Commercial HIsmelt Plant, Kwinana, WA

HIsmelt (Operations) Pty. Limited

Report and recommendations
of the Environmental Protection Authority

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Summary and recommendations

HIsmelt (Operations) Pty. Limited proposes to construct and operate a commercial scale HIsmelt Process Plant at Kwinana, Western Australia. This report provides the Environmental Protection Authority's (EPA's) advice and recommendations to the Minister for the Environment and Heritage 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 and Heritage 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

The EPA decided that the following environmental factors relevant to the proposal required detailed evaluation in the report:

(a) Atmospheric emissions;

(b) Waste management;

(c) Greenhouse gas emissions;

(d) Surface water and groundwater;

(e) Noise and vibration;

(f) Marine environment; and

(g) Water supply.

There were a number of other factors which were relevant to the proposal, but the EPA is of the view that the information set out in Appendix 3 provides sufficient evaluation.

Conclusion

The EPA has considered the proposal by HIsmelt (Operations) Pty. Limited to construct and operate a commercial scale HIsmelt Process Plant at Kwinana, Western Australia.

Sulphur dioxide (SO_2)

The EPA notes that predicted SO_2 ground level concentrations obtained from air quality modelling are below the relevant Environmental Protection (Kwinana) (Atmospheric Wastes) Policy (i.e. the Kwinana EPP) standards for all operating scenarios of the proposed Stage 1 and Stage 2 plants. The EPA commends the proponent for making a commitment to incorporate a flue gas desulphurisation (FGD) system into the plant design which is considered best available technology at the time of plant design. The EPA understands that the European Commission considers that FGD systems are best available technology for SO_2 removal in large combustion

plants. The EPA notes that SO_2 emissions will also be minimised through the use of low sulphur coals in the plant. The EPA also acknowledges that the proponent has committed to install a continuous monitoring instrument to measure SO_2 emissions in the gas stream exiting the main stack of the plant, and to report monitoring data for SO_2 to the DEP on a monthly basis, and annually as part of the National Pollution Inventory (NPI).

Nitrogen oxides (NO_X)

The EPA notes that predicted NO_X ground level concentrations obtained from cumulative impact air quality modelling are below the relevant National Environmental Protection Measure (NEPM) standards for all operating scenarios of the proposed Stage 1 and Stage 2 plants. The EPA commends the proponent for making a commitment to incorporate burners that are designed to keep NO_X emissions as low as reasonably practicable where process gas will be combusted, and low NO_X burners where natural gas will be combusted in the plants. The EPA considers that the use of these burners aptly demonstrates the implementation of best available technology by the proponent. The EPA is aware that the low calorific value and associated combustion characteristics of the process gas will effectively reduce the amount of NO_X that will be generated by the plant.

Particulate and fugitive dust emissions

Predicted particulate ground level concentrations obtained from air quality modelling are below the relevant Kwinana EPP and NEPM standards, for all operating scenarios of the proposed Stage 1 and Stage 2 plants. The EPA is satisfied with the proponent's commitment to incorporate scrubbers and bag filters that are considered best available technology at the time of plant design. The EPA understands that the European Commission considers that scrubbers and bag filters are best available technology for particulate removal in the iron and steel production industry. The EPA also acknowledges that the proponent has committed to measure particulate emissions from the plant stacks on, as a minimum, a six monthly basis, and report particulate monitoring data to the DEP on, as a minimum, a six monthly basis.

The EPA notes the commitment made by the proponent to prepare, submit, and implement a Dust Management Plan, which will include measures to control dust emissions, a monitoring programme, reporting requirements, and remediation measures, if dust emissions exceed the relevant criteria. However, the EPA recognises the concern expressed in submissions in relation to the emission of fugitive dust from the proposed plant, and considers that it would be appropriate for a condition to be imposed on the proponent in order to provide for contingency measures in the event that the proposed fugitive dust control measures prove to be inadequate. A condition has been recommended which requires the proponent to investigate options, including enclosure, and to subsequently implement additional dust control measures as soon as practicable to prevent further fugitive dust emissions, in the event that dust monitoring indicates that fugitive dust is being emitted from any of the iron ore, coal, dolomite, and slag stockpiles in excess of established criteria, or is found to be unreasonably interfering with the health, welfare, convenience, comfort or amenity of any person in any premises.

Dioxins and furans, poly aromatic hydrocarbons (PAHs), volatile organic compounds (VOCs), persistent organic pollutants (POPs), and heavy metals

The EPA notes that the report titled "Assessment of Human Health Issues" prepared by HIsmelt (Corporate Environmental Consultancy Pty Ltd, 2002b) indicates that concentrations of pollutants in the stack emissions from the plant are expected to be low because of the benign nature of the raw materials proposed for use, and the application of best practicable measures and technology. The EPA also notes that there is the potential for very low levels of heavy metals including iron, cadmium, lead, and zinc, and dioxins, furans, and VOCs to be released via stack emissions.

The EPA notes that the proponent has made commitments to manage potential emissions of dioxins and furans, PAHs and VOCs, and heavy metals from the plant. The proponent has committed to sample and analyse the offgas emissions, in accordance with an agreed standard based on international best practice, during commissioning and subsequent operation to establish if dioxins and furans are present, and whether concentrations of PAHs, VOCs, and heavy metals are at or above Trigger Levels, provide monitoring results for dioxins, furans, PAHs, VOCs, and heavy metals to the DEP as they are received, and review future monitoring of the offgas emissions for dioxins, furans, PAHs, VOCs, and heavy metals in conjunction with the DEP as the results of the monitoring are being assessed. The EPA considers that direct measurement of gas emissions at the stack would provide an accurate measurement of the efficiency of the pollution control measures implemented in the plant (both "in process" and "end of pipe" measures). The EPA considers that with further air quality monitoring of stack emissions, together with plume modelling, a more accurate prediction of ambient air quality can be achieved.

In view of community concerns expressed in submissions in relation to the potential health impacts from emissions of dioxins, furans, PAHs, VOCs, POPs, and heavy metals from the proposed plant, the EPA considers that it would be appropriate for a condition to be imposed on the proponent in order to address these concerns. The recommended condition stipulates that, in the event that monitoring indicates that dioxins and furans are present and/or that heavy metals, VOCs, PAHs, or other POPs are being detected at or above the Trigger Levels from the plant, the proponent shall investigate and implement additional control measures to prevent further emissions. Furthermore, if emissions are measured above the Licence Limits, the recommended condition stipulates that the proponent shall cease plant operations until investigations and plant modifications are undertaken to demonstrate that the Licence Limits can be achieved.

In relation to dioxins and furans, the EPA considers that the use of the limits recommended by the European Commission (European Commission, 2001) for stack emissions should be adopted as an interim limit. The EPA notes that the proponent will implement best practicable measures to ensure that levels of dioxins and furans in the stack emissions are managed at acceptable levels to protect the environment and human health. In relation to heavy metals, the EPA considers that the use of limits recommended by the US EPA for large waste combustors should be adopted to ensure that heavy metal concentrations for iron, cadmium, lead and zinc do not pose a risk to the environment and human health.

Greenhouse gas emissions

The Stage 1 and Stage 2 plants will produce 3Mtpa of CO_2 per year when they are operating concurrently. The EPA considers that the proposal will be a significant contributor to both Western Australia's and Australia's total greenhouse gas emissions given that the combined total of 3Mtpa of CO_2 represents about 6% of Western Australia's greenhouse emissions and 0.66% of Australia's total greenhouse gas emissions. However, the EPA acknowledges that the proposed plant will achieve lower greenhouse gas emissions per tonne of hot metal produced in comparison with existing blast furnace technology. The EPA commends the proponent on its research and development for the HIsmelt technology, and recognises the potential for global greenhouse gas emissions to be reduced if the technology employed in the proposed plant is adopted by the operators of existing blast furnaces around the world. The EPA also acknowledges the commitments made by the proponent to prepare a Greenhouse Gas Emissions Management Plan, continue to participate in the Australian Greenhouse Office Greenhouse Challenge Programme, research and develop new technologies that will reduce greenhouse gas emissions, and investigate opportunities for offsetting the plants greenhouse gas emissions.

Waste management

The assessment identified the potential for the capacity of the proposed process wastewater storage facility to be exceeded during extreme rainfall events given that it was only to be designed to accommodate the surface run-off from a 1 in 10 year rainfall event of 72 hours duration. The EPA determined that if a more extreme rainfall event occurs, process wastewater would need to be disposed of into the marine environment via the Cape Peron Outlet Pipeline (CPOP). In order to minimise potential impacts on the marine environment, the EPA recommended that a condition be imposed on the proponent which requires the construction of an additional process wastewater storage facility within the boundary of the Commercial HIsmelt plant with sufficient capacity to accommodate the influx of additional water from extreme rainfall events of greater magnitude than a 1 in 10 year rainfall event of 72 hours duration. The design, construction and actual storage volume of the new process wastewater storage facility will be in accordance with advice received from the DEP and the Water and Rivers Commission.

Surface water and groundwater

In relation to surface water and groundwater, the EPA notes the commitments made by the proponent to prepare, submit, and implement a Surface Water Management Plan, and a Groundwater Management Plan. The EPA is satisfied that these commitments will ensure that potential impacts on surface water and groundwater will be acceptable.

Noise and vibration

The results obtained from noise modelling undertaken by the proponent and Fremantle Ports' indicate that, with the exception of noise levels at the plant boundary, noise emissions from the Stage 1 and Stage 2 plants and shipping operations at KBB2 will comply with the *Environmental Protection (Noise) Regulations, 1997*. The EPA notes that noise levels at the plant boundary are predicted to reach 70dB(A) where-as the current allowable level is 65dB(A) for noise received at a neighbouring industrial premises. The EPA understands that a recent review of the Regulations by a working group (DEP, 2000b) suggested that the industry-to-industry noise criteria be amended to limit noise at a plant boundary where an office is within 15m of this boundary to 70dB(A), and 75dB(A) at a plant boundary where an office is more than 15m from this boundary. The EPA is aware that the suggested amended criteria is yet to be adopted. However, the EPA acknowledges that the proponent has stated in the PER that, should the proposed change not be endorsed through the review, then the proponent will review the actual noise levels and noise attenuation measures implemented at the site, and will meet the existing criteria. The EPA considers that the measures that will be employed to manage noise during construction activities, operation of the plant, road and rail movements, and shipping operations are adequate in terms of minimising the potential for impacts on the surrounding community. In regard to vibration from the proposed plant and rail movements, the EPA considers that potential impacts on the health and amenity of the surrounding community are unlikely to be significant.

Marine environment

The EPA is aware of the various management measures that will be implemented by both the proponent and Fremantle Ports' at Kwinana Bulk Berth No. 2 (KBB2) to mitigate any potential impacts on the marine environment. The EPA acknowledges that the proponent will ensure that shipping activities relating to the project will comply with the Draft Cockburn Sound EPP and EMP, and that they will select reputable shipping contractors.

Water supply

The EPA is aware of the potential for the proposed plant to consume significant quantities of scheme water if recycled water from the proposed Kwinana Wastewater Recycling Plant (KWRP) is not utilised. The EPA is also aware of the announcement that the Water Corporation will construct the KWRP in the short term. However, in order to facilitate the use of recycled water instead of scheme water in the proposed plant, the EPA considers that a condition should be imposed on the proponent. The recommended condition requires the proponent to source water from the KWRP, if it is operational prior to the Commercial HIsmelt plant being commissioned, and to design the Commercial HIsmelt plant such that it can readily source water from the KWRP in the event that the KWRP commences operations after the Commercial HIsmelt plant has been commissioned. The EPA believes that this factor is manageable provided that the recommended condition is imposed on the proponent.

In view of the above, 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 proponent's commitments and the recommended conditions summarised in Section 4, and detailed in Appendix 4.

Other advice

Community health concerns

A number of the submissions to the EPA on the HIsmelt project expressed concerns about potential health impacts on the community from cumulative air emissions from Kwinana industries. This was particularly reflected in the submission from the Town of Kwinana.

The Town of Kwinana requested that a study be undertaken of the levels of dioxins, furans, PAHs, VOCs, and heavy metals emitted from Kwinana industries by the DEP, Kwinana Industries Council, and industry. The study should predict the cumulative levels of these pollutants within residential areas in proximity to the industrial area.

The EPA is also aware of the Government's initiatives to establish a Ministerial Council on Health, Environment and Industry Sustainability, and that one of its initial steps has been to form an Environmental Health Foundation to provide independent expert advice to Government on the potential impacts of industrial emissions and chemicals. The EPA understands that a taskforce reporting to the Ministerial Council, incorporating the Departments of Environmental Protection, Health, Worksafe and Mineral and Petroleum Resources, will be preparing a strategy for comprehensive review of potential health issues from emissions from Kwinana industries. The strategy is expected to include a program for increased monitoring of pollutants such as dioxins, furans, PAHs, VOCs, and heavy metals to provide greater information on levels of these pollutants.

The EPA supports these initiatives and believes that they should address the community's concerns and those expressed by the Town of Kwinana in its submission to the EPA. The EPA sees this as an important issue and encourages Government to ensure that the relevant government agencies have resources to undertake this work.

Management of noise from Kwinana industries

The EPA notes that, whilst this individual proposal has demonstrated that it can comply with the *Environmental Protection (Noise) Regulations, 1997*, it will form part of the broader Kwinana Industrial Area, from which cumulative noise has been found to be a substantial concern within surrounding residential areas. The EPA understands, from research recently conducted, that cumulative noise emissions from Kwinana industries regularly exceed the prescribed limits, set by the *Environmental Protection (Noise) Regulations, 1997,* for these surrounding residential locations. In the main, this is due to the consolidation of a large number of heavy industries in this region.

The residential areas surrounding the Kwinana Industrial Area have evolved with heavy industry in close proximity over many years and it is perhaps not surprising to find industry not complying with the prescribed noise limits at all times, given that the Noise Regulations are relatively new. However, it was evident during the assessment of this proposal that existing cumulative noise levels are beyond normally acceptable limits and that noise levels from the Kwinana Industrial Area need to be reduced over time. The EPA notes that the Noise Regulations review process is looking at noise policy in this region and is considering the matter of appropriate noise emission targets for Kwinana industries.

The EPA acknowledges the strategic State significance of the Kwinana Industrial Area and recognises attempts by Government to secure a buffer between industrial and residential land uses in this region. Recently, it also notes the considerable effort made by the Kwinana Industries Council to quantify cumulative noise emissions from industry, identify the key sources of noise, and prepare a strategy for cumulative noise reduction from the Kwinana Industrial Area (including a programme for individual industries to develop and implement their own noise control plans).

The EPA is aware that new industrial proposals for the Kwinana Industrial Area, including the HIsmelt proposal, have the potential to make it harder for existing industries to reduce the cumulative noise level received at surrounding residences. Ideally, future proposals for the Kwinana Industrial Area will be able to demonstrate that their individual noise emissions will be at a level that will ensure the sustainability of Kwinana Industries Council's longer-term strategy to reduce cumulative noise emissions to more acceptable levels for the community.

The EPA considers that cumulative noise emissions from the Kwinana Industrial Area need to be progressively reduced over time, to ensure an improved level of amenity for the surrounding residential areas. The EPA supports the whole-of-industry approach adopted by the Kwinana Industries Council and recommends the ongoing involvement of the community and Government in this noise reduction process.

Environmental management programmes (EMPs)

Whilst the EPA recognises that the proponent will make the various EMPs publicly available on their web site and at the DEP library and other local libraries, the EPA suggests that the proponent liaise closely with the Town of Kwinana, City of Cockburn, City of Rockingham, and the Cockburn Sound Management Council (CSMC) in relation to the scope and content of these EMPs on an on-going basis.

Port facilities

The EPA considers that the recommissioning of Kwinana Bulk Berth No. 1 (KBB1), or any significant change in existing operations, or upgrading of the facilities at KBB2 that would be required to cater for the requirements of the proposed Stage 1 and Stage 2 plants, would need to be referred to the EPA for assessment.

Recommendations

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

1. That the Minister notes that the proposal being assessed is for the construction and operation of a commercial scale HIsmelt Process Plant at Kwinana, Western Australia;

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 4, and summarised in Section 4, including the proponent's commitments; and

4. That the Minister imposes the conditions and procedures recommended in Appendix 4 of this report.
5. That the Minister notes the other advice provided by the EPA.

Conditions

Having considered the proponent's commitments and the information provided in this report, the EPA has developed a set of conditions that the EPA recommends be imposed if the proposal by HIsmelt (Operations) Pty. Limited to construct and operate a commercial scale HIsmelt Process Plant at Kwinana, Western Australia, is approved for implementation.

These conditions are presented in Appendix 4. Matters addressed in the conditions include the following:

(a) that the proponent be required to fulfil the commitments in the Consolidated Commitments statement set out as an attachment to the recommended conditions in Appendix 4;

(b) that the proponent be required to fulfil condition 8 relating to the management of dust in order to minimise impacts to the environment and public health;

(c) that the proponent be required to fulfil condition 9 relating to management of air emissions in order to protect public health;

(d) that the proponent be required to fulfil condition 10 relating to waste management in order to minimise impacts from the discharge of process wastewaters on the marine environment; and

(e) that the proponent be required to fulfil condition 11 relating to water supply requirements for the plant.

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1. Introduction and background

This report provides the advice and recommendations of the Environmental Protection Authority (EPA) to the Minister for the Environment and Heritage on the environmental factors relevant to the proposal by HIsmelt (Operations) Pty. Limited, to construct and operate a commercial scale HIsmelt Process Plant at Kwinana, Western Australia.

The proposal was referred to the EPA on 4 October 2001, and on 22 October 2001 the level of assessment was set at Public Environmental review (PER) under section 38 of the *Environmental Protection Ac,t 1986*.

The PER document was made available for a public review period of four weeks commencing on 22 April 2001 and ending on 20 May 2001.

The EPA's decision to assess the proposal at the level of PER was based on seven main factors, namely atmospheric emissions, greenhouse gas emissions, waste management, surface water and groundwater, noise and vibration, marine environment, and water supply.

Further details of the proposal are presented in Section 2 of this report. Section 3 discusses the 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.

A summary of submissions and the proponent's response to submissions [Corporate Environmental Consultancy Pty Ltd (2002b)] is attached as a separate document to this report, and is included 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

HIsmelt (Operations) Pty. Limited, acting as the manager on behalf of an unincorporated joint venture with a number of other companies, proposes to construct and operate a commercial scale HIsmelt Process Plant at Kwinana in Western Australia. The plant will be located at the site currently occupied by the existing HIsmelt Research and Development Facility (HRDF) within the northern portion of the Kwinana Industrial Area (KIA), 40km south of Perth (Figures 1, 2, and 3).

The Stage 1 plant will initially produce around 820,000 tonnes per annum of pig iron. If the Stage 1 plant is found to be technically and commercially viable, the proponent proposes to install an additional iron-making plant (i.e. the Stage 2 plant) to double production to around 1.64 million tonnes per annum of pig iron.

The HIsmelt process is a direct smelting technology for the production of liquid iron (hot metal) using iron ore fines or any other appropriate ferrous feed material. The smelting will be undertaken in a molten iron bath using coal as the reductant and energy source.

The principal raw materials required for the process are iron ore fines, coal and fluxes (lime and dolomite). The proposal will utilise the reserves of Western Australia's iron ore fines which are currently not suitable for blast furnace feed due to their high phosphorus content. Iron ore will be shipped to Kwinana from Dampier and railed from Koolyanobbing in Western Australia (see Figure 1). Coal will be shipped from the east coast of Australia to Kwinana**.**

Pig iron produced in the plant will be shipped for use in steel mills either within Australia or overseas. The unloading and loading of raw materials and product will be undertaken at the Fremantle Port Authority's Kwinana Bulk Terminal Berth No. 2 (see Figure 3).

The major components of the proposal comprise:

(a) Stage 1 and Stage 2 process plants;

(b) Transport of materials and products;

(f) Power generation;

(g) Water supply and treatment;

(h) Air separation (oxygen and nitrogen) units; and

(i) Waste disposal.

The main characteristics of the proposal are summarised in Table 1 below. A detailed description of the proposal is provided in Section 4 of the PER [Corporate Environmental Consultancy Pty Ltd (2002a)].

Table 1: Summary of key proposal characteristics

ELEMENT	DESCRIPTION	
	Stage 1	**Stages 1 and 2**
Project Purpose	To construct and operate a HIsmelt Process Plant in Kwinana to produce pig iron.	
Project Location	Leath Road, Kwinana Industrial Area, Western Australia.	
Life of Project (yrs)	20+	20+
Project Components	• Process Plants. • Transport of Materials and Product. • Water Supply. • External Electrical Supply. • Natural Gas Supply.	
Plant Components	• Raw Material Delivery and Storage. • Raw Material Reclamation and Preparation. • Ore Preheater. • Smelt Reduction Vessel. • Offgas System. • Flue Gas Desulphurisation System. • Pig Iron and Slag Production. • Power Generation Facility. • Air Separation Unit (Oxygen and Nitrogen Plant). • Water Supply Facilities and Circuits. • Effluent Treatment Facility. • Stormwater and Wastewater Collection Facilities. • Electrical Power Supply Facilities. • Natural Gas Supply Facilities. • Administration Facilities. • Plant Access Roads and Car Parking.	
Plant Operating Hours (per day)	24	
Operating Hours (per year)	7660 – 8760	
Pig Iron Production (ktpa)	820	1640
Slag Production (ktpa)	225	450
Gypsum Production (ktpa)	11.1	22.2
Iron Ore Fines (ktpa, by ship)	650	1300
Iron Ore Fines (ktpa, by Rail)	650	1300
Imported Coal (ktpa wet)	560	1120
Lime (ktpa)	70	140
Dolomite (ktpa)	70	140
Lime Kiln Dust (ktpa)	6	12
Natural Gas (TJ/a)	1480	2960
Iron Ore Stockpiles (kt)	56 and 10	56 and 10
Coal Stockpile (kt)	57	57
Dolomite Stockpile (kt)	35-50	35-50
Pig Iron Stockpile (kt)	60	60
Slag Stockpile (kt)	0-100	0-100
Air Separation Unit - Oxygen Production (tpd) - Nitrogen Production (tpd)	880 800	1760 1600
Greenhouse Gas Emissions (tonnes of CO_2/tonne of hot metal)	1.86	1.86
Greenhouse Gas Emissions (Mtpa CO_2 gross)	1.5	3
SO_X Emissions - normal operations g/sec (tpa)	9 (250)	18 (500)
NO_X Emissions g/sec (tpa)	21.8 (603)	43.6 (1206)
Particulate Emissions g/sec (tpa),	2.3 (64)	4.6 (128)
Water Usage kL/hr (GL/a)	405 (3.2)	810 (6.4)
Water Source	Kwinana Wastewater Recycling Plant	
Construction Period (months)	20 – 24	20-24
Power Generation – Number of Turbines	1	2
Power Generation (MW)	20	40

Source: Table 3.1 of the Proponent's Response to Submissions document (Corporate Environmental Consultancy Pty Ltd, 2002b)

Table 1: Summary of key proposal characteristics (Continued)

ELEMENT	DESCRIPTION	
Emergency Power Supply (Standby from the grid) (MW)	10	10
Plant Area (ha)	21.1	36
Solid Waste (ktpa)	6-10	12-20
Process Effluent (Plant expected to be in water balance).	0	0
No of Truck Movements (per day)	73	146
No of Ore Train Movements (per week)	10	20
Ship Movements (per year)	30 - 50	60 - 100
Workforce Numbers	65	125
Construction Noise	Comply with *Environmental Protection Noise Regulations, 1997*.	
Operational Noise at Residential Areas.	At least 5dB(A) below the assigned noise levels at residential areas.	
Operational Noise – Boundary dB(A)	65	65
Road Noise Increase in L_{Aeq} dB(A)	0.0	0.0
Rail Noise Increase in L_{Aeq} dB(A)	0.1	0.2
Noise – Shipping Operations	At least 5dB(A) below the assigned noise levels at residential areas.	
Risk at Plant Boundary	Less than fifty in one million per year.	
Risk at Residential Area	Less than one in one million per year.	

Source: Table 3.1 of the Proponent's Response to Submissions document (Corporate Environmental Consultancy Pty Ltd, 2002b)

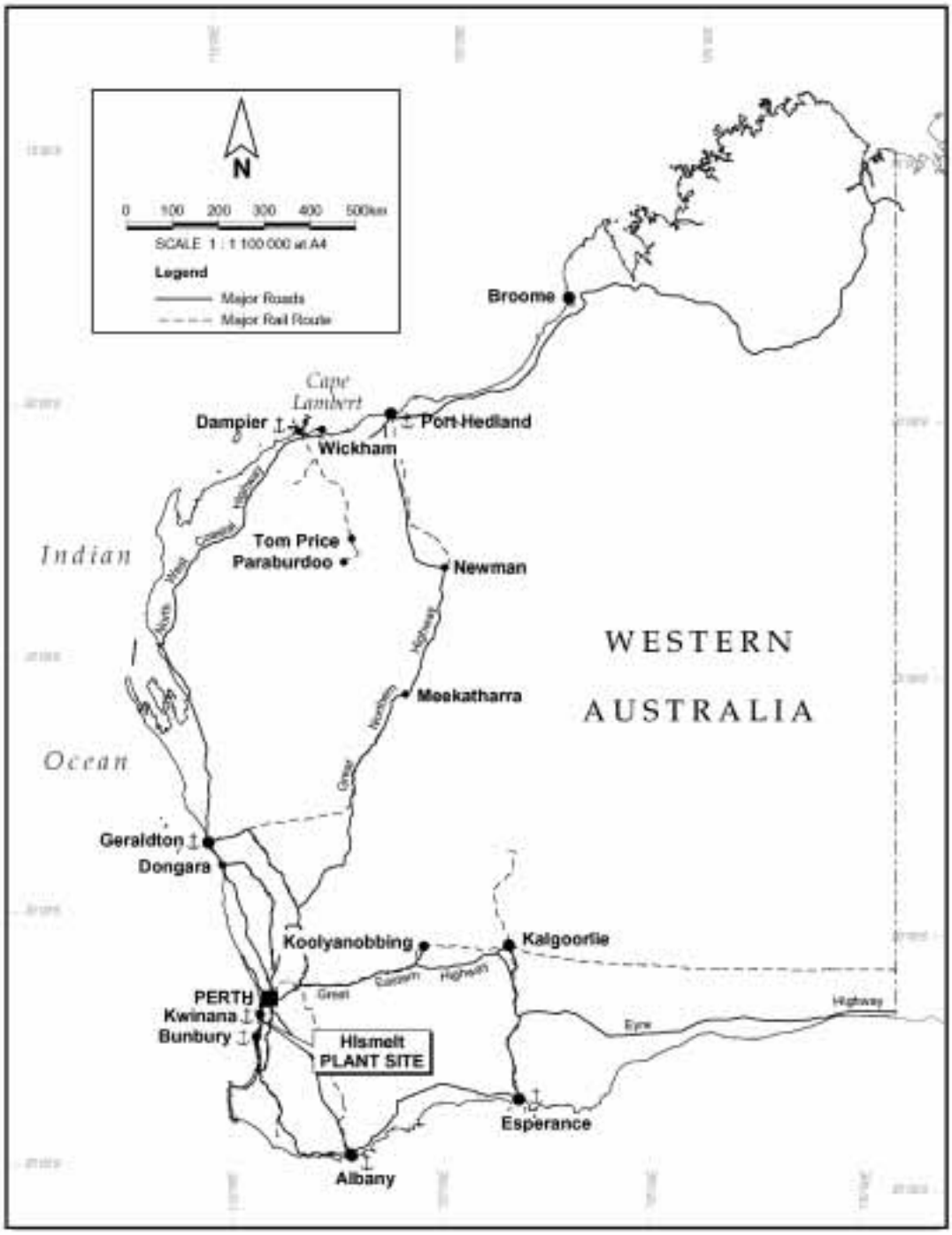

Figure 1: ***Regional location (Source: Figure 1.1 from Corporate Environmental Consultancy Pty Ltd, 2002a)***

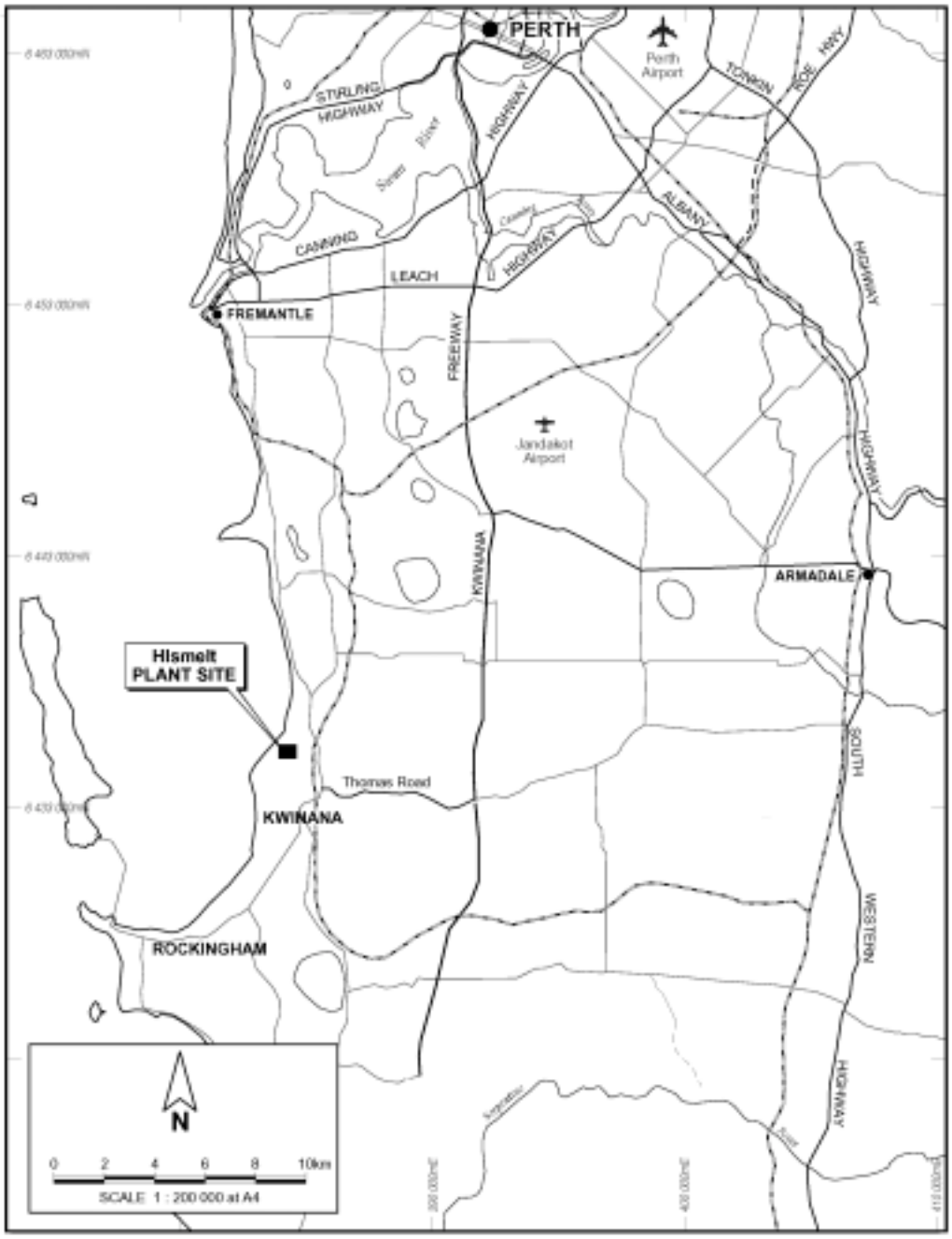

Figure 2: ***Location plan (Source: Figure 1.2 from Corporate Environmental Consultancy Pty Ltd, 2002a)***

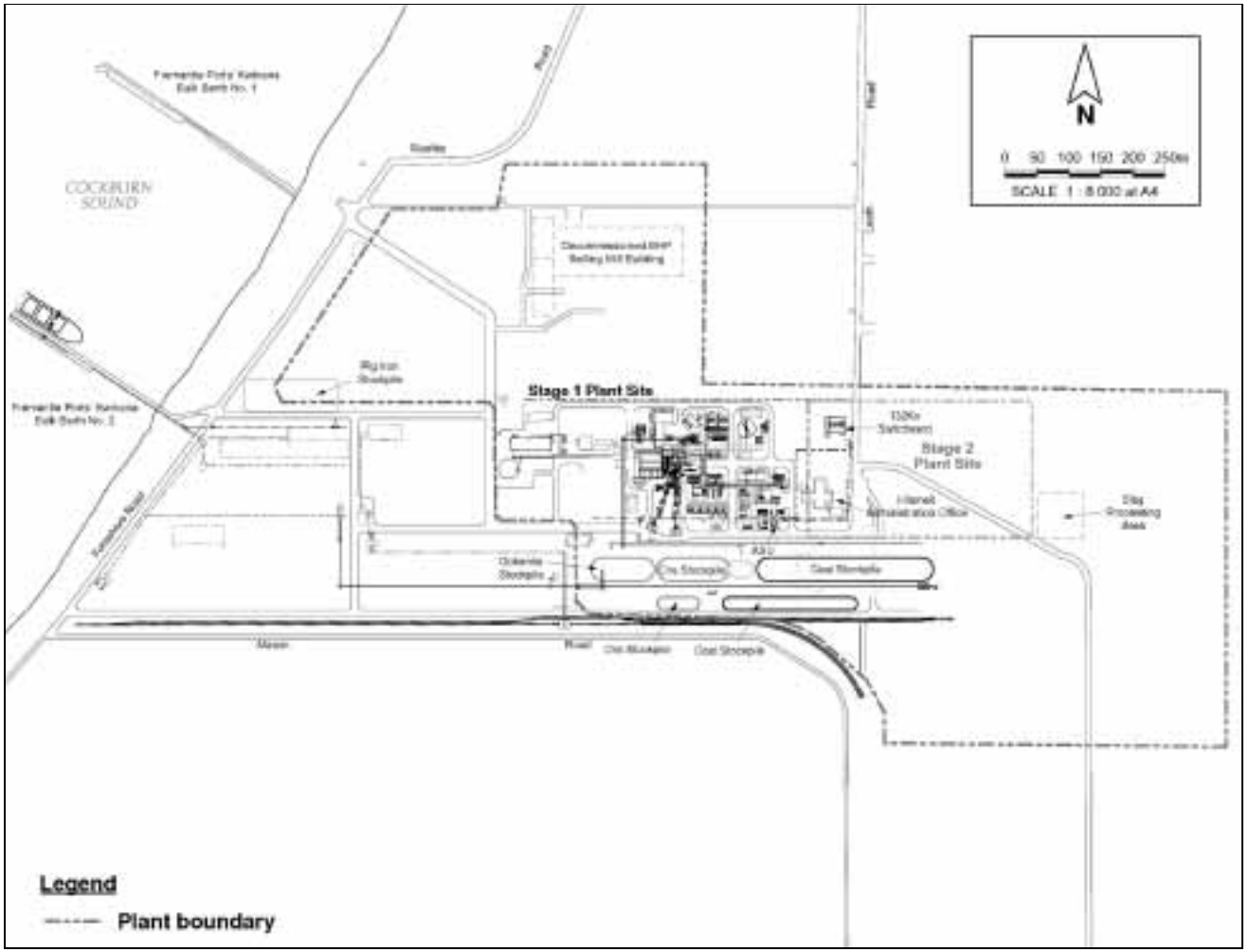

Figure 3: Conceptual site layout (Source: Figure 4.2 from Corporate Environmental Consultancy Pty Ltd, 2002a)

3. Relevant environmental factors

Section 44 of the *Environmental Protection Act, 1986* requires the EPA to report to the Minister for the Environment and Heritage 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.

The identification process for the relevant factors selected for detailed evaluation in this report is summarised in Appendix 3. The reader is referred to Appendix 3 for the evaluation of factors not discussed below. A number of these factors, such as visual amenity, are relevant to the proposal, but the EPA is of the view that the information set out in Appendix 3 provides sufficient evaluation.

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

(a) Atmospheric emissions;

(b) Greenhouse gas emissions;

(c) Waste management;

(d) Surface water and groundwater;

(e) Noise and vibration;

(f) Marine environment; and

(g) Water supply.

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

Details on the relevant environmental factors and their assessment are contained in Sections 3.1 - 3.7. 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 Atmospheric emissions

3.1.1 Sulphur dioxide (SO_2)

Description

Determination of existing sulphur dioxide emission levels

In the original "determination" of emission allocation to the industries, the Kwinana Industries Council (KIC) allocated maximum permissible quantities (emission limits) to each of the industries such that predicted ground level concentrations were just at or below the Kwinana EPP standards. This process was achieved using the DEP's coastal dispersion model (DISPMOD v4.1), which had been extensively validated for the region.

The PER indicated that a review of the 1992 determination had not been finalised at this point in time. However, it is understood that the redetermination will use a more reliable probability of emissions from the various industries, and that allowances will be made for emissions from future industries.

Predicted concentrations from existing industry

Predicted maximum and ninth highest 1-hour ground level concentrations of SO_2 using the current allocated emission limits (as provided by the DEP, *pers comm*, 2001) are summarised in Table 7.3 in the PER. Data in Table 7.3 in the PER indicate that the concentrations resulting from industry emitting at their allocated SO_2 emission rates are at or just below the 1-hour limits and standards in all three areas. Of the various criteria, the predicted concentrations are closest to the residential standard of 350µg/m^3 outside the buffer zone (Area B) to the north east of Cockburn Cement. Modelling with a grid resolution of 50m for the 1992 determination found that the concentrations at this point were predicted to be just below 350µg/m^3. Emissions from the current industries in the area are generally well below their allocated permissible emissions. Currently measured ground level concentrations, as detailed in Section 5.3.1 of the PER, are well below the standards and limits with concentrations generally much less than a third of the standards and limits.

Predicted concentrations from the HIsmelt Research and Development Facility

For the operations of the HIsmelt Research and Development Facility (HRDF), HIsmelt was allocated a maximum permissible emission rate of 35 g/s of SO_2. This emission rate was set to allow for discharges under upset plant conditions. Figure 7.1 in the PER presents the ninth highest 1-hour ground level concentrations of SO_2 predicted using DISPMOD and using the allocated maximum permissible quantity emission of 35g/s.

The PER indicated that in the 1992 determination, the emissions from the HRDF were modelled as being constant at 35g/s, which was the maximum expected emission rate from the HRDF. At the time, reliable estimates of the probability of maximum emissions occurring due to plant upset conditions were not available. For this emission rate and the existing stack conditions, the predicted maximum 1-hour ground level concentrations resulting from the HRDF emissions in isolation are presented in Table 7.3 in the PER together with the percentage of the respective criteria. The maximum ground level concentrations for the HRDF are shown on Figure 7.2 in the PER. The HRDF, as modelled for its allocated maximum permissible emissions, contributed between 5.9% to 7.9% of the respective EPP criteria.

Predicted concentrations from the Stage 1 plant in isolation

The PER indicated that for modelling purposes, the emission rate for the Stage 1 plant was estimated by conservatively assuming that emissions were 11g/s for 98.5% of the time and at 24g/s for the remaining 1.5% of the time (see Section 4.20.2 of the PER). This results in an annual average emission rate of 11.2g/s, compared to anticipated actual emission rates of between 6.7 to 8.8g/s from the main plant (see Table 4.9 of the PER).

Results from the modelling indicate that the ground level concentrations from the Stage 1 plant shown in Table 7.3 in the PER range between 2.6% and 4.2% of the respective standards and limits in the EPP areas. This is around half that predicted for the HRDF emitting at its emission limit as modelled in the 1992 determination (see Section 7.3.3.2 of the PER).

Stage 1 plant with existing industry

For modelling of the Stage 1 plant with existing industry the existing HIsmelt allocation limit was replaced with the new plant emissions. The results shown in Table 7.3 in the PER indicate that the maximum predicted concentrations in Areas B and C will be slightly less than those modelled for the HRDF emissions, although generally the changes in predicted concentrations will be negligible.

Stage 1 and Stage 2 plants in isolation

Table 7.3 and Figure 7.3 in the PER present the predicted ninth highest 1-hour ground level concentration of SO_2 for both the Stage 1 and Stage 2 plants in operation in isolation using the probability of the maximum emissions occurring. For modelling purposes, the emission rates of the plants were approximated by conservatively assuming that the emissions from the two plants were a total of 22g/s for 98.4% of the time, and 35g/s (one plant at 11g/s and the other at 24g/s) for 1.6% of the time. The results from the modelling indicate that ground level concentrations shown in Table 7.3 and on Figure 7.3 in the PER will be between 4.9% to 9% of the respective standards and limits in the EPP areas. The predicted concentrations indicate that the emissions from the Stage 1 and Stage 2 plants operating together will be similar to those modelled for the HRDF in the 1992 determination.

Stages 1 and 2 plants with existing industry

Table 7.3 and Figure 7.4 in the PER present the predicted ninth highest 1-hour average ground level concentration of SO_2 from the existing industry allocation together with both Stage 1 and Stage 2 plants in operation. The results shown in Table 7.3 and Figure 7.4 in the PER indicate that the concentrations will be essentially the same as for the 1992 determination (EPA, 1992a). The PER stated that the replacement of the HRDF with the Stage 1 and Stage 2 plants will result in similar concentrations to those modelled for the HRDF in the 1992 determination.

Maximum 24-hour concentrations

The predicted maximum 24-hour average ground level concentrations of SO_2 from the HRDF, using the maximum permissible emission rate of 35g/s, and from the Stage 1 plant operating alone, and when both the Stage 1 and Stage 2 plants are operating together, are summarised in Table 7.4 in the PER. These data have been obtained by assuming an emission rate of 12.6g/s for the Stage 1 plant, and 23.6g/s for the Stage 1 and Stage 2 plants operating together. These emission rates are equivalent to assuming six maintenance shutdowns during a single day, which is unlikely to happen, with the higher emissions of 24g/s lasting for 30 minutes each time.

The results in Table 7.4 in the PER show that maximum concentrations from the Stage 1 plant will be less than those modelled for the HRDF in the 1992 determination, whilst the concentrations from the Stages 1 and 2 plants will be slightly higher than those predicted for the HRDF. The greater concentrations predicted are a result of lower plume rise due to the cooler plumes from the new plants. Comparison to the standard presented in Table 7.4 indicates that the Stage 1 and Stage 2 plants operating together will contribute up to 8.4% of the standard.

Annual average

The predicted annual average concentrations for the Stage 1 and Stage 2 plants are presented in Table 7.4 in the PER. The data indicate that predicted concentrations from the Stage 1 and Stage 2 plants operating together are up to 2.7% of the standard. These concentrations are approximately equivalent to those modelled for the HRDF in the 1992 determination.

Management of SO_2 emissions

The PER indicated that experience at the HRDF showed that the sulphur reporting to the offgas stream is predominantly present in the form of H_2S with minor quantities of other species such as SO_2 also present at times.

The proponent decided it would be beneficial to combust the cleaned process gas as a fuel in the stoves and waste heat recovery system, which will result in the conversion of all sulphur species to SO_2. The waste gases will be captured and passed through a flue gas desulphurisation (FGD) system that will remove at least 95% of the SO_2.

The FGD system will be sized to handle a SO_2 load significantly greater than that expected for normal operation of the plant so that the removal efficiency is not compromised if greater SO_2 levels are present in the process gas during certain operating conditions. Redundancy will be built in to the FGD in the form of a sufficient number of pumps to allow for a pump to be taken out of service for maintenance if required. In the unlikely event of a complete failure of the FGD system, the process will be shutdown until the fault in the FGD system has been rectified.

Submissions

The EPA Service Unit requested that the proponent clarify the accuracy of the claim made that the SO_2 removal efficiency of the flue gas desulphurisation (FGD) system will be at least 95%. Information was also sought on maximum worst case stack emissions under abnormal operations for both the Stage 1 and Stage 2 plants.

The City of Rockingham indicated that the PER contains no information on the likely SO_2 emissions if the low sulphur coal is not used, and suggested that the proponent should make a formal commitment to use low sulphur coal or be required to carry out additional modelling to predict SO_2 levels where high sulphur coal is used. The City of Rockingham also indicated that the commitment to report SO_2 on a six monthly basis is inadequate, and suggested that the proponent should also be required to

immediately report any incidence of elevated emissions and the reason for the variation to the DEP.

The proponent was encouraged to continue implementing and employing the best available technology to further reduce levels of air emissions where possible. Additional information and a commitment were sought from the proponent in regard to the installation of continuous gas monitors.

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:

- SO_2 emissions meet the air quality standards and limits stated in the Kwinana EPP and requirements of Section 51 of the *Environmental Protection Act 1986*; and
- the proponent uses all reasonable and practicable measures to minimise SO_2 discharges and ensure that they do not cause an environmental or human health / amenity problem.

Applicable ambient ground level standards

The Kwinana region is covered by the Environmental Protection (Kwinana) (Atmospheric Wastes) Policy (EPP) (EPA, 1992b and 1999c) [i.e. the Kwinana EPP] which defines limits (concentrations of atmospheric wastes that shall not be exceeded) and standards (concentrations of atmospheric wastes that should not desirably be exceeded) for SO_2 as shown in Table 2 below.

Table 2: Kwinana EPP ambient air quality standards and limits for sulphur dioxide

Species	Area	Averaging Period	Standard ($\mu g/m^3$)	Limit ($\mu g/m^3$)
Sulphur Dioxide	Area A (Industrial)	1-hour	700	1400
		24-hour	200	365
		1-year	60	80
	Area B (Buffer)	1-hour	500	1000
		24-hour	150	200
		1-year	50	60
	Area C (Residential)	1-hour	350	700
		24-hour	125	200
		1-year	50	60

Source: Modified version of Table 7.1 of the PER (Corporate Environmental Consultancy Pty Ltd, 2002a)

The EPA notes that the predicted concentrations of SO_2 from the Stage 1 plant in isolation, and when both the Stage 1 and 2 plants operating together will be relatively low, as illustrated in Tables 7.3 and 7.4 in the PER. Predicted maximum 1-hour concentrations will be between 2.6% to 4.2% of the Kwinana EPP standards and limits for the Stage 1 plant operating alone, and 4.9% to 9.0% when the Stage 1 and Stage 2 plants are operating together. Predicted 24-hour concentrations will be between 2.2% to 3.5% of the Kwinana EPP Standards for the Stage 1 plant operating

alone, and 4.5% to 8.4% when the Stage 1 and Stage 2 plants are operating together. Annual average concentrations will be around 1.3% and 2.7% of the annual standard for the Stage 1 plant operating alone, and when the Stage 1 and Stage 2 plants are operating together, respectively.

Comparison with the modelled concentrations for the HRDF's maximum permissible emission rate of 35g/sec indicates that concentrations from the Stage 1 plant will be around half of those predicted for the HRDF. Concentrations from both the Stage 1 and Stage 2 plants operating together would be approximately the same as for the 1992 determination, therefore, no increase in the maximum permissible emission rate allocated in 1992 would be required for the operation of the proposed Stage 1 and Stage 2 plants.

The EPA notes that emissions of SO_2 from the Stage 1 and Stage 2 plants will be managed by the use of low sulphur coals and a FGD system. The coal specifications provided to potential suppliers include an upper limit sulphur content of 1.0% on a dry basis, with a preference for the sulphur content to be less than 0.8%. The EPA considers that the above information adequately addresses the City of Rockingham's concerns in relation to the use of low sulphur coals in the proposed plant.

The EPA notes that a continuous emission monitoring instrument will be installed on the FGD stack to provide process control input on the operation of the FGD, and to also collect SO_2 emission data for performance reporting. The instrument will be designed to measure SO_2 in a gas stream with a high water vapour content, as the gas scrubbing will be a wet process. An independent stack testing contractor will check the calibration and accuracy of the instrument periodically by sampling the stack using appropriate standard techniques. The EPA notes that monitoring data will be stored in the Plant Control System.

The EPA notes that the proponent has made a commitment to:

- incorporate a Flue Gas Desulphurisation System in the Plant design that is considered Best Available Technology at the time of Plant design;
- install a continuous monitoring instrument to measure SO_2 emissions in the gas stream exiting the main stack of the Plant; and
- report monitoring data for SO_2 to the DEP on a monthly basis, and annually as part of the National Pollution Inventory (NPI).

The EPA notes from the proponent's response to submissions, that they have held discussions with several manufacturers of FGD systems, and all vendors reported that a SO_2 removal efficiency of 95% was achievable using a wet lime or limestone based FGD, and that they would provide process guarantees to back up this claim. The EPA has confirmed that the European Commission considers that FGD systems are best available technology for SO_2 removal in large combustion plants. The EPA considers that the above information satisfactorily addresses the EPA Service Unit's concerns in relation to the proponent's claims about the FGD system.

The EPA considers that the proponent's commitment satisfactorily addresses the City of Rockingham's concern in regard to the frequency of reporting of monitoring data for SO_2, and public concerns about the use of best available technology to reduce emissions, and the installation of continuous gas monitors.

Summary

Having particular regard to the:

(a) predicted SO_2 ground level concentrations obtained from air quality modelling being below the relevant Kwinana EPP standards for all operating scenarios of the proposed Stage 1 and Stage 2 plants; and

(b) commitment made by the proponent;

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 commitment is made legally enforceable.

3.1.2 Nitrogen oxides (NO_X)

Description

Emissions of NO_X from the main stacks of the Stage 1 and Stage 2 plants can arise from the smelting process and be present in the offgas. NO_X can also be generated in the subsequent burning of the gas in the hot blast stoves and waste heat recovery system prior to release to the atmosphere. Typically, around 90% of the NO_X emitted from gas fired burners is in the form of NO with the remainder as NO_2. Following release, the NO is slowly oxidised to the more reactive NO_2, which has a greater health and environmental impact than NO.

Predicted maximum 1 hour concentrations of NO_X from the Stage 1 and Stage 2 plants are summarised in Table 7.6 in the PER, and the ground level concentration contours for both the Stage 1 and Stage 2 plants operating are shown in Figure 7.6 in the PER.

The results indicate that the maximum 1-hour concentrations of NO_X are predicted to occur within 1km of the plant within the Industrial EPP Area A. The maximum concentrations are estimated to be 121µg/m^3 for the Stage 1 plant, and 186µg/m^3 when both the Stage 1 and Stage 2 plants are operating together. At the nearest residential area within Buffer Area B (near the Hope Valley monitoring site) the highest concentrations of NO_X are predicted to be 43µg/m^3 for the Stage 1 plant and 69µg/m^3, when both the Stage 1 and Stage 2 plants are operating together. Within Area C the maximum 1-hour concentrations of NO_X are predicted to be 38µg/m^3 for the Stage 1 plant and 75µg/m^3 when both the Stage 1 and Stage 2 plants are operating together.

As a conservative assumption, predicted NO_2 concentrations have been derived assuming that 100% of the NO_X is NO_2. In practice, the NO_2 will only be a fraction of the NO_X with the remainder being NO. Using the assumption of a 100% conversion, the predicted maximum concentrations of NO_2 at residential areas is 75µg/m^3, which is equivalent to 30% of the NEPM standard (246µg/m^3) (NEPC, 1998).

To determine cumulative impacts of existing industry and the HIsmelt Plants, hourly predicted NO_X concentrations from the Plants (assumed to be 100% NO_2) were added to the hourly measured NO_2 concentrations reported in the DEP 1996 database from the NO_2 monitoring stations at Hope Valley and North Rockingham for each hour. This allowed the modelled concentrations from both the Stage 1 and Stage 2 plants to be added to the observed concentrations. To ensure that the measured and predicted peaks are not offset by an hour, the modelled concentrations for the preceding and following hours were added.

Annual average concentrations from the Stage 1 plant and for both the Stage 1 and Stage 2 plants operating together are summarised in Table 7.7 in the PER.

The above analysis of the impact of cumulative NO_X emissions only considered the proposed HIsmelt plant with other existing NO_X sources. It did not consider the additional impact of the proposed Global Olivine Western Australia (GOWA) Waste to Energy Plant. In order to enable an assessment of the additional impact of the proposed GOWA plant to be made, further modelling was undertaken. The methodology utilised in this additional modelling is outlined in Section 4.3.4 of the attached copy of the proponent's Response to Submissions document (Corporate Environmental Consultancy Pty Ltd, 2002b). The results for the predicted ground level concentrations from the GOWA and HIsmelt plants are presented in Table 4.1 in the attached copy of the proponent's Response to Submissions document (Corporate Environmental Consultancy Pty Ltd, 2002b).

Cumulative NO_2 ground level concentrations from the proposed GOWA and HIsmelt plants and existing sources (industry, motor vehicles etc) are presented in Table 4.2 in the attached copy of the proponent's Response to Submissions document (Corporate Environmental Consultancy Pty Ltd, 2002b).

Submissions

The EPA Service Unit sought information in regard to whether the proponent has considered the use of post combustion flue gas NO_X control measures where process offgas is burnt in the plant, and whether such systems could be utilised in these areas of the plant.

The EPA Service Unit also sought information in regard to whether other additional NO_X control technology could be used in conjunction with the low NO_X burners that will be used to burn natural gas, to further reduce NO_X emissions to best practice levels.

Additional information was requested in regard to NO_X emissions from the main stack, Coal Mill stack, and Pre-heater stack, especially with respect to predicted emission concentrations, and whether the quoted emission concentration levels represents best practice when compared to relevant European Commission (EC) and US EPA standards. Clarification was sought in regard to whether the process offgas burners that will be used in the plant are considered to be best available control technology.

The EPA Service Unit requested that additional modelling be undertaken to enable an assessment of the cumulative impact of NO_X emissions from both the HIsmelt and Global Olivine Western Australia Limited (GOWA) plants to be made. Information was also requested on maximum worst case stack emissions under abnormal operations for both the Stage 1 and Stage 2 plants. Clarification was sought in regard to whether the Plant Control System could be designed to monitor and collect measurements of NO_X concentrations on a continuous basis.

The Town of Kwinana requested that consideration be given to the impact of cumulative NO_X emissions on smog formation when they are combined with VOCs and reactive organic compounds from other industries in Kwinana.

The Cockburn Sound Management Council sought information in regard to how the NO_X and nitrates emitted from the scrubbers would be prevented from entering marine waters.

The City of Rockingham indicated that the commitment to report NO_X on a six monthly basis is inadequate, and suggested that the proponent should be required to immediately report any incidence of elevated emissions and the reason for the variation to the DEP.

Other submissions requested evidence be provided to confirm that the proposed type of burners that will be used will keep NO_X emissions as low as reasonably practicable, and clarification in regard to whether the process offgas burners that will be used in the plant are considered to be best available control technology. The proponent was encouraged to continue implementing and employing the best available technology to further reduce levels of air emissions where possible. Additional information and a commitment were sought from the proponent in regard to the installation of continuous gas monitors.

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:

- NO_X emissions meet acceptable standards including the NEPM for Ambient Air Quality, and the requirements of Section 51 of the *Environmental Protection Act 1986*.
- the proponent uses all reasonable and practicable measures to minimise NO_X discharges and ensure that they do not cause an environmental or human health / amenity problem.

Applicable ambient ground level standards

The EPA requires that NO_X emissions meet the National Environmental Protection Measure (NEPM) standards listed in Table 3 below. These standards specify the maximum concentration and the goal that is to be achieved within ten years.

Table 3: National Environmental Protection Measure - Standards and goals for nitrogen dioxide

Pollutant	Averaging Period	Maximum Concentration		Goals within 10 years Maximum allowable exceedances
		(ppm)	($\mu g/m^3$)	
Nitrogen Dioxide	1 hour 1 year	0.12 0.03	246 62	1 day a year none

Source: Modified version of Table 7.2 of the PER (Corporate Environmental Consultancy Pty Ltd, 2002a)

The EPA notes that the results show that the increase in the existing NO_2 concentrations is predicted to be small with maximum concentrations increasing from 93 to 113$\mu g/m^3$ (equivalent to 38% to 46% of the NEPM standards) at Hope Valley, and 84 to 105$\mu g/m^3$ (equivalent to 34% to 43% of the NEPM standard) at North Rockingham. This small increase in the maximum 1 hour concentration occurs as the hours with predicted high concentrations from the two plants do not coincide with those hours with highest monitored concentrations at these locations.

The EPA notes that the results indicate that the contribution from both plants to existing annual NO_X concentrations will be small. Annual concentrations at the monitoring stations at Hope Valley and North Rockingham based on the 1996 DEP database are 8.4$\mu g/m^3$ and 9.7$\mu g/m^3$ (i.e. 13.5% and 15.6% of the NEPM), respectively. With the addition of the Stage 1 plant these concentrations will increase to 9.03$\mu g/m^3$ (i.e. 14.5% of the NEPM standard at Hope Valley and 9.83$\mu g/m^3$ (i.e. 15.9% of the NEPM standard) at North Rockingham. With the addition of both the Stage 1 and Stage 2 plants, the concentrations will increase to 9.75$\mu g/m^3$ and 9.97$\mu g/m^3$ (i.e. 15.7 and 16.0% of the NEPM standard), at Hope Valley and Rockingham, respectively.

The EPA notes that the results of the additional modeling undertaken in order to assess the cumulative impact of NO_X emissions indicate that the concentrations from the GOWA plant will contribute 23.5% of the NEPM standards, and the HIsmelt plant will contribute 19.1% of the NEPM standard. Cumulative contributions from the GOWA and HIsmelt plants to the maximum 1 hour concentrations will be 37.4% of the NEPM standard occurring at residences within Hope Valley. This is less than the addition of the two as the maximum ground level concentrations from the GOWA and the HIsmelt plants will occur at different locations and different times, due to the relative positions of the their respective stacks, and the different final plume heights. Cumulative contributions from the GOWA and HIsmelt plants to the annual average will be 3.4% of the NEPM standard at residences within Hope Valley.

The EPA notes that the results indicate that existing maximum 1 hour NO_2 concentrations at Hope Valley may increase from 38% to 55% of the NEPM standard with the operation of both the GOWA and the HIsmelt plants. At North Rockingham the concentrations will increase from 34 to 36%. Annual average concentrations are predicted to increase slightly to approximately 16% of the NEPM standard for NO_2. The EPA considers that the above information adequately addresses the Town of Kwinana's concerns in relation to the impact of cumulative NO_X emissions.

The EPA notes that sampling and measurement of gas streams at the HRDF indicate that the HIsmelt process offgas will have a very low potential to generate fuel NO_X and that the emissions of NO_X from both plants will be predominantly due to thermally generated NO_X. The production of prompt NO_X is also considered highly unlikely as the high temperatures present in the top space of the Smelt Reduction Vessel (SRV) destroy the hydrocarbon radicals.

The EPA understands that the process offgas gas has a low calorific value and will tend to burn with a low flame temperature of around 950^oC, and that this will reduce the amount of NO_X generated during combustion and thus negate the need for other NO_X reduction techniques such as Low Excess Air, Flue Gas Recirculation and water injection to be utilised. These control techniques limit NO_X generation by lowering peak flame temperatures during combustion. The EPA considers that this information adequately addresses the EPA Service Unit's concerns in relation to whether the NO_X reduction techniques referred to above could be utilised in the proposed plant where process offgas is burnt.

The EPA notes that the gas stream exiting the main stacks from both plants will be sampled and analysed for NO_X on a six monthly basis. An independent stack testing contractor will undertake the sampling and analysis using appropriate standard techniques. Monitoring data will be reported to the DEP and Rio Tinto on a six monthly basis and annually, as part of the NPI. The EPA considers this to be an appropriate monitoring and reporting timeframe.

The EPA notes that the proponent has made a commitment to:

- incorporate burners that are designed to keep NO_X emissions as low as reasonably practicable where process gas will be combusted, and low NO_X burners where natural gas will be combusted in the Plants;
- sample and analyse the gas stream exiting the main stack for NO_X emissions on, as a minimum, a six monthly basis; and
- report monitoring data for NO_X emissions to the DEP on, as a minimum, a six monthly basis, and annually as part of the NPI.

The EPA considers that the use of burners referred to in the above commitment, aptly demonstrates the implementation of best available technology by the proponent.

Summary

Having particular regard to the:

(a) predicted NO_X ground level concentrations obtained from cumulative impact air quality modelling being below the relevant NEPM standards for all operating scenarios of the proposed Stage 1 and Stage 2 plants; and

(b) commitment made by the proponent;

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.

3.1.3 Particulate and fugitive dust emissions

Description

Particulate emissions

Larger dust particles, ranging from 10 to 50μm in size, in the air may reduce visibility by scattering light, hence causing haze and affecting visual amenity. Finer dust particles, less than 10μm in diameter pose a risk to health, as they are inhalable, with that fraction smaller than 2.5μm being of particular concern as they are respirable and may lodge in the lungs.

The PER indicated that the process offgas exiting the SRV will contain particulate material in the form of unreacted char and slag droplets together with iron oxide fume. It is estimated that this gas will contain particulate material in the range of 10 to 20g/Nm^3 (based on data from the HRDF) and therefore must be cleaned prior to combustion and its subsequent release.

Emissions from the other stacks will comprise:

- coal dust from the coal drier stack;
- iron ore dust from the Preheater stack; and
- iron oxide fume from the cast house and pig caster fume extraction stack.

Management of particulate emissions

Predicted maximum concentrations of particulate emissions as TSP and PM_{10} from the stacks of the Stage 1 and Stage 2 plants in isolation are presented in Table 7.5 in the PER and the predicted 24 hour PM_{10} ground level concentrations are shown in Figure 7.5 of the PER.

The PER stated that maximum concentrations of particulates are predicted to occur on-site and will then rapidly decrease with distance. The high concentrations will arise from the induced turbulence from the nearby coal feed bins which rapidly mix the plumes from the short fume extraction stack. Table 7.5 in the PER shows that the maximum predicted TSP concentrations will be up to 16.7% of the criteria in Area A, decreasing to 2.5% of the criteria in Area C. The PM_{10} concentrations are predicted to be less than 6% of the NEPM standard at the nearest residence.

The PER indicated that the emission of airborne particulates from both the Stage 1 and Stage 2 plants will be managed by the following:

- Wet scrubbers on both the Preheater and main offgas lines will clean the process offgas to ensure that the particulate level is less than $5mg/Nm^3$. The PER indicated that this type of scrubber is considered to be best available technology by the European Commission (European Commission, 2000) and has demonstrated to be very reliable and to consistently be below the $5mg/Nm^3$ output level.
- Particulate emissions from the main stack of each plant will average 0.17g/s.
- Particulate emissions from the other stacks in each plant will be designed to be less than $50mg/Nm^3$. Greater than 95% of the particulates will be less than 1μm.
- Fume resulting from the operations with molten materials will be minimised by covering launders through which the material are tapped and captured using forced draught fume extraction hoods above susceptible areas. The fume will be captured in two bag filter modules, both of which will be designed to clean the gas to particulate concentrations of less than $50mg/Nm^3$ prior to release to atmosphere. The PER indicated that they are considered to be best available technology in Europe (European Commission, 2000).
- Any storage bins that are filled by the pneumatic conveying of solid materials, such as the ground coal storage bin and the three lime bins, will be vented through bag filter cleaning systems designed to clean the exhaust gas stream to particulate concentrations of less than $50mg/Nm^3$ prior to release to the atmosphere.

The PER indicated that because any particulates emitted will have passed through wet scrubbers and bag filters it is expected that the particulates will be all considered PM_{10}.

The PER also indicated that particulate emissions from both plants will be monitored six monthly to ensure that the levels from the main stack are less than 5mg/Nm^3, and less than 50mg/Nm^3 from the other stacks. A size distribution of particulates in the emissions will be undertaken in the initial sampling programme to determine the percentage to TSP, PM_{10} and $PM_{2.5}$. Monitoring data will be reported to the DEP and Rio Tinto on a six monthly basis.

Fugitive dust emissions from the proposed plant

Fugitive dust may be generated on site from:

- cleared areas;
- construction activities;
- transporting and unloading of raw materials;
- conveying of materials;
- stockpiling and recovery of raw materials; and
- movement of vehicles on unsealed areas.

Management of fugitive dust emissions from the proposed plant

In relation to fugitive dust control, the PER indicated that a Dust Management Plan will be prepared and implemented as part of the EMP for the site, which will be submitted to the DEP prior to commissioning. To ensure that dust generation from the activities listed above is minimised the following dust management measures will be incorporated:

- the integration of dust control provisions into work practices;
- monitoring (visual and high volume sampling) and feedback mechanisms to ensure that appropriate controls are implemented where monitoring indicates additional control is required;
- liaison with suppliers of raw materials to the Project to ensure that the delivered product has a moisture content that minimises dust generation during unloading and delivery to the stockpiles;
- atomising water sprays will be used at transfer points, dump hoppers and conveyor discharge points to:
    - wet dust and particles;
    - prevent liberation;
    - increase fall out rates; and
    - prevent dust surges due to the up-flow of displaced air;
- stockpiling of materials using a stacker conveyor that has luffing capabilities allowing the discharge height to be minimised, thereby minimising the generation of dust at the stacker conveyor discharge;

- covering of conveyors and transfer points, where practicable (internal conveyors and transfer points will be enclosed, the stacker conveyor cannot be enclosed, however, due to the requirement for movement along the entire length of the stockpile area);
- use of water sprays on stockpiles - a network of high pressure water cannons will be installed to provide coverage of the entire stockpile area;
- use of water tankers to apply water, possibly dosed with a dust suppressant, to disturbed areas such as unsealed roads and front end loader routes at the raw material reclamation area;
- maintain a high standard of housekeeping such as the regular cleaning and sweeping of areas to remove fugitive dust; and
- establishing and maintaining a vegetation buffer around the plant site.

Fugitive dust emissions from rail transportation of iron ore

Rail transport of iron ore from Koolyanobbing to Kwinana has the potential to generate fugitive dust from ore blowing from the rail wagons and from dumping of iron ore from the wagons at the Kwinana Bulk Terminal.

Management of fugitive dust emissions from rail transportation of iron ore

The PER indicated that the selected rail freight provider is proposing to use wagons that were originally designed for the carriage of coal with a maximum capacity of 75 tonnes per wagon. As the bulk density of iron ore is more than double that of coal the ore will take up less than half of the available volume in the wagon. The upper surface of the ore will thus be well below the top of the wagon and it is unlikely that any significant quantities of ore dust will be blown from the wagons. The moisture content of the ore (3 to 5%) will help prevent dust losses from the wagons.

The ore will be unloaded by positioning each rail wagon over a dump hopper and opening the gates on the bottom of the wagon, thus allowing the ore to drop into the hopper. The existing dump station is situated in a small shed through which the wagons are shunted. This system is currently used for the unloading of silica sand and mineral sand concentrates, which are delivered dry, without dust emissions being a problem. From the dump hopper the ore will be removed by a below ground conveyor and conveyed to the conveyor that delivers ore from the jetty to the HIsmelt Stacker Conveyor. The dump station and conveyor will be enclosed therefore minimising dust emissions from the unloading of iron ore wagons.

Fugitive dust emissions from the Kwinana Bulk Berth No. 2

Iron ore and coal will be unloaded from the ship's holds using a Grab Bucket Ship Unloader. The unloading operation has the potential to generate dust and spillage.

Management of fugitive dust emissions from the Kwinana Bulk Berth No. 2

The PER indicated that:

- dust management at the Kwinana Bulk Berth No. 2 (KBB2) unloading area will be the responsibility and management of Fremantle Ports';
- the current dust extraction and suppression systems are being reviewed by Fremantle Ports' to ensure that they are effective and compliant with the existing environmental licence for the KBB2. Any necessary improvements will be implemented to the reasonable satisfaction of the DEP. New conveyors will be covered where required for dust control;
- dust emissions from the receival hopper of the unloader, which is the main potential source of dust, will be monitored by Fremantle Ports' and improvements implemented as required;
- Fremantle Ports' will implement a dust monitoring programme to ensure compliance with the EPP requirements. The programme will be undertaken in accordance with Fremantle Ports' existing dust monitoring programmes where high volume sampling will be conducted over a 24 hour period whilst ships are being unloaded to measure the concentration of TSP within the premises boundary. This programme will be managed and the reports forwarded to the DEP in accordance with the environmental licence for Fremantle Ports' operations; and
- Fremantle Ports' Marine Quality Monitoring Program will be utilised to establish baseline water quality. Monitoring will be undertaken by Fremantle Ports' directly following unloading events to ensure that any dust reaching the marine environment is not having a significant impact using the ANZECC Water Quality Guidelines as a basis for assessment (ANZECC, 2001). Following this monitoring, the long term marine water quality monitoring requirements will be incorporated in Fremantle Ports' overall Marine Quality Monitoring Program.

Submissions

The EPA Service Unit sought additional information in regard to the performance of the wet scrubbers on the Preheater and main offgas lines, particularly in relation to predicted emission concentrations. Additional information was also sought in regard to particulate emissions from the various plant stacks, especially with respect to predicted emission concentrations and particulate sizes, and whether the quoted emission concentration levels represent best practice when compared to relevant European Commission (EC) and US EPA standards. The EPA Service Unit queried the predicted particulate emissions concentrations from the Cast House Extraction No. 1 stack and the Pig Caster Fume Extraction No. 2 stack, and suggested that whilst bag filter modules may be considered to be best available technology by the European Commission, they should be designed to emit particulate emissions at best practice levels (i.e. 1 to 15mg/Nm^3). The proponent was asked to make an additional commitment to design the bag filter modules so that they achieve a particulate emission concentration level of 1 to 15mg/Nm^3. The predicted particulate emission concentrations from the Coal Mill stack were also queried, and clarification was sought in regard to whether the bag filter cleaning system that will be used to control emissions from any storage bins that are filled by the pneumatic conveying of solid

materials is considered to be best available technology when compared to relevant European Commission (EC) and US EPA standards. The proponent was requested to provide information on maximum worst case stack emissions under abnormal operations for both the Stage 1 and Stage 2 plants.

The EPA Service Unit sought additional detailed justification from the proponent for not implementing the same dust control measures that are used at the Port of Esperance, and will be used at the proposed Kwinana Export Facility, such as enclosing stockpiles in sheds.

The DEP (Kwinana) and the Cockburn Sound Management Council indicated that there is a need for the proponent to demonstrate that a fully enclosed fine materials storage system is not required at the proposed plant, and that no estimate has been provided in regard to the amount of dust generated from the stockpiling of iron ore and coal. It is therefore not possible to determine whether the use of water sprays will be sufficient to prevent fugitive dust emissions. The Cockburn Sound Management Council requested that an estimate of the dust to be generated from the unloading of ore and coal should be provided, and suggested that some description of any dust plume, which may arise from the unloading operations should be provided.

The Town of Kwinana requested that evidence be provided to confirm that the management of airborne particulates from the plant does in fact represent best available technology, and suggested that the proponent should commit to comply with the Kwinana EPP standard for particulates. It was also suggested that the proponent should measure/monitor particulates quarterly rather than every six months. Clarification was also sought on the size of particles to be included in the proposed dust monitoring programme. The Town of Kwinana indicated that dust from the feedstock stockpiles could be a nuisance if not managed properly, and suggested that the proponent should address this issue as part of the Environmental Management Plan. The Town of Kwinana recommended that the proponent should give a commitment to cover the rail wagons if dust is found to be a nuisance.

The City of Cockburn requested that contact details be provided to facilitate appropriate reporting of dust complaints, and that the Dust Management Plan address the potential for dust from the road and rail transport of materials. The City of Cockburn indicated that there is no mention of sprinklers on the conveyors to minimise dust and suggested that this needs to be considered for those conveyors that are not covered. It was also suggested that the train wagons may need to be covered, and that trucks carrying lime or slag should be required to be covered.

Other submissions recommended that a Dust Management Plan should be prepared for the site that addresses the possible use of sprinklers on conveyors and stockpile materials. It was also recommended that all coal and iron ore handling facilities should be completely enclosed to prevent spillage to the Sound, and that best available technology should be used for all loading/unloading operations and transfer systems. It was suggested that the management measures for the loading and unloading of ore and other materials may not be adequate to deal with the impact of dust on Cockburn Sound, and that their adequacy should be further demonstrated. Concern was expressed in regard to the likelihood of spillages of iron ore and coal dust into Cockburn Sound occurring and what would be done when they did occur. A

guarantee that there will be no spillage into Cockburn Sound during loading and unloading operations was sought from the proponent, and it was suggested it was unacceptable to place the responsibility on Fremantle Ports'. There was uncertainty in relation to who would be responsible for cleaning up if a spill occurs.

It was suggested that continuous particulate monitoring should be considered, and additional information and a commitment were sought from the proponent in regard to the installation of continuous gas monitors. It was recommended that $PM_{2.5}$ should also be monitored as world recognised research indicates that it is responsible for serious health problems. The proponent was encouraged to continue implementing and employing the best available technology to further reduce levels of air emissions where possible.

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:

- protect the surrounding land users such that particulate and dust emissions from Kwinana industries will not adversely impact upon their welfare and amenity or cause health problems by meeting the NEPM for Ambient Air Quality relating to PM_{10} at residential areas, and the Environmental Protection (Kwinana) (Atmospheric Wastes) Policy 1992 for Total Suspended Particulates (TSP); and
- ensure that the proponent uses all reasonable and practicable measures to minimise the discharge of particulate wastes and the generation of dust, including the construction phase.

Ambient ground level standards

The Kwinana EPP and regulations stipulate concentrations of TSP allowable in the air for the EPP Areas (Table 4 below).

Table 4: Kwinana EPP Ambient Air Quality Standards and Limits for particulates

Species	Area	Averaging Period	Standard ($\mu g/m^3$)	Limit ($\mu g/m^3$)
Particulates	Area A,B,C	15-minute	-	1000
	A	24-hour	150	260
	B	24-hour	90	260
	C	24-hour	90	150

Source: Modified version of Table 7.1 of the PER (Corporate Environmental Consultancy Pty Ltd, 2002a)

The NEPM for Ambient Air Quality sets an ambient particulate standard of $50\mu g/m^3$ for particles less than $10\mu m$ in size (NEPC, 1998). As the buffer area (EPP Area B) contains residences in Hope Valley and Wattleup, the NEPM criteria is applicable to those residences within Area B and all of Area C (see Figure 5.2 in the PER).

In regard to the management of particulate emissions from the plant, the EPA notes that the proponent has made a commitment to:

- incorporate scrubbers and bag filters that are considered Best Available Technology at the time of Plant design;
- measure particulate emissions from the Plant stacks on, as a minimum, a six monthly basis; and
- report particulate monitoring data to the DEP on, as a minimum, a six monthly basis.

The EPA has confirmed that the scrubbers and bag filters that will be incorporated into the proposed plant are considered to be best available technology by the European Commission in there document titled '*Integrated Pollution Prevention and Control (IPPC) - Best Available Techniques Reference Document on the Production of Iron and Steel'* (European Commission, 2000). The EPA notes from the proponent's response to submissions that it is their intention to achieve final particulate emission concentrations which are consistent with best available technology, which is less than 15mg/Nm^3. The EPA considers that the above information adequately addresses the concerns expressed by the EPA Service Unit and the Town of Kwinana in regard to the implementation of best practice and best available technology for the control of particulate emissions in various parts of the proposed plant.

Whilst the EPA notes the Town of Kwinana's concern in regard to the proposed frequency of monitoring, the EPA considers that the measuring frequency for particulate emissions outlined in the proponent's above commitment to be an appropriate monitoring and reporting framework. The EPA notes that a size distribution of particulates in the emissions will be undertaken in the initial sampling programme to determine the percentage to TSP, PM_{10} and $PM_{2.5}$. The EPA considers that the above information satisfactorily addresses the concerns expressed by the EPA Service Unit and the public about the provision of information regarding the percentages of TSP, PM_{10} and $PM_{2.5}$ in particulate emissions.

In regard to the management of fugitive emissions from the plant, the EPA notes that the proponent has made a commitment to:

Prepare, submit, and implement a Dust Management Plan, which will include:

- measures for controlling dust emissions;
- monitoring programme;
- reporting requirements; and
- remediation measures if exceedances of the criteria occur.

The EPA acknowledges the community concern expressed in submissions in regard to the management of fugitive dust. However, the EPA considers that the dust management measures proposed by the proponent are capable of managing dust from the project to ensure that there are not unacceptable off-site impacts to public health and amenity.

The EPA expects that the Dust Management Plan will be important in setting the monitoring and reporting programme, and criteria to be met, to enable proper assessment of the acceptability of performance of the dust management measures. In this regard, the EPA considers that the criteria to be achieved for the plant should take into consideration not only the standards and limits set in the Kwinana EPP, but also ensure that the NEPM standards are met in residential areas.

Furthermore, the EPA considers that a ministerial condition should be imposed on the approval of the project to ensure that contingency measures are in place in the event that the proposed dust control measures prove to be inadequate. The following condition is recommended:

8-1 In the event that dust monitoring undertaken as part of the Dust Management Plan prepared in accordance with commitment 15 indicates that fugitive dust is being emitted from any of the iron ore, coal, dolomite, and slag stockpiles in excess of the established criteria, or is found to be unreasonably interfering with the health, welfare, convenience, comfort or amenity of any person in any premises, the proponent shall investigate options, including enclosure, and subsequently implement additional dust control measures as soon as practicable to prevent further fugitive dust emissions, to the requirements of the Minister for the Environment and Heritage on advice of the Environmental Protection Authority.

The EPA considers that the proposed management measures that will be used to manage fugitive dust emissions from the rail transportation of iron ore, will be adequate in terms of ensuring that they will not pose a risk to the environment and human health.

The EPA believes that the dust control measures that will be employed by Fremantle Ports' at Kwinana Bulk Berth No. 2 (KBB2) and other associated materials handling infrastructure on their premises will be adequate in terms of minimising potential dust related impacts from the loading and unloading of ships carrying materials associated with the plant. The EPA is aware that if the Stage 2 plant is constructed, Kwinana Bulk Berth No. 1 (KBB1) will need to be recommissioned. Accordingly, the EPA expects that the recommissioning of KBB1, or any significant change in existing operations, or upgrading of the facilities at KBB2 that would be required to cater for the requirements of the proposed Stage 1 and Stage 2 plants, would need to be referred to the EPA for assessment.

Summary

Having particular regard to the:

(a) predicted particulate ground level concentrations obtained from air quality modelling being below the relevant Kwinana EPP and NEPM standards for all operating scenarios of the proposed Stage 1 and Stage 2 plants;

(b) management measures that will be adopted by HIsmelt (Operations) Pty. Limited to manage fugitive dust emissions;

(c) management measures that will be implemented by Fremantle Ports' at KBB2 to manage fugitive dust emissions; and

(d) commitments made by the proponent to control particulate emissions and dust;

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 the ministerial condition outlined above is imposed on the proponent.

3.1.4 Dioxins, furans, poly aromatic hydrocarbons (PAHs), volatile organic compounds (VOCs), persistent organic pollutants (POPs), and heavy metals

Description

Dioxins and furans

The PER indicated that traditional integrated iron and steel plants have been identified as major sources of dioxin and furan emissions. Figures from the European Union estimate that in 1995, the iron and steel industry was responsible for 19% of total European emissions of dioxins and furans (European Commission, 2000). This has largely been due to emissions from sinter plants, which are used to recycle waste oxide materials arising from operations at the integrated works. The proposed HIsmelt plant does not include a sinter plant. Oily mill scale from the casting and rolling of steel is a source of chlorine that reacts with carbonaceous particles and oxygen in the exhaust gas stream to produce dioxins and furans. Dioxins and furans have the potential to cause health impacts.

Management of dioxins and furans

The offgas handling system for the Stage 1 and Stage 2 plants was selected to prevent dioxins and furans being emitted to the atmosphere. A discussion on the rationale to the selection of the offgas handling systems in relation to dioxins and furans is provided in Appendix G of the PER.

The PER indicated that sampling of the offgas would be undertaken during the first year of Stage 1 plant operation to establish if there are any dioxins or furans present, and that monitoring results would be provided to the DEP. In the unlikely event that dioxins and furans are being generated by the HIsmelt process and emitted to the atmosphere, the proponent will investigate the source of the emissions and will continue regular monitoring.

If monitoring confirms that no dioxins and furans are being generated and emitted by the HIsmelt process, then sampling and analysis of the offgas for dioxins and furans would be undertaken less frequently, following review of the results with the DEP.

PAHs, VOCs, and POPs

The use of coal as the reductant and energy source has the potential to result in emissions of PAHs, VOCs, and POPs. It should be noted that dioxins and furans are also POPs. However, they have been considered separately under the previous heading as they are a common form of POPs. These compounds have the potential to contribute to photochemical smog (VOCs), and to cause health impacts (VOCs, PAHs and POPs).

The PER indicated that the offgas from the HRDF was sampled and analysed for VOCs on a number of occasions, and specifically for PAHs on one occasion. The gas was sampled after cleaning in a bag filter and prior to combustion, before being released to atmosphere. The results indicated that levels of VOCs were in the parts per billion range and PAHs in the gas totalled 4.4µg/Nm^3. These compound were then subjected to a high temperature combustion prior to release to atmosphere. This combustion stage would have resulted in the destruction of these compounds in the offgas ensuring there were no emissions to atmosphere.

Management of PAHs, VOCs, and POPs

The PER indicated that the manner in which the HIsmelt process utilises coal results in a very low potential for the generation of PAHs, VOCs, and POPs. The coal is injected at high velocity into a deep bath of molten iron, the carbon being dissolved in the iron and the mineral components (ash) reports to the slag. Coal volatiles evolved due to pyrolysis, together with carbon monoxide produced by the reaction of iron ore with the dissolved carbon, are then partially combusted by reaction with the Hot Air Blast in the furnace top space. The high temperature (approximately 2000°C) in the top space breaks down any organic compounds that survive the passage through the molten iron and slag into carbon monoxide and hydrogen.

The offgas is then cooled to 1000°C prior to the stream being split into two, half being passed to the preheater while the remainder is cleaned in the wet scrubber. The gas from the wet scrubber is then used as a fuel in the hot blast stoves and the WHR. The preheater offgas is cleaned in a wet scrubber and is then also used as a fuel in the WHR. The combustion of the offgas destroys any VOCs, PAHs etc that have managed to survive the high temperatures in the SRV resulting in no significant emissions of these species to the atmosphere.

The PER indicated that sampling of the offgas will be undertaken during the first year of the Stage 1 plant operation to establish if there are any VOCs, PAHs or POPs present. Monitoring results would be provided to the DEP. Future monitoring will depend upon the results of the initial monitoring. In the unlikely event that those species are being generated by the HIsmelt process and emitted to the atmosphere, the proponent will investigate the source of the emissions and will continue regular monitoring. If monitoring confirms that no VOCs, PAHs or POPs are being generated by the HIsmelt Process and emitted then sampling and analysis of the offgas for those species would be undertaken less frequently, upon review of the results with the DEP.

Heavy metals

Iron ore, coal and fluxes contain trace quantities of metallic elements such as zinc, lead and cadmium. These elements may be released during processing and have the potential to impact on the environment and human health.

Management of heavy metals

The PER indicated that experience gained from the HRDF, and information from other iron and steel making processes, indicates that metallic elements such as zinc, lead and cadmium will report predominantly to the SRV offgas stream as metallic vapour. The flowsheet for the HIsmelt process estimates that 19kg/hr of Zn, 1kg/hr of Pb and a few grams/hr of Cd may be present in the gas leaving the SRV. An investigation of the thermodynamics of these species indicates that they will remain in the gas as vapours at temperatures above 800°C. Half of the total present will pass into the Pre-heater, where they will condense on the hot ore particles and be recycled to the SRV, with the remainder being passed into the wet scrubber. Wet scrubbing, at a temperature between 900°C and 1000°C, prevents these species from condensing on the surface of dust particles. The low pH liquid phase in the quench zone of the wet scrubber will result in the dissolution of these elements. Should any metals pass through the wet scrubber, they will be subjected to further scrubbing with water in the offgas cooler. Combustion of the gas in the waste heat recovery system will be followed by another scrubbing stage in the FGD. Therefore it is unlikely that there will be any emissions of heavy metals to the atmosphere.

The metallic elements will remain in solution through the scrubber circuit and report in the slurry to the clarifier as discussed in Section 4.10.2 of the PER. In the clarifier the addition of caustic for pH control and the reaction of metallic elements with dissolved hydrogen sulphide will result in a high proportion of the metallic elements being precipitated. These will be recycled to the SRV with the clarifier sludge. Any of these metals remaining in solution will be directed to the process water tank in the scrubber circuit blowdown. The addition of lime to raise the pH to 8 will precipitate the remaining metals as hydroxides.

The PER stated that sampling of the offgas will be undertaken during the first year of the Stage 1 plant operation to establish if there are any significant concentration of heavy metals being emitted to the atmosphere. The results will be provided to the DEP. Future monitoring will depend upon the results of the initial monitoring. In the unlikely event that significant concentrations of heavy metals are being emitted then the proponent will investigate the source of the emissions and will continue regular monitoring.

If monitoring confirms that there are no significant concentrations of heavy metals being emitted then sampling and analyses of the offgas for heavy metals would be undertaken less frequently, upon review of the results with the DEP.

Submissions

The EPA Service Unit indicated that minor emissions of dioxins, furans, PAHs, VOCs, and other POPs from the proposed plant would be of concern to the public, and requested that the proponent estimate the emission rate/quantity of each species, show how the emissions are calculated, and compare the anticipated emissions with best practice limits. Information was sought about the contingency measures that could be employed by the proponent if significant dioxins and furans emissions were detected.

The EPA Service Unit requested information to substantiate the claim made that all heavy metals would be removed through the various scrubbing stages. The proponent was requested to provide information on the removal efficiencies that can be achieved at each stage, or to evaluate removal efficiencies on the basis of the monitoring data. A mass balance/flow diagram for heavy metals was also requested. The EPA Service Unit indicated that significant volumes of "fume" will be emitted from the pig caster area, and requested that information on the composition of the "fume" be provided, including heavy metals and organic compounds. Information was requested on the composition of the Preheater offgas before and after the wet scrubbing stage during the commissioning period, and the likelihood of the offgas containing heavy metals and other organic compounds. The proponent was requested to provide information on maximum worst case stack emissions under abnormal operations for both the Stage 1 and Stage 2 plants.

The Town of Kwinana requested details on the results of stack testing at the HRDF and whether any air toxics were detected and at what concentrations, and indicated that there appears to be no intention to monitor PAHs and VOCs. It was suggested that the Council, industry and the community should be made aware of the levels of emissions of dioxins, furans, PAHs and VOCs, and heavy metals, and that the EPA should facilitate a study to determine these levels. It was also suggested that a multi pathway exposure and health risk assessment should have been undertaken. The Town of Kwinana requested that Council be consulted on any downgrading of monitoring programmes for dioxins, furans and heavy metals, and stated that any downgrading needs to be justified.

The City of Rockingham recommended that the proponent should report to DEP immediately any incidence of dioxins and furans detected and the reasons for the release, and that on going monitoring of dioxins and furans should be required to ensure that the process technology is working effectively to remove any dioxins and furans produced.

Concern was expressed about the emissions of heavy metals from the furnace not being covered in any detail, and it was suggested that the proponent provide additional information. It was also suggested that a health impact and risk assessment should be undertaken, and that more information be provided in relation to possible dioxin and furan emissions arising from a cooling system malfunction or incorrect operation. The need for the community to be consulted on any downgrading of monitoring was also identified. The proponent was requested to commission a health impact assessment which includes the impact from dioxins, furans, PAHs, VOCs, and

heavy metals. The proponent was encouraged to continue implementing and employing best available technology to further reduce levels of air emissions where possible. Additional information and a commitment were sought from the proponent in regard to the installation of continuous gas monitors.

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:

- emissions such as dioxins, furans, PAHs, VOCs, POPs, and heavy metals meet acceptable standards, and do not pose a threat to public health; and
- the proponent uses all reasonable and practicable measures to minimise the discharge of these types of emissions.

The EPA notes the management measures that will be used in the plant to control emissions of dioxins and furans. The EPA also notes that, as a result of issues raised during the assessment, the proponent has modified their original commitment regarding the monitoring and reporting of dioxins and furans to read as follows:

The Proponent will:

- sample and analyse the offgas emissions, in accordance with an agreed standard based on international best practice, during commissioning and the subsequent operation to establish if there are any Dioxins or Furans present;
- provide monitoring results for Dioxins and Furans to the DEP as they are received; and
- review future monitoring of the offgas emissions for Dioxins and Furans in conjunction with DEP as the results of the monitoring are being assessed.

The EPA notes the management measures that will be used in the plant to control emissions of PAHs and VOCs. The EPA also notes that, as a result of issues raised during the assessment, the proponent has modified their original commitment regarding the monitoring and reporting of PAHs and VOCs to read as follows:

The Proponent will:

- sample and analyse the offgas emissions, in accordance with an agreed standard based on international best practice, during commissioning and the subsequent operation to establish if concentrations of PAHs and VOCs are at or above Trigger Levels;
- provide monitoring results for the PAHs and VOCs to the DEP as they are received; and
- review future monitoring of the offgas emissions for PAHs and VOCs in conjunction with the DEP as the results of the monitoring are being assessed.

The EPA notes the management measures that will be used in the plant to control emissions of heavy metals. The EPA also notes that, as a result of issues raised during the assessment, the proponent has modified their original commitment regarding the monitoring and reporting of heavy metals to read as follows:

The Proponent will:

- sample and analyse the offgas emissions, in accordance with an agreed standard based on international best practice, during commissioning and the subsequent operation to establish if concentrations of heavy metals are at or above Trigger Levels;
- provide monitoring results for the heavy metals to the DEP; and
- review future monitoring of the offgas emissions for heavy metals in conjunction with the DEP as the results of the monitoring are being assessed.

Assessment of health issues and monitoring of stack emissions

A key issue raised in submissions was the potential impact of emissions from the project on the health of the community. In response to this, the proponent undertook an assessment of the human health issues associated with the proposal in consultation with the Department of Health (DOH) and the DEP. The report is included as part of the proponent's response to submissions document (Corporate Environmental Consultancy Pty Ltd, 2002b).

The report titled 'Assessment of Human Health Issues', indicates that concentrations of pollutants in the stack emissions from the plant are expected to be low because of the benign nature of the raw materials proposed for use, and the application of best practicable measures and technology. The report concludes that the project will not result in an adverse impact on human health.

The DOH and the DEP have reviewed the report and advised that it adequately addresses potential health issues related to the operation of the plant. The DOH and the DEP concur with the proponent's commitments to monitor emissions during commissioning and subsequent operations, and report these to the DEP as they are obtained.

The EPA considers that direct measurement of gas emissions at the stack provides an accurate measurement of the efficiency of the pollution control measures implemented in the plant (both "in process" and "end of pipe" measures), and data to confirm that the plant is not producing emissions which could pose a threat to human health. The EPA considers that the air quality monitoring of stack emissions, together with plume modelling, enables a more accurate prediction of ambient air quality to be achieved.

The EPA is aware that the project will be subject to Works Approval and Licensing by the DEP under Part V of the *Environmental Protection Act, 1986.* The EPA considers that in licensing the project, it would be appropriate to set both Trigger Levels and Licence Limits for pollutants of potential health concern from the project.

The Trigger Levels should be set by taking into consideration reasonable detection levels for pollutants from sampling and analysis of offgas emissions carried out in accordance with appropriate standards and international best practice. If levels of significance are detected, the proponent should be required to investigate and implement additional measures to control emissions.

The Licence Limits should be set based on consideration of the predicted emission levels for the plant provided in the PER and the Assessment of Human Health Issues report for the project, and available international standards to protect public health. In relation to dioxins and furans, the EPA considers that the use of the limits recommended by the European Commission (European Commission, 2001) for stack gas emissions should be adopted. In relation to heavy metals, the EPA considers that the use of limits recommended by the US EPA for large waste combustors should be adopted to ensure that heavy metal concentrations for iron, cadmium, lead and zinc do not pose a risk to the environment and human health. If monitoring indicates that Licence Limits are being exceeded, the proponent should be required to cease operations until investigations and plant modifications are undertaken to demonstrate that the limits can be achieved.

Accordingly, the EPA recommends that the following condition be imposed on the proponent:

9-1 In the event that monitoring undertaken in accordance with commitments 9, 10, and 11 indicates that dioxins and furans are present and/or that heavy metals, volatile organic compounds (VOCs), poly aromatic hydrocarbons (PAHs), or other persistent organic pollutants (POPs) are being detected at or above the Trigger Levels from the Commercial HIsmelt plant, the proponent shall investigate and implement additional control measures to prevent further emissions, to the requirements of the Minister for the Environment and Heritage on advice of the Environmental Protection Authority. If emissions are measured above the Licence Limits, the proponent shall cease plant operations until investigations and plant modifications are undertaken to the requirements of the Minister for the Environment and Heritage on advice of the Environmental Protection Authority, to demonstrate that the Licence Limits can be achieved.

Having considered the report on human health issues for the project and the advice received from the DOH and the DEP, and provided the proponent's commitments are made legally enforceable, and that the above condition is imposed, the EPA considers that the proposal should not result in adverse impacts to public health.

Summary

Having particular regard to the:

(a) management measures that will be implemented by the proponent to manage emissions of dioxins, furans, PAHs, VOCs, POPs, and heavy metals; and

(b) commitments made by the proponent;

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 the ministerial condition outlined above is imposed on the proponent.

3.2 Greenhouse gas emissions

Description

The proposed plant will utilise coal as a reductant. The subsequent combustion of the gaseous reaction products (CO and H_2) will result in the Stage 1 plant emitting around 1.5Mtpa of CO_2 to the atmosphere. An additional 1.5Mtpa of CO_2 will be emitted for the Stage 2 Plant. The combined total of 3Mtpa represents 0.66% of Australia's net greenhouse emissions as listed in the Greenhouse Inventory Report for 1999 (AGO, 2001) or 6% of Western Australia's emissions as listed in the 1995 state inventory. Hence, the plant is considered to be a significant contributor to both the state and national CO_2 inventory.

Greenhouse emissions from the proposed plant will be predominantly in the form of CO_2 in the main exhaust gas stream, and will be generated by the:

(a) reaction of coal in the molten bath with oxygen from the iron ore;

(b) post combustion of CO in the furnace top space;

(c) pre-reduction of iron ore in the Preheater; and

(d) combustion of cleaned process offgas, containing residual CO, plus some natural gas in the hot blast stoves and the waste heat recovery (WHR) system for steam generation.

The PER indicated that CO_2 emissions will be minimised by the very efficient use of the input energy from the coal. The emissions will be, on a per unit of product basis, 1.87 tonnes of CO_2 per tonne of hot metal produced. According to the PER, the CO_2 will be contained in a large volume of offgas (approximately 480,000Nm^3/hr) at a concentration of 21.4% (v/v), which makes it impracticable to scrub the CO_2 from the gas.

Pig iron sold on the commodity market has historically been produced in blast furnaces but generally only as a small proportion of blast furnace output. The majority of blast furnace iron is used in the molten state for steel production in the basic oxygen steel making process. Some smaller blast furnaces produce pig iron as the sole product.

Submissions

The EPA Service Unit indicated that while the PER provides information on CO_2 emissions from the plant in isolation, it does not provide any information on CO_2 generation from the entire project (i.e. plant site and transportation components etc). Information on the total quantity of CO_2 emitted from the entire project on an annual basis was requested. Information was sought in regard to whether the quantity of CO_2 produced per tonne of product been reduced since the HRDF commenced operations. Concern was expressed about the lack of a commitment from the proponent to investigate other opportunities for carbon sequestration such as establishing tree farms.

The Town of Kwinana suggested that the proponent should have specified what "beyond no regrets" measures would be used. It was also suggested that the proponent should be required to contribute to carbon sequestration as part of the Greenhouse Challenge Programme, particularly in the Kwinana area, and that carbon trading opportunities should also be investigated. The proponent was requested to specify the evaluation process used to determine that the waste heat recovery system is the most energy efficient and lowest cost scenario.

The City of Cockburn recommended that further investigations should be undertaken to ensure that the technology being proposed produces the least greenhouse gas emissions possible. The City of Cockburn suggested that the proponent should be required to contribute to carbon sink or use carbon trading opportunities to compensate for greenhouse gas emitted.

Other submissions indicated that further investigations should be undertaken to ensure that the technology being proposed is producing the least greenhouse gas emissions possible, and that the proponent has not done a proper greenhouse gas assessment and has failed to demonstrate that it will take all reasonable steps to minimise greenhouse gas emissions. It was recommended that the proponent be encouraged to join a programme such as the Carbon Neutral Program to offset their greenhouse gas emissions. Concern was expressed about the transport of coal from Queensland being unsustainable due to high transport cost and increased production of greenhouse gas, and it was suggested that the proponent should not be allowed to burn coal. The proponent was encouraged to continue implementing and employing best available technology to further reduce levels of air emissions where possible.

Assessment

The EPA considers this proposal to be a significant contributor to Western Australia's greenhouse gas emissions, and its objectives in regard to this environmental factor from both a global and Australian context, consistent with the National Greenhouse Strategy, are to:

- minimise greenhouse gas emissions in absolute terms and reduce emissions per unit of product to as low as reasonably practicable; and
- mitigate greenhouse gas emissions in accordance with the Framework Convention on Climate Change 1992, and in accordance with established Commonwealth and State policies including Environmental Protection Authority Interim Guidance No. 12 'Minimising Greenhouse Gases'.

To achieve this, the EPA expect that potential greenhouse gas emissions emitted from proposed projects are adequately addressed in the planning/design and operation of projects, and that:

- best practicable measures are applied to maximise energy efficiency and minimise emissions;
- comprehensive analysis is undertaken to identify and implement appropriate offsets; and
- proponents undertake an on-going programme to monitor and report emissions and periodically assess opportunities to further reduce greenhouse gas emissions over time.

The greenhouse gas emissions from the Stage 1 and Stage 2 plants were considered in the context of:

- **"**Business as usual" - considered to be the application of technology or processes of similar capacity using 1990 performance as a benchmark.
- **"**No regrets" - those measures that can be implemented by a proponent which are effectively cost neutral and provide the proponent with returns in savings, which offset the initial capital expenditure that may be incurred.
- **"**Beyond no regrets" - measures that can be implemented by a proponent which involve some additional cost that is not expected to be recovered.

"Business as usual" comparison with other pig iron plants

The total predicted production capacity of the proposed plant, 820,000tpa for Stage 1 and 1.6Mtpa for Stage 2, is relatively low in terms of the capacity of modern blast furnaces which typically produce greater than 3Mtpa of molten iron. However, a large number of smaller blast furnaces with production levels comparable to the proposed Stage 1 plant, are currently in operation throughout the world. These small blast furnaces have been used to compare greenhouse emissions with those from the HIsmelt plant. Production levels of the BHP Newcastle Blast Furnaces, Numbers 3 and 4, which closed in 1999, were around 1Mtpa each. The production level at the Australian Iron and Steel (AIS) blast furnace at Kwinana, which closed in 1982, was around 750,000tpa. These plants are considered to be appropriate "business as usual" benchmarks when undertaking a comparison of greenhouse gas emissions. A number of similar sized furnaces in North America were also included for comparison purposes. Typical inputs for the Newcastle blast furnaces are listed in the Annual Blast Furnace Roundup (Iron and Steel Society, 2001). A typical mass balance for the AIS blast furnace at Kwinana was obtained from AUSIMM (AUSIMM, 1981). A carbon balance has been derived from these data and is summarised in Table 7.11 in the PER. A carbon balance allows the total greenhouse emissions per tonne of molten iron (including those from the production of coke, sinter or pellets) to be calculated.

The EPA notes that Table 7.11 in the PER presents the gross emissions for the blast furnaces, which are attributed to the production of hot metal, and that the net emissions may be less due to the use of the coke oven and blast furnace gases as fuel in other processes within the steel plant. The net value will vary for each plant depending upon its configuration therefore it is difficult to calculate. The PER indicated that a comparison of the gross CO_2 emissions could be undertaken, if the blast furnaces listed in Table 7.11 in the PER are considered as stand alone pig iron producers. The data in Table 7.11 in the PER represent on-site emissions only, emissions associated with transport are not included as transport distances for the various sources of raw material suppliers is unknown. The PER stated that for the Stage 1 and Stage 2 plants, values of 2 tonnes of CO_2/MT/km may be applied for the shipping of ore and coal (Rio Tinto Technical Services, pers comm, 2002). This results in around 10,000tpa of CO_2 being generated for the transportation of materials for both the Stage 1 and Stage 2 plants.

The EPA notes that CO_2 emission from the HIsmelt plant were considered to be both a net and gross value as the site operations will be in energy balance and thus represent a significant reduction in greenhouse emissions compared to an equivalent size blast furnace. Considerable improvements in energy intensity, and consequently greenhouse emissions, have been made in blast furnaces. However, a considerable proportion of the reductant must be in the form of coke and the iron ore fines must be agglomerated (sintered or pellets). The PER stated that additional process steps involved in the preparation of the feed materials result in a higher than optimum energy consumption, estimated at between 3 and 3.8GJ/t of steel (IEA, 2000).

Identification of "no regrets" measures considered by the proponent

The proponent believes that the decision to commercialise the HIsmelt process by establishing the proposed plant at Kwinana can be considered a "no regrets" measure on behalf of its parent company, Rio Tinto. The development of the HIsmelt process represents a considerable investment in research and development expenditure over the past 16 years, which ultimately will deliver global benefits in the form of lower energy usage and lower greenhouse emissions per tonne of iron and, therefore, per tonne of steel.

The PER indicated that while the development of the HIsmelt process has primarily focused on the SRV, it had been recognised from an early stage in the development of the process that the optimum energy efficiency would be from the coupling of the SRV with a suitable technology that enabled hot, pre-reduced material to be produced and fed directly to the SRV.

The EPA understands that HIsmelt has performed testing in laboratory scale versions of several of the pre-reduction technologies such as the Circofer® Process, being developed by Outokumpu Lurgi, and multi hearth furnaces. The Circofer Process is a coal-based direct reduction process that has the potential, when coupled with the HIsmelt process, to provide an iron making route with significantly lower greenhouse emissions than any process currently available. The emissions are expected to be around 1300kg of CO_2 per tonne of pig iron compared to those presented in Table 7.11 in the PER from blast furnaces, which range from about 2091kg to 2427kg of CO_2 per tonne of pig iron.

The EPA notes that the project, even though it is considered to be a significant greenhouse emitter, is a necessary step in the development of processes that will lead to a reduction in future emissions of greenhouse gases from the global iron and steel sector. Figure 7.7 in the PER shows the relative CO_2 emissions per tonne of hot metal produced for iron making processes. Figure 7.7 in the PER shows that the blast furnace process has demonstrated continual improvement over its considerable history. The HIsmelt Process, once accepted as a viable alternative ironmaking process to the blast furnace, would be expected to undergo further development (such as combination with other processes as discussed above) leading to further improvements in emissions.

The EPA notes that the results of the "no regrets" comparison show that the proposed plant will achieve significantly lower greenhouse gas emissions per tonne of hot metal produced in comparison to existing blast furnace technology. The EPA commends the proponent on its research and development for the HIsmelt technology, and recognises the potential for global greenhouse gas emissions to be reduced if the technology employed in the proposed plant is adopted by the operators of existing blast furnaces around the world.

Identification of "beyond no regrets" measures considered by the proponent

The PER stated that in regard to "beyond no regrets measures", Rio Tinto has been involved in the research and development of enhanced bio-fixation of CO_2. Rio Tinto has commenced a three year research collaboration with a company called Maxygen, a major biotechnology company based in California, in February 2000 to develop proprietary technologies known as Molecular Breeding. Rio Tinto identified the technology as a potential route to new chemical and biological processes such as those involved in bioleaching and CO_2 sequestration.

The aim is to apply Molecular Breeding to the key enzyme involved in CO_2 fixation, which is one of the basic processes of photosynthesis. Enhancement of CO_2 fixation will lead to cost effective control of CO_2 emissions and production of renewable energy via bio fuels. The technology has the potential to achieve the fixation of CO_2 from the atmosphere and transform it into algal biomass.

Maxygen technology also has the potential for application in the emerging use of hydrogen as a fuel. Hydrogen has the potential to replace fossil fuels as a clean and sustainable source of energy. For hydrogen to be produced, stored and utilised in a cost effective manner, new technologies must be developed. Rio Tinto is active in supporting research and development in this area. Developments in carbon sequestration (such as Maxygen) mean that CO_2 fixed as biomass could become a low cost feedstock for hydrogen production.

The EPA is aware that the efficient use of energy across all aspects of mining and processing will significantly reduce greenhouse gas emissions. The EPA notes that the proponent's parent company, Rio Tinto, is supporting research and development to:

- improve the way in which grinding mills are operated;
- develop neural network software designed to optimise the combustion system in power plants; and
- lower heat losses in smelting furnaces by controlling slag chemistry in order to form insulating slag layers on water cooled panels. The HIsmelt process is one example of this and there will also be implications for non-ferrous smelters.

The PER indicated that Rio Tinto is investigating the use of advanced smelting cells at Comalco's (a Rio Tinto subsidiary) aluminium smelters. Changing cell designs to reduce energy usage and increase productivity has resulted in substantial gains in productivity at Comalco's aluminium smelters over the past decade. The current research and development studies aim to extend that work by the improved modelling of the cells to give better stability through the control of flow and the overall heat balance. The improved cells should have a lower specific energy consumption, and also enable productivity increases of the order of 10 to 20% within existing smelters.

The EPA notes the various "beyond no regrets" measures that are being investigated by the proponent's parent company, and considers that they are appropriate examples of the application of "beyond no regrets" measures in the iron and steel industry.

The EPA notes that the proponent has made commitments to prepare and implement a Greenhouse Gas Emissions Management Plan, and:

- continue to participate in the Australian Greenhouse Office Greenhouse Challenge Programme;
- will participate in the research and development of new technologies that will result in a reduction of greenhouse emissions such as coal gasification and hydrogen production;
- calculate annual greenhouse gas emissions from the Plant and report the findings to the DEP; and
- continue to investigate opportunities for offsetting the greenhouse gas emissions from the Project.

Summary

Having particular regard to the:

(a) comparison which shows that the proposed plant will achieve lower greenhouse gas emissions per tonne of hot metal produced in comparison to existing blast furnace technology, and the potential for global greenhouse gas emissions to be reduced if the technology employed in the proposed plant is adopted by the operators of existing blast furnaces around the world;

(b) the measures that are being investigated by the proponent's parent company in order to further reduce greenhouse gas emissions; and

(c) commitments made by the proponent;

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 ministerial condition 7 is imposed on the proponent.

3.3 Waste management

Description

The proposed plant will generate a variety of liquid and solid wastes during operation.

Liquid waste

Scrubber blowdown

The main liquid waste generated by the proposed plant will be scrubber blowdown from the clarifier circuit, which has the potential to contain high concentrations of total dissolved solids (TDS) and some heavy metals.

Management of scrubber blowdown

The blowdown from the Stage 1 and Stage 2 plants will be directed to the process water tank from where it will be used for the cooling of the slag and pig iron. The water balance for the Stage 1 plant (see Figure 4.11 of the PER) shows that during normal operations, with the exception of extreme rainfall events, no process effluent will require disposal off-site. Additional make-up water will be required as the blowdown from the water circuits will be insufficient to match the quantity required for the cooling of the pig iron and slag. The existing clarifier basin for the HRDF will be used as the process water tank.

Contact blowdown and stockpile runoff will be treated with lime to raise the pH to around 8.0 as it enters the process water tank so that any residual heavy metals will precipitate. The precipitates, together with suspended solids in the stockpile runoff, will settle in the cone section of the tank. The resulting sludge will be pumped out periodically using the underflow pumps and then be de-watered in a filter system.

Estimates of the effluent composition at the intake and with dilution from storm water, where the process tank was 25%, 50% and 75% full at the commencement of a major rainfall event, are presented in Table 7.22 of the PER. For estimation purposes, the storm water was assumed to be free of dissolved species as the concentrations in the water will not significantly change the estimate of the effluent composition.

Water in the process water tank will be sampled and analysed for a range of relevant parameters on a monthly basis in order to provide baseline analysis of the process water for the first three years of operation. Following this period, monitoring will be undertaken on a quarterly basis. Data will be recorded to allow a correlation of process water quality with water used for plant operations and rainfall.

The PER indicated that in the event that water from the process tank is to be discharged through the Water Corporation's Point Peron outfall, the discharge will be sampled and analysed and the results will be provided to the Water Corporation. The sampling and analysis will be undertaken as stipulated by the Water Corporation in its conditions allowing industrial effluent from the HIsmelt plant to be discharged through the Point Peron outfall.

Air Separation Unit (ASU) wastewater

The ASUs will produce only small amounts of wastewater, which will be returned to the proposed plant's water circuit.

Sewage

Nutrients such as phosphorus and nitrogen species have been identified as the major contaminant load in Cockburn Sound. Discharge from inappropriately designed septic systems is a potential source of such nutrients. The PER indicated that the proponent will install appropriate nutrient retentive sewerage systems on the site.

Management of sewage

The PER stated that the Water Corporation and local sewer network do not currently service the site and there is no possible point with which the site could be linked in the Naval Base vicinity (Water Corporation, *pers. comm*., 2002b). Consequently, the site will have to continue to use septic type systems for the treatment of sewage on site. The PER indicated that the two existing septic systems on site will be replaced with nutrient retentive sewerage systems following approval from the Environmental Health Section of the Town of Kwinana and the WA Health Department. This type of system is similar to common systems in that it involves a below ground tank and leach drains. However, the process that takes place inside the tank reduces the quantity of nitrogen and phosphorus in the effluent stream. The system will not result in any unpleasant or offensive odours.

Solid waste

The solid wastes that will be generated during the operation of the proposed plant, and which will require disposal include scrubber sludge, refractory materials, slag, gypsum general waste.

General management of solid waste

Waste will be minimised by re-use and recycling, and any waste requiring disposal will be disposed at an appropriate and approved facility. The PER indicated that a Waste Management Plan will be prepared as a component of the EMP for the site. The plan will be based on the principles of reduce, recycle and re-use and will define the waste disposal practices on site. The plan will establish a framework for waste segregation, waste collection and disposal, and auditing of waste management.

Wastes will be divided into the following categories:

- Recyclable - such as steel scrap, process dusts, cardboard and paper.
- Re-use - such as slag as a construction material.
- Waste processing facility - such as refractory materials and construction rubble.
- Return to supplier - such as packaging for chemicals
- Landfill - putrescible wastes.
- Special waste - such as magnesia-chromite refractories.

Examples of waste management measures that will be implemented by the proponent include:

- Reduce - Enter into agreements with suppliers of consumables for the re-use of packaging such as the return of empty containers to suppliers for refilling where applicable.
- Re-use - Process materials that may be considered waste, such as sludge, gypsum and slag will be converted to by-products by investigating possible uses. Preliminary investigations and iron and steel industry practice suggest that this is feasible for these materials.
- Recycle - Bins will be provided to facilitate the segregation of waste material for recycling where possible such as for - cardboard packaging, steel and plastics.

Scrubber sludge

The wet scrubbers used to clean the offgas from the SRV and Preheater will produce a thickened slurry that will be filtered to produce a filter cake with a moisture content of approximately 20%. This material, termed scrubber sludge, will be recycled back into the process via the Preheater. When the concentrations of elements such as Zn, Pb and Cd build up there may be an adverse effect on the process, therefore, some of the sludge must be removed. It is expected that around 0.5 tonnes per hour to 1.5 tonnes per hour of sludge will need to be removed.

An estimated composition of the sludge is presented in Table 7.21 of the PER. The actual composition will be determined once the proposed plant is in operation. The PER indicated that the concentration of some species in the estimates provided in Table 7.21 result in the material failing to meet the inert waste criteria on composition alone. Leaching tests will be required to determine the class of landfill that could accept this material if re-use on-site or at a neighbouring facility proves not to be feasible.

Management of scrubber sludge

The quantity of sludge requiring disposal will be minimised by recycling the sludge. A sampling programme will be implemented during commissioning, and operation, which will determine what proportion of the sludge is able to be recycled.

The PER stated that preliminary investigations by the proponent undertaken to assess the suitability of the sludge as a processing input to a local facility have indicated that it may be suitable. If the processing option is not considered feasible then the sludge will be sent to an approved landfill facility following the analysis of the sludge, and in liaison with the DEP.

The proponent is also currently investigating technologies that:

- can use the sludge as feed material;
- produce a pre-reduced or partially metallised product for feed to the SRV; and
- recover the heavy metals (Zn, Pb, and Cd) in a concentrate suitable as feed to a smelter or refinery.

Refractory materials

Refractory materials will be used to protect the steel in the high temperature areas within the proposed plant such as the hearth section of the SRV. The refractory lining in the hearth section of the SRV is expected to require a partial replacement after one year of operation and a full reline every 18 months, resulting in the spent refractory requiring disposal. There will be two types of refractory material; magnesia-chromite and alumina.

Management of refractory materials

The PER indicated that the worn magnesia-chromite refractory lining will be sent to an approved landfill as the chromium content generally precludes its use as an aggregate in construction applications. The class of landfill will be determined at the time of disposal through consideration of the material chemical analysis and the results of leaching tests. Methods of recycling of this material will continue to be explored in order to reduce the quantity of solid waste from the site going to landfill.

The alumina refractories contain no potentially harmful constituents. When these materials are replaced it is expected that they will either be recycled for use on-site or directed to a waste management facility for processing into an aggregate material.

Slag

Slag will be produced in the proposed plant due to the reaction between the flux and gangue in the ore, and the ash in the coal. Depending on the source of the raw materials and process efficiency approximately 250 to 300kg of slag will be generated per tonne of hot metal. This will result in annual slag production of 225,000tpa for the Stage 1 plant. This will double to 450,000tpa when the Stage 1 and Stage 2 plants are operating together.

Management of slag

The PER indicated that a contractor with expertise in slag processing will process the slag once it has been tapped from the furnace. The contractor's involvement will encompass the operation of a slag granulation facility should further investigations show that this is a viable processing option.

The contractor may install an on-site facility for the processing of slag for use as aggregate or road base. Alternatively the slag may be taken to an off-site processing facility. The slag will be crushed and screened and any entrained metallic iron particles will be magnetically removed and returned to the plant. The slag will be loaded onto trucks for delivery to customers. Approximately 20 to 30 trucks per day (average of 24) will be required for the transport of the slag from the Stage 1 plant, with that number doubling when both the Stage 1 and Stage 2 plants are operating.

If established on-site, the slag processing facility would be located to the east of Leath Road on land that was historically the slag storage area for the Australian Iron and Steel (AIS) blast furnace and the HRDF (see Figure 4.2 in the PER).

Gypsum

The FGD system will produce a high quality gypsum product that may be used either as an additive by the cement industry or by the wallboard manufacturing industry. The PER indicated that it is expected that local cement manufacturers will consume the small tonnage that will be produced by the proposed plant. Gypsum is a hydrated calcium sulphate ($CaSO_4.2H_2O$) that occurs naturally and is commonly used as a soil conditioner. It is an inert compound with a very limited solubility.

Production levels will depend on the sulphur content of the raw materials but is expected to be around 1.5 tonnes per hour. The gypsum will be stored in a concrete bin prior to being loaded onto trucks by front-end loader for delivery to customers. Approximately two trucks per day from the Stage 1 plant and two trucks per day from the Stage 2 plant will transport the gypsum from site.

General wastes

Other sources of solid waste will include packaging from delivery of consumables, scrap metal waste from maintenance activities, and putrescible wastes from the site operations.

Submissions

The EPA Service Unit indicated that the disposal of process wastewaters via a soakaway to groundwater and Cockburn Sound is unacceptable, unless it could be demonstrated that it would not compromise any of the environmental quality objectives of the Sound. The EPA Service Unit also indicated that the effluent is likely to contain heavy metals, and suggested that an upper estimate of the annual loads of these contaminants discharged to the Cape Peron pipeline or a soak pit needed to be provided. Information was sought on the contaminant loads in the process wastewater overflow during storm events and non-normal operations modes,

and what effect this would have on the total contaminant loads through the Cape Peron pipeline. Clarification was sought in regard to whether the capacity of the pipeline would be exceeded during storm events given that the flows from all streams to the pipeline would be peaking under these conditions. Information was also sought in relation to the risk of the pipeline becoming unavailable for varying lengths of time, and the resulting implications for the volumes and characteristics of the effluent from the plant. Clarification was also sought in regard to what the applicable ANZECC criteria is for discharge from the Cape Peron Outfall into the Sepia Depression in terms of ecosystem protection. Concern was expressed about the environmental fate of the flocculant and wetting agent referred to in the PER and the probability of them entering the marine environment.

The Town of Kwinana suggested that wash down areas should be fitted with a vertical gravity separator or equivalent hydrocarbon arrester, and that the potential for contamination from pipeline leaks should be addressed.

The Cockburn Sound Management Council stated that it supported contaminated wastewater being separated from other sources, treated and discharged into the Point Peron pipeline, and indicated that in the event that wastewater does not meet the criteria for discharge, it may need to be pretreated or evaporated on site.

The Water Corporation indicated that no waste water quality data are provided in the PER, making approval of the option of disposing of wastewater through the Cape Peron Outlet line risky for both the EPA and the Water Corporation.

The City of Rockingham indicated that given the uncertainty as to what substances will be in the wastewater, approval to dispose of wastewater through the Water Corporation's Cape Peron Outlet pipeline should be opposed.

Other submissions suggested that seepage water and leachates should be recovered from the site and sprayed back over the stockpiles to prevent wind drift, and that contaminated water must not be discharged into Cockburn Sound or via Cape Peron, but should be evaporated on site and the solids taken to a Class 4 landfill instead. Information was sought in relation to the wastewater to be disposed of through the Cape Peron outfall, including a list of the contaminants and the levels of those contaminants, and the predicted flows of wastewater.

Assessment

The area considered for assessment of this factor is the plant site and Cockburn Sound.

The EPA's environmental objective for this factor is that:

- where possible, waste should be minimised, reused or recycled to the As Low As Is Reasonably Practicable (ALARP) level; and
- liquid and solid wastes should be treated on-site or disposed of off-site at an appropriate landfill facility. Where this is not feasible, contaminated material should be managed on-site to prevent groundwater and surface water contamination or risk to public health.

The EPA notes that the proponent has made commitments to:

- prepare, submit, and implement a Wastewater Management Plan, which will include the management, monitoring and reporting of process wastewaters;
- install an appropriate Nutrient Retentive Sewerage System on the site; and
- prepare, submit, and implement a Waste Management Plan based on the principles of Reduce, Recycle and Re-use.

The EPA considers that, in general, the various measures that will be adopted and implemented by the proponent to manage liquid and solid wastes are adequate in terms of ensuring that potential environmental impacts are minimised.

However, the EPA considers that there is the potential for the capacity of the proposed process wastewater storage facility to be exceeded during extreme rainfall events as it has only been designed to accommodate the surface run-off from a 1 in 10 year rainfall event of 72 hours duration. If a more extreme rainfall event occurs, process wastewater would need to be disposed of into the marine environment via the Cape Peron Outlet Pipeline (CPOP). Accordingly, in order to minimise potential impacts on the marine environment, the EPA recommends that the following ministerial condition be imposed on the proponent.

10-1 The proponent shall construct an additional process wastewater storage facility within the boundary of the Commercial HIsmelt plant with sufficient capacity to accommodate the influx of additional water from extreme rainfall events of greater magnitude than a 1 in 10 year rainfall event of 72 hours duration. The design, construction and actual storage volume of the new process wastewater storage facility shall be in accordance with advice received from the Department of Environmental Protection and the Water and Rivers Commission.

The EPA considers that the concerns expressed in the submissions regarding this factor will be adequately addressed by the above condition, and the implementation of the proposed management measures and proponent's commitments.

Summary

Having particular regard to the:

(a) management measures that will be implemented by the proponent to manage liquid and solid waste; and

(b) commitments made by the proponent;

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 the ministerial condition outlined above is imposed on the proponent.

3.4 Surface water and groundwater

Description

Surface water

The site is located within the Environmental Protection (Cockburn Sound) Policy Area. There is the potential for stormwater or wash waters from the site to directly, or indirectly via groundwater, enter Cockburn Sound and impact on the marine environment. The main areas where there is a potential for contaminated water to be generated will be the stockpile area, wash down areas on the site, and maintenance areas of the Air Separation Unit (ASU).

The PER indicated that sulphur present in the coal has the potential to be oxidised or leached by bacterial action, which may result in acidic run-off from the stockpiles. Fine particulate material may be mobilised as suspended solids in stormwater run-off. Wash waters from the wash down areas and maintenance areas have the potential to contain hydrocarbons.

Surface drainage on the site was installed by BHP for its steel mill, sinter plant, blast furnace and power station. A network of drains services the north western portion of the lease around the old rolling mill and workshops, and the south western portion of the lease, which includes the area previously leased by HIsmelt for the HRDF.

The BHP drainage systems ultimately discharged into Cockburn Sound via a concrete drainage channel (Southern Drain) at the south-western portion of the Fremantle Ports' Kwinana Bulk Terminal area, or a drain at the north-western portion of the site (Northern Drain) near the Fremantle Ports' Kwinana Bulk Berth No.1 (KBB1). The drain outlets are both located on Fremantle Ports' Kwinana Bulk Terminal site.

During the construction of the HRDF, the drainage system on HIsmelt's lease for the HRDF was modified to prevent site run-off from entering the BHP drainage system. The bulk of the HRDF site run-off was directed to two settling ponds. Soak wells were also installed at the boundary of the HRDF lease to capture run-off and allow the water to seep into the superficial aquifer.

The drainage system in the area occupied by the coal, ore and dolomite stockpiles for the HRDF, was modified to capture all stormwater run-off and direct it to a concrete lined sump. Water was pumped from the sump to the clarifier, which acted as a process water tank, on the western end of the HRDF site for retention and use for the cooling of the slag.

Wash waters from the areas around the HRDF Core Plant building, which had the potential to be contaminated through contact with raw materials or cooling water chemicals, were captured in a sump and pumped to the clarifier.

The north-western portion of the expanded HIsmelt lease area has a drainage network that captures stormwater runoff from the roads and around the rolling mill buildings. The drainage system contains a number of drainage sumps and silt traps that capture any suspended solids prior to the water being discharged through the Northern Drain.

The area between the rolling mill building and the HRDF site, which was used as a laydown area for the steel mill does not have a drainage system. Surface water in this area would simply flow to a low point and seep through the soil.

The undeveloped area to the east of Leath Road is not currently served by a drainage network. Surface water in this area would be absorbed by or seep through the porous soil.

Management of surface water

The PER indicated that a Surface Water Management Plan will be prepared and implemented as a component of the site Environmental Management Plan (EMP). The plan will include the management of both clean storm water run-off, and potentially contaminated run-off and wash waters. The key strategy of the plan will be the segregation and collection of any potentially contaminated storm water run-off. The PER stated that the plan will be formulated using the Draft EPA Guidance Document No.26, *Management of Surface Run-off from Industrial and Commercial Sites* (EPA, 1999e).

The objectives of the Cockburn Sound EMP (CSMC, 2001) in relation to surface water and groundwater will be incorporated in the Surface Water Management Plan and applied at the site. The objective in the Cockburn Sound EMP in relation to contamination is to integrate planning and management of catchment land uses to minimise the overall impact of ground and surface water contamination on the environmental values of Cockburn Sound.

Storm water management at the site will be based on the principle of directing the clean run-off to soaks or settling ponds from where it can infiltrate the porous soil layer and replenish the groundwater resource rather than directly discharging it into Cockburn Sound. The PER indicated that a hydrogeologist from the Water and Rivers Commission (WRC) advised the proponent that the use of soaks for the collection of storm water is the preferred method for this site (WRC, pers comm, 2001).

The settling pond at the north-west corner of the current HIsmelt office car park will be relocated a short distance to the north. Existing drains on the expanded HIsmelt lease, other than those affected by the stockpile installation, that ultimately flow to either the Northern or Southern Drains will be terminated at or near the lease boundary. Soaks will be installed at these points to collect and dissipate the run-off water.

Drainage of the area to the east of Leath Road currently occurs through the porous soils via infiltration. Drainage systems will be installed when and if construction of facilities, such as the slag processing area, proceed in that area.

Wash waters from around the raw material bins, storm water accumulating in bunds around fuel or chemical storage tanks and drainage from the cooling water circuits will be directed to the sump to the east of the proposed plant from where it will be pumped to the process water tank.

The PER indicated that stockpiles of ore and coal will be established south of the proposed plant on a site that is currently occupied by the BHP Transport and Logistics business (see Figure 4.2 in the PER). Stockpile management measures will be implemented to minimise the potential for run-off, and will include minimising the quantity of coal and ore stockpiled and the effective rotation of the raw material inventory. The stockpile area is currently bituminised and drains into the Southern Drain. The bitumen will be removed and replaced with a layer of compacted low permeability material such as clay, crushed slag or a synthetic liner that will form the base of the stockpiles. A decision as to the most suitable material will be made during the detailed design phase of the proposed plant in liaison with the authorities.

The drainage system associated with the currently sealed area will be removed, or blocked off, and a stockpile drainage system will be installed. The stockpiles drainage system will drain to a common concrete lined sump, from where the collected run-off water will be pumped to the process water tank. Water from the tank will be used for the cooling of the slag and pig iron.

The existing clarifier basin for the HRDF will be used as a process water tank for the proposed plant. The clarifier basin was constructed for use as the clarifier for the wet scrubber on the old AIS blast furnace offgas system. The PER indicated that the rake mechanism was removed prior to its use as a process water tank for the HRDF. The basin is a concrete structure with a conical base section that directs settled solids to the intakes of two underflow pumps situated in a tunnel underneath the clarifier. The capacity of this tank is around 4000kL. The tank is in good condition and there is no evidence of any leakage. A bore is located immediately down gradient of the tank, which is used to monitor the groundwater so any leakage may be identified.

During and following rainfall events, run-off from the stockpile area will be collected in a sump and pumped to the process water tank for later use for the cooling of pig iron and slag. The process water tank will generally be only half filled so that there is a sufficient buffer capacity to allow for an influx of rain water. By only filling half the volume of the tank, an additional influx from 20mm of rainfall over a 24 hour period can be accommodated in the tank.

The stockpile sump pumps will be designed to remove water from the stockpile area at a maximum rate of 7000kL per day, which is equivalent to 1 in a 100 year storm. The process water tank will be able to contain the 87kL per hour of storm water run-off from the stockpile area which may occur during a 1 in a 10 year storm event of 72 hours duration as required in the EPA Draft Guidance on the Management of Surface Runoff (EPA, 1999e). The PER stated that surface water management infrastructure has been designed for a 1 in a 20 year rainfall event as required in Water Quality Protection Guidelines for Mining and Mineral Processing. Table 7.19 in the PER presents an overview of the process water tank's storm water input rates.

Groundwater

Groundwater contamination in the Cockburn Sound catchment area is mainly due to spills and leakage from industrial sites, and from seepage from waste disposal ponds. The PER stated that contaminant plumes exist within the Kwinana Industrial Area due to past waste disposal practices, with the main contaminants being ammonium sulphate, sodium hydroxide, hydrocarbons, nitrogen and herbicides (CSMC, 2001).

The PER indicated that six groundwater monitoring bores (BH1 to BH6) were installed around the HRDF site in 1990 to provide baseline data on the groundwater which would have been impacted by previous industrial activities in the area. The locations of the bores are shown on Figure 5.15 in the PER.

BH4 was lost due to construction works in late 1990. Two additional monitoring bores were established (BH7 and BH8) in 1991, and another two bores (BH9 and BH10) established in 1993. Bores BH5, BH6 and BH7 are background bores located to the east of the site. All other bores monitor the groundwater under the site.

Groundwater monitoring of these bores was undertaken on a bi-annual basis between 1990 and 1993, prior to the commissioning of the HRDF. The frequency of monitoring was increased to quarterly once the HRDF was operational. Monitoring continued on a quarterly basis even after the HRDF was placed on care and maintenance.

The quality of groundwater beneath the site meets the guideline values for use of water for irrigation of lawns, landscape areas and industrial cooling purposes. With the exception of zinc (and possibly nitrate as no specific limit is provided) the levels of contaminants in the groundwater under the site are below the ANZECC water quality guidelines for marine ecosystems.

The PER stated that elevated nitrate levels were detected in some bores (Golder Associates, 2000) but the distribution of contamination did not seem to follow a pattern with the exception that the bores near the southern boundary of the site reported higher levels. The concentration levels peaked in the mid 1990s and appear to have since declined. Regional concentrations vary within a wide range and values of 50 to 100mg/L are not uncommon. Golder Associates (2001b) concluded that the source of the elevated nitrates could not be identified but that an off-site source in the area to the south of the site could be contributing to these levels.

Management of groundwater

The groundwater monitoring programme established for the HRDF will continue using the existing bores to identify any significant changes in the groundwater. Additional bores will be installed within the extended HIsmelt lease area, and will be included in the groundwater monitoring programme. The monitored parameters would also be reassessed in liaison with the DEP. Groundwater monitoring data will be provided to the DEP on an annual basis.

Submissions

The EPA Service Unit sought clarification from the proponent in regard to whether best practice control measures would be adopted to prevent groundwater contamination arising from seepage from stockpile and slag pit areas. The EPA Service Unit suggested that the proponent should demonstrate that their groundwater monitoring programme will be designed to enable early detection of contaminant seepage should it occur. The EPA Service Unit also suggested that the proponent should state the criteria for implementing management measures to stop any emerging seepage/groundwater contamination problem.

The Cockburn Sound Management Council requested that the proponent give a firm commitment to install a low permeability layer under the stockpiles, and suggested that the proponent should commit to an outcome rather than commenting on the method it chooses to achieve control of run-off and leaching. The Town of Kwinana requested that the proponent specify the type of low permeable material that will be used, as well as its thickness and specific permeability.

The Water Corporation recommended that an additional water storage facility should be constructed to provide for the influx of heavy rainfall during very wet winter months, and that consideration should be given to covering the storage tanks to prevent rainfall incursion in order to remove the need for either additional storage or ocean disposal.

The Town of Kwinana suggested that the Surface Water Management Plan should be made available for public assessment, and that groundwater monitoring bores should be located downstream of all feedstock and storage stockpiles to ensure early detection of pollution. The Town of Kwinana also suggested that results from these monitoring bores should be reported to the Town of Kwinana and the DEP on a six monthly basis.

The City of Cockburn suggested that a Drainage and Wastewater Management Plan should be developed which addresses the prevention of contaminated groundwater and surface water entering Cockburn Sound.

The City of Rockingham indicated that the commitment to report groundwater monitoring results on an annual basis is inadequate, and suggested that the proponent should immediately report evidence of contamination and the causes of that contamination to the DEP.

Potential contamination from stockpiles through leachate and run-off was of concern, particularly from the sulphur in the coal which could result in acidic run-off from stockpiles. It was suggested that the proponent should commit to technically specify how it intends to meet a zero groundwater pollutants discharge target.

Assessment

The area considered for assessment of this factor is plant site.

The EPA's environmental objective for this factor is to maintain the quality of surface water and groundwater so that existing and potential uses, including ecosystem maintenance, are protected.

The EPA notes that the proponent has made a commitment to prepare, submit, and implement a Surface Water Management Plan, which will include the management for both clean stormwater run-off and for potentially contaminated run-off and washwaters.

The EPA considers that the proposed management measures that will be employed by the proponent, together with the above commitment, will be adequate in terms of ensuring that any potential impacts on surface water are minimised.

The EPA also notes that the proponent has made a commitment to prepare, submit, and implement a Groundwater Management Plan, which will include:

- procedures for the protection of groundwater;
- details of the ongoing, and extended, groundwater monitoring programme undertaken on the site to identify any significant changes in the groundwater; and
- procedures for reviewing the monitoring programme, and parameters monitored, in conjunction with the DEP.

The EPA considers that the proposed groundwater monitoring programme that will be undertaken by the proponent, together with the above commitment, will be adequate in terms of ensuring that any potential impacts on groundwater are minimised.

In view of the above, the EPA considers that the various concerns expressed in the submissions received in relation to this factor have been satisfactorily addressed.

Summary

Having particular regard to the:

(a) management measures that will be implemented by the proponent to manage surface water and groundwater; and

(b) commitments made by the proponent;

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.

3.5 Noise and vibration

Description

Noise emissions from construction activities

Noise generated during the construction period will be related to pile driving, movement of vehicles, and the use of construction equipment.

Management of construction noise

The EPA notes that construction activities will be carried out in accordance with the *Environmental Protection (Noise) Regulations, 1997* and the control of noise practices set out in the Australian Standard 2436-1981 "*Guide to Noise Control on Construction, Maintenance and Demolition Sites.*"(AS 2436-1981).

Construction activities will generally be undertaken between 7am and 7pm on Monday to Saturdays. If construction activities are to be undertaken outside of these hours, then the requirements of the *Environmental Protection (Noise) Regulations, 1997* for "Construction Out of Hours" will be complied with. The proponent will ensure that the equipment used for construction has adequate operational noise control measures fitted.

Noise emissions from the Stage 1 and Stage 2 plants

Operation of the Stage 1 and Stage 2 plants will generate noise from numerous sources such as cooling towers, steam turbines, blowers, fans, compressors, coal mills, and front end loaders etc.

Management of noise emissions from the Stage 1 and Stage 2 plants

The PER indicated that the proponent will ensure that noise levels from the project's operations comply with the *Environmental Protection (Noise) Regulations, 1997.*

Noise specification upper limits will be applied when sourcing items of equipment for the proposed plant. The proponent will ensure that the equipment sound power levels used in the modelling are the upper limit for equipment noise specifications. Noise attenuation measures, such as the establishment of enclosures around equipment with a high noise level, will be incorporated where practicable.

The proponent will consult with Kwinana Industries Council (KIC) on the findings of its study to discuss the noise levels from the Plant in relation to the regional noise levels and other Kwinana industries.

A noise monitoring survey will be undertaken once normal operation of the proposed plant has been established to ensure that the actual noise levels are within those predicted. Noise monitoring will then be undertaken on an annual basis. The results of the noise survey will be provided to the DEP and the KIC.

Noise from shipping operations

Shipping movements and ship loading and unloading operations which will be undertaken by Fremantle Ports' at the KBB2 have the potential to generate noise. The PER indicated that noise emissions from the ship unloader and associated conveyors during import and transfer of iron ore and coal are not expected to be greater than the noise levels from the existing material handling operations at the KBB2.

Management of noise from shipping operations

The PER indicated that measures will be taken to control the noise associated with the export of pig iron, these may include:

- provision of noise reducing liners in transfer chutes.
- review of transfer chute impact tables; and
- control of "on board" loading operations, including the use of timber dunnage on ship's hold floor to reduce noise from falling pig, and control of loader position to minimise free fall of pig iron.

The PER stated that a review of the world's best practice for the handling of pig iron is currently being undertaken by the proponent and Fremantle Ports'.

Noise from road and rail movements

Road and rail movements have the potential to cause noise impacts to residences along the transport routes. It is estimated that there will be an additional 73 truck movements per day for the Stage 1 plant and 146 when the Stage 1 plant and Stage 2 plant are operating together. Trucks will be used for the transport of lime from the Cockburn Cement site on Russell Road to the proposed plant, and for the transport of slag from the site to a local slag processing facility. Residences likely to be impacted by noise from truck movements to the slag processing facility will be those along Rockingham Road in Wattleup.

There are currently around eight rail movements per day between Forrestfield and Kwinana. This number includes approximately seven movements per week either to or from the existing BHP Transport Logistics operations adjacent to the HIsmelt site. These trains are between 600 and 800m in length, and are similar in size to the trains proposed to transport the ore for the project. These train movements will cease in 2003, when the BHP Transport Logistics operation is relocated to another site.

It is anticipated that there will be approximately ten rail movements per week related to Stage 1 plant. This will result in a net increase of three movements per week (once the trains to the BHP site cease), for the Stage 1 plant and around 13 per week (two per day) when both the Stage 1 and Stage 2 plants are operating together. The trains will comprise a locomotive and 39 wagons and will be approximately 600m long.

Noise from road and rail movements

The estimated change in L_{Aeq} values are shown in Table 7.18 of the PER for road and rail transportation. The PER indicated that noise from the trucks transporting materials for the project along Rockingham Road are predicted to have no significant effect on the residences due to the existing high volumes of traffic and existing high noise levels.

Calculations indicate that the noise level increase for train movements in L_{Aeq} would be in the order of 0.1dB(A) to the existing conditions for the Stage 1 plant and an additional 0.1dB(A) between the Stage 1 and Stage 2 plants. This results in an overall increase of 0.2dB(A), which is marginally above the criteria which allows no increase. The PER indicated that this increase is not considered significant as the calculations were conservative, due to the noise levels used in the calculations being for maximum power and speed, and the existing road and rail noise levels at the time of Stage 2 plant commissioning are expected to be higher. This is in general accordance with the EPA's draft Guidance for noise from road and rail transportation.

Management of noise from road and rail movements

The PER indicated that the freight service provider will determine the most appropriate driver techniques for the noise sensitive areas to minimise pass by noise such as appropriate throttle settings, braking techniques and fuel saving techniques. The provider advised the proponent that there are no steep gradients adjacent to the noise sensitive areas so low power settings can be used in these locations.

Vibration

Vibrations can occur during plant construction, plant operation, and rail operations. During plant construction, vibration may be generated when pile driving and site compaction is being undertaken. Vibration from the Stage 1 and Stage 2 plants may be caused by large items of rotating machinery. Vibration associated with the rail operations can cause instability and damage of structures, and annoyance to nearby residents.

Management of vibration

The PER indicated that all large items of rotating machinery will be placed on concrete footings to dampen any vibrations. The extent of the foundations for the footings will be based on engineering calculations using parameters such as the soil conditions and the equipment manufacturer's load data. Where additional measures are recommended by the manufacturer to dampen vibration these will be implemented. Significant vibration levels are not expected to result from the operation of the proposed plant.

The PER indicated that the vibration from the proposed trains is likely to be similar to those already emitted by the existing trains. Hence, the magnitude of vibration will not increase. Previous studies undertaken by Herring Storer Acoustics (Herring Storer Acoustics, 2002a), showed that these vibration levels are not high enough to cause any structural damage but are of a level where they may be perceptible. The frequency of occurrence of perceptible vibration may increase once the Stage 2 plant commences to operate, although this is considered to be of negligible impact.

Submissions

The EPA Service Unit indicated that the proposed plant may exceed existing industry to industry noise limits and sought additional information in regard to how the proponent would ensure compliance with these limits.

The DEP (Kwinana) requested that further noise modelling which incorporates data for the proposed plant with that from the Kwinana Industries Council (KIC) cumulative noise model be undertaken.

The Town of Kwinana requested that the proponent provide details of their consultation with the KIC relating to the regional noise levels. The Town of Kwinana stated that noise from the rail transport of iron ore has the potential to impact on the Homestead Ridge Special Residential Zone, and suggested that the proponent should commit to using the quietest available rail locomotives and wagons to reduce noise impacts, and schedule train movements through residential areas outside of night time periods whenever possible.

The City of Rockingham recommended that cumulative noise impacts from the Kwinana Industrial Area and the proposed plant should be modelled to ensure that exceedances of the assigned noise levels at north-east Rockingham are no worse than present levels. The City of Rockingham recommended that acute noise events such as from train and ship warning horns should be monitored to determine if they are a source of noise complaints from residents at north-east Rockingham. The City of Rockingham suggested that a commitment should be made to continually monitor this type of noise following construction of the plant and to implement noise reduction measures where they are shown to be a problem for residents in north-east Rockingham. The City of Rockingham suggested that night time loading and unloading of material should be avoided where possible.

Other submissions suggested that noise from trucks transporting slag should be modelled once the location of the slag processing facility has been determined, and that truck movements should be kept to daylight hours.

Assessment

The area considered for assessment of this factor is the proposed plant site and surrounding residential areas.

The EPA's environmental objective for this factor is to ensure that:

(a) noise levels from the plant comply with the *Environmental Protection (Noise) Regulations, 1997*;

(b) noise levels from construction activities comply with the requirements of Australian Standard 2436-1981 "*Guide to Noise Control on Construction, Maintenance and Demolition Sites*."; and

(c) noise levels from road and rail movements are in general accordance with the requirements of the draft EPA document: *EIA No. 14 (Version 3) Road and Rail Transportation Noise*.

Applicable standards for construction noise

Construction activities need to be carried out in accordance with the *Environmental Protection (Noise) Regulations, 1997* and the control of noise practices set out in the Australian Standard 2436-1981 "*Guide to Noise Control on Construction, Maintenance and Demolition Sites*."(AS 2436-1981).

The EPA notes that the proponent has made a commitment to prepare and submit a construction EMP for the project which will include specific management for noise.

Applicable standards for plant related noise

Environmental noise is managed by the *Environmental Protection (Noise) Regulations, 1997* (as amended). The Regulations are prescribed standards under the *Environmental Protection Act, 1986.* Noise emissions, which exceed the prescribed standard can be regarded as pollution and "unreasonable noise" under the *Act.* The Regulations stipulate maximum allowable external noise levels determined by the calculation of an influencing factor which is then added to the baseline assigned outdoor noise levels shown in Table 7.12 in the PER. The influencing factor is calculated for the usage of land within the two circles, having radii of 100m and 450m from the premises of concern.

The EPA notes that the levels presented in Table 7.12 are conditional on no annoying characteristics such as tonality, amplitude modulation or impulsiveness existing in the noise of concern. If such characteristics exist and cannot be practicably removed at the source, then any measured level is adjusted according to the adjustments presented in Table 7.13 in the PER. The PER indicated that the magnitude of the noise at nearby residences will be low enough to be effectively masked by the existing ambient noise, such that noise from the HIsmelt plant will not exhibit intrusive characteristics. Therefore, no adjustments will need to be added to the assigned noise levels.

At the plant boundary, it is likely that the noise would be considered tonal due to the higher noise levels, relatively low ambient level, and the type of equipment that will be used in the proposed plant. Therefore, a plus 5dB(A) adjustment should be applied to the predicted levels for the site boundary.

As the proposed plant will be a 24 hour operation, the L_{A10} (i.e. the noise level exceeded for 10% of the time) night time level will be applicable at Hope Valley, Medina, North Rockingham, and Wattleup. The applicable assigned noise levels for these locations are presented in Table 7.14 in the PER.

As noise at a residence is the total of noise emissions from a number of individual industries, the requirements for "significantly contributing" under Regulation 7 of the Regulations must be considered when assessing compliance with the *Environmental Protection (Noise) Regulations, 1997*. In accordance with Regulation 7, noise emissions from the proposed plant would be considered as not "significantly contributing" to the noise emission at a noise sensitive premises, if the noise at that premises is 5dB(A) below the assigned noise level. Therefore, to comply during the night period, noise emissions from the proposed plant are required to be:

- 40dB(A) at the most constraining residences within Hope Valley and Wattleup; and
- 30dB(A) at the most constraining residences in Medina and North Rockingham.

The "most constraining residences" are the closest locations with negligible influence (in terms of the assigned noise levels) from land zoned for industrial use (Hope Valley and North Rockingham) and from EPP Area B (Medina and North Rockingham).

The EPA notes that the proponent engaged a consultant to undertake an acoustical modelling study on the predicted noise emissions associated with the operation of the proposed plant at Kwinana (Herring Storer Acoustics, 2002a). Modelling of the noise emissions was undertaken using the Environmental Noise Model (ENM) program. Resultant noise levels at the most constraining residences, for the Stage 1 and Stage 2 plant scenarios and wind directions, are listed in Table 7.15 in the PER.

Noise contours for the scenarios presented in Table 7.15 in the PER (with all wind directions combined) are shown in Appendix H of the PER. The noise contours for the Stage 1 plant operating alone and the Stage 1 and Stage 2 plants operating together with all the wind directions combined are shown on Figures 7.8 and 7.9 of the PER, respectively. The EPA notes that by showing the winds occurring in all directions simultaneously an unrealistic worst case scenario is presented as winds cannot be from all directions at once.

The EPA notes that data in Table 7.15 in the PER show that the predicted noise levels from the Stage 1 plant operating alone will be at least 5dB(A) below the assigned noise levels (see Table 7.12 of the PER) at the surrounding residences. The predicted noise levels from the Stage 1 and 2 plants operating together will also be 5dB(A) below the assigned noise levels shown in Table 7.14 in the PER. Therefore, the noise levels at the residential areas from the Stage 1 plant operating alone, and the Stage 1 and Stage 2 plants operating together will comply at all times with the *Environmental Protection (Noise) Regulations, 1997*.

The PER indicated that single point calculations were carried out to predict noise levels at the boundary of the site to determine compliance at neighbouring industrial premises. The results of these calculations are summarised in Table 7.16 of the PER. The EPA notes that predicted noise levels at the site boundary, are up to 65dB(A) for both the Stage 1 plant operating alone, and Stage 1 and Stage 2 plants operating together. At the site boundary the noise is likely to be considered tonal. Therefore, 5dB(A) must be added to the predicted level. Hence, the predicted worst case noise level at the boundary for assessment purposes would be 70dB(A).

The EPA notes that the allowable noise level specified by the Noise Regulations for noise received at industrial premises is 65dB(A). The EPA also notes that the review of the Regulations by a working group suggested that the criteria for industry-to-industry noise be amended to:

- 70dB(A) at a plant boundary where an office is within 15m of this boundary; and
- 75dB(A) at a plant boundary where an office is more than 15m from this boundary.

The EPA notes that the DEP recommended that the above criteria be adopted (DEP, 2000b). The purpose behind such an amendment is to remove the existing situation where industry is unnecessarily constrained by boundary noise requirements, without any direct benefits being realised at noise sensitive locations further a field. The

predicted noise level from the proposed plants at the site boundary is 70dB(A), inclusive of the 5dB(A) adjustment for tonality, which is above the existing criteria but is in accordance with the suggested new criteria for industry-to-industry noise. The EPA also notes that, should the proposed change not be endorsed through the review, then the proponent will review the actual noise levels and noise attenuation measures implemented at the site and meet the criteria.

The EPA notes that the proponent has made a commitment to prepare and implement a Noise Management Plan, which will include noise attenuation measures, surveys and monitoring, and reporting. The EPA also notes that the proponent has made an additional commitment to consult with the Kwinana Industries Council (KIC) on the findings of the regional noise survey, and to provide results of the noise monitoring and modelling to the Kwinana Industries Council for inclusion in the Kwinana Noise model.

Applicable standards for shipping related noise

Noise emissions generated by shipping movements and ship loading and unloading operations is governed by the *Environmental Protection (Noise) Regulations, 1997.* The applicable criteria relating to shipping operations is identical to that presented in Table 7.14 in the PER.

The EPA notes that Fremantle Ports' has undertaken an acoustical modelling study to predict the noise emissions associated with the shipping, unloading and loading operations at the KBB2 related to the HIsmelt Project (Herring Storer, 2002b). Results from the noise modelling for the most constraining residences and the unloading and loading operations under the various wind directions are presented in Table 7.17 in the PER. The EPA notes that the results show that the predicted noise levels from Fremantle Ports' unloading and loading operations for the Project will be 5dB(A) below the assigned levels presented in Table 7.12 of the PER. Therefore, the noise levels at the residential areas will comply at all times with the *Environmental Protection (Noise) Regulations, 1997.*

Applicable levels for road and rail movement related noise

Noise from road and rail traffic on public roads and railway lines is not covered in the Noise Regulations as specified under Regulation 3. The EPA has produced a draft document: *EIA No. 14 (Version 3) Road and Rail Transportation Noise* (EPA, 2001f) to assess such activities. The document lists noise increases which would generally be acceptable when a change in the infrastructure occurs (such as increased traffic, or change of alignment), where the acceptable increase is dependent upon the existing noise levels at the residences. The acceptable noise level increases are tabulated in Appendix H in the PER.

The EPA notes that it is estimated that residences adjacent to the railway line, which are typically 30m from the track, would be in Rating N4 as shown in Appendix H of the PER, based on maximum noise levels from existing Western Australian freight trains. Therefore, no significant increase in L_{Aeq} (the average noise level over a certain period) is desirable.

The EPA considers that measures that will be employed to manage noise during construction activities, operation of the plant, road and rail movements, and shipping operations are adequate in terms of minimising the potential for impacts on the surrounding community.

In regard to vibration from the proposed plant and rail movements, the EPA considers that potential impacts on the health and amenity of the surrounding community are unlikely to be significant.

Summary

Having particular regard to the:

(a) results obtained from noise modelling undertaken by the proponent and Fremantle Ports' which indicates that, with the exception of noise levels at the plant boundary, noise emissions from the Stage 1 and Stage 2 plants and shipping operations at KBB2 will comply with the *Environmental Protection (Noise) Regulations, 1997*.

(b) proponent indicating in the PER that they will review the actual noise levels and noise attenuation measures implemented at the site in order to ensure that noise levels at the plant boundary will meet the relevant criteria;

(c) management measures that will be implemented by the proponent to manage noise;

(d) management measures that will be implemented by Fremantle Ports' to manage noise from shipping operations; and

(e) commitments made by the proponent;

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.

3.6 Marine environment

Description

The proposed plant site is located on the eastern foreshore of Cockburn Sound. Cockburn Sound is the most intensively used marine embayment in Western Australia.

The competing uses place an increasing pressure on the Sound. Therefore, there is a need to manage these multiple uses and the associated impacts. Direct industrial discharge and contaminated groundwater entering the Sound has resulted in contamination (see Sections 5.12.3 and 5.12.4 in the PER).

Raw materials required for the HIsmelt process and the pig iron product will be shipped through Cockburn Sound. The shipping and unloading of these materials has the potential to impact on the marine environment of Cockburn Sound. The significant issues associated with the shipping and loading and unloading operations in Cockburn Sound are due to contamination from dust, tributyltin, ballast water, oil spills, and spillage of materials.

Dust

Shipping and loading and unloading operations at the Kwinana Bulk Berth No. 2 (KBB2), have the potential to generate dust impacts. These impacts and their management are discussed in Section 3.1.3 of this report.

General management

The PER indicated that Fremantle Ports' will be responsible for the management of shipping in Cockburn Sound and the material transfer operations at the KBB2.

The proponent's management of the potential impacts on the marine environment from the shipping activities will include:

- the selection of reputable shipping contractors; and
- compliance with the Draft Cockburn Sound EPP and EMP.

Tributyltin

Tributyltin (TBT) contamination is a concern in Cockburn Sound as high levels were found during surveys undertaken in 1994 and 1999. TBT is the active ingredient in antifouling paints used by the world's shipping fleets. TBT based paints offer up to five years protection against both the growth of organisms such as barnacles on the ships hulls and the spread of foreign marine organisms. TBT is highly toxic to a wide range of marine organisms and accumulates in marine sediments.

Management of tributyltin

The PER stated that in 1991, the Western Australian Government, through the DEP, introduced legislation which banned the use of TBT paints on vessels less than 25m long and restricted its use to low leaching paints on boats over 25m. The Royal Australian Navy has banned TBT use on ships less than 40m long and is replacing TBT on war ships with copper-based paint. In 1998, the Fremantle Port Authority banned in-water hull cleaning within Port waters, which is consistent with the Australian and New Zealand Environment and Conservation Council's (ANZECC) Code of Practice for Antifouling and In-water Hull Cleaning and Maintenance (ANZECC, 1997). The International Maritime Organisation has recently announced its intention to pursue an international ban on the application of TBT to ship's hulls from 2003.

The PER indicated that the TBT levels in sediments in Cockburn Sound appears to be more related to shipping maintenance areas than shipping movements (D.A. Lord, 2001). The PER stated that the DEP licences ship maintenance facilities to ensure that any toxic residues and discharges from hull cleaning activities are collected and disposed of at an approved landfill.

The PER indicated that although shipping activities are expected to increase, TBT levels in local marine sediments will reduce to levels that will not impact on the marine environment due to:

- the placement of international and national initiatives to reduce and replace TBT paints;
- the natural degradation of TBT over time; and
- placement of controls to manage the accumulation that has occurred, predominantly related to hull cleaning (Fremantle Port Authority, 2001a).

Ballast water

The use of seawater as ballast in ships presents an opportunity for marine organisms to transfer from one marine environment to another. Foreign marine organisms such as those discussed in Section 5.12.6 of the PER, have been found in the waters of Cockburn Sound and have most likely entered through the discharge of ballast water or have been attached to ships hulls.

Management of ballast water

The PER indicated that the Australian Quarantine and Inspection Service (AQIS) is designated as the lead agency for the ballast water management in Australia and has issued Mandatory Ballast Water Requirements (AQIS, 2001) which are enforced under the *Quarantine Ac*t, 1908. These requirements will assist in reducing the risk of introducing exotic marine organisms into Australian waters. Management measures include:

- the exchange of ballast water at sea;
- no high risk ballast water being discharged in Australian ports or waters;
- the use of a "Decision Support System" which provides AQIS with details of ballast water uptake and the intended discharge whilst the ship is still at the last port of call or no later than five days prior to arriving in Australia; and
- the information provided through the System will enable a risk assessment to be undertaken on the ballast water in terms of introducing exotic species. No ballast water can be discharged in Australian waters without written permission from AQIS.

Oil spills

Oil spills may result from vessel collisions, groundings, and during fuel oil transfer. Oil can harm the marine environment by smothering marine life and can bioaccumulate in organisms, thus affecting organisms higher in the food chain. Sea animals and birds can be harmed when their fur or feathers are covered with oil.

Management of oil spills

Oil spill response capability is legislated at national, state and local levels. The PER indicated that the Australian Maritime Safety Authority (AMSA) administers the National Plan to Combat Pollution of the Sea by Oil and other Noxious and Hazardous Substances.

The PER indicated that Fremantle Ports' is required by legislation to have an oil spill response capability and they are well equipped and prepared to respond to any spills that occur within the vicinity of Fremantle Ports' waters. The Fremantle Ports' Marine and Safety Plan includes emergency preparedness and the Ports' Emergency Response Plan.

Spillage of materials

There is the potential for spillage of the ore and coal being unloaded at the KBB2 to contaminate the environment.

Management of material spillages

The PER indicated that Fremantle Ports' has considerable experience in the management of bulk cargoes, and in minimising or eliminating spillage from cargo handling. Modifications made to the Fremantle Ports' Kwinana Bulk Jetty (formerly the Kwinana Bulk Cargo Jetty) are considered to be best practice for an existing facility (Fremantle Ports', pers. comm., 2001). The PER indicated that the installation of a combination of deflector plates, bunding, sumps, recovery tanks and stringent operating procedures has resulted in an estimated 95% reduction in the amount of spillage at the Kwinana Bulk Jetty. Industrial sweepers and operational procedures ensure any spillage onto the wharf or onto land is recovered and returned to the product owner for recycling or appropriate disposal.

The PER stated that, using the Kwinana Bulk Jetty as a benchmark, Fremantle Ports' will implement a plan to upgrade the existing transfer equipment at the KBB2 to the reasonable satisfaction of DEP to minimise the risk of material spillage onto land or water with a target of zero spill. The extent to which any modifications are necessary will be determined through the operation of the Kwinana Bulk Terminal and prior to the commissioning of the HIsmelt plant. Spillage prevention and/or containment will be incorporated into the design of any new equipment. The PER stated that Fremantle Ports' standard operating procedures for the cleanup of any spillage, which are documented as part of its certified EMS, will be applied (Fremantle Ports', pers. comm., 2001).

The PER indicated that, in the unlikely event of a significant spillage of ore and coal into the marine environment due to an accident or equipment failures, Fremantle Ports' will conduct an immediate assessment of the potential impacts of the spillage, and initiate an appropriate recovery plan. The PER indicated that the facilities at the KBB2 will be incorporated in the Fremantle Ports' Marine Quality Monitoring Program in order to monitor for any contamination arising from material handling (Fremantle Ports', pers. comm., 2001).

Submissions

Submissions raised concerns regarding potential impacts on the marine environment from dust and spillages associated with the handling of iron ore, coal, and pig iron at KBB2, ballast water discharge and TBT arising from shipping activity, and the possible disturbance of contaminated sediment around KBB1 and KBB2.

Information was sought about the potential impacts from nutrients such as phosphates in the iron ore and coal, and nitrates from scrubbers.

Submissions indicated that there should be no impact on the multiple uses of Cockburn Sound, particularly its ecological, social, and recreational functions.

The approach taken in stating that Fremantle Ports' will have responsibility for certain key environmental outcomes was deemed to be unsatisfactory because it resulted in key environmental impacts not being covered in the PER, and the level of responsibility and commitment by the proponent to achieving acceptable outcomes not being made clear. A commitment was sought from the proponent to ensure that Fremantle Ports' employs practices to minimise dust and spillages. It was suggested that a zero spillage target and a fully specified management plan should be produced prior to approval.

Assessment

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

The EPA's environmental objective for this factor is to maintain the ecological function, abundance, species diversity and geographic distribution of marine flora and fauna.

In assessing the potential impacts on the marine environment, the EPA notes the various management measures that will be implemented by both the proponent and Fremantle Ports' at Kwinana Bulk Berth No. 2 (KBB2) to mitigate any potential impacts on the marine environment. The EPA acknowledges that the proponent will ensure that shipping activities relating to the project will comply with the Draft Cockburn Sound EPP and EMP, and that they will select reputable shipping contractors. The EPA is aware that the Australian Quarantine and Inspection Service (AQIS) is designated as the lead agency for the ballast water management in Australia and has issued Mandatory Ballast Water Requirements (AQIS, 2001) which are enforced under the *Quarantine Ac*t, 1908. In regard to the potential impacts from tributyltin (TBT), the EPA understands that the Fremantle Port Authority has banned in-water hull cleaning within Port waters, and that the use of low leaching TBT paints has been restricted to vessels over 25m in length. The EPA also understands that the International Maritime Organisation has recently announced its intention to pursue an international ban on the application of TBT to ship's hulls from 2003. In view of the above, the EPA considers this factor can be managed in an environmentally acceptable manner.

Summary

Having particular regard to the:

(a) management measures that will be implemented by the proponent to mitigate any potential impacts on the marine environment; and

(b) management measures that will be implemented by Fremantle Ports' at KBB2 to mitigate any potential impacts on the marine environment;

it is the EPA's opinion that the proposal can be managed to meet the EPA's environmental objective for this factor.

3.7 Water supply

Description

Water consumption

Approximately 405kL/hr (3.2GL/year) of water will be required for the Stage 1 plant, and approximately 810kL/hr (6.4GL/year) of water will be required when both the Stage 1 and Stage 2 plants are operating together.

The major use of water will be in the cooling towers for cooling process equipment and the process offgas, or for the condensation of steam. Blowdown from the cooling towers will be directed to the scrubber circuits as a source of make-up, since those circuits are able to tolerate higher levels of TDS than the cooling towers. The blowdown from the scrubbers will be evaporated in the cooling of the slag and pig iron products.

Fresh water

The PER indicated that fresh water supply options for the proposed plant site are currently limited to groundwater or scheme water. Groundwater is used by a number of industrial sites in the Kwinana industrial area under licences from the Water and Rivers Commission (WRC). The volume of water available under such licences is limited and it is understood that groundwater is close to being fully allocated in this area, therefore, groundwater is not available for use in the project (WRC, pers. comm., 2001).

The PER stated that the Water Corporation currently supplies scheme water for the proposed plant site from the Lake Thompson reservoir, which comprises a blend of hills dam water and groundwater from the Jandakot borefield. The Water Corporation currently indicate that additional scheme water will be available for use in the project, subject to some upgrade to the supply system (Water Corporation, pers. comm., 2002a). The proponent indicated that, at the time of the preparation of the PER, the only guaranteed supply of fresh water is scheme water, and is therefore the basis for plant design.

Recycled water

The PER indicated that there is a probability that an additional source of water will be available prior to the commissioning of the proposed plant. The Water Corporation together with Kwinana industries is proposing to establish a Wastewater Recycling Plant in Kwinana. This plant would treat wastewater using reverse osmosis to produce high quality industrial grade water from secondary treated municipal effluent drawn from the pipeline which runs to the Point Peron outlet. The water would have a total dissolved solids (TDS) concentration of around 50mg/L for industrial use.

Reject water from the recycling plant would be reintroduced back into the Point Peron line together with treated wastewater of suitable quality from the industries for disposal offshore (4.2km) into the Sepia Depression.

Using water from the Kwinana Wastewater Recycling Plant (KWRP) and returning the wastewater into the line would eliminate the need for industrial effluent from Kwinana industries to be discharged to Cockburn Sound, and it would also reduce the requirements for industry to draw on scheme water or groundwater resources. The PER indicated that the proponent will preferably use water from the Water Corporation's KWRP, if it is feasible.

Submissions

Submissions raised concerns regarding the potential use of significant quantities of scheme water in the proposed plant, and the impact that this would have on Perth's drinking water supplies. The majority of the submissions suggested that recycled water, preferably from the KWRP, should be used instead.

Assessment

The area considered for assessment of this factor is the Perth metropolitan area.

The EPA's environmental objective for this factor is to minimise the use of scheme water by heavy industry and to maximise the use of recycled water where ever possible.

The EPA notes from the proponent's response to the summary of submissions that the proposed plant is being designed to accept water from both the Water Corporation's proposed KWRP and scheme water. The proponent indicated that this is necessary from a plant safety standpoint as a guaranteed supply of fire water must be available at all times, and a back up source of cooling water is also required in case the KWRP supply develops problems. Changing the source of water into the plant from scheme water over to the KWRP would involve opening and closing a number of valves.

The EPA notes that the Water Corporation has recently stated that it would build a water recycling plant in Kwinana which would initially be capable of processing 5GL of treated municipal wastewater per year to a quality suitable for use by major Kwinana industrial customers. The plant will be built, owned and operated by the Water Corporation, and will be commissioned in early 2004.

Nevertheless, the EPA considers that the proponent should be required to utilise recycled water from the KWRP in the proposed plant during normal operations in preference to scheme water, and should only utilise scheme water as an emergency back up if recycled water from the KWRP not be available for whatever reason. Accordingly, the EPA recommends that the following ministerial condition which requires the proponent to source water from the KWRP, be imposed on the proponent:

11-1 The proponent shall source water for the Commercial HIsmelt plant from the Water Corporation's Kwinana Wastewater Recycling Plant (KWRP) if it is operational prior to the Commercial HIsmelt plant being commissioned. The proponent shall also design the Commercial HIsmelt plant such that it can readily source water from the KWRP in the event that the KWRP commences operations after the Commercial HIsmelt plant has been commissioned.

Summary

Having particular regard to the:

(a) potential for the proposed plant to consume significant quantities of scheme water if recycled water from the KWRP is not utilised; and

(b) the Water Corporation's advice that it will be constructing the KWRP;

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 recommended ministerial condition outlined above is imposed on the proponent.

4. Conditions and commitments

Section 44 of the *Environmental Protection Act, 1986* requires the EPA to report to the Minister for the Environment and Heritage 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 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.

Proponent's commitments

The proponent's commitments as set in the PER and subsequently modified, as shown in Appendix 4, should be made enforceable.

Recommended conditions

Having considered the proponent's commitments and the information provided in this report, the EPA has developed a set of conditions that the EPA recommends be imposed if the proposal by HIsmelt (Operations) Pty. Limited to construct and operate a commercial scale HIsmelt Process Plant at Kwinana, Western Australia, is approved for implementation.

These conditions are presented in Appendix 4. Matters addressed in the conditions include the following:

(a) that the proponent be required to fulfil the commitments in the Consolidated Commitments statement set out as an attachment to the recommended conditions in Appendix 4;

(b) that the proponent be required to fulfil condition 8 relating to the management of dust in order to minimise impacts to the environment and public health;

(c) that the proponent be required to fulfil condition 9 relating to management of air emissions in order to minimise and identify ant impacts from these emissions;

(d) that the proponent be required to fulfil condition 10 relating to waste management in order to minimise impacts from the discharge of process wastewaters on the marine environment; and

(e) that the proponent be required to fulfil condition 11 relating to water supply requirements for the plant.

5. Other advice

Community health concerns

A number of the submissions to the EPA on the HIsmelt project expressed concerns about potential health impacts on the community, particularly in the adjoining areas of Naval Base, Wattleup, Kwinana and northern Rockingham, from cumulative air emissions from Kwinana industries. The EPA is also aware of recent media articles regarding concerns about potential impacts on worker health.

As indicated in Section 3.1.4 of this report on its assessment of air emissions from the HIsmelt project, the EPA considers that with the pollution control measures proposed for the plant, the monitoring and reporting requirements set on the company, and enforcement condition recommended requiring action if levels of significance are detected, the project should not result in adverse impacts to public health.

Notwithstanding this, there is a clear community expectation for greater monitoring and reporting of emissions from Kwinana industries, and evaluation of potential health issues from these. This was particularly reflected in the submission from the Town of Kwinana.

The Town of Kwinana requested that a study be undertaken of the levels of dioxins, furans, PAHs, VOCs, and heavy metals emitted from Kwinana industries by the DEP, Kwinana Industries Council, and industry. The study should predict the cumulative levels of these pollutants within residential areas in proximity to the industrial area.

The EPA is aware that the Western Australian Planning Commission, the DEP and the Department of Mineral and Petroleum Resources have recently released a report, "Review of Kwinana Air-Quality Buffer", and that this is currently open for public comment to the 27 September 2002. The EPA supports the approach being taken in this review to protect human health and amenity. The EPA notes that the review focuses primarily on the most significant air-quality issue, which has arisen at Kwinana, that is the management of sulphur dioxide, with consideration also of public risk, dust, odour, and noise.

Consistent with national and international trends, there is growing recognition in Western Australia of the need for increased monitoring and evaluation of potential health issues from a broader range of air pollutants including dioxins, furans, PAHs, VOCs, and heavy metals. The State is participating in national programs, including development of a National Environmental Protection Measure (NEPM), to address such pollutants.

The EPA is also aware of the Government's initiatives to establish a Ministerial Council on Health, Environment and Industry Sustainability, and that one of its initial steps has been to form an Environmental Health Foundation to provide independent expert advice to Government on the potential impacts of industrial emissions and chemicals. The EPA understands that a taskforce reporting to the Ministerial Council, incorporating the Departments of Environmental Protection, Health, Worksafe and Mineral and Petroleum Resources, will be preparing a strategy for comprehensive review of potential health issues from emissions from Kwinana industries. The strategy is expected to include a program for increased monitoring of pollutants such as dioxins, furans, PAHs, VOCs, and heavy metals to provide greater information on levels of these pollutants.

The EPA supports these initiatives and believes that they should address the community's concerns and those expressed by the Town of Kwinana in its submission to the EPA. The EPA sees this as an important issue and encourages Government to ensure that the relevant government agencies have resources to undertake this work.

Management of noise from Kwinana industries

The EPA notes that, whilst this individual proposal has demonstrated that it can comply with the *Environmental Protection (Noise) Regulations, 1997*, it will form part of the broader Kwinana Industrial Area, from which cumulative noise has been found to be a substantial concern within surrounding residential areas. The EPA understands, from research recently conducted, that cumulative noise emissions from Kwinana industries regularly exceed the prescribed limits, set by the *Environmental Protection (Noise) Regulations, 1997,* for these surrounding residential locations. In the main, this is due to the consolidation of a large number of heavy industries in this region.

The residential areas surrounding the Kwinana Industrial Area have evolved with heavy industry in close proximity over many years and it is perhaps not surprising to find industry not complying with the prescribed noise limits at all times, given that the Noise Regulations are relatively new. However, it was evident during the assessment of this proposal that existing cumulative noise levels are beyond normally acceptable limits and that noise levels from the Kwinana Industrial Area need to be reduced over time. The EPA notes that the Noise Regulations review process is looking at noise policy in this region and is considering the matter of appropriate noise emission targets for Kwinana industries.

The EPA acknowledges the strategic State significance of the Kwinana Industrial Area and recognises attempts by Government to secure a buffer between industrial and residential land uses in this region. Recently, it also notes the considerable effort made by the Kwinana Industries Council to quantify cumulative noise emissions from industry, identify the key sources of noise, and prepare a strategy for cumulative noise reduction from the Kwinana Industrial Area (including a programme for individual industries to develop and implement their own noise control plans).

The EPA is aware that new industrial proposals for the Kwinana Industrial Area, including the HIsmelt proposal, have the potential to make it harder for existing industries to reduce the cumulative noise level received at surrounding residences. Ideally, future proposals for the Kwinana Industrial Area will be able to demonstrate that their individual noise emissions will be at a level that will ensure the sustainability of Kwinana Industries Council's longer-term strategy to reduce cumulative noise emissions to more acceptable levels for the community.

The EPA considers that cumulative noise emissions from the Kwinana Industrial Area need to be progressively reduced over time, to ensure an improved level of amenity for the surrounding residential areas. The EPA supports the whole-of-industry approach adopted by the Kwinana Industries Council and recommends the ongoing involvement of the community and Government in this noise reduction process.

Environmental management programmes (EMPs)

Whilst the EPA recognises that the proponent will make the various EMPs publicly available on their web site and at the DEP library and other local libraries, the EPA suggests that the proponent liaise closely with the Town of Kwinana, City of Cockburn, City of Rockingham, and the Cockburn Sound Management Council (CSMC) in relation to the scope and content of these EMPs on an on-going basis.

Port facilities

The EPA considers that the recommissioning of Kwinana Bulk Berth No. 1 (KBB1), or any significant change in existing operations, or upgrading of the facilities at KBB2 that would be required to cater for the requirements of the proposed Stage 1 and Stage 2 plants, would need to be referred to the EPA for assessment.

6. Conclusions

The EPA has considered the proposal by HIsmelt (Operations) Pty. Limited to construct and operate a commercial scale HIsmelt Process Plant at Kwinana, Western Australia.

Sulphur dioxide (SO_2)

The EPA notes that predicted SO_2 ground level concentrations obtained from air quality modelling are below the relevant Environmental Protection (Kwinana) (Atmospheric Wastes) Policy (i.e. the Kwinana EPP) standards for all operating scenarios of the proposed Stage 1 and Stage 2 plants. The EPA commends the proponent for making a commitment to incorporate a flue gas desulphurisation (FGD) system into the plant design which is considered best available technology at the time of plant design. The EPA understands that the European Commission considers that FGD systems are best available technology for SO_2 removal in large combustion plants. The EPA notes that SO_2 emissions will also be minimised through the use of low sulphur coals in the plant. The EPA also acknowledges that the proponent has committed to install a continuous monitoring instrument to measure SO_2 emissions in the gas stream exiting the main stack of the plant, and to report monitoring data for SO_2 to the DEP on a monthly basis, and annually as part of the National Pollution Inventory (NPI).

Nitrogen oxides (NO_X)

The EPA notes that predicted NO_X ground level concentrations obtained from cumulative impact air quality modelling are below the relevant National Environmental Protection Measure (NEPM) standards for all operating scenarios of the proposed Stage 1 and Stage 2 plants. The EPA commends the proponent for making a commitment to incorporate burners that are designed to keep NO_X emissions as low as reasonably practicable where process gas will be combusted, and low NO_X burners where natural gas will be combusted in the plants. The EPA considers that the use of these burners aptly demonstrates the implementation of best available technology by the proponent. The EPA is aware that the low calorific value and associated combustion characteristics of the process gas will effectively reduce the amount of NO_X that will be generated by the plant.

Particulate and fugitive dust emissions

Predicted particulate ground level concentrations obtained from air quality modelling are below the relevant Kwinana EPP and NEPM standards, for all operating scenarios of the proposed Stage 1 and Stage 2 plants. The EPA is satisfied with the proponent's commitment to incorporate scrubbers and bag filters that are considered best available technology at the time of plant design. The EPA understands that the European Commission considers that scrubbers and bag filters are best available technology for particulate removal in the iron and steel production industry. The EPA also acknowledges that the proponent has committed to measure particulate emissions from the plant stacks on, as a minimum, a six monthly basis, and report particulate monitoring data to the DEP on, as a minimum, a six monthly basis.

The EPA notes the commitment made by the proponent to prepare, submit, and implement a Dust Management Plan, which will include measures to control dust emissions, a monitoring programme, reporting requirements, and remediation measures, if dust emissions exceed the relevant criteria. However, the EPA recognises the concern expressed in submissions in relation to the emission of fugitive dust from the proposed plant, and considers that it would be appropriate for a condition to be imposed on the proponent in order to provide for contingency measures in the event that the proposed fugitive dust control measures prove to be inadequate. A condition has been recommended which requires the proponent to investigate options, including enclosure, and to subsequently implement additional dust control measures as soon as practicable to prevent further fugitive dust emissions, in the event that dust monitoring indicates that fugitive dust is being emitted from any of the iron ore, coal, dolomite, and slag stockpiles in excess of established criteria, or is found to be unreasonably interfering with the health, welfare, convenience, comfort or amenity of any person in any premises.

Dioxins and furans, poly aromatic hydrocarbons (PAHs), volatile organic compounds (VOCs), persistent organic pollutants (POPs), and heavy metals

The EPA notes that the report titled "Assessment of Human Health Issues" prepared by HIsmelt (Corporate Environmental Consultancy Pty Ltd, 2002b) indicates that concentrations of pollutants in the stack emissions from the plant are expected to be low because of the benign nature of the raw materials proposed for use, and the application of best practicable measures and technology. The EPA also notes that there is the potential for very low levels of heavy metals including iron, cadmium, lead, and zinc, and dioxins, furans, and VOCs to be released via stack emissions.

The EPA notes that the proponent has made commitments to manage potential emissions of dioxins and furans, PAHs and VOCs, and heavy metals from the plant. The proponent has committed to sample and analyse the offgas emissions, in accordance with an agreed standard based on international best practice, during commissioning and subsequent operation to establish if dioxins and furans are present, and whether concentrations of PAHs, VOCs, and heavy metals are at or above Trigger Levels, provide monitoring results for dioxins, furans, PAHs, VOCs, and heavy metals to the DEP as they are received, and review future monitoring of the offgas emissions for dioxins, furans, PAHs, VOCs, and heavy metals in conjunction with the DEP as the results of the monitoring are being assessed. The EPA considers that direct measurement of gas emissions at the stack would provide an accurate measurement of the efficiency of the pollution control measures implemented in the plant (both "in process" and "end of pipe" measures). The EPA considers that with further air quality monitoring of stack emissions, together with plume modelling, a more accurate prediction of ambient air quality can be achieved.

In view of community concerns expressed in submissions in relation to the potential health impacts from emissions of dioxins, furans, PAHs, VOCs, POPs, and heavy metals from the proposed plant, the EPA considers that it would be appropriate for a condition to be imposed on the proponent in order to address these concerns. The recommended condition stipulates that, in the event that monitoring indicates that dioxins and furans are present and/or that heavy metals, VOCs, PAHs, or other POPs are being detected at or above the Trigger Levels from the plant, the proponent shall

investigate and implement additional control measures to prevent further emissions. Furthermore, if emissions are measured above the Licence Limits, the recommended condition stipulates that the proponent shall cease plant operations until investigations and plant modifications are undertaken to demonstrate that the Licence Limits can be achieved.

In relation to dioxins and furans, the EPA considers that the use of the limits recommended by the European Commission (European Commission, 2001) for stack emissions should be adopted as an interim limit. The EPA notes that the proponent will implement best practicable measures to ensure that levels of dioxins and furans in the stack emissions are managed at acceptable levels to protect the environment and human health. In relation to heavy metals, the EPA considers that the use of limits recommended by the US EPA for large waste combustors should be adopted to ensure that heavy metal concentrations for iron, cadmium, lead and zinc do not pose a risk to the environment and human health.

Greenhouse gas emissions

The Stage 1 and Stage 2 plants will produce 3Mtpa of CO_2 per year when they are operating concurrently. The EPA considers that the proposal will be a significant contributor to both Western Australia's and Australia's total greenhouse gas emissions given that the combined total of 3Mtpa of CO_2 represents about 6% of Western Australia's greenhouse emissions and 0.66% of Australia's total greenhouse gas emissions. However, the EPA acknowledges that the proposed plant will achieve lower greenhouse gas emissions per tonne of hot metal produced in comparison with existing blast furnace technology. The EPA commends the proponent on its research and development for the HIsmelt technology, and recognises the potential for global greenhouse gas emissions to be reduced if the technology employed in the proposed plant is adopted by the operators of existing blast furnaces around the world. The EPA also acknowledges the commitments made by the proponent to prepare a Greenhouse Gas Emissions Management Plan, continue to participate in the Australian Greenhouse Office Greenhouse Challenge Programme, research and develop new technologies that will reduce greenhouse gas emissions, and investigate opportunities for offsetting the plants greenhouse gas emissions.

Waste management

The assessment identified the potential for the capacity of the proposed process wastewater storage facility to be exceeded during extreme rainfall events given that it was only to be designed to accommodate the surface run-off from a 1 in 10 year rainfall event of 72 hours duration. The EPA determined that if a more extreme rainfall event occurs, process wastewater would need to be disposed of into the marine environment via the Cape Peron Outlet Pipeline (CPOP). In order to minimise potential impacts on the marine environment, the EPA recommended that a condition be imposed on the proponent which requires the construction of an additional process wastewater storage facility within the boundary of the Commercial HIsmelt plant with sufficient capacity to accommodate the influx of additional water from extreme rainfall events of greater magnitude than a 1 in 10 year rainfall event of 72 hours duration. The design, construction and actual storage volume of the new process

wastewater storage facility will be in accordance with advice received from the DEP and the Water and Rivers Commission.

Surface water and groundwater

In relation to surface water and groundwater, the EPA notes the commitments made by the proponent to prepare, submit, and implement a Surface Water Management Plan, and a Groundwater Management Plan. The EPA is satisfied that these commitments will ensure that potential impacts on surface water and groundwater will be acceptable.

Noise and vibration

The results obtained from noise modelling undertaken by the proponent and Fremantle Ports' indicate that, with the exception of noise levels at the plant boundary, noise emissions from the Stage 1 and Stage 2 plants and shipping operations at KBB2 will comply with the *Environmental Protection (Noise) Regulations, 1997*. The EPA notes that noise levels at the plant boundary are predicted to reach 70dB(A) where-as the current allowable level is 65dB(A) for noise received at a neighbouring industrial premises. The EPA understands that a recent review of the Regulations by a working group (DEP, 2000b) suggested that the industry-to-industry noise criteria be amended to limit noise at a plant boundary where an office is within 15m of this boundary to 70dB(A), and 75dB(A) at a plant boundary where an office is more than 15m from this boundary. The EPA is aware that the suggested amended criteria is yet to be adopted. However, the EPA acknowledges that the proponent has stated in the PER that, should the proposed change not be endorsed through the review, then the proponent will review the actual noise levels and noise attenuation measures implemented at the site, and will meet the existing criteria. The EPA considers that the measures that will be employed to manage noise during construction activities, operation of the plant, road and rail movements, and shipping operations are adequate in terms of minimising the potential for impacts on the surrounding community. In regard to vibration from the proposed plant and rail movements, the EPA considers that potential impacts on the health and amenity of the surrounding community are unlikely to be significant.

Marine environment

The EPA is aware of the various management measures that will be implemented by both the proponent and Fremantle Ports' at Kwinana Bulk Berth No. 2 (KBB2) to mitigate any potential impacts on the marine environment. The EPA acknowledges that the proponent will ensure that shipping activities relating to the project will comply with the Draft Cockburn Sound EPP and EMP, and that they will select reputable shipping contractors.

Water supply

The EPA is aware of the potential for the proposed plant to consume significant quantities of scheme water if recycled water from the proposed Kwinana Wastewater Recycling Plant (KWRP) is not utilised. The EPA is also aware of the announcement that the Water Corporation will construct the KWRP in the short term. However, in order to facilitate the use of recycled water instead of scheme water in the proposed plant, the EPA considers that a condition should be imposed on the proponent. The recommended condition requires the proponent to source water from the KWRP, if it is operational prior to the Commercial HIsmelt plant being commissioned, and to design the Commercial HIsmelt plant such that it can readily source water from the KWRP in the event that the KWRP commences operations after the Commercial HIsmelt plant has been commissioned. The EPA believes that this factor is manageable provided that the recommended condition is imposed on the proponent.

In view of the above, 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 proponent's commitments and the recommended conditions summarised in Section 4, and detailed in Appendix 4.

7. Recommendations

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

1. That the Minister notes that the proposal being assessed is for the construction and operation of a commercial scale HIsmelt Process Plant at Kwinana, Western Australia;
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 4, and summarised in Section 4, including the proponent's commitments; and
4. That the Minister imposes the conditions and procedures recommended in Appendix 4 of this report.
5. That the Minister notes the other advice provided by the EPA.

Appendix 1

List of submitters

Organisations:

1. City of Cockburn
2. City of Rockingham
3. Cockburn Sound Management Council
4. Community Networking Inc. (COM-NET)
5. Conservation Council of Western Australia Inc
6. DEP Kwinana-Peel Regional Office
7. Department of Planning and Infrastructure - Marine Safety
8. Hope Valley Progress Association
9. Kwinana Progress Association Inc and Kwinana Watchdog Group (joint submission)
10. Naragebup Rockingham Regional Environment Centre (Inc.)
11. Pollution Action Network
12. Recfishwest
13. Town of Kwinana
14. Water Corporation

Individuals:

1. Allan Gade
2. Glenis Cooper
3. James Mumme
4. J. A. Stables
5. Michael T. Kitchin
6. Mrs S. Edwards
7. Sharon Mears

Appendix 2

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Appendix 3

Summary of identification of relevant environmental factors

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
Biophysical			
Terrestrial flora	No clearing of vegetation required to implement the proposal.	No comments received.	This factor does not require further evaluation by the EPA.
Terrestrial fauna	No disturbance to native fauna is required to implement the proposal.	No comments received.	This factor does not require further evaluation by the EPA.
Marine environment	The proposal may impact upon the marine environment as a result of shipping operations due to TBT anti-fouling agents, ballast water discharge, oil spills and spills of raw materials during ship unloading.	**Department of Planning and Infrastructure** It would like to acknowledge the proponent's intention to ensure that ships chartered meet the requirements of the Right Ship System. Thus ensuring that only well maintained vessels operated by companies with good management principles (including operating procedures and manning requirements) will be chartered. **Cockburn Sound Management Council** Expressed concern that the approach to stating that Fremantle Ports is tasked with having responsibility for certain key environmental outcomes is unsatisfactory as key environmental impacts are not covered in the PER. It is not clear as to the level of responsibility and commitment by the proponent to achieving acceptable outcomes. Requested that HIsmelt need to make a firm commitment to ensure that Fremantle Ports employ practices to minimise dust and spillage. Stated that baseline information on marine pests and TBT levels in the vicinity of the HIsmelt proposal should be included in the PER. Questioned whether the Mandatory Ballast Water Requirements adequately cover the movement of shipping ballast water between Australian ports? Stated that Fremantle Ports needs to provide information to support the statement that the proposal will not impact on the multiple uses of Cockburn Sound. States that the Proponent (or Fremantle Ports) needs to address the potential impact on increased mooring time on recreational boat users in Cockburn Sound. The PER mentions that the iron ore has a high phosphorus content. The fate of the phosphate should be clarified. **Town of Kwinana** The PER should address concerns about nutrients such as phosphates from coals and nitrates from scrubbers. The proponent's commitment to replace existing septic systems with nutrient retentive sewerage systems is supported by Council. **Public comments** There should be " no net loss of ecological or social function" for Cockburn Sound. A zero spillage target and a fully specified management plan should be produced prior to approval. Heavy metal contamination such as mercury exists around the old BHP jetties and this should have been covered in the PER. More information is required on the sediment contamination. There appears to be no requirement for the management of ballast water into Cockburn sound from shipping.	Marine environment is considered to be a relevant environmental factor.

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
Marine environment (Continued)		**Public comments (Continued)** The proponent should undertake some baseline research in order to determine any impacts of the development of TBT and changes in future ecology of marine organisms at the site. There is no mention of the type of "parking time" and where the ships may be "parked". What happens to the phosphorus? Where does it end up after processing? The proponent should address the potential of phosphates enriching groundwater and Cockburn Sound. $P_2 0_5$ emissions could also be a problem. The proponent has said that initially the lime would be sourced from Cockburn Cement. This is unacceptable due to the degradation caused to the environment of the Sound by Cockburn Cement's operations. The transport of coal from Queensland is unsustainable due to high transport costs and in transit hazards, especially within the marine environment.	Marine environment is considered to be a relevant environmental factor.
Decommissioning	The location of the proposed plant is on the site occupied by the existing HRDF. The site has been used by industry for decades.	No comments received.	This factor does not require further evaluation by the EPA.
Pollution			
Atmospheric emissions	The proposed plant will emit: 1. Sulphur dioxide (SO_2) • Stage 1 plant - 250tpa • Stage 2 plant - 500tpa 2. Nitrogen oxides (NO_X) • Stage 1 plant - 603tpa • Stage 2 plant - 1206tpa 3. Greenhouse gases (CO_2) • Stage 1 plant - 1.5Mtpa • Stage 2 plant - 3.0Mtpa 4. Carbon monoxide (CO) • Stage 1 plant - 668tpa • Stage 2 plant - 1336tpa 5. Particulates • Stage 1 plant - 64tpa • Stage 2 plant - 128tpa The transport of raw materials by rail may generate fugitive dust. The unloading of raw materials from ships and subsequent handling and stockpiling may generate fugitive dust. Construction activities may generate fugitive dust emissions. The plant may generate odour. The plant may possibly emit dioxins, furans, PAHs, VOCs, POPs, and heavy metals.	**EPA Service Unit** Table 4.9 in the PER provides stack parameters under normal operations. However, the proponent should provide an equivalent table to account for maximum worst case stack emissions under abnormal operations for both the Stage 1 and Stage 2 plants. This is especially important from a licensing perspective given that licensing conditions are usually formulated around maximum worst case stack emissions. The first paragraph of Section 4.11.3 on page 4-20 of the PER indicates that the Plant Control System will monitor and collect measurements of SO_2 concentrations from the stack on a continuous basis. Can the Plant Control System be designed to monitor and collect measurements of NO_X and CO? The second paragraph of Section 4.15 on page 4-26 of the PER indicates that the flue gas desulphurisation (FGD) system will have a SO_2 removal efficiency of at least 95%. Is this a claim made by the system's manufacturer given that Table 3.4.5 on page 96 of the Draft Reference Document on Best Available Techniques for Large Combustion Plants (European Commission, 2001) indicates that general SO_2 reduction rates for FGD systems which utilise wet lime/limestone range from 90% to 95%? Whilst it would be beneficial for the proposed FGD system to exceed current best practice SO_2 emission levels, can the proponent please clarify whether the claimed SO_2 removal efficiency of at least 95% is accurate, and in fact realistically achievable. The first dot point in Section 7.3.5.4 of the PER indicates that the process offgas has a low calorific value and will tend to burn with a low flame temperature of around 950°C. The EPA Service Unit acknowledges that this will reduce the amount of NO_X produced during combustion, and therefore negate the need to use other NO_X control measures such as low excess air, flue gas recirculation and water injection. However, Section 7.3.5.4 does not indicate whether the proponent has considered the use of post combustion flue gas NO_X control measures such as selective catalytic reduction (SCR) systems (i.e. ammonia injection) and selective non-catalytic reduction (SNCR) systems in the Waste Heat Recovery System, the Hot Blast Stoves, and any other part of the plant that will burn process offgas? Can such systems be utilised in these areas of the plant? If they cannot be used, the specific reasons why this would be the case need to be provided together with copies of appropriate advice received from the relevant equipment manufacturers to justify any claims made in this regard.	Atmospheric emissions is considered to be a relevant environmental factor.

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
Atmospheric emissions (Continued)	Emissions of NO_X and VOCs may lead to additional smog being generated.	**EPA Service Unit (Continued)** Notes from Table 4.9 in the PER, that NO_X emissions from the main stack, coal mill stack, and Pre-heater stack will be 157mg/Nm^3, 48mg/Nm^3, and 71mg/Nm^3 respectively (7% O_2, dry). Can the Proponent please indicate what the averaging time is for these quoted particulate emission concentration values? Can the proponent clarify whether they represent best practice levels given that the European Commission (EC) and US EPA 24hr standards for NO_X emission concentrations are 200mg/m^3 and 220mg/m^3 respectively (both at 11% O_2, 0°C, dry)? Are the process offgas burners that will be used in the plant considered to be best available control technology? If they are, can the proponent please provide suitable evidence and references to justify any claims made in this regard. If they are not, can the proponent please provide detailed justification for not utilising process offgas burners that are best available technology. Where low NO_X burners will be used in the plant to burn natural gas, can other additional NO_X control technology such as low excess air (LEA), over fire air (OFA), fuel reburning, and flue gas recirculation (FGR), selective catalytic reduction (SCR) systems (i.e. ammonia injection), and selective non-catalytic reduction (SNCR) systems etc be used in conjunction with them to further reduce NO_X emissions to best practice levels? If they cannot be used, the specific reasons why this would be the case need to be provided together with copies of appropriate advice received from the relevant equipment manufacturers to justify any claims made in this regard. Evidence is required to confirm that the proposed type of burners to be used will keep NO_X emissions as Low as Reasonably Practicable. Are the process offgas burners that will be used in the plant considered to be best available control technology? In view of the likely NO_X emissions from the proposed Global Olivine Western Australia Limited (GOWA) Waste to Energy Plant in Kwinana, additional modelling should be undertaken to enable an assessment of the cumulative impact of NO_X emissions from both the HIsmelt and GOWA plants to be made. In order to achieve this, NO_X emissions from the HIsmelt Plant (Stage 1 operating alone, and Stage 1 and Stage 2 operating concurrently) and the GOWA plant need to be modelled together in DISPMOD and the results added to monitored data. The results obtained from the above cumulative modelling should then be compared with the applicable NEPM standard. Can the proponent please provide information (with suitable references) either from the HRDF monitoring data or from another source which substantiates the claim made that all heavy metals would be removed through the various scrubbing stages? Is it possible for the proponent to provide information on the removal efficiencies that can be achieved at each stage, or to evaluate removal efficiencies on the basis of the monitoring data? Can the proponent also provide a mass balance / flow diagram for heavy metals? Significant volumes of “fume” will be emitted from the pig caster area. Section 4.16 of the PER indicates that blowdown from the scrubbers (which will contain various contaminants) will be evaporated in the cooling of slag and pig iron. As this is done via direct contact it could have the potential to produce emissions of various compounds that may be toxic. Thus, information on the composition of the “fume” needs to be provided, including heavy metals and organic compounds. Section 4.3.1 of the PER indicates that during the commissioning period the Preheater offgas will be cleaned in a wet scrubber prior to being discharged to atmosphere. Please provide information on the composition of the offgas before and after the wet scrubbing stage. What is the likelihood of the offgas containing heavy metals and other organic compounds?	Atmospheric emissions is considered to be a relevant environmental factor.

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
Pollution			
Atmospheric emissions (Continued)		**EPA Service Unit (Continued)** The first dot point in Section 7.3.4.3 of the PER indicates that the wet scrubbers on the Preheater and the main offgas lines are considered to be best available technology by the European Commission (European Commission, 2000), and that they will clean the process gas to ensure that the particulate level is less than 5mg/Nm^3. Can the proponent please address the following concerns: 1) What is the averaging time for the quoted value of 5mg/Nm^3? 2) Is the quoted level of 5mg/Nm^3 a claim made by the manufacturer of the wet scrubbers? and 3) Is the statement that this type of scrubber "has demonstrated to be very and reliable and to consistently be below the 5mg/Nm^3 output level", also a claim made by the manufacturer of the wet scrubbers? If not, can the proponent please clarify the source of this information? The third dot point in Section 7.3.4.3 of the PER indicates that particulate emissions will be managed because "Particulate emissions from the main stack will average 0.17g/s". Table 4.9 in the PER indicates that the particulate emission concentration from the main stack under normal operating conditions will be 1.8mg/Nm^3. Can the proponent please address the following concerns: 1) What is the averaging time for the quoted particulate emission concentration of 1.8mg/Nm^3 from the main stack?; and 2) Does the quoted concentration level of 1.8mg/Nm^3 represent best practice given that the European Commission (EC) and US EPA 24hr standards for particulate emissions are 10mg/m^3 and 17mg/m^3 respectively (both at 11% O_2, 0°C, dry)? [please provide appropriate references] The fourth dot point in Section 7.3.4.3 of the PER indicates that "Particulate emissions from the other stacks will be designed to be less than 50mg/Nm^3", and "Greater than 95% of the particulates will be less than 1µm". Can the proponent please provide the following information: 1) What is the size of the particulates in the remaining 5% of the emissions from the "other stacks"?; 2) What is the averaging time for the quoted particulate emission concentration of 50mg/Nm^3 from the "other stacks"?; and 3) Does the quoted level of 50mg/Nm^3 represent best practice given that the European Commission (EC) and US EPA 24hr standards for particulate emission concentration are 10mg/m^3 and 17mg/m^3 respectively (both at 11% O_2, 0°C, dry)? [please provide appropriate references] The fifth dot point in Section 7.3.4.3 of the PER indicates that "The fume will be captured in two bag filter modules, both of which will be designed to clean the gas to particulate concentrations of less than 50mg/Nm^3 prior to release to atmosphere, which is considered Best Available Technology in Europe (European Commission, 2000)." Can the proponent please clarify what the averaging time is for the quoted particulate emission concentration of 50mg/Nm^3. It is noted that Item 7 in Section 7.4 on page 212 of the above referenced document indicates that dust emission concentrations of 1 to 15mg/Nm^3 can be achieved with fabric filtration (i.e. bag filters) when collecting fume from operations dealing with molten metals. Furthermore, the European Commission (EC) and US EPA 24hr standards for particulate emission concentration are 10mg/m^3 and 17mg/m^3 respectively (both at 11% O_2, 0°C, dry). Table 4.9 in the PER indicates that particulate emission concentrations from the Cast House Extraction No. 1 stack and the Pig Caster Fume Extraction No. 2 stack under normal operations will be 30mg/Nm^3 and 20mg/Nm^3 respectively. These values appear to be well above best practice levels. Therefore, whilst bag filter modules may be considered to be best available technology, the EPA Service Unit considers that they should be designed to emit particulate emissions at best practice levels (i.e. 1 to 15mg/Nm^3). In view of the above, is the proponent prepared to make an additional commitment to design the bag filter modules so that they achieve a particulate emission concentration level of 1 to 15mg/Nm^3? If not, why not?	Atmospheric emissions is considered to be a relevant environmental factor.

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
Pollution			
Atmospheric emissions (Continued)		**EPA Service Unit (Continued)** The fifth dot point in Section 7.3.4.3 of the PER indicates that "Any storage bins that are filled by the pneumatic conveying of solid materials, such as the ground coal storage bin and the three lime bins, will be vented through bag filter cleaning systems designed to clean the exhaust gas stream to particulate concentrations of less than 50mg/Nm^3 prior to release to the atmosphere." Can the proponent please clarify what the averaging time is for the quoted particulate emission concentration value of 50mg/Nm^3. Table 4.9 in the PER indicates that particulate emission concentrations from the Coal Mill stack will be 15mg/Nm^3 under normal operating conditions. Can the proponent please provide additional information (with suitable references) in regard to whether the bag filter cleaning system that will be used is considered to be best available technology for the above application, given that the European Commission (EC) and US EPA 24hr standards for particulate emission concentration are 10mg/m^3 and 17mg/m^3 respectively (both at 11% O_2, 0°C, dry). Minor emissions of dioxins, furans, polyaromatic hydrocarbons (PAHs), volatile organic compound (VOCs), and other persistent organic pollutants (POPs) from the proposed plant would be of concern to the public. Can the proponent please: • estimate the emission rate / quantity of each species; • show how the emissions are calculated (include references); and • compare the anticipated emissions with best practice limits? Appendix G of the PER indicated that monitoring for Dioxins at the HRDF showed levels of 0.09ng/m^3 I-TEQ after the bag filter. The proponent believes that the scrubbing technology employed in the proposed plant will prevent dioxins from forming. The proponent has made a commitment to monitor for the presence of dioxins and furans during the first year of operation. Section 7.3.8 of the PER indicates that, in the unlikely event that dioxins and furans are being generated by the HIsmelt process and emitted to atmosphere, the proponent will investigate the source of emissions and will continue regular monitoring. What are the contingency measures that can be employed by the proponent if dioxins and furans emissions cannot be prevented? In view of the fact that: 1) the various measures implemented at the Port of Esperance to control dust from iron ore stockpiles, such as enclosing the stockpiles in a shed, are considered to represent "state of the art" technology (Dames & Moore, 1999), and have been included as a case study in Environment Australia's "Best Practice Environmental Management in Mining - Dust Control" booklet (Environment Australia, 1998); and 2) the proposed Kwinana Export Facility will employ the various measures implemented at the Port of Esperance to control dust from iron ore stockpiles, including sheds; the proponent needs to provide detailed justification for not implementing the same measures, at the proposed plant. Is the proponent willing to demonstrate good corporate citizenship through the application of best available technology and best management practices, and make an additional commitment to implement equivalent best available technology (in particular, enclosing the iron ore and coal stockpiles in sheds) in order to control fugitive dust emissions from the proposed plant? If not, why not? While Section 7.4 of the PER provides information on CO_2 emissions from the plant in isolation, it does not provide any information on CO_2 generation from the entire project (i.e. plant site and transportation components etc). What will be the total quantity of CO_2 emitted from the entire project on an annual basis?	Atmospheric emissions is considered to be a relevant environmental factor.

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
Pollution (Continued)			
Atmospheric emissions (Continued)		**EPA Service Unit (Continued)** Has the quantity of CO_2 produced per tonne of product been reduced since the HIsmelt Research and Development Facility (HRDF) commenced operations? If so, by how much? If CO_2 emissions have not been reduced, what are the reasons for this? The EPA Service Unit notes the various commitments made by the proponent in relation to greenhouse gas emissions, and that Rio Tinto has commenced a three year research collaboration with Maxygen into enhanced bio-fixation of CO_2. However, the proponent has not made a commitment to investigate other opportunities for carbon sequestration such as establishing tree farms etc in order to offset the significant quantity of greenhouse gas emissions that will be emitted from the proposed plant. Is the proponent willing to demonstrate good corporate citizenship by making an additional commitment to investigate other opportunities for carbon sequestration such as establishing tree farms etc? If not, why not? **DEP (Kwinana)** Requested that there is a need to demonstrate that a fully enclosed fine materials storage system is not required at the proposed HIsmelt Plant. No estimate is provided as to the amount of dust generation for dust generated from the stockpiling of ore and coal. It is therefore not possible to determine whether the use of water sprays will be sufficient to prevent fugitive dust emissions. **Town of Kwinana** Requested that HIsmelt characterise all gaseous emissions from the Plant. Requested that the cumulative impact of NO_X that may combine with other VOCs and ROCs emitted by other industries in Kwinana should be considered in the formation of smog. States that Council, Industry and the community should be aware of the levels of emissions of heavy metals. The EPA should facilitate a study should to determine these levels. Requested details on the results of stack testing at the HRDF and if any air toxics were detected and at what concentrations. Requested that the Council be consulted prior to any downgrading of monitoring. Requested evidence to confirm that the management of airborne particulates from the plant does in fact represent Best Available Technology. Stated that the proponent should commit to comply with the EPP standards for particulates. Requested that the proponent measure/ monitor particulates quarterly rather than every six months. Requested clarification on the size of particles to be included in the proposed dust monitoring programme. Requested details on the results of stack testing at the HRDF and if any air toxics were detected and at what concentrations. Stated that there appears to be no intention to monitor PAHs and VOCs.	Atmospheric emissions is considered to be a relevant environmental factor.

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
Pollution (Continued)			
Atmospheric emissions (Continued)		**Town of Kwinana (Continued)** Stated that Council, Industry and the community should be aware of the levels of emissions of dioxins, furans , PAHs and VOCs. The EPA should facilitate a study to determine these levels. Requested that it be consulted on any downgrading of monitoring programmes for dioxins, furans and heavy metals. Any downgrading needs to be justified. A multi pathway exposure and health risk assessment should have been undertaken for the HIsmelt Project. Throughout the life of the HRDF, neither DEWCP nor the Council have received complaints resulting from odour or any other site impacts. Dust from the feedstock stockpiles could also be a nuisance if not managed properly. The proponent should address this issue as part of the Environmental Management Plan. The proponent should give a commitment to cover the rail wagons if dust is found to be a nuisance. Supports the proponent's commitment to employing optimum energy efficiency in plant design and operation, and its support for research and development in new technologies and role in greenhouse Challenge. However, "Beyond no regrets" measures should be specified. The proponent should be required to contribute to carbon sequestration as part of the Greenhouse Challenge Programme, particularly in the Kwinana area. Carbon trading opportunities should also be investigated to compensate for the greenhouse gas emissions. If different types of ores are trialled at the plant how will the emissions from these ores be licensed? HIsmelt should consult with all stakeholders should they use ores that have not been assessed during the PER process. **City of Cockburn** Stated that the proposal must be subject to the limits and standards of the EPP and the cumulative limits and standards for the EPP are not exceeded as a result of the Stage 1 or Stage 2 of the Project. States that the proposed plant will be the first commercial application of the process and the stated emissions are theoretical and may be well exceeded under full production. It is questionable that this process should be permitted due to the possible risks. Requested that contact details be provided to facilitate appropriate reporting of dust complaints. There is no mention of sprinklers on the conveyors to minimise dust. This needs to be considered for those conveyors that are not covered. The train wagons may need to be covered. Trucks carrying lime or slag should also be required to be covered. Requested that the Dust Management Plan address the potential of dust from road and rail transport of materials. Further investigations should be undertaken to ensure that the technology being proposed is producing the least greenhouse gas emissions possible. The proponent should be required to contribute to carbon sink or use carbon trading opportunities to compensate for greenhouse gas emitted.	Atmospheric emissions is considered to be a relevant environmental factor.

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
Pollution (Continued)			
Atmospheric emissions (Continued)		**City of Rockingham** The PER contains no information on the likely SO_2 emissions if the low sulphur coal is not used. The Proponent should make a formal commitment to use low sulphur coal or be required to carry out additional modelling to predict SO_2 levels where high sulphur coal is used. The commitment to report SO_2 on a six monthly basis is inadequate. The Proponent should also be required to report to the DEWCP immediately any incidence of elevated emissions and the reason for the variation. The commitment to report NO_X on a six monthly basis is inadequate. The Proponent should also be required to report to the DEWCP immediately any incidence of elevated emissions and the reason for the variation. Recommends that the proponent should report to DEWCP immediately any incidence of dioxins and furans detected and the reasons for the release. On going monitoring of dioxins and furans should be required to ensure that the process technology is working effectively to remove any dioxins and furans produced. **Cockburn Sound Management Council** How are the NO_X and nitrates emitted from the scrubbers prevented from entering the marine waters? Requested that there is a need to demonstrate that a fully enclosed fine materials storage system is not required at the proposed HIsmelt Plant. No estimate is provided as to the amount of dust generation for dust generated from the stockpiling of ore and coal. It is therefore not possible to determine whether the use of water sprays will be sufficient to prevent fugitive dust emissions. Requested an estimate of the dust to be generated from the unloading of ore and coal. Some description of any dust plume, which may arise from the unloading operations, should be provided. **Public comments** Additional information and a commitment are required from the proponent in regard to the installation of continuous gas monitors as this is considered to be best available technology. The current levels of heavy metals in the Kwinana air shed should be measured. The emissions of heavy metals from the furnace are not covered in any detail. The proponent needs to provide additional information on heavy metal emissions. Any downgrading of monitoring programmes for heavy metals needs to be justified and with consultation with the community. Continuous particulate monitoring should be considered. $PM_{2.5}$ should also be monitored as world recognised research indicates that it is responsible for serious health problems. The current levels of dioxins, furans, PAHs and VOCs in the Kwinana air shed should be measured. The community needs to be consulted on any downgrading of monitoring.	Atmospheric emissions is considered to be a relevant environmental factor.

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
Pollution (continued)			
Atmospheric emissions (Continued)		**Public comments (Continued)** A risk assessment and more information on the possible dioxin / furan emissions, such as in cases of cooling system malfunction or incorrect operation should be provided. The high levels of air pollutants that would be emitted are unacceptable and contain substances harmful to the health of the communities. Health impact studies should be undertaken in the Kwinana area on a regular basis. The proponent is asked to commission a health risk assessment to include the impact from NO_X, SO_2, CO, CO_2, heavy metals, dioxins, furans, VOCs, PAHs, and particulates. What is the potential impact of odour on recreational users of the Sound? A Dust Management Plan should be prepared for the site that addresses the possible use of sprinklers on conveyors and stockpile materials. All coal and iron ore handling facilities should be completely enclosed to prevent spillage to the Sound. Best Available Technology should be used for all loading / unloading operations and transfer systems. How can we be sure that spillage of iron ore and coal dust into Cockburn Sound will not occur and what will be done if it does? Will the proponent guarantee that there will be no spillage into Cockburn Sound during loading and unloading operations? It is not good enough to say that this is Fremantle Ports responsibility. Who will clean up if a spill occurs? The management measures for the loading and unloading of ore and other materials may not be adequate to deal with the concern about the impact of dust on Cockburn Sound and their adequacy should be further demonstrated. Further investigations should be undertaken to ensure that the technology being proposed is producing the least greenhouse gas emissions as possible. The proponent has not done a proper greenhouse gas assessment and has failed to demonstrate that it will take all reasonable steps to minimise greenhouse gas emissions. HIsmelt is encouraged to join a programme such as the Carbon Neutral Program to offset greenhouse gases emitted during industry operations. HIsmelt is encouraged to continue implementing and employing the best available technology to further reduce levels of air emissions where possible. The transport of coal from Queensland is unsustainable due to high transport costs and increased production of greenhouse gas. HIsmelt should not be allowed to burn coal.	Atmospheric emissions is considered to be a relevant environmental factor.
Surface water and groundwater	Clean and potentially contaminated storm water will be segregated. Clean storm water will be directed to soaks or settling ponds. Potentially contaminated storm water run-off, water from various parts of the plant, and from the various stockpile areas will be collected and pumped to the process water tank.	**EPA Service Unit** Can the proponent clarify whether best practice control measures will be adopted to prevent groundwater contamination arising from seepage from stockpile and slag pit areas? The proponent needs to demonstrate that its groundwater monitoring programme will be designed to enable early detection of contaminant seepage should it occur. The proponent needs to state the criteria (i.e. the triggers) for implementing management measures to stop any emerging seepage/groundwater contamination problem.	Surface water and groundwater is considered to be a relevant environmental factor.

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
Pollution (continued)			
Surface water and groundwater (Continued)	Water in the process water tank will be used for cooling pig iron and slag. During extreme rainfall events overflow water from the process water tank will be directed to the proposed Kwinana Wastewater Recycling Plant (KWRP). If the KWRP is not ready when the plant is commissioned, then an additional on-site water storage facility will be constructed. The proponent will continue and extend the groundwater monitoring program undertaken on the site. Leaks, spills and contaminated storm water may impact on the quality of surface water and groundwater.	**Cockburn Sound Management Council** Requested that the proponent give a firm commitment to installing a low permeability layer under the stockpiles. The proponent should commit to an outcome rather than commenting on the method it chooses to achieve control of runoff and leaching. A Drainage and Wastewater Management Plan should be developed which addresses the prevention of contaminated groundwater and surface water entering Cockburn Sound. **Town of Kwinana** Requested that the type of low permeable material to be used be specified as should its thickness and specific permeability. The Surface Water Management Plan should be available for public assessment. Groundwater monitoring bores should be located downstream of all feedstock and storage stockpiles to ensure early detection of pollution. Results from these monitoring bores should be reported to the Town of Kwinana and DEWCP on a six monthly basis. The potential for contamination from pipeline leaks should be addressed. **City of Cockburn** A Drainage and Wastewater Management Plan should be developed which addresses the prevention of contaminated groundwater and surface water entering Cockburn Sound. **City of Rockingham** Supports the commitment to extensively monitor the groundwater. However, the commitment to report groundwater monitoring results on an annual basis is inadequate. The proponent should report to DEWCP immediately evidence of contamination and causes of that contamination. **Public comments** Potential contamination from stockpiles through leachate, runoff or dust is of concern, particularly from the sulphur in the coal which could result in acidic runoff from stockpiles. The Proponent should commit to and technically specify how it intends to meet a zero groundwater pollutants discharge target.	Surface water and groundwater is considered to be a relevant environmental factor.
Waste management	The plant will be in water balance and no process effluent will be disposed of off-site except during extreme rainfall events. Any excess will be directed to the proposed Kwinana Wastewater Recycling Plant (KWRP). Scrubber blowdown will be directed to the process water tank and will be used for cooling pig iron and slag. Contact blowdown and stockpile run-off will be treated with lime to precipitate any residual heavy metals.	**EPA Service Unit** The disposal of process wastewaters via a soakaway to groundwater and Cockburn Sound is a priori considered to be unacceptable, unless it could be demonstrated that it would not compromise any of the environmental quality objectives of the Sound. This has not been adequately demonstrated in the PER document. The proponent needs to provide additional information in order to address this concern. From the information provided in Section 3.5.1.2 of the PER, it appears that the effluent is likely to contain a suite of heavy metals, including Al, As, Cd, Cu, Cr, Pb, Zn, Mn and possibly others. An upper estimate of the annual loads of these contaminants discharged to the Cape Peron line [or a soakaway (soak pit)] needs to be provided by the proponent. What would the contaminant loads in the process wastewater overflow be during storm events etc, and what effect would this have on the total contaminant loads through the Cape Peron pipeline? Although	Waste management is considered to be a relevant environmental factor.

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
Pollution (continued)			
Waste management (Continued)	The precipitates and suspended solids from the stock pile run-off will settle at the bottom of the process water tank. The resulting sludge will be de-watered in a filter system and disposed of at an approved landfill facility if it cannot be recycled in the plant. An on-site nutrient retentive sewerage system will replace the existing septic tank system. Refractory materials will be sent to an approved landfill facility. Slag will be sold to the construction industry. The proponent will investigate other uses for the slag.	the PER does include some discussion of non-normal operations modes, the proponent needs to indicate whether these modes would result in any effluent discharge. The estimated process wastewater overflow during storm events etc is of order $0.1m^3/s$, which is about 5-10% of the capacity of the Cape Peron Outfall (CPO). However, under these conditions, the flows from all streams to the CPO would be peaking. Is the proponent sure that the capacity of the CPO pipeline would not be exceeded under these conditions? This needs to be clarified. Additional detailed information needs to be provided by the proponent in relation to the risk of the Cape Peron pipeline becoming unavailable for varying lengths of time, and the resulting implications for the volumes and characteristics of the effluent from the plant. The paragraph under Table 7.22 on page 7-66 of the PER states that "It should be noted that where the < sign is presented in Table 7.22 this implies it will be less than the ANZECC criteria for discharge to the marine environment, the relevant criteria being that applicable for the Sepia Depression where the outfall is located." The proponent needs to clearly indicate what the applicable ANZECC criteria is for discharge from the Cape Peron Outfall into the Sepia Depression in terms of ecosystem protection [i.e. species protection levels (e.g. 90%, 95% and 99% etc) and water quality]. What will be the environmental fate of the flocculant and wetting agent referred to on page 4-37 of the PER? Is there any chance that they will enter the marine environment? Can the proponent provide information in relation to their environmental performance? **Water Corporation** Recommends that additional water storage be constructed to cater for the influx of heavy rainfall during very wet winter months. An option should be considered to cover the storage tanks to prevent rainfall incursion, which would circumvent the need for either additional storage or ocean disposal. No waste water quality data are provided in the PER, making approval of the option of disposing of wastewater through the Water Corporation Cape Peron Outlet line risky for both the EPA and Water Corporation. **Town of Kwinana** Wash down areas should be fitted with a vertical gravity separator or equivalent hydrocarbon arrester. Construction waste should be analysed and confirmed to be free from contamination prior to being released for processing at a materials recycling facility. The stockpiling of waste on the site should be kept to a minimum and for only short lengths of time. The management of slag should be addressed in the Waste Management Plan and a commitment should be made not to landfill the slag or a Memorandum of Understanding should be undertaken with a suitable user. A groundwater monitoring bore be located downstream of the slag stockpile to ensure detection of any pollution. Results of annual monitoring should be provided to DEWCP. A response plan detailing actions if any contamination is detected should be specified. Requested that once the location of the slag processing facility has been determined then an assessment should be undertaken by DEWCP to ensure that offsite impacts are acceptable. The Council requested to be consulted through the assessment process.	Waste management is considered to be a relevant environmental factor.

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
Pollution (continued)			
Waste management (Continued)		**City of Cockburn** Further studies may be required to determine the impact to residence from the transport of slag, once the location of the facility is known **City of Rockingham** Given the uncertainty as to what substances will be in the waste water, approval to dispose of waste water through the Water Corporation's Cape Peron Outlet pipeline should be opposed. **Cockburn Sound Management Council** In the event that the wastewater does not meet the criteria for discharge then it may need to be pre treated or evaporated on site. **Public comments** HIsmelt should establish themselves as world leaders in environmentally sustainable initiatives by recycling and reusing wastewater. Seepage water and leachates should be recovered from the site and sprayed back over the stockpiles to prevent wind drift. Contaminated water must not be discharged into Cockburn Sound or via Cape Peron, it should be evaporated on site and the solids taken to a Class 4 landfill. Contaminated wastewater should be separated from other sources, treated and discharged into the Point Peron wastewater pipeline. Information is required on the wastewater to be disposed of through the Cape Peron outfall. The list and levels of contaminants and the predicted flows of wastewater. There is no mention of the disposal of slag. The production of 800,000 tonnes of pig iron will produce 500,000 tonnes of slag. What are the disposal methods for dealing with the expanding slag dumps? People should be given a detailed explanation as to how the slag waste disposal problem is to be dealt with. The recycling and reuse of slag should be given high priority. The proponent should make a commitment to not dump the 450tpa of waste slag generated around the site or in landfills. The slag processing facility should have been included in the PER. Once the location of the slag processing facility has been determined, an assessment of the potential impacts may be required which includes community consultation.	Waste management is considered to be a relevant environmental factor.
Site contamination	Soil and groundwater contamination investigations undertaken on the site found that the site has generally low concentrations of industrial contamination. Additional contamination may result if the existing areas of contamination are disturbed by construction activities, and by project operations. A Stage II assessment for on site contamination will be undertaken prior to the commencement of construction. Should any contaminated areas have the potential to be disturbed during construction and/or require	**Town of Kwinana** Stated that any contaminated areas with the potential to be disturbed during construction or that require remediation should be addressed through a remediation plan. The possible impacts and design issues relating to site contamination should be specified. **Cockburn Sound Management Council** The proponent needs to strengthen its commitment to ensure that any potential contamination associated with construction is remediated so there are no significant offsite impacts. **Public comments** More information and an additional commitment on groundwater and site remediation is required.	The proponent has indicated in their response to the summary of submissions that they have undertaken a Stage II assessment of the on-site contamination and that the preliminary results indicate that no additional areas of contamination were identified. The proponent also indicated that LandCorp will prepare and implement a remediation plan for any contaminated areas on the site that have the potential to be disturbed by construction, and require remediation. This factor does not require further evaluation by the EPA.

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
Pollution (continued)			
Site contamination (Continued)	remediation, a Remediation Plan will be prepared in conjunction with LandCorp.	**Public comments (Continued)** It is believed that the site contains high contamination levels of heavy metals such as mercury, which has not been addressed in the PER. More details are required on site contamination and groundwater contamination levels.	This factor does not require further evaluation by the EPA.
Noise and vibration	Noise and vibration will be generated during the construction and operational phases of the project. The nearest residential area is Hope Valley, and the nearest residence is located approximately 1.3km away from the north-eastern boundary of the Stage 2 plant. Noise and vibration will also be generated by the transport of raw materials by road and rail, when raw materials are unloaded from ships, and during ship loading of pig iron at Fremantle Ports' Kwinana Bulk Berth No. 2.	**EPA Service Unit** The PER indicates that the industry to industry noise limits will be exceeded. It goes on to discuss that this limit could possibly be the subject of a future noise regulation amendment. This information is correct, however, there is no guarantee on whether the proposed regulation amendment will come into force, or when. How will the proponent ensure compliance with the existing limit should this regulation amendment not be enacted prior to plant operations commencing? In view of the above, is the proponent willing to make an additional commitment to ensure that the proposed plant will comply with the applicable regulations for industry to industry noise when the plant commences operating? If not, why not? **DEP (Kwinana)** Requested that further noise modelling be undertaken that incorporates data estimated for the proposed HIsmelt plant with that from the Kwinana Industries Council (KIC) cumulative noise model. **City Of Rockingham** Recommended that the cumulative noise impacts from the Kwinana Industrial Area needs to be carried out to ensure that noise exceedances of the assigned noise levels at North east Rockingham are no worse that what they are now. Recommended that acute noise events (such as from train and ship warning horns) should be monitored to determine if they are a source of noise complaints from residents at Northeast Rockingham. A commitment should be made to continually monitor this type of noise following construction of the plant and to implement noise reduction measures where they are shown to be a problem for residents in northeast Rockingham. Nighttime loading and unloading of material should be avoided where possible. **Town Of Kwinana** Request that the proponent provide details of the consultation with KIC relating to the regional noise levels to the Council. Noise from the rail transport of iron ore has the potential to impact on the Homestead Ridge Special Residential Zone. The proponent should commit to using the quietest available rail locomotives and wagons to reduce noise impacts. Train movements through residential areas should be scheduled outside of nighttime periods whenever possible. Requested that once the location of the slag processing facility has been determined then noise from trucks transporting the slag should be modelled. Truck movements should be kept to daylight hours. **Public comments** Further studies may be required to determine the impact of noise on residents along the slag transport route once the location of the slag processing facility is known.	Noise and vibration is considered to be a relevant environmental factor.

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
Social surroundings (Continued)			
Risk and hazards	The operation of the plant will lead to an increase in individual risk levels, particularly from the release of toxic gases. Individual fatality risk levels at the plant boundary and at the nearest residence will meet relevant EPA risk criteria.	No comments received.	This factor does not require further evaluation by the EPA.
Road safety	The increased road and rail traffic associated with the delivery of raw materials and the transport of slag from the proposed plant has the potential to impact upon road safety.	**Town of Kwinana** The proposed extension of Anketell Road as shown in the FRIARS report is the preferred option for the eastern connection to the industrial area. The proposal needs to take into account the extension of Leath Road and Mason Road for a north / south industrial traffic movements. Traffic volumes created by to the Project are expected to exceed the capacity of the local road networks. An upgrade of Leath Road and Beard Street will be required to allow for the project traffic. Increased traffic volumes are also expected to exceed the capacity of the Beard Road and Rockingham Road intersection and further upgrading of the intersection will be required. Does not support the transport of raw materials via Thomas Road due to amenity risk issues. Trucks should be encouraged to use Anketell Road rather than Thomas Road. **City of Cockburn** Further information needs to be provided on the routes to be taken by trucks transporting material to and from the site and the impacts should be further investigated. **Public comment** The increase in traffic movements for the project accounts for one truck every ten minutes which is a large increase and constitutes a threat to safety.	The EPA considers that the proponent has satisfactorily addressed the various concerns expressed in the public submissions in regard to this issue in their response to submissions. This factor does not require further evaluation by the EPA.
Culture and heritage	A search of the Indigenous Affairs Department register was undertaken and no recorded Aboriginal sites were found.	No comments received.	There are no known Aboriginal sites within the proposed plant boundary. This factor does not require further evaluation by the EPA.
Aesthetics (visual amenity)	The proposed plant will be constructed within an existing Kwinana industrial area. There will be a minimal impact on visual amenity given that the height of the proposed plant is approximately the same as other existing structures. The proponent will use screening vegetation around the plant to further reduce any impact on visual amenity.	**Town of Kwinana** Considering the industrial nature of the area and surrounding land uses the overall aesthetic effect is considered to be reasonably low. However, all reasonable measures must be taken to ensure the plant is designed to blend harmoniously into the surrounding environment. **The Cockburn Sound Management Council** Requested that to assess the visual impact from an "on water" perspective from Cockburn Sound, a visual representation of the typical dust plumes expected to be generated by the project during bulk loading and unloading operations would be appropriate.	The proponent has made a commitment to establish screening vegetation around the plant site to act as a site buffer. The plant will be located within a designated heavy industrial area. This factor does not require further evaluation by the EPA.
Other			
Water supply	The proposed Stage 1 plant will consume 3.2GL of water per year. When both the Stage 1 plant and Stage 2 plant are running together they will both consume 6.4GL of water per year. The proponent's preferred source for this water is the Water Corporation's proposed Kwinana Wastewater Recycling Plant.	**EPA Service Unit** The PER indicates that the proponent's preferred option is to have water supplied from the Water Corporation's proposed Kwinana Wastewater Recycling Plant (KWRP), if feasible. From an environmental perspective, this option is preferred over scheme water. If the KWRP is not available in a timely manner, can the proposed plant be retrofitted to allow this option to be utilised once it is operating?	Water supply is considered to be a relevant environmental factor.

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
Other (Continued)			
Water supply (Continued)		**DEP (Kwinana)** It is unlikely that sufficient scheme water could be sourced from the Water Corporation to meet the HIsmelt Plant requirements. Water from the proposed Kwinana Wastewater Recycling Plant should be used. **Water Corporation** It would prefer that the proponent sources water from the KWRP, provided all approvals are obtained for the project, in order to reduce the demand for scheme water. A Proponent commitment to that effect should be made. **Cockburn Sound Management Council** Strongly supported the water to be sourced from the waste water recycling proposal. **Town of Kwinana** The use of scheme water is unacceptable. The Water Corporation, DEWCP and all other stakeholders should be encouraged to progress the development of the Kwinana Wastewater Recycling Plant. **City of Cockburn** The proponent should be required to use an alternative water supply to scheme water. **Public comments** The proposed water consumption is far too high to permit the use of scheme water. Alternative sources of water exist to meet industry needs without relying on this precious, finite resource. The plant would consume the total of the Woodman Point Water Treatment Station if it were to be treated to a suitable level. However, given the water shortage in Perth and the likelihood of delays in implementing this project , the HIsmelt proposal will have a significant impact on Perth's water supplies.	Water supply is considered to be a relevant environmental factor.
Site selection	Eight potential locations within Western Australia were investigated for the proposed plant. These locations were Cape Lambert, Dampier, Quarry Flats, Maitland Estate, Oakajee, Kwinana, Bunbury, and Esperance. The criteria used to determine the preferred location included: • logistics for the supply of raw materials; • proximity to port and rail infrastructure; • proximity to major regional centres; • social and environmental aspects; • supply of utilities; and • availability of suitable land.	**EPA Service Unit** In regard to siting of the plant, given that the source materials have to be imported from great distances, and the product then has to be exported great distances, the argument for choosing Kwinana as the preferred site for the proposal appears to be thin. How does the proponent respond to this concern? **Public comments** The criteria for the decision to site the Plant in Kwinana is questioned on a number of grounds: 1) Prevailing SW winds blow pollution to Perth CBD. 2) Uses large amount of water. 3) Increases pollution from the Kwinana Industrial strip. 4) Extra greenhouse emissions. 5) Pollutants from the Plant will be carried across Kwinana, Wattleup and Hope Valley which are residential areas. 6) Cancer rates in communities close to industrial strip are greater than for other Metropolitan suburbs. The PER states that the Kwinana site was the worst of the eight possible locations for environmental and social impacts and was chosen due to economic factors. Environment and health should be paramount as part of the decision making process.	The EPA considers that the site selection process utilised by the proponent is satisfactory in view of the additional clarification provided in their response to the summary of submissions. This factor does not require further evaluation by the EPA.

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
Other (Continued)			
Site selection (Continued)		**Public comments (Continued)** No effort was made to consider sites nearer the source of iron ore which would have the advantage of reduced transport and handling costs and the reduction of environmental pollution in Kwinana The Kwinana site for the plant was chose by the proponent for economic reasons such as cheaper labour and infrastructure costs. However, the threat to the health of the surrounding communities posed by this plant should be given priority over economic factors.	This factor does not require further evaluation by the EPA.
Community consultation	The proponent has consulted with relevant Government departments, local government authorities, local community groups, and members of the general public.	**Cockburn Sound Management Council** Requested that the CSMC have opportunity to comment on the Management Plans. **Public comments** The residents of Kwinana have no effective voice in the (EPA) decision- making processes. The community should be consulted on the proposed management plans. The community should have access to all monitoring data and have involvement in annual auditing and verification process. Environmental Management Plans should be available as part of the PER process. The public needs an opportunity to review and comment on the Plans.	The EPA considers that the proponent has undertaken adequate public consultation, and has satisfactorily addressed the various concerns expressed in the public submissions in regard to this issue in their response to submissions. The Environmental Management Plans for construction and operation will be made available to the public. This factor does not require further evaluation by the EPA.

Appendix 4

Recommended environmental conditions and proponent's consolidated commitments

Statement No.

RECOMMENDED CONDITIONS AND PROCEDURES

STATEMENT THAT A PROPOSAL MAY BE IMPLEMENTED (PURSUANT TO THE PROVISIONS OF THE ENVIRONMENTAL PROTECTION ACT 1986)

COMMERCIAL HISMELT PLANT, KWINANA, WESTERN AUSTRALIA

Proposal: The construction and operation of a commercial scale HIsmelt Process Plant at Kwinana, Western Australia. The Stage 1 plant will produce approximately 820,000 tonnes per year of pig iron. If the Stage 1 plant is found to be technically and commercially viable, a Stage 2 plant will be constructed to double production to approximately 1.6 million tonnes per year of pig iron. The proposal is documented in schedule 1 of this statement.

Proponent: HIsmelt (Operations) Pty. Limited

Proponent Address: C/- HIsmelt Corporation Pty. Limited
PO Box 455
KWINANA WA 6966

Assessment Number: 1402

Report of the Environmental Protection Authority: Bulletin 1068

The proposal referred to above may be implemented subject to the following conditions and procedures:

Procedural conditions

1 Implementation and Changes

1-1 The proponent shall implement the proposal as documented in schedule 1 of this statement subject to the conditions 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 and Heritage 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 as documented in schedule 1 of this statement in any way that the Minister for the Environment and Heritage determines, on advice of the Environmental Protection Authority, is not substantial, the proponent may implement those changes upon receipt of written advice.

2 Proponent Commitments

2-1 The proponent shall implement the 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 the conditions in this statement.

3 Proponent Nomination and Contact Details

3-1 The proponent for the time being nominated by the Minister for the Environment and Heritage 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 and Heritage has exercised the Minister's power under section 38(7) of the Act to revoke the nomination of that proponent and nominate another person as the proponent for the proposal.

3-2 If the proponent wishes to relinquish the nomination, the proponent shall apply for the transfer of proponent and provide a letter with a copy of this statement endorsed by the proposed replacement proponent that the proposal will be carried out in accordance with this statement. Contact details and appropriate documentation on the capability of the proposed replacement proponent to carry out the proposal shall also be provided.

3-3 The nominated proponent shall notify the Department of Environmental Protection of any change of contact name and address within 60 days of such change.

4 Commencement and Time Limit of Approval

4-1 The proponent shall provide evidence to the Minister for the Environment and Heritage within five years of the date of this statement that the proposal has been substantially commenced or the approval granted in this statement shall lapse and be void.

Note: The Minister for the Environment and Heritage will determine any dispute as to whether the proposal has been substantially commenced.

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

The application shall demonstrate that:

- the environmental factors of the proposal have not changed significantly;
- new, significant, environmental issues have not arisen; and
- all relevant government authorities have been consulted.

Note: The Minister for the Environment and Heritage may consider the grant of an extension of the time limit of approval not exceeding five years for the substantial commencement of the proposal.

Environmental conditions

5 Compliance Audit and Performance Review

5-1 The proponent shall prepare an audit program in consultation with and submit compliance reports to the Department of Environmental Protection which address:

- the implementation of the proposal as defined in schedule 1 of this statement;
- evidence of compliance with the conditions and commitments; and
- the performance of the environmental management plans and programs.

Note: Under sections 48(1) and 47(2) of the Environmental Protection Act 1986, the Chief Executive Officer of the Department of Environmental Protection is empowered to audit the compliance of the proponent with the statement and should directly receive the compliance documentation, including environmental management plans, related to the conditions, procedures and commitments contained in this statement. Usually, the Department of Environmental Protection prepares an audit table which can be utilised by the proponent, if required, to prepare an audit program to ensure the proposal is implemented as required. The Chief Executive Officer is responsible for the preparation of written advice to the proponent, which is signed off either by the Minister or, under an endorsed condition clearance process, a delegate within the Environmental Protection Authority or the Department of Environmental Protection that the requirements have been met.

5-2 The proponent shall submit a performance review report every five years after the start of the operations phase to the requirements of the Minister for the Environment and Heritage on advice of the Environmental Protection Authority, which addresses:

- the major environmental issues with the project; the objectives for those issues; the methodologies used to achieve these; and the key indicators of environmental performance measured against those objectives;

- the level of progress in the achievement of sound environmental performance, including industry benchmarking, and use of best available technology where practicable;

- significant improvements gained in environmental management, including the use of external peer reviews;

- stakeholder and community consultation about environmental performance and the outcomes of that consultation, including a report of any on-going concerns being expressed; and

- the proposed environmental objectives over the next five years, including improvements in technology and management processes.

6 Closure Plans

6-1 Prior to commissioning, the proponent shall prepare, and subsequently implement, a Preliminary Closure Plan, which provides the framework to ensure that the site is left in an environmentally acceptable condition to the requirements of the Minister for the Environment and Heritage on advice of the Environmental Protection Authority.

The Preliminary Closure Plan shall address:

(1) rationale for the siting and design of plant and infrastructure as relevant to environmental protection, and conceptual plans for the removal or, if appropriate, retention of plant and infrastructure;

(2) a conceptual rehabilitation plan for all disturbed areas and a description of a process to agree on the end land use(s) with all stakeholders;

(3) a conceptual plan for a care and maintenance phase; and

(4) management of noxious materials to avoid the creation of contaminated areas.

6-2 At least six months prior to the anticipated date of closure, or at a time agreed with the Environmental Protection Authority, the proponent shall prepare a Final Closure Plan designed to ensure that the site is left in an environmentally acceptable condition to the requirements of the Minister for the Environment and Heritage on advice of the Environmental Protection Authority.

The Final Closure Plan shall address:

(1) removal or, if appropriate, retention of plant and infrastructure in consultation with relevant stakeholders;

(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 and proposed management measures to relevant statutory authorities.

6-3 The proponent shall implement the Final Closure Plan required by condition 6-2 until such time as the Minister for the Environment and Heritage determines, on advice of the Environmental Protection Authority, that the proponent's closure responsibilities are complete.

6-4 The proponent shall make the Final Closure Plan required by condition 6-2 publicly available, to the requirements of the Minister for the Environment and Heritage on advice of the Environmental Protection Authority.

7 Greenhouse Gas Emissions

7-1 Prior to commencement of construction of the processing plant, the proponent shall prepare a Greenhouse Gas Emissions Management Plan to:

- ensure that “greenhouse gas” emissions from the project are adequately addressed and best available efficient technologies are used to minimise total net “greenhouse gas” emissions and/or “greenhouse gas” emissions per unit of product; and

- mitigate “greenhouse gas” emissions in accordance with the Framework Convention on Climate Change 1992, and consistent with the National Greenhouse Strategy;

to the requirements of the Minister for the Environment and Heritage on advice of the Environmental Protection Authority.

This Plan shall include:

(1) calculation of the "greenhouse gas" emissions associated with the proposal, as indicated in "Minimising Greenhouse Gas Emissions, Guidance for the Assessment of Environmental Factors, No. 12" published by the Environmental Protection Authority;

(2) specific measures to minimise the total net "greenhouse gas" emissions and/or the "greenhouse gas" emissions per unit of product associated with the proposal;

(3) monitoring of "greenhouse gas" emissions;

(4) estimation of the "greenhouse gas" efficiency of the project (per unit of product and/or other agreed performance indicators) and comparison with the efficiencies of other comparable projects producing a similar product;

(5) analysis of the extent to which the proposal meets the requirements of the National Greenhouse Strategy using a combination of:

- "no regrets" measures;
- "beyond no regrets" measures;
- land use change or forestry offsets; and
- international flexibility mechanisms.

(6) a target set by the proponent for the reduction of total net "greenhouse gas" emissions and/or "greenhouse gas" emissions per unit of product over time, and annual reporting of progress made in achieving this target.

Note: In part 5 above, the following definitions apply:

(1) "no regrets" measures are those that can be implemented by a proponent which are effectively cost-neutral and provide the proponent with returns in savings which offset the initial capital expenditure that may be incurred; and

(2) "beyond no regrets" measures are those that can be implemented by a proponent which involve some additional cost that is not expected to be recovered.

7-2 The proponent shall implement the Greenhouse Gas Emissions Management Plan required by condition 7-1 to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.

7-3 The proponent shall make the Greenhouse Gas Emissions Management Plan required by condition 7-1 publicly available, to the requirements of the Minister for the Environment and Heritage on advice of the Environmental Protection Authority.

8 Dust

8-1 In the event that dust monitoring undertaken as part of the Dust Management Plan prepared in accordance with commitment 15 indicates that fugitive dust is being emitted from any of the iron ore, coal, dolomite, and slag stockpiles in excess of the established criteria, or is found to be unreasonably interfering with the health, welfare, convenience, comfort or amenity of any person in any premises, the proponent shall investigate options, including enclosure, and subsequently implement additional dust control measures as soon as practicable to prevent further fugitive dust emissions, to the requirements of the Minister for the Environment and Heritage on advice of the Environmental Protection Authority.

9 Air Emissions

9-1 In the event that monitoring undertaken in accordance with commitments 9, 10, and 11 indicates that dioxins and furans are present and/or that heavy metals, volatile organic compounds (VOCs), poly aromatic hydrocarbons (PAHs), or other persistent organic pollutants (POPs) are being detected at or above the Trigger Levels from the Commercial HIsmelt plant, the proponent shall investigate and implement additional control measures to prevent further emissions, to the requirements of the Minister for the Environment and Heritage on advice of the Environmental Protection Authority. If emissions are measured above the Licence Limits, the proponent shall cease plant operations until investigations and plant modifications are undertaken to the requirements of the Minister for the Environment and Heritage on advice of the Environmental Protection Authority, to demonstrate that the Licence Limits can be achieved.

10 Waste Management

10-1 The proponent shall construct an additional process wastewater storage facility within the boundary of the Commercial HIsmelt plant with sufficient capacity to accommodate the influx of additional water from extreme rainfall events of greater magnitude than a 1 in 10 year rainfall event of 72 hours duration. The design, construction and actual storage volume of the new process wastewater storage facility shall be in accordance with advice received from the Department of Environmental Protection and the Water and Rivers Commission.

11 Water Supply

11-1 The proponent shall source water for the Commercial HIsmelt plant from the Water Corporation’s Kwinana Wastewater Recycling Plant (KWRP) if it is operational prior to the Commercial HIsmelt plant being commissioned. The proponent shall also design the Commercial HIsmelt plant such that it can readily source water from the KWRP in the event that the KWRP commences operations after the Commercial HIsmelt plant has been commissioned.

Procedures

1 Where the condition states "to the requirements of the Minister for the Environment and Heritage on advice of the Environmental Protection Authority", the Chief Executive Officer of the Department of Environmental Protection will obtain that advice for the preparation of written advice to the proponent.

2 The Environmental Protection Authority may seek advice from other agencies, as required, in order to provide its advice to the Chief Executive Officer of the Department of Environmental Protection.

Notes

1 The Minister for the Environment and Heritage will determine any dispute between the proponent and the Environmental Protection Authority or the Department of Environmental Protection over the fulfilment of the requirements of the conditions.

2 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 1986.

Schedule 1

The Proposal (Assessment No. 1402)

HIsmelt (Operations) Pty. Limited, acting as the manager on behalf of an unincorporated joint venture with a number of other companies, proposes to construct and operate a commercial scale HIsmelt Process Plant at Kwinana in Western Australia. The plant will be located at the site currently occupied by the existing HIsmelt Research and Development Facility (HRDF) within the northern portion of the Kwinana Industrial Area (KIA), 40km south of Perth (Figures 1, 2, and 3).

The Stage 1 plant will initially produce around 820,000 tonnes per annum of pig iron. If the Stage 1 plant is found to be technically and commercially viable, the proponent proposes to install an additional iron-making plant (i.e. the Stage 2 plant) to double production to around 1.64 million tonnes per annum of pig iron.

The HIsmelt process is a direct smelting technology for the production of liquid iron (hot metal) using iron ore fines or any other appropriate ferrous feed material. The smelting will be undertaken in a molten iron bath using coal as the reductant and energy source.

The principal raw materials required for the process are iron ore fines, coal and fluxes (lime and dolomite). The proposal will utilise the reserves of Western Australia's iron ore fines which are currently not suitable for blast furnace feed due to their high phosphorus content. Iron ore will be shipped to Kwinana from Dampier and railed from Koolyanobbing in Western Australia (see Figure 1). Coal will be shipped from the east coast of Australia to Kwinana**.**

Pig iron produced in the plant will be shipped for use in steel mills either within Australia or overseas. The unloading and loading of raw materials and product will be undertaken at the Fremantle Port Authority's Kwinana Bulk Terminal Berth No. 2 (see Figure 3).

The major components of the proposal comprise:

(a) Stage 1 and Stage 2 process plants;

(b) Transport of materials and products;

(f) Power generation;

(g) Water supply and treatment;

(h) Air separation (oxygen and nitrogen) units; and

(i) Waste disposal.

The main characteristics of the proposal are summarised in Table 1 below.

Table 1: Summary of key proposal characteristics

ELEMENT	DESCRIPTION	
	Stage 1	**Stages 1 and 2**
Project Purpose	To construct and operate a HIsmelt Process Plant in Kwinana to produce pig iron.	
Project Location	Leath Road, Kwinana Industrial Area, Western Australia.	
Life of Project (yrs)	20+	20+
Project Components	• Process Plants. • Transport of Materials and Product. • Water Supply. • External Electrical Supply. • Natural Gas Supply.	
Plant Components	• Raw Material Delivery and Storage. • Raw Material Reclamation and Preparation. • Ore Preheater. • Smelt Reduction Vessel. • Offgas System. • Flue Gas Desulphurisation System. • Pig Iron and Slag Production. • Power Generation Facility. • Air Separation Unit (Oxygen and Nitrogen Plant). • Water Supply Facilities and Circuits. • Effluent Treatment Facility. • Stormwater and Wastewater Collection Facilities. • Electrical Power Supply Facilities. • Natural Gas Supply Facilities. • Administration Facilities. • Plant Access Roads and Car Parking.	
Plant Operating Hours (per day)	24	
Operating Hours (per year)	7660 – 8760	
Pig Iron Production (ktpa)	820	1640
Slag Production (ktpa)	225	450
Gypsum Production (ktpa)	11.1	22.2
Iron Ore Fines (ktpa, by ship)	650	1300
Iron Ore Fines (ktpa, by Rail)	650	1300
Imported Coal (ktpa wet)	560	1120
Lime (ktpa)	70	140
Dolomite (ktpa)	70	140
Lime Kiln Dust (ktpa)	6	12
Natural Gas (TJ/a)	1480	2960
Iron Ore Stockpiles (kt)	56 and 10	56 and 10
Coal Stockpile (kt)	57	57
Dolomite Stockpile (kt)	35-50	35-50
Pig Iron Stockpile (kt)	60	60
Slag Stockpile (kt)	0-100	0-100
Air Separation Unit - Oxygen Production (tpd) - Nitrogen Production (tpd)	880 800	1760 1600
Greenhouse Gas Emissions (tonnes of CO_2/tonne of hot metal)	1.86	1.86
Greenhouse Gas Emissions (Mtpa CO_2 gross)	1.5	3
SO_X Emissions - normal operations g/sec (tpa)	9 (250)	18 (500)
NO_X Emissions g/sec (tpa)	21.8 (603)	43.6 (1206)
Particulate Emissions g/sec (tpa),	2.3 (64)	4.6 (128)
Water Usage kL/hr (GL/a)	405 (3.2)	810 (6.4)
Water Source	Kwinana Wastewater Recycling Plant	
Construction Period (months)	20 – 24	20-24
Power Generation – Number of Turbines	1	2
Power Generation (MW)	20	40

Source: Table 3.1 of the Proponent's Response to Submissions document (Corporate Environmental Consultancy Pty Ltd, 2002b)

Table 1: Summary of key proposal characteristics (Continued)

ELEMENT	DESCRIPTION	
Emergency Power Supply (Standby from the grid) (MW)	10	10
Plant Area (ha)	21.1	36
Solid Waste (ktpa)	6-10	12-20
Process Effluent (Plant expected to be in water balance).	0	0
No of Truck Movements (per day)	73	146
No of Ore Train Movements (per week)	10	20
Ship Movements (per year)	30 - 50	60 - 100
Workforce Numbers	65	125
Construction Noise	Comply with *Environmental Protection Noise Regulations, 1997*.	
Operational Noise at Residential Areas.	At least 5dB(A) below the assigned noise levels at residential areas.	
Operational Noise – Boundary dB(A)	65	65
Road Noise Increase in L_{Aeq} dB(A)	0.0	0.0
Rail Noise Increase in L_{Aeq} dB(A)	0.1	0.2
Noise – Shipping Operations	At least 5dB(A) below the assigned noise levels at residential areas.	
Risk at Plant Boundary	Less than fifty in one million per year.	
Risk at Residential Area	Less than one in one million per year.	

Source: Table 3.1 of the Proponent's Response to Submissions document (Corporate Environmental Consultancy Pty Ltd, 2002b)

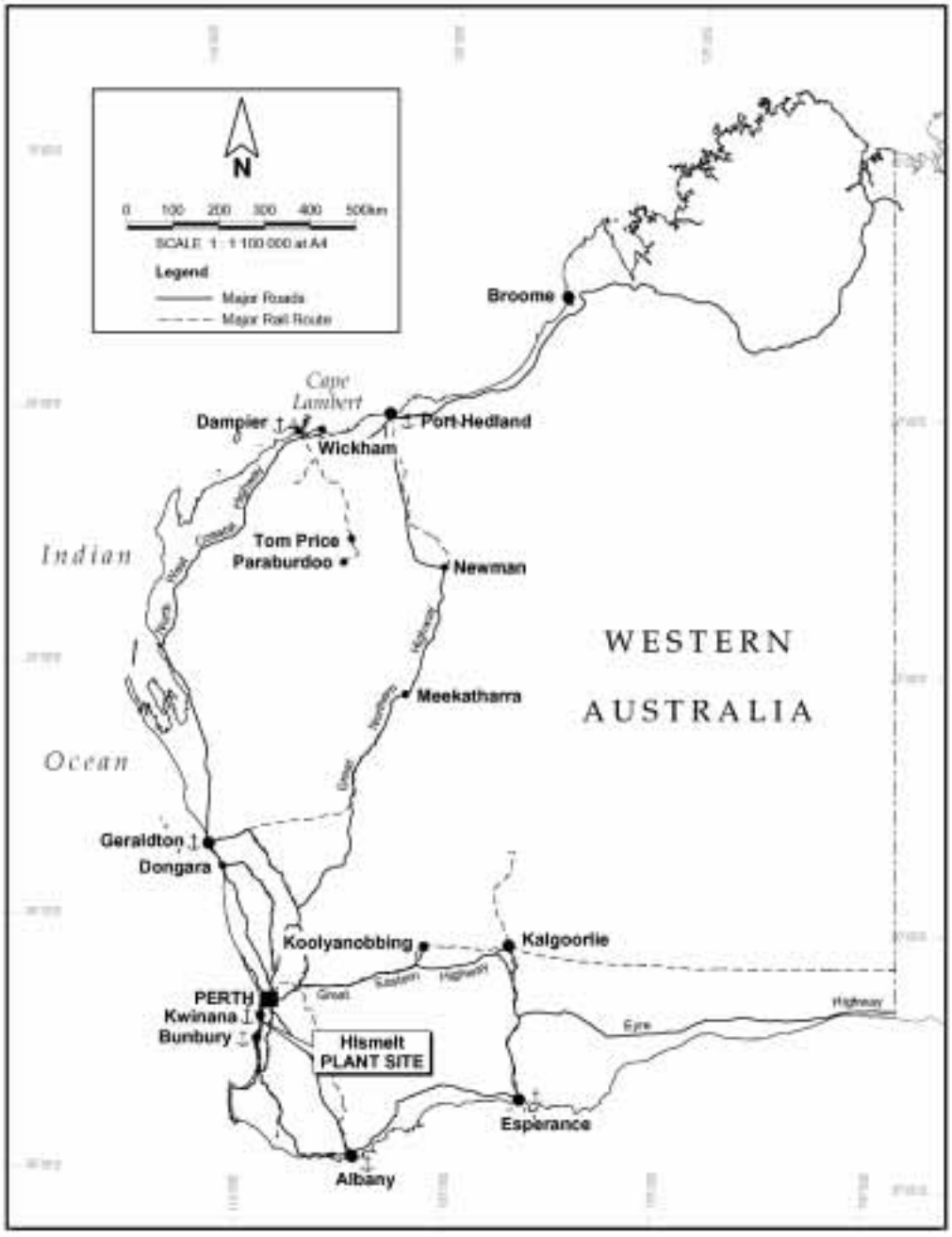

Figure 1: ***Regional location (Source: Figure 1.1 from Corporate Environmental Consultancy Pty Ltd, 2002a)***

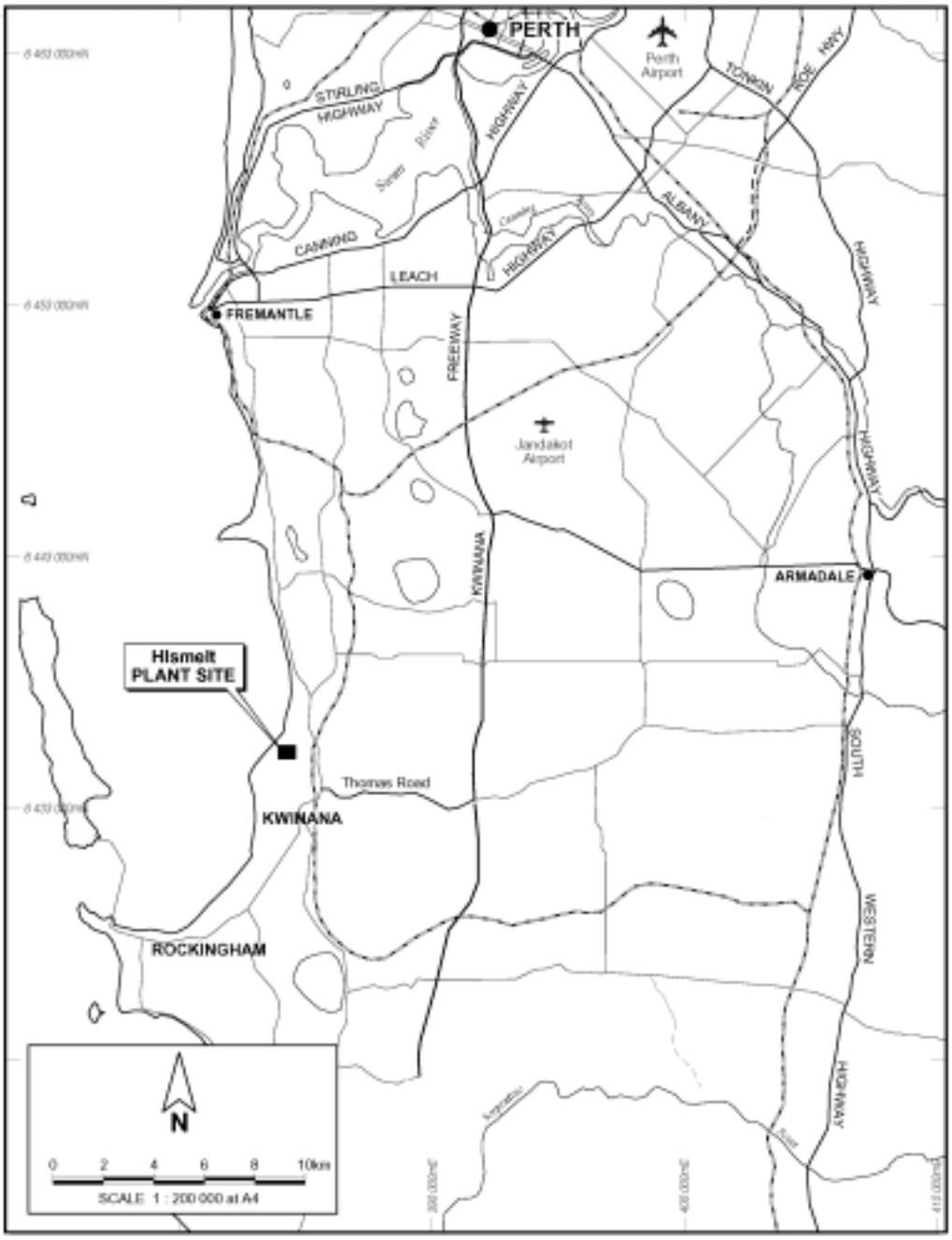

Figure 2: ***Location plan (Source: Figure 1.2 from Corporate Environmental Consultancy Pty Ltd, 2002a)***

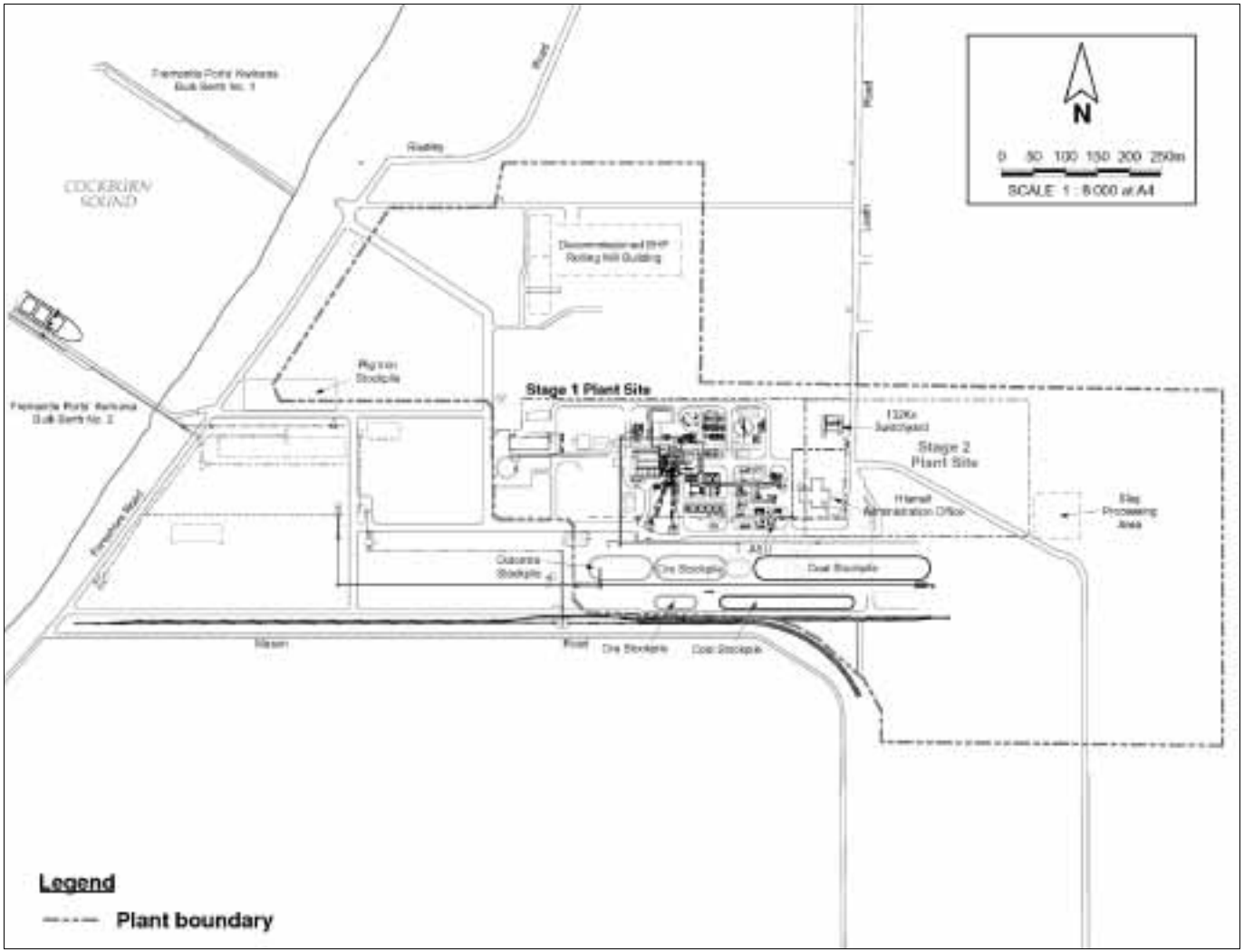

Figure 3: Conceptual site layout (Source: Figure 4.2 from Corporate Environmental Consultancy Pty Ltd, 2002a)

Schedule 2

Proponent's Consolidated Commitments (Assessment No. 1402)

Number	Topic	Environmental Objective	Action (Commitment)	Timing	Advice
1	**General Environmental Management**	To ensure that that any potential environmental impacts associated with the construction and operations of the Project are minimised or ameliorated.	Prepare and submit an Environmental Management Plan (EMP) for the site, which will include Plans for the following: • Construction. • Atmospheric Emissions. • Greenhouse Gases. • Dust. • Noise. • Surface Water. • Groundwater. • Hazardous Materials. • Solid Waste. • Wastewaters. • Transport of Materials. • Decommissioning and Closure. • Safety. Make the above Management Plans available on the HIsmelt web site and at the DEP and local libraries.	Construction EMP (CEMP) - Prior to construction. Prior to commissioning.	DEP
2	**General Environmental Management**	To ensure that that any potential environmental impacts associated with the operations of the Plant are managed and minimised.	Prepare an Environmental Management System (EMS) for the operations of the HIsmelt Plant. The EMS will include elements such as: • Identification of issues. • Management measures. • Training and communication. • Key performance indicators. • Measuring and corrective actions. • Record management. • Programme of review. • Means for continual improvement. • Policy. • Emergency preparedness and response. Implement the EMS.	Prior to commissioning. During commissioning and operation.	

Source: Table 6.1 of the Proponent's Response to Submissions document (Corporate Environmental Consultancy Pty Ltd, 2002b)

Proponent's Consolidated Commitments (Assessment No. 1402) [Continued]

Number	Topic	Environmental Objective	Action (Commitment)	Timing	Advice
3	**Construction**	To ensure that appropriate environmental management measures are incorporated in the construction phase of the Project.	Prepare and submit a Construction EMP for the Project, which will include specific management for: • Contractors. • Incident reporting. • Dust. • Noise. • Waste Disposal. • Groundwater. • Stormwater runoff. • Erosion. • Transport. • Safety. Implement the Construction EMP.	Prior to construction. During construction.	DEP
4	**Atmospheric Emissions**	To ensure that gaseous and particulate emissions, from the Plant do not cause ambient ground level concentrations to exceed appropriate criteria, including the Kwinana EPP and the NEPM standard for Air Quality.	Prepare an Atmospheric Emissions Plan which will include the specific management, monitoring, reporting requirements and measures to be undertaken if exceedances occur for the following parameters: • Sulphur dioxide. • Particulates. • Nitrogen oxides. • Carbon monoxide. • Dioxins and Furans. • Heavy metals. • Volatile organic compounds, Polyaromatic hydrocarbons, Persistent organic pollutants. • Odour. Implement the Atmospheric Emissions Plan.	Prior to commissioning. During operations.	DEP
5	**Sulphur Dioxide**	To ensure that emissions of SO_2 from the Plant are managed and monitored so that they are below the maximum permissible levels.	The Proponent will: • incorporate a Flue Gas Desulphurisation System in the Plant design that is considered Best Available Technology at the time of Plant design; • install a continuous monitoring instrument to measure SO_2 emissions in the gas stream exiting the main stack of the Plant; and • report monitoring data for SO_2 to the DEP on a monthly basis, and annually as part of the National Pollutant Inventory (NPI).	Prior to commissioning and during operation.	DEP

Source: Table 6.1 of the Proponent's Response to Submissions document (Corporate Environmental Consultancy Pty Ltd, 2002b)

Proponent's Consolidated Commitments (Assessment No. 1402) [Continued]

Number	Topic	Environmental Objective	Action (Commitment)	Timing	Advice
6	**Particulates**	To manage and minimise the emissions of airborne particulates from the Plant, and to ensure that the ground level concentrations resulting from these emissions are below the relevant Environmental Protection Policy (EPP) and National Environmental Protection Measure (NEPM) standards.	The Proponent will: • incorporate scrubbers and bag filters that are considered Best Available Technology at the time of Plant design; • measure particulate emissions from the Plant stacks on, as a minimum, a six monthly basis; and • report particulate monitoring data to the DEP on, as a minimum, a six monthly basis.	Prior to commissioning and during operation.	DEP
7	**Nitrogen Oxides**	To ensure that NO_X emissions from the Plant are minimised and that ground level concentrations resulting from these emissions comply with the NEPM standard in residential areas.	The Proponent will: • incorporate burners that are designed to keep NO_X emissions as low as reasonably practicable where process gas will be combusted, and low NO_X burners where natural gas will be combusted in the Plants; • sample and analyse the gas stream exiting the main stack for NO_X emissions on, as a minimum, a six monthly basis; and • report monitoring data for NO_X emissions to the DEP on, as a minimum, a six monthly basis, and annually as part of the NPI.	Prior to commissioning and during operation.	DEP
8	**Carbon Monoxide**	To ensure that emissions of carbon monoxide from the Plant do not result in an exceedance of the NEPM standard in residential areas.	The Proponent will: • sample and analyse the gas stream exiting the main stack of the Plant for CO emissions on, as a minimum, a six monthly basis; and • report monitoring data for CO emissions to the DEP on, as a minimum, a six monthly basis, and annually as part of the NPI.	During operation.	DEP
9	**Dioxins and Furans**	To ensure that the offgas handling system employed in the Plant does not allow dioxins and furans to be emitted.	The Proponent will: • sample and analyse the offgas emissions, in accordance with an agreed standard based on international best practice, during commissioning and the subsequent operation to establish if there are any Dioxins or Furans present; • provide monitoring results for Dioxins and Furans to the DEP as they are received; and • review future monitoring of the offgas emissions for Dioxins and Furans in conjunction with DEP as the results of the monitoring are being assessed.	During commissioning and operation.	DEP

Source: Table 6.1 of the Proponent's Response to Submissions document (Corporate Environmental Consultancy Pty Ltd, 2002b)

Proponent's Consolidated Commitments (Assessment No. 1402) [Continued]

Number	Topic	Environmental Objective	Action (Commitment)	Timing	Advice
10	**Poly Aromatic Hydrocarbons (PAHs) and Volatile Organic Compounds (VOCs)**	To ensure that there are no significant concentrations of PAHs and VOCs emitted to the atmosphere in the offgas from the Plant.	The Proponent will: • sample and analyse the offgas emissions, in accordance with an agreed standard based on international best practice, during commissioning and the subsequent operation to establish if concentrations of PAHs and VOCs are at or above Trigger Levels; • provide monitoring results for the PAHs and VOCs to the DEP as they are received; and • review future monitoring of the offgas emissions for PAHs and VOCs in conjunction with the DEP as the results of the monitoring are being assessed.	During commissioning and operation.	DEP
11	**Heavy metals**	To ensure that there are no significant concentrations of heavy metals emitted to the atmosphere from the Plant.	The Proponent will: • sample and analyse the offgas emissions, in accordance with an agreed standard based on international best practice, during commissioning and the subsequent operation to establish if concentrations of heavy metals are at or above Trigger Levels; • provide monitoring results for the heavy metals to the DEP; and • review future monitoring of the offgas emissions for heavy metals in conjunction with the DEP as the results of the monitoring are being assessed.	During commissioning and operation.	DEP
12	**Odour**	To ensure that any odours emanating from the Project do not adversely affect the welfare and amenity of other land uses.	The Proponent will implement measures to minimise the potential for odours to be produced or released to the environment.	During commissioning and operation.	DEP
13	**Greenhouse**	To minimise greenhouse gas emissions per unit of product, and implement measures for greenhouse gas management.	Prepare and implement a Greenhouse Gas Emissions Management Plan.	Prior to the commencement of construction.	DEP

Source: Table 6.1 of the Proponent's Response to Submissions document (Corporate Environmental Consultancy Pty Ltd, 2002b)

Proponent's Consolidated Commitments (Assessment No. 1402) [Continued]

Number	Topic	Environmental Objective	Action (Commitment)	Timing	Advice
14	**Greenhouse**	To minimise greenhouse gas emissions per unit of product, and implement measures for greenhouse gas management.	As part of the Rio Tinto Group, the Proponent will: • continue to participate in the Australian Greenhouse Office Greenhouse Challenge Programme; • will participate in the research and development of new technologies that will result in a reduction of greenhouse emissions such as coal gasification and hydrogen production; and • calculate annual greenhouse gas emissions from the Plant and report the findings to the DEP. The Proponent will continue to investigate opportunities for offsetting the greenhouse gas emissions from the Project	Ongoing.	
15	**Dust**	To minimise dust generation from Project operations, and to ensure that dust levels from the site are within the Kwinana EPP and NEPM standards and limits, meet the agreed criteria, and do not unreasonably interfere with the health, welfare, convenience, comfort or amenity of any person.	Prepare and submit a Dust Management Plan, which will include: • measures for controlling dust emissions; • monitoring programme; • reporting requirements; and • remediation measures if exceedances of the criteria occur. Implement the Dust Management Plan.	Prior to commissioning. During operations.	DEP
16	**Noise**	To ensure that noise levels from the Project operations comply with the *Environmental Protection (Noise) Regulations, 1997.*	Prepare a Noise Management Plan, which will include: • noise attenuation measures; • surveys and monitoring; and • reporting. Implement the Noise Management Plan.	Prior to commissioning. During operations.	DEP / Kwinana Industries Council
17	**Noise**	To ensure that the predicted noise level from the Plant is included in the cumulative noise study for the Kwinana industries.	Consult with the Kwinana Industries Council (KIC) on the findings of the regional noise survey. Provide results of the noise monitoring and modelling to the Kwinana Industries Council for inclusion in the Kwinana Noise model.	Prior to and during operations.	KIC
18	**Surface Water Runoff and Wash Waters**	To ensure that surface water runoff and washwaters are managed and do not impact on the environment.	Prepare and submit a Surface Water Management Plan, which will include the management for both clean stormwater runoff and for potentially contaminated runoff and washwaters. Implement the Surface Water Management Plan.	Prior to commissioning.	DEP

Source: Table 6.1 of the Proponent's Response to Submissions document (Corporate Environmental Consultancy Pty Ltd, 2002b)

Proponent's Consolidated Commitments (Assessment No. 1402) [Continued]

Number	Topic	Environmental Objective	Action (Commitment)	Timing	Advice
19	**Groundwater**	To ensure that groundwater beneath the site is not adversely impacted by the Project.	Prepare and submit a Groundwater Management Plan, which will include: • procedures for the protection of groundwater; • details of the ongoing, and extended, groundwater monitoring programme undertaken on the site to identify any significant changes in the groundwater; and • procedures for reviewing the monitoring programme, and parameters monitored, in conjunction with the DEP. Implement the Groundwater Management Plan.	Prior to construction.	DEP
20	**Hazardous Materials**	To ensure that the handling, storage and disposal of hazardous materials related to the Project does not result in impacts on the environment or people.	Prepare and submit a Hazardous Materials Management Plan, which will include: • procedures for maintaining an inventory of hazardous materials; • storage and handling requirements; and • emergency response. Implement the Hazardous Materials Management Plan.	Prior to commissioning. During operations.	DEP / MPR
21	**Waste Management**	To minimise, re-use or recycle wastes where practicable and to ensure that any wastes requiring disposal are disposed in an environmentally acceptable and approved manner.	Prepare and submit a Waste Management Plan based on the principles of Reduce, Recycle and Re-use. Implement the Waste Management Plan.	Prior to commissioning. During operation.	DEP
22	**Process Wastewaters**	To ensure that there is no adverse impact on the environment from the storage and if necessary disposal of process wastewaters.	Prepare and submit a Wastewater Management Plan, which will include the management, monitoring and reporting of process wastewaters. Implement the Wastewater Management Plan.	Prior to commissioning. During operation.	DEP / Water Corporation
23	**Sewage**	To ensure that an appropriate sewerage system is installed on site to minimise the potential for nutrients from the sewage to enter the environment.	Install appropriate Nutrient Retentive Sewerage Systems on the site.	During construction.	Department of Health / Town of Kwinana
24	**Site Contamination**	To ensure that any existing on-site contamination is managed, and that further contamination from Project operations is avoided.	Undertake a Stage II Site assessment to identify on site contamination.	Prior to construction.	LandCorp / DEP
25	**Community**	To ensure that the community is consulted during development, construction and operation of the Plant.	Continue to liaise with the community and other stakeholders during the development, construction and operation of the Plants.	During the development, construction and operation of the Plant.	

Source: Table 6.1 of the Proponent's Response to Submissions document (Corporate Environmental Consultancy Pty Ltd, 2002b)

Proponent's Consolidated Commitments (Assessment No. 1402) [Continued]

Number	Topic	Environmental Objective	Action (Commitment)	Timing	Advice
26	**Visual Amenity**	To minimise the impact of the Plant on visual amenity.	Establish screening vegetation around the Plant site to act as a site buffer.	During construction and operations.	
27	**Risk and Hazards**	To ensure that the Plant is designed, constructed and operated in a safe manner, and that the Project operations undertaken are non-hazardous.	The Proponent will: • undertake HAZOP studies as part of the design, construction and operation of the Plants which will be submitted to the MPR; • prepare Site Safety Management Plans, as part of the Project Management Plan for the site, which will be submitted to the MPR; and • develop Emergency Response Procedures, which will include the establishment and maintenance of an Emergency Response Team. The Procedures will be provided to the Kwinana Industries Mutual Aid group. The Proponent will ensure that the operator of the Air Separation Unit analyses for hydrocarbons and CO_2 at appropriate locations within the ASU.	Studies will be undertaken during the design, construction and operation of the Plant. Plans prepared prior to construction and commissioning. During Plant operations.	MPR
28	**Decommissioning and Closure**	To ensure that the Plant is properly decommissioned and the site is left in a safe and acceptable manner.	The Proponent will: • prepare and regularly update a Closure Plan in accordance with Rio Tinto's requirements; • prepare a Decommissioning Plan which will be submitted to Rio Tinto and DEP prior to closure; and • decommission and close the Plant site in accordance with the regulatory requirements at the time.	Prior to closure.	DEP

Source: Table 6.1 of the Proponent's Response to Submissions document (Corporate Environmental Consultancy Pty Ltd, 2002b)