considered to be a relevant factor. It will be assessed under the fcator Waste and by-products.**

PRELIMINARY ENVIRONMENTAL FACTOR	RELEVANT AREA	PROPOSAL CHARACTERISTICS	GOVERNMENT AGENCY AND PUBLIC COMMENTS ON PER DOCUMENT	IDENTIFICATION OF RELEVANT ENVIRONMENTAL FACTORS
POLLUTION				
Soil and Groundwater contamination	Proposal site.	The site is contaminated from past industrial land use activities. The proponent has agreed to undertake remediation of the site that is purchased. Proponent's commitments: • To prepare a contaminated soil and groundwater EMP which includes: • identification of contaminated material; • risk assessment; • remediation (if required); • validation of remedial action; and ongoing monitoring. Potential for further contamination through waste handling activities.	**Government**: The DEP notes that the proponent's commitments to manage the existing contamination and that any contaminated soil or groundwater requiring treatment could be processed in the UHTC's. The HDWA note that with a large construction and operational workforce it is preferable for the site to be sewered. **Public:** Com-Net notes that there is potential for wastes and leachates to affect groundwater. They believe it is imperative that no additional pressure be placed on groundwater. The ECWA suggest that the concept that the plant could be used to remediate the existing site contamination is outstanding.	The proponent's amended commitments are considered sufficient to manage the contaminated site issue. The proponent has advised that the site will be sewered. The proposed design features and commitments are considered sufficient to protect groundwater from further contamination. **Factor does not require further EPA evaluation.**
Marine impacts	Cockburn Sound.	The plant requires seawater for cooling purposes (80%) and also for the production of fresh water in the desalination units (20%). Seawater Intake: <4.2 m3/s **Discharge characteristics:** (Summer) Flow Rate: 3.3 m3/s Temp: 32 degrees C Salinity: 48 ppt Anti-scalant: 3.4 ppm (Winter) Flow Rate: 1.4 m3/s Temp: 32 degrees C Salinity: 60 ppt Anti-scalant: 8 ppm	**Government:** The DEP had a number of questions relating to the marine aspects, particularly: • Possible contaminants in the marine discharge; • Validation of the marine plume modelling, and • Impacts from the anti-scalant. The HDWA notes that it is of concern that the hyper saline solution will be heavier than the surrounding seawater and may sink as it discharges to the Sound. It would appear that the dispersal characteristics have not been adequately modelled. The HDWA note that the chemical data sheet provided on the anti-scalant is insufficient to determine its suitability. **Public**: The ECWA states that entrainment of fish into marine intakes is often a problem. They note with approval the holding pond and question whether there is the opportunity of a small fishery in the pond. The ECWA is also concerned about anti-scalant being discharged into the Sound. Com-Net notes that the eastern margin of Cockburn Sound contains shallow basins where it may in future be possible for seagrass replanting. It is critical that temp and salinity changes from the discharge do not affect this area.	**Considered to be a relevant factor.**

PRELIMINARY ENVIRONMENTAL FACTOR	RELEVANT AREA	PROPOSAL CHARACTERISTICS	GOVERNMENT AGENCY AND PUBLIC COMMENTS ON PER DOCUMENT	IDENTIFICATION OF RELEVANT ENVIRONMENTAL FACTORS
SOCIAL SURROUNDINGS				
Health Risk	Proposal site and surrounding areas.	The proponent undertook a Health Risk assessment (HRA) for the proposal, the results of which predict the plant would contribute only a small percentage to total daily intakes of dioxins and heavy metals. For example, at probable average emission levels: • dioxin: 0.03% of WHO "target" tolerable daily intake, • lead: 0.006% of tolerable daily intake, and • cadmium: 0.003% of tolerable daily intake. The HRA also considered an extreme exposure scenario, which predicts very small increases in exposures. This gives added assurance that even if emissions increased due to unforeseen upset conditions, no health effects are likely.	**Government**: The DEP had several questions and comments regarding the HRA methodology and the deposition modelling. The HDWA advised that the approach adopted for the HRA can be considered valid. The HDWA notes that both PCB's and PAH's have been excluded from the risk assessment as emission levels are considered to be very low. The HDWA would expect the predicted low levels to be confirmed by monitoring. **Public:** No comments received.	**Considered to be a relevant factor. It will be assessed under the factor Air Emissions.**
Risk	Proposal area and surrounding areas including nearby residences.	Materials stored onsite and used or produced in the process have the potential to increase the risk of fatality.	**Government:** The DEP raised several matters that should be included in the risk commitments in order to improve them. The DME advised that a final risk assessment would be required prior to commissioning and it should consider all credible hazardous events as well as the potential for knock-ons. The DME advised that it is unlikely that the facility would be classified as a Major Hazard Facility. However if it were, then a Safety Report would be required prior to commissioning. **Public:** No comments received.	The proponent's amended commitments are considered sufficient to address risk. **Factor does not require further EPA evaluation.**

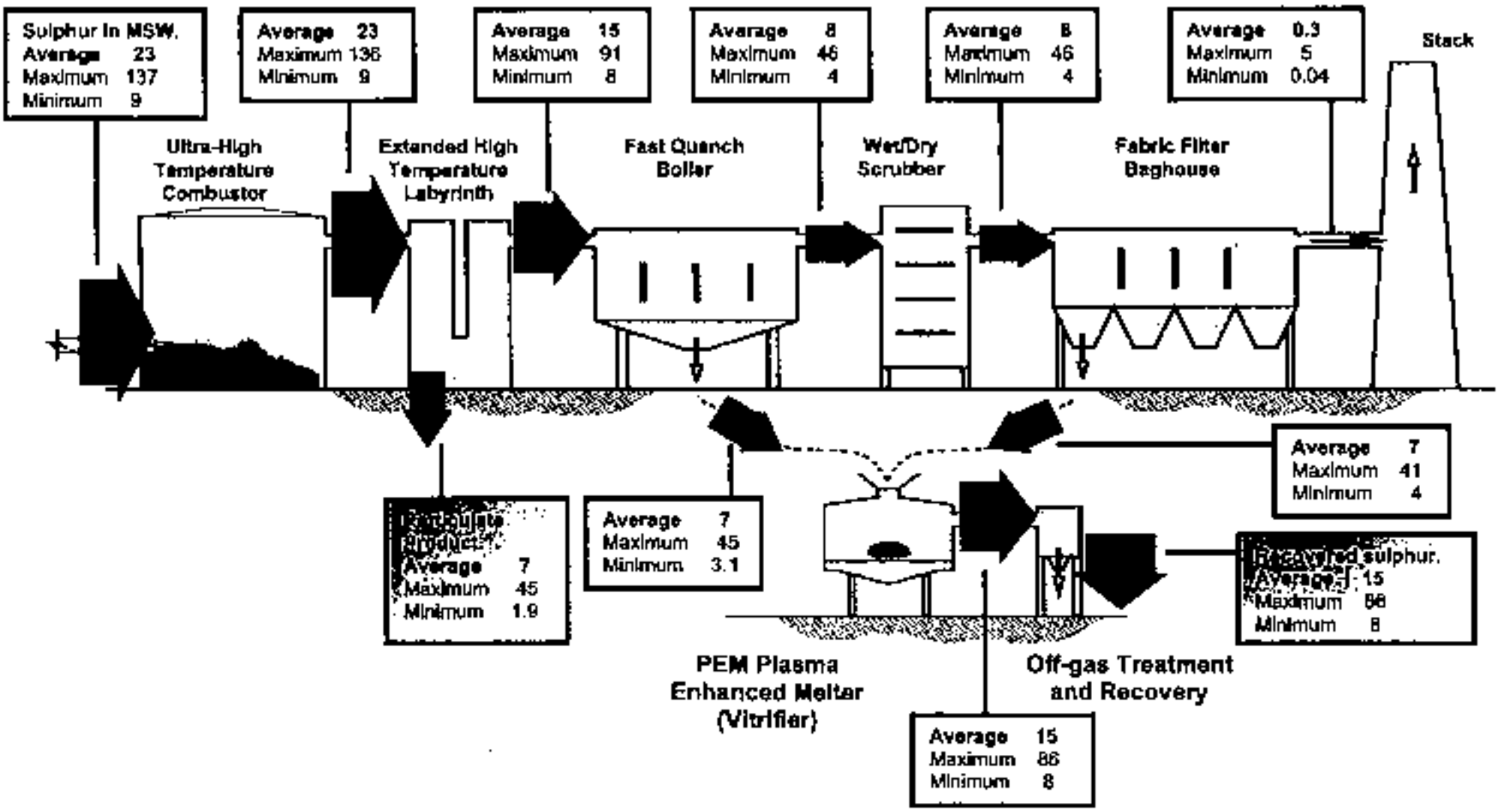
PRELIMINARY ENVIRONMENTAL FACTOR	RELEVANT AREA	PROPOSAL CHARACTERISTICS	GOVERNMENT AGENCY AND PUBLIC COMMENTS ON PER DOCUMENT	IDENTIFICATION OF RELEVANT ENVIRONMENTAL FACTORS
Transport	Proposal area and surrounding access roads.	Once operational the facility would add an additional 496 vehicle movements per day to Mason Road. (386 of these would be truck movements). Mason Road presently carries about 3900 vehicles per day. Proponent's commitments: • schedule workforce start and stop times to avoid peak hour periods; • develop an entry to the premises that affords safe entry and includes a left slip lane; and • negotiate with MRD to have the improvements to the intersection completed prior to the facility becoming operational.	**Government:** The DRD questioned the numbers and timing of truck movements and the adequacy of the intersection to cope. The HDWA note that product from the water bottling plant has not been included in the total truck movements. **Public:** No comments received.	The proponent's commitments are considered sufficient to address impacts **Factor does not require further EPA evaluation.**
Communication	Community.	Potential for adverse public reaction to waste handling facilities. Proponent carried out a meaningful community consultation program.	**Government:** The DEP notes that the proponent undertook a comprehensive public information campaign. **Public**: The CCWA note that it would be desirable to establish a community reference group for the facility.	The proponent has agreed to establish a community reference group for the facility. **Factor does not require further EPA evaluation.**

Appendix 4

Mass flow balance diagrams

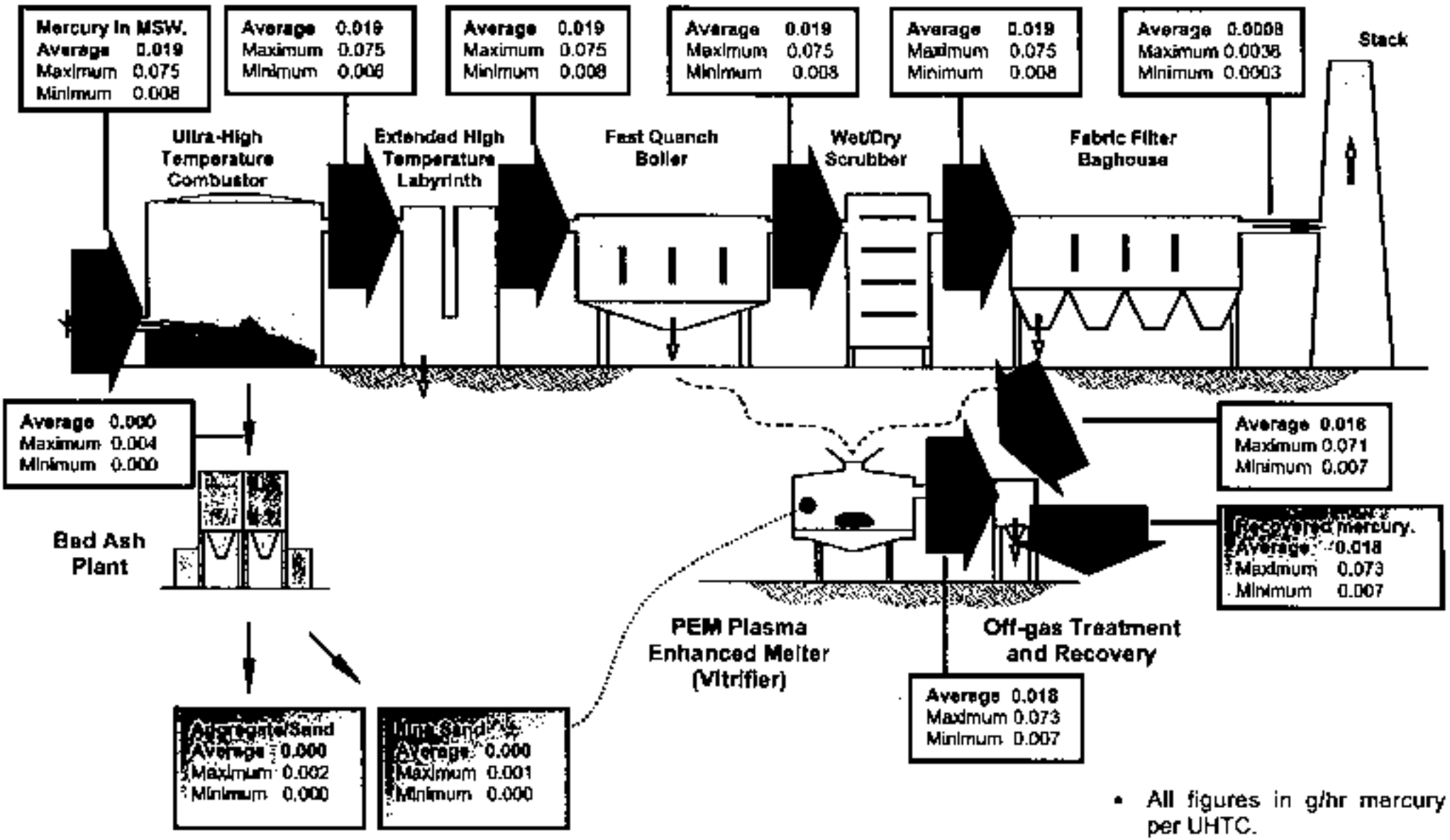
Mass flow diagrams for sulphur, mercury and dioxin are included here. Mass flow diagrams for other materials are included in the proponent's response to public submissions.

Mass Balance for SULPHUR



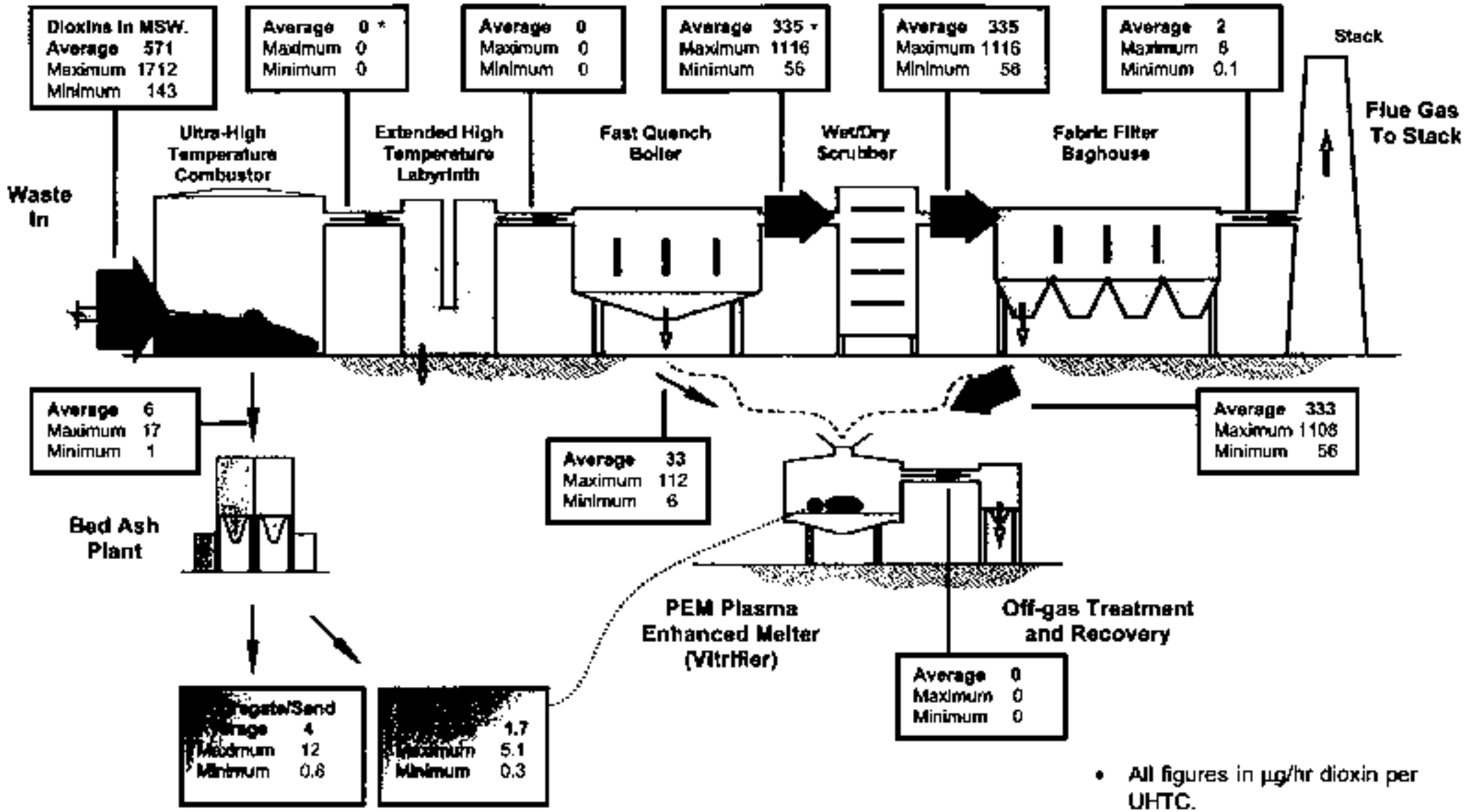
- All figures in kg/hr sulphur per UHTC.
- Thickness of arrows is proportional to average mass flow of sulphur.

Mass Balance for MERCURY



- All figures in g/hr mercury per UHTC.
- Thickness of arrows is proportional to average mass flow of mercury.

Mass Balance for DIOXINS



- All figures in µg/hr dioxin per UHTC.
- Thickness of arrows is proportional to average mass flow of dioxin

* Note: Dioxins are both destroyed by combustion and reformed in the cooling flue gas.

Appendix 5

Recommended Environmental Conditions and

Proponents Consolidated Commitments

DRAFT ENVIRONMENTAL CONDITIONS

WASTE-TO-ENERGY AND -WATER PLANT, LOT 15 MASON ROAD, KWINANA

Proposal: The construction and operation of a Waste-to-Energy and -Water Plant at Lot 15 Mason Road, Kwinana.
The plant will combust up to 1.45 million tonnes per annum of municipal solid and other waste in twelve ultra high temperature combustors installed in parallel trains. Heat from the combustion process is used to produce steam and drive turbines which generate electricity. Waste heat from this process is further used in desalination units to produce potable water. Plasma enhanced melters process flyash and some hazardous wastes into glass products. The proposal is documented in schedule 1 of this statement.

Proponent: Global Olivine Western Australia

Proponent Address: 2/72 Marine Terrace, FREMANTLE WA 6160

Assessment Number: 1289

Report of the Environmental Protection Authority: Bulletin 1004

The proposal to which the above report of the Environmental Protection Authority relates may be implemented subject to the following conditions and procedures:

Procedures

1 Implementation

1-1 Subject to these conditions and procedures, the proponent shall implement the proposal as documented in schedule 1 of this statement.

1-2 Where the proponent seeks to change any aspect of the proposal as documented in schedule 1 of this statement in any way that the Minister for the Environment determines, on advice of the Environmental Protection Authority, is substantial, the proponent shall refer the matter to the Environmental Protection Authority.

1-3 Where the proponent seeks to change any aspect of the proposal, including technological aspects, as documented in schedule 1 of this statement in any way that the Minister for the Environment determines, on advice of the Environmental Protection Authority, is not substantial, those changes may be effected.

2 Proponent Commitments

2-1 The proponent shall implement the consolidated environmental management commitments documented in schedule 2 of this statement.

2-2 The proponent shall implement subsequent environmental management commitments which the proponent makes as part of the fulfilment of conditions and procedures in this statement.

3 Proponent

3-1 The proponent for the time being nominated by the Minister for the Environment under section 38(6) or (7) of the Environmental Protection Act 1986 is responsible for the implementation of the proposal until such time as the Minister for the Environment has exercised the Minister's power under section 38(7) of the Act to revoke the nomination of that proponent and nominate another person in respect of the proposal.

3-2 Any request for the exercise of that power of the Minister referred to in condition 3-1 shall be accompanied by a copy of this statement endorsed with an undertaking by the proposed replacement proponent to carry out the proposal in accordance with the conditions and procedures set out in the statement.

3-3 The proponent shall notify the Department of Environmental Protection of any change of proponent contact name and address within 30 days of such change.

4 Commencement

4-1 The proponent shall provide evidence to the Minister for the Environment within five years of the date of this statement that the proposal has been substantially commenced.

4-2 Where the proposal has not been substantially commenced within five years of the date of this statement, the approval to implement the proposal as granted in this statement shall lapse and be void. The Minister for the Environment will determine any question as to whether the proposal has been substantially commenced.

4-3 The proponent shall make application to the Minister for the Environment for any extension of approval for the substantial commencement of the proposal beyond five years from the date of this statement at least six months prior to the expiration of the five year period referred to in conditions 4-1 and 4-2.

4-4 Where the proponent demonstrates to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority that the environmental parameters of the proposal have not changed significantly, then the Minister may grant an extension not exceeding five years for the substantial commencement of the proposal.

5 Compliance Auditing

5-1 The proponent shall submit periodic Compliance Reports, in accordance with an audit program prepared in consultation between the proponent and the Department of Environmental Protection.

5-2 Unless otherwise specified, the Chief Executive Officer of the Department of Environmental Protection is responsible for assessing compliance with the conditions, procedures and commitments contained in this statement and for issuing formal, written advice that the requirements have been met.

5-3 Where compliance with any condition, procedure or commitment is in dispute, the matter will be determined by the Minister for the Environment.

Environmental Conditions

6 Environmental Management System

6-1 In order to manage the environmental impacts of the project, and to fulfil the requirements of the conditions and procedures in this statement, prior to ground-disturbing activity, the proponent shall demonstrate to the requirements of the Environmental Protection Authority on advice of the Department of Environmental Protection that there is in place an environmental management system which includes the following elements:

1 An environmental policy and corporate commitment to it;

2 Mechanisms and processes to ensure:

(1) planning to meet environmental requirements;

(2) implementation and operation of actions to meet environmental requirements;

(3) measurement and evaluation of environmental performance; and

3 Review and improvement of environmental outcomes.

6-2 The proponent shall implement the environmental management system referred to in condition 6-1.

7 Desalination Plant

7-1 Prior to construction of the desalination plant, the proponent shall demonstrate that the discharges from the desalination plant to Cockburn Sound of the following parameters are acceptable:

1 heat;
2 saline water;
3 heavy metals; and
4 anti-scalant,

to the requirements of the Environmental Protection Authority on advice of the Department of Environmental Protection.

8 Ocean Outfall

8-1 In the event that port development in the vicinity of James Point is likely to take place, the proponent shall refer their plans for the modified ocean outfall from the Desalination Plant referred to in condition 7-1 to the Environmental Protection Authority.

9 Decommissioning Plans

9-1 At least six months prior to the anticipated date of decommissioning, or at a time agreed with the Department of Environmental Protection, the proponent shall prepare a Final Decommissioning Plan designed to ensure that the site is left in a suitable condition, with

no liability to the State, to the requirements of the Environmental Protection Authority on advice of the Department of Environmental Protection.

The Final Decommissioning Plan shall address:

1 removal or, if appropriate, retention of plant and infrastructure;

2 rehabilitation of all disturbed areas to a standard suitable for the agreed new land use(s); and

3 identification of contaminated areas, including provision of evidence of notification to relevant statutory authorities.

9-2 The proponent shall implement the Final Decommissioning Plan required by condition 9-1 until such time as the Minister for the Environment determines that decommissioning is complete.

9-3 The proponent shall make the Final Decommissioning Plan required by condition 9-1 publicly available, to the requirements of the Environmental Protection Authority.

10 Performance Review

10-1 Each six years following the commencement of construction, the proponent shall submit a Performance Review Report to the Department of Environmental Protection:

- to document the outcomes, beneficial or otherwise;
- to review the success of goals, objectives and targets; and
- to evaluate the environmental performance over the six years;

relevant to the following:

1 environmental objectives reported on in Environmental Protection Authority Bulletin 1004;

2 proponent's consolidated environmental management commitments documented in schedule 2 of this statement and those arising from the fulfilment of conditions and procedures in this statement;

3 environmental management system environmental performance targets;

4 environmental management programs and plans; and/or

5 environmental performance indicators;

to the requirements of the Environmental Protection Authority on advice of the Department of Environmental Protection.

Note: The Environmental Protection Authority may recommend changes and actions to the Minister for the Environment following consideration of the Performance Review Report.

Note

1 The proponent is required to apply for a Works Approval and Licence for this project under the provisions of Part V of the Environmental Protection Act.

Schedule 1

The Proposal

The proposal is for the construction and operation of a Waste-to-Energy and -Water Plant. The plant will combust up to 1.45 million tonnes per annum of municipal solid and other waste.

The plant consists of four main components:

- up to twelve ultra high temperature combustors, each with an associated boiler and air pollution control equipment;
- up to five steam driven turbo alternators;
- up to eight desalination units; and
- up to four plasma enhanced melters.

The plant also has facilities for producing compost, concrete and glass products, as well as infrastructure, such as internal roads, truck wash, weighbridge and dangerous goods store.

The plant site is part Lot 15, Mason Road, Kwinana.
The main characteristics of the proposal are summarised in the table below. They provide an outline on the proposal and should not be viewed as restricting improvements in environmental outcomes.

Key Characteristics Table

ELEMENT	DESCRIPTION
Waste to Energy Building	Roof Area – approximately 17,200 square metres. Total floor area (upper-basement and upper-level)– approximately 31,200 square metres. Fully enclosed and tightly sealed. Constructed on a large concrete pad with internal drainage system. Storage – approximately 6 days waste storage: Direct truck access to upper basement and upper level. 2 stacks approximately 70 metres in height, each discharging treated flue gases from 6 Ultra High Temperature Combustors
Up to 12 Ultra High Temperature Combustors	Processing an average of 1.2 million tonnes of municipal solid waste and maximum of 1.45 million tonnes of municipal solid waste per annum. Constructed in two plants (6 units per plant) within the Waste to Energy building. Producing approximately: • 220,000 – 260,000 tonne of bed ash aggregate and ferrous and non ferrous metal clinker per annum; • 35,000 tonne of bed fines per annum; • 24,000 tonne of fly ash per annum. Each UHTC will be fitted with the following air emission controls (or equipment of equivalent performance): • High Temperature Gas Scrubbing. • Low Temperature Gas Scrubbing.

ELEMENT	DESCRIPTION
	• Selective Non-Catalytic Reduction. • Activated Carbon Injection. • Fabric Filter. Each UHTC will be fitted with plant and monitoring controls to ensure optimum combustion temperature and residence time and emissions monitoring.
Boilers	One water tube conventional boiler for each UHTC. Two spare boilers to be stored on-site in boiler workshops.
Up to 5 Turbo Generators	780 GigaWatt hours per annum average. Three turbines each with 35 MegaWatt capacity Two turbines each with 17 MegaWatt capacity Housed within a separate, enclosed turbine hall.
Up to 4 Plasma Enhanced Melters	Processing approximately 100,000 tonnes per annum. Housed within a separate, enclosed building. Processing the following products into glass: • Bed ash fines (up to approximately 94 tonne/day). • Fly ash (approximately 68 tonne/day). • Boiler ash. • Hazardous wastes, excluding radioactive substances and explosives. Each Plasma Enhanced Melter will be fitted with the following: • Baghouse • Water Scrubber • Activated carbon filter • LO-CAT Scrubber Off-gas fuel vented to UHTC's after scrubbing and removal of by-products.
Glass Products Plant	Approximately 88,000 tonnes/annum average
Water Desalination Plant	Producing up to approximately 30 million tonnes per annum average from up to 8 units. Including: • Water Treatment Plant • Water Reservoir • Water Bottling Plant
Cooling water inlet and discharge	Intake approximately 4.2 cubic meters per second. Water discharge (summer) – approximately 3.34 cubic metres per second. Water discharge (winter) – approximately 1.42 cubic metres per second.
Compost Plant	Processing up to approximately 56,000 tonnes green waste per annum and producing 30,000 tonnes compost per annum. Housed within a separate, enclosed building. Vented to UHTC's.
Concrete Plant	Proprietary packaged unit or similar. Approximately 80,000 cubic metres per annum. Fitted with specification extraction hoods and bag filters.
Concrete Products Plant	For moulding of concrete products including olivine panels.
Bed Ash Aggregate Screening Plant	Approximately 220,000 – 260,000 tonnes per annum Housed within a separate, enclosed building 24hr ash storage Ventilated to UHTC's Ash transfer point fitted with fabric filter.
Dangerous Goods Store	To store all hazardous wastes for vitrification and dangerous goods used on-site.
Ancillary Works	Stormwater drainage designed to separate clean and contaminated water; Internal roads; Truck wash; Truck weighbridge Main site office

Figure 1 shows the plant layout

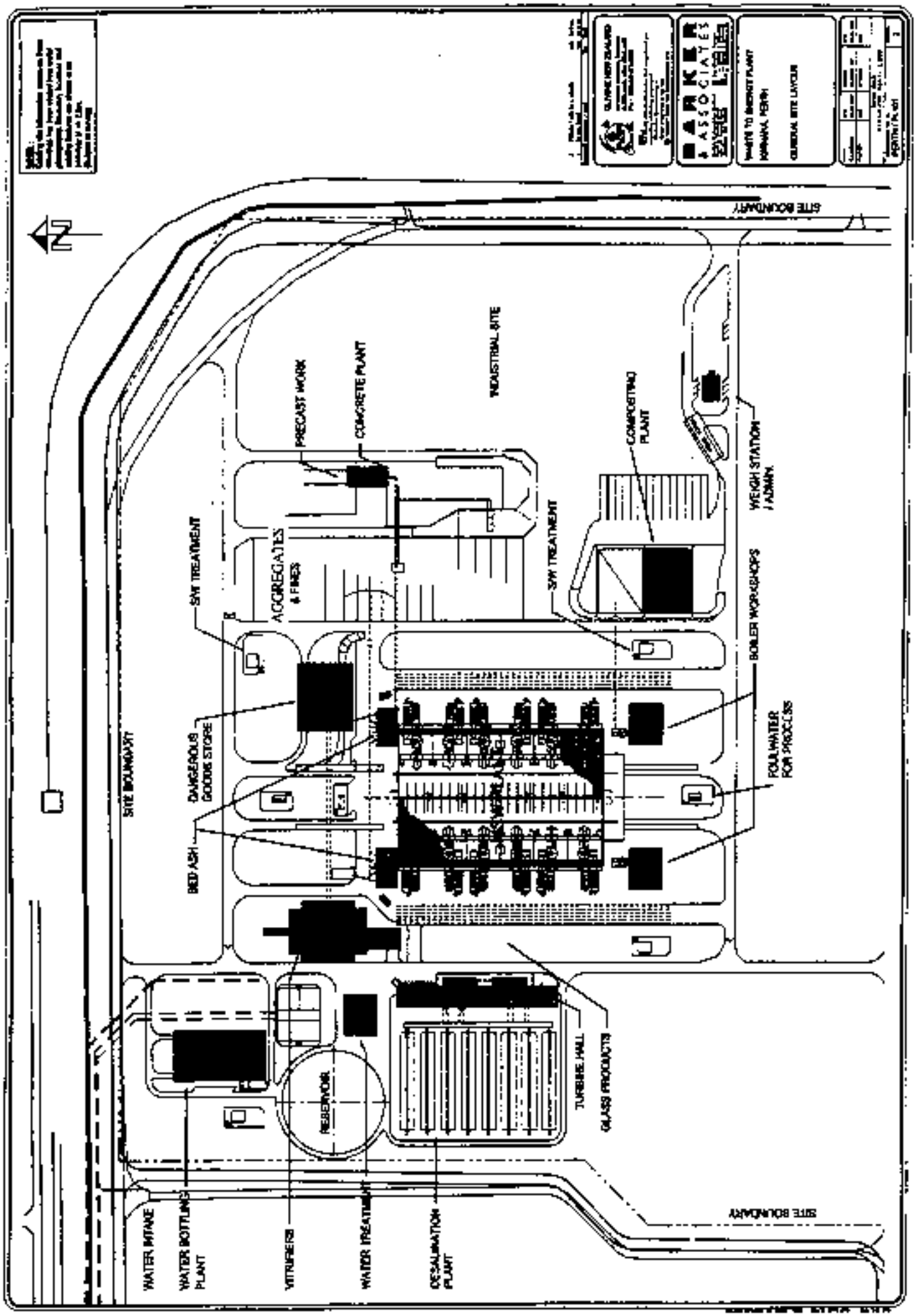


Figure 1. Plant layout

Schedule 2

Proponent's Consolidated Environmental Management Commitments

8 December 2000

WASTE-TO-ENERGY AND -WATER PLANT, LOT 15 MASON ROAD, KWINANA (1289)

GLOBAL OLIVINE WESTERN AUSTRALIA

NO	TOPIC	ACTION	OBJECTIVES	TIMING	ADVICE
1.	Community involvement in Environmental Management	Global Olivine Western Australia will take steps to ensure that the public remain directly informed of the effects of their operations on the environment. One of the key steps will be to convene a community reference group, through which the community can raise issues directly with Global Olivine Western Australia and Global Olivine Western Australia can pass information directly to the community.	To ensure the public are informed regarding the operations and that the public can raise issues directly with Global Olivine Western Australia.	Prior to construction	DEP
2.	Marine Water Quality	Undertake model validation exercise using results of field survey characterising Western Power and/or BP plumes.	Validate results of modelling.	Prior to construction	DEP
3.	Marine Water Quality	Prepare risk assessment and associated contingency plan for the possibility of contamination of the cooling water with hazardous substances.	Develop understanding of risk of contamination of cooling water and appropriate contingency plan	Prior to construction	DEP
4.	Marine Water Quality	Undertake field survey to determine dilution and extent of Global Olivine Western Australia plume.	Demonstrate extent of influence Global Olivine Western Australia plume and confirm validity of model.	Commissioning	DEP
5.	Marine Water Quality	Undertake testing of effluent to establish toxicity levels using principles outlined in the Australian and New Zealand guidelines for fresh and marine water quality. If toxicity levels are unacceptable prepare a contingency plan to prevent impact on marine organisms.	Confirm assumption of low toxicity	Commissioning	DEP
6.	Marine Water Quality	Undertake screening analysis of the effluent and any site runoff under a representative range of conditions.	Accurately characterise the quality of the water leaving the site and confirm that effluent meets design assumptions.	Six monthly (post-commissioning)	DEP
7.	Marine Water Quality	There will be a detailed assessment of the effects of a combined BP/ Global Olivine Western Australia discharge if the situation arises that the discharges are to be combined.	Ensure the impact of a combined Global Olivine Western Australia/BP discharge will be acceptable.	Prior to combined discharge Works Approval —if required.	DEP
8.	Marine Water Quality	There will be a detailed assessment of the effects of the Stage 2 James Point Pty Ltd harbour configuration on the Global Olivine Western Australia discharge if the harbour is approved for construction.	Ensure the impact of the James Point Stage 2 development on the Global Olivine Western Australia discharge will be acceptable.	Prior to combined discharge Works Approval —if required.	
9.	Marine Water Quality	Meet agreed quality objectives set for Cockburn Sound in the Environmental Protection Policy for the Sound.	To maintain the current levels of safety of the waters of Cockburn Sound for swimming or harvesting of seafood.	Report annually	DEP

NO	TOPIC	ACTION	OBJECTIVES	TIMING	ADVICE
10.	Marine Water Quality	The chemistry of the cooling water discharge and detailed estimates of the quantity and concentration to be discharged to Cockburn Sound and its likely effects will be supplied in the Operations Environmental Management Plan. The Environmental Management Plan will include a program for management of the discharge to ensure that the level of impact is acceptable.	To ensure that the level of impact from the discharge is acceptable.	Prior to construction	DEP
11.	Marine Sediment Quality	Undertake baselevel sediment quality monitoring in vicinity of the proposed discharge structure.	To establish the existing baselevel sediment quality.	Prior to construction	DEP
12.	Marine Sediment Quality	Undertake periodic surveys of sediment quality in vicinity of discharge.	To establish the level of impact on sediment quality.	Annually during the first five years of operation and annually thereafter if required.	DEP
13.	Marine Sediment Quality	Undertake investigation and/or remedial management action if sediment quality exceeds trigger levels as the result of the plant discharge.	To investigate and remediate any adverse effect on sediment quality.	Within 3 months of trigger levels being exceeded	DEP
14.	Marine Fauna Protection	Build screened intake structure such that intake velocities will result in minimal entrainment of pelagic fish.	To minimise impacts on marine fauna.	Prior to operation	DEP & FISHERIES
15.	Marine Fauna Protection	Undertake study following commissioning to ensure that intake velocities meet the design criteria.	To minimise impacts on marine fauna.	Within six months of commissioning	DEP & FISHERIES
16.	Marine Fauna Protection	In the event that velocities exceed design criteria, develop and implement a contingency plan to the satisfaction of the DEP	To minimise impacts on marine fauna.	Within 1 year of commissioning	DEP & FISHERIES
17.	Marine Fauna Protection	In the event that Global Olivine Western Australia utilise the existing BP intake, a study will be undertaken to determine the velocities at the screen. If it is found that these velocities are likely to result in unacceptable impacts on marine fauna, a suitable solution will be devised. This may include modifying the existing screens or installing new screens on the intake.	To minimise impacts on marine fauna.	Prior to use of the existing BP intake	DEP & FISHERIES
18.	Emissions control	Investigate and establish the lowest practical level of reliably achievable oxides of nitrogen emissions	Provide a basis for review of emission limits Demonstrate and achieve lowest practical emissions	1 year after commissioning	DEP
19.	Emissions control	Investigate and establish the lowest practical level of reliably achievable sulphur dioxide emissions	Provide a basis for review of emission limits Demonstrate and achieve lowest practical emissions	1 year after commissioning	DEP

NO	TOPIC	ACTION	OBJECTIVES	TIMING	ADVICE
20.	Emissions Control	Demonstrate compliance with the emission limits set out in Table 3-2 on each pair of combustors prior to commissioning the remaining combustors.	Demonstrate compliance with emission limits.	Commissioning	DEP
21.	Dust/Odour	All wastes received in enclosed buildings, with air extracted to Ultra High Temperature Combustors.	Ensure absence of release of dusts, odours or other airborne contaminants from wastes	During operations	
22.	Dust control	Prepare, and agree dust management plan for plant construction. This shall include a watering regime program if dust emissions are likely to be of concern.	Avoid dust nuisances during construction.	Plan agreed before start of construction	DEP
23.	Dust control	Implement dust management plan for plant construction.	Avoid dust nuisances during construction and operation,	During construction	DEP
24.	Dust control	All ash processing in enclosed buildings with air extracted to Ultra High Temperature Combustors	Avoid dust emissions	During operation	
25.	Dust control	Lime/limestone/cement vents fitted with bag filters. Retrofit reception hoppers if fugitive dust proves to be a problem.	Minimised dust emissions during transfers	During operations and construction	
26.	Emissions monitoring	Undertake continuous monitoring of emission gas flow, oxygen, temperature, opacity, particulates, carbon monoxide, sulphur dioxide, oxides of nitrogen and hydrogen chloride on the stacks	Demonstrate control of emissions from the plant	During operation	Monthly summaries to DEP
27.	Emissions monitoring	Undertake analyses of composite samples of baghouse filter cake	Provide demonstration of low emissions of heavy metals from the plant Provide an alert and basis for trace-back of sources of increased heavy metal inputs to plant in wastes	Weekly for first year of operation and thereafter if required.	DEP
28.	Emissions monitoring	Undertake emissions testing on Ultra High Temperature Combustor units for particulates, hydrogen fluoride, mercury and other heavy metals, and dioxins.	Demonstrate compliance with emissions limits	Quarterly during the first year of commissioning each unit	DEP
29.	Emissions monitoring	Undertake on-going emissions testing on Ultra High Temperature Combustors units for particulates, hydrogen fluoride, mercury, polychlorinated biphenyls, polyaromatic hydrocarbons and other heavy metals, and dioxins.	Demonstrate compliance with emissions limits	Twice annually	DEP
30.	Environmental monitoring	Monitor rainfall contaminants at plant site	Determine wet deposition rates, as demonstration of low impacts from plant at more distant sites	1 year before start-up and 2 years after start-up	DEP
31.	Environmental monitoring	Determine total suspended particulates and metal concentrations in ambient air at Hope Valley	Confirm/modify estimates of existing levels of metals in ambient air, used in health risk assessment.	1 year before start-up and 2 years after start-up	DEP

NO	TOPIC	ACTION	OBJECTIVES	TIMING	ADVICE
32.	Environmental monitoring	Determine polychlorinated biphenyls, polyaromatic hydrocarbons and dioxin concentrations in ambient air at Hope Valley. This will also include the testing of a representative milk sample for dioxin and PCB's.	Confirm/modify estimates of existing levels and significance of contribution from plant emissions from the health risk assessment	1 year before start-up and 2 years after start-up	DEP
33.	Environmental monitoring	Provide oxides of nitrogen monitor for Abercrombie Rd monitoring site	Assess existing oxides of nitrogen and nitrogen dioxide concentrations at site close to predicted maximum concentration increments from the plant emissions.	Within 3 months of confirmation of project proceeding	DEP
34.	Emission Control Equipment	Obtain an independent audit of the final engineering design. Revise the design if deficiencies in the plant and/or air pollution control equipment are identified.	To ensure that the final plant design will achieve environmental performance levels described in the PER.	Prior to construction	DEP
35.	Vitrifiers	Provide confirmation from the suppliers that the vitrification units will achieve design specifications. If specifications can't be met, prepare a contingency plan to ensure no environmental impacts.	To verify that the vitrification units will operate as described in the PER document.	Prior to construction	DEP
36.	Sulphur Product Recovery Equipment	Confirm that the LO-CAT sulphur removal system is able to achieve design specifications. If specifications can't be met, prepare a contingency plan to ensure no environmental impacts.	To ensure that a minimum of 50% of sulphur is removed during the flyash vitrification process before gas is returned to the Ultra High Temperature Combustors.	Prior to construction	DEP
37.	Control and Automation Systems	Provide a review of the control and automation systems including: - Control of routine and emergency start-up and shut-down sequences - Monitoring of sub-system performance - Provision for alarms and interlocks.	To verify that all systems are designed to cover sub-system performance and emergency situations	Prior to construction	DEP
38.	Health Risk	Provide a follow up health risk assessment based on actual monitoring data The follow up health risk assessment shall cover dioxins, heavy metals and other contaminants as agreed with the DEP.	To ensure that there is no health risk to the local community	Within 12 months of the plant reaching a processing capacity of 600,000 tonnes of MSW per year	DEP
39.	Local Air Quality	Investigate options in conjunction with surrounding industries to minimise the total emissions to the Kwinana airshed.	Improve local air quality.	Operation	DEP
40.	Odour	Undertake full survey of potential odour sources and discharges	Confirm adequacy of ventilation design	Within six months of commissioning	DEP

NO	TOPIC	ACTION	OBJECTIVES	TIMING	ADVICE
41.	Greenhouse emissions	Enter into a Greenhouse Challenge Agreement with Australian Greenhouse Office.	Formalise assessment and reporting of greenhouse gas emissions performance of project.	Within six months of commissioning	DEP and Australian Greenhouse Office.
42.	Greenhouse emissions	Estimate greenhouse gas emissions and report annually	Provision of data for national emissions inventory	Annually	DEP and Australian Greenhouse Office.
43.	Greenhouse emissions	Investigate means of determining fossil carbon dioxide emissions from the waste to energy and water plant	Improve assessment of greenhouse gas emissions	Within 2 years of project start-up	DEP and Australian Greenhouse Office.
44.	Greenhouse emissions	Determine levels of nitrous oxide emissions from the waste to energy and water plant	Improve assessment of greenhouse gas emissions	Within 1.5 years of project start-up	DEP and Australian Greenhouse Office.
45.	Greenhouse emissions	Investigate means of reducing nitrous oxide emissions, if significant	Minimise greenhouse gas emissions	Within 2 years of project start-up	DEP and Australian Greenhouse Office.
46.	Greenhouse emissions	Undertake Life Cycle Analysis for management of waste paper in Western Australia	Establish optimum environmental management for this resource	Within 2 years of project start-up	DEP and Australian Greenhouse Office.
47.	Waste reuse	Prepare and agree environmental management plan to demonstrate acceptability of vitrifier glass and bed ash aggregate material. Include contingency plan for disposal of off spec material.	Establish acceptability of acceptability of vitrifier glass and bed ash aggregate material.	Pre-commissioning	DEP
48.	Waste reuse	Undertake routine testing of bottom ash aggregate	In-house product quality control, including expected low levels of leachable heavy metals.	Ongoing, with summaries within 1 month of start-up of aggregate production, then annually	DEP
49.	Waste reuse	Undertake leaching trials of vitrifier glass	Demonstrate the expected very low levels of leachable heavy metals and dioxin, as a basis for suitability for potential uses	Within 1 month of start-up of vitrifiers	DEP
50.	Waste reuse	Undertake dioxin testing of aggregate	Demonstrate low or negligible level of dioxins in the product	Within 1 month of start-up of aggregate production	DEP

NO	TOPIC	ACTION	OBJECTIVES	TIMING	ADVICE
51.	Waste Strategy	To undertake discussions with the EPA and the Waste Management Division of the DEP regarding the Western Australia waste management strategy prior to plant expansion beyond 8 UHTCs.	To assess the effect of the project in achieving the objectives of the Western Australia Waste Management Strategy.	Once the plant capacity reaches 800,000 tonnes per annum (8 Ultra High Temperature Combustors).	EPA and DEP
52.	Construction Noise	All equipment used during construction will comply with the sound power levels used in the noise modelling. If the equipment is markedly different from that used in the modelling, the model will be rerun and the noise impacts reassessed.	To minimise the impact of noise from construction of nearby residents	Construction	DEP
53.	Operation Noise	Prior to construction remodel the final design to demonstrate compliance.	To ensure compliance with assigned noise levels.	Prior to construction	DEP
54.	Operation Noise	All equipment will comply with the sound power levels used in the noise modelling. If manufacturer's equipment varies significantly, the noise model will be rerun and reassessed.	Noise levels of plant operation will not 'significantly contribute' to the assigned noise level as per the Environmental Protection (Noise) Regulations 1997.	Prior to construction	DEP
55.	Operation Noise	Upon completion of construction, noise levels of equipment will be measured and checked for agreement with manufacturers data and compliance with the model/Regulations	Noise levels of plant operation will not 'significantly contribute' to the assigned noise level as per the Environmental Protection (Noise) Regulations 1997.	Operation	DEP
56.	Groundwater and soil contamination	1. Prepare contaminated soil and groundwater management EMP which includes: a) Results of additional site investigations and monitoring; b) Assessment to determine any human health and/or ecological risk; c) Proposed management of contamination and remediation plan (if warranted); d) Proposed validation and on-going monitoring	To meet EPA objectives for the site.	Prior to construction	DEP, WRC
57.	Groundwater and soil contamination	Implement the approved contaminated soil and ground water EMP	To meet EPA objectives for the site.	During Construction	DEP, WRC
58.	Groundwater and soil contamination	The plant will be designed, constructed and operated so as to maintain or improve the existing soil and groundwater quality.	To ensure that construction and operation of the plant does not result in further contamination of the site and site meets DEP criteria for relevant land use.	Prior to construction and during the operations phase.	DEP

NO	TOPIC	ACTION	OBJECTIVES	TIMING	ADVICE
59.	Groundwater contamination	Global Olivine Western Australia will design and implement a groundwater quality monitoring programme to the satisfaction of the DEP.	To provide sufficient information to determine whether the plant has any adverse impacts on groundwater quality.	Prior to construction and during the operations phase.	DEP
60.	Groundwater contamination	In the event that the monitoring shows that the plant has had an adverse impact on groundwater quality, Global Olivine Western Australia will design and implement a groundwater remediation plan to the satisfaction of the DEP.	To manage groundwater quality in a manner consistent with EPA objectives.	If monitoring shows that the plant has adversely impacted groundwater quality.	DEP
61.	Accidental releases of hazardous and non-hazardous substances and leachate associated with any of these	Develop a hazardous and non-hazardous substance management plan which includes: 1. Location, size and elevations 2. Plans for mechanical, structural, drainage, electrical, ventilation, fire-fighting system, signs 3. Other specifications 4. Prepare and implement the approved Emergency Plan and Health and Safety Plan. 5. Establish site operating procedures (SOP) for activities involving hazardous and non-hazardous substances and wastes. 6. Establish technical training program for staff and contractors in SOP, hazardous substances, emergency response, heath and safety. 7. Establish and implement monitoring and reporting policies and procedures.	To ensure that the beneficial uses of groundwater can be maintained consistent with the draft WA Guidelines for Fresh and Marine Waters (EPA, 1993)	Complete detailed design of storage facilities and make application for dangerous goods licence and obtain approval from DEP Complete Emergency Plan before facility operation begins. Test Emergency Plan. Complete Health and Safety Plan, implement during construction phase, and begin training staff. Complete SOP before facility start-up and test SOP within 6 months of start-up. Train permanent staff within 6 months of facility start-up. Implement monitoring and reporting procedures at start-up and test within 6 months of start-up.	DEP, WRC, Chief Inspector dangerous goods or designate, representatives of emergency response agencies, Worksafe Western Australia
62.	Accidental releases of hazardous and non-hazardous substances and leachate associated with any of these	Implement the hazardous and non-hazardous substance management plan	To ensure that the beneficial uses of groundwater can be maintained consistent with the draft WA Guidelines for Fresh and Marine Waters (EPA, 1993)	Commissioning	DEP
63..	Plant Operation	Ensure that an appropriately qualified engineer is present on-site at all times. The engineer should hold Americian Society of Engineers Certification of Resource Recovery Facility Operators (QRO-1) or an equivalent internationally recognised qualification.	To ensure that the plant operation is supervised by appropriately qualified personnel.	Operation	DEP

NO	TOPIC	ACTION	OBJECTIVES	TIMING	ADVICE
64.	Water—Potentially contaminated stormwater from on site sources	Develop a stormwater management plan which includes: 1. Separation of potentially contaminated and uncontaminated stormwater 2. Collection of contaminated stormwater while ensuring groundwater and surface water protection 3. Reticulation of stormwater to appropriate treatment and on site disposal 4. Design of stormwater treatment and disposal devices 5. Develop stormwater management plan and forward for approval	To manage on site surface water to prevent discharge of contaminated water from site or to groundwater	Complete detailed design prior to construction Implement management plan during construction	DEP, WRC
65.	Water—Potentially contaminated stormwater from on site sources	Implement the approved stormwater management plan, including at a minimum: 1. Procedures during construction 2. Site cleaning and housekeeping program 3. Spills management and clean up procedures 4. Maintenance of stormwater collection, treatment and disposal devices 5. Monitoring of stormwater quality	To manage on site surface water to prevent discharge of contaminated water from site or to groundwater	During construction	DEP, WRC
66.	Traffic – Road Transport	Liase with established industries in the Kwinana Industrial Area and schedule workforce start and stop times and product deliveries to avoid immediate morning and afternoon peak periods for the Mason Road, Patterson Road, Rockingham Road, Mandurah Road intersection.	To minimise the peak volume of traffic through the Mason Road intersection.	Commencement of construction.	Main Roads WA.
67.	Traffic – Plant Access	Develop an entry to the premises off Mason Road that affords appropriate safe sight distance and accommodates safe entry movement for over dimensional vehicles. Provide the entry with a left slip lane and develop it in accordance with the Town of Kwinana requirements.	Safe turning movements into and out of the plant site.	Commencement of construction.	Town of Kwinana.

NO	TOPIC	ACTION	OBJECTIVES	TIMING	ADVICE
68.	Risk Management	Undertake a risk management strategy recommended for the future stages of this project is outlined below. The intent of the proposed strategy is to ensure the plant design and operation minimises the risk to personnel, the facility and the environment. This includes: 1. Project Safety 2. Hazard Register 3. Design Reviews 4. HAZOP Studies 5. Dangerous Goods Licence 6. Safety Management System Risk assessment studies will be undertaken to identify and assess all significant hazards associated with the design, construction and operation of the waste to energy and water plant.	The overall objectives in the management of hazardous industrial plant are: 1. To minimise the risk (i.e.: individual, societal and environmental) associated with new developments. 2. To ensure that hazardous industry and land-use planning in the vicinity meet acceptable criteria for individual fatality risk and that separation distances are established in the planning process. 3. To ensure the plant continues to operate in such a manner that the emissions and risks are managed within the accepted criteria and licence conditions.	All project phases	DEP
69.	Risk Management	Join the Kwinana Industries Mutual Aid Group.	To manage risk incidents in conjunction with surrounding industries.	Pre-operation	DEP
70.	Risk Management	Contingency Plans will be developed for the following: - Failure of vitrifier off-gas treatment system - Assessment and adoption of alternative oxides of nitrogen emission control technology - Failure of critical integrated process.	To ensure contingencies are put in place prior to start-up for critical design failures.	Pre-commissioning	DEP
71	Waste Receival	Accept municipal waste and hazardous waste only from the State of Western Australia.	To ensure hazardous waste is not transported from other states.	Operation	
72.	Vermin Control	Engage a professional pest control organisation to survey and report on vermin control options and implement vermin control.	To prevent vermin becoming a nuisance to neighbouring premises and prevent the spread of vermin borne disease and prevent pesticides reaching the marine environment.	Annually	DEP

Note: Stringent air emission conditions will be imposed under the licence agreement to achieve a minimum of those standards set out in Table 3-3.