SINCLAIR KNIGHT MERZ

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Dampier Port Increase in Throughput to 145 Mtpa

GREENHOUSE GAS EMISSIONS

- Rev 1
- 30 October 2006

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Document history and status

Revision	Date issued	Reviewed by	Approved by	Date approved	Revision type
Draft A	21 August 2006	R Burgess	M Bell	21 August 2006	Internal Review
Rev 0	19 Oct 2006	R Burgess	PMR, S Russell	24 Oct 2006	For PI Review
Rev 1	24 Oct 2006	R Burgess	Peter Jensen	30 Oct 2006	Final

Distribution of copies

Revision	Copy no	Quantity	Issued to
Rev 0	Electronic	1	Peter Royce
Rev 0	Electronic	1	Steve Russell
Rev 1	1	1	P. Royce

Printed:	24 May 2007
Last saved:	24 May 2007 09:45 AM
File name:	I:\WVES\Projects\WV03010\WV03010\Technical\GHG\DPU GHG Assessment Rev 1B.doc
Author:	R Burgess
Project manager:	Richard Galloway
Name of organisation:	Rio Tinto Iron Ore
Name of project:	Dampier Port Increase in Throughput to 145 Mtpa
Name of document:	Greenhouse Gas Emissions
Document version:	Rev 1
Project number:	WV03010

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Executive Summary

Pilbara Iron is currently upgrading its Dampier Port Operations, which will result in an increase in throughput capacity to 145 Mtpa. The Operations consist of the port facilities at Parker Point and East Intercourse Island, near of the Town of Dampier. As a part of the environmental approvals process for this proposed throughput, this greenhouse gas emissions assessment has been undertaken to estimate the annual emissions as a result of the upgraded port facilities and increased throughput.

Annual greenhouse emissions from the upgraded Port Operations are estimated to be around 129,251 t CO_2 –e. This estimate includes emissions from electricity use, diesel fuel consumption, wastewater and solid waste production (**Table 1**). The two significant sources of greenhouse gas emissions are electricity use and diesel fuel combustion, emitting 115,468 and 13,356 t CO_2 –e or 89.3% and 10.3% of total greenhouse gas emissions respectively.

- **Table 1: Annual Emissions Summary – Dampier Port Operations 145 Mtpa**

Emission type	Projected Use	Emissions (t CO_2 –e/ yr)
Electricity	164,955 MWh	115,468
Wastewater	Population of 445	38
Solid Waste	12.7 t Paper, 283.6 t Co-mingled	389
Diesel Fuel Combustion	4,770 kL	13,356
Land Clearing	0	0
Explosives	0	0
Total	n/a	**129,251**

The estimation of 129,251 t CO_2 –e equates to 0.89 kg CO_2 –e/railed tonne received. This figure represents an increase in efficiency when compared with historical greenhouse gas emissions data for the Port Operations (**Table 2**).

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Table 2: Historical Emissions Summary – Dampier Port Operations

Year	Total Greenhouse Gas Emissions (tCO_2 -e)	Dampier Port Railed Tonnes Received (Mtpa)	Total Emissions per Railed Tonne Received (kg CO_2 -e/t)
2001	59878	69.0	0.87
2002	65990	69.5	0.95
2003	66908	71.1	0.94
2004	72965	73.9	0.99
2005	82602	82.9	1.00
145 Mtpa	129251	145.0	0.89

(Hamersley Iron, 2005)

The Dampier Port Operations will continue to be a significant contributor[1] of greenhouse gases for Rio Tinto Iron Ore. Specific requirements for significant operations are detailed in the Rio Tinto Greenhouse Gas Emissions Standard and Guidance Note (Rio Tinto 2003a and 2003b), and include requirements to:

- Develop, document and maintain knowledge of greenhouse gas emissions, including current and future greenhouse gas sources and the factors that effect emission levels;
- Identify and assess the greenhouse gas related risks and opportunities for the business or operation, including the use of emissions abatement cost curves[2], assessments of emissions trading and offset opportunities where necessary;
- Develop and achieve greenhouse gas emissions reduction targets;
- Ensure that technical and commercial consideration of greenhouse gas emission issues are included in the appropriate external and internal publications;
- Implement and maintain greenhouse gas emission control and reduction programs;
- Assign clear responsibilities and accountabilities for greenhouse gas management;
- Ensure appropriate measures are in place for metering or estimating greenhouse gas emissions; and

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[1] As defined by the Rio Tinto Greenhouse Gas Emissions Guidance Note (Rio Tinto, 2003a) significant operations are defined as those that consistently emit 3000 t CO_2 –e or greater.

[2] Emissions abatement cost curves are required for operations which produce greenhouse gas emission of greater than 50 000 t CO_2 –e and are smelters, refineries or mines with a life expectancy of > 5 years (RTIO, 2003a). Hence, cost curves are **NOT** a specific requirement for Port Operations, even though Dampier Port has a life expectancy of > 5 years, and estimated annual greenhouse gas emissions of 129,251 t CO_2 –e.

- Conduct periodic reviews to identify potential risks and opportunities associated with greenhouse gas issues.

This estimation of greenhouse gas emissions for the Port Operations will aid in the development and documentation of knowledge of greenhouse gas emissions for the Operations, as well as providing a basis for the determination of future reduction targets and control and reduction programs.

1. Introduction

1.1 Background: Dampier Port Upgrade

The Dampier Port Operations consist of port facilities at both Parker Point and East Intercourse Island, located near the Town of Dampier (**Figure 1**). The Port is operated by Pilbara Iron on behalf of Hamersley Iron Pty Limited and is currently undergoing works to increase throughput capacity. The original capacity of the Dampier Port Operations was 80 Mtpa, and was upgraded to 95 Mtpa, with construction completed in early 2006. Construction has recently commenced on the subsequent upgrade providing a throughput capacity of 145 Mtpa, and will continue into 2007.

The most recent upgrade provides for an increase in throughput capacity to 145 Mtpa by Q4 2007. The upgrade to 145 Mtpa will consist of replacement and upgrade of key infrastructure at Parker Point and some minor works at East Intercourse Island. The Parker Point facilities will undergo the most significant changes, resulting in an increase of capacity from 75 Mtpa to 100 Mtpa. This will be achieved by optimisation of existing facilities and those currently under construction. Project characteristics for the Parker Point facilities are listed below in **Table 3**.

- **Table 3: Dampier Port Upgrade Characteristics – Parker Point**

Characteristic	Existing Parker Point Operations– Approved Ministerial Statement 000702 (Total port capacity: 120 Mtpa)	Parker Point Operations following Port increase in throughput (Total port capacity: 145 Mtpa)
Parker Point Capacity	75 Mtpa	**100 Mtpa**
Number of ship loading berths	2 at 220,000 DWT and 1 at 180,000 DWT	2 at 220,000 DWT and **2** at 180,000 DWT
Blending stockpile capacity	4.7 Mtpa	4.7 Mtpa
Bulk stockpile live capacity	2.5 Mtpa	**3.5 Mtpa**
Number of train arrivals	8 - 9 per day	**10 - 11 per day**
Facility footprint	186 ha	186 ha
Major Plant Components	2 Car Dumpers 2 Screenhouses 2 Sample Stations 4 Stackers 3 Reclaimers 2 Shiploaders 24 Stockpiles	2 Car Dumpers 2 Screenhouses 2 Sample Stations 4 Stackers 3 Reclaimers 2 Shiploaders 24 Stockpiles
Water Requirements	2,160 ML/year (PP and EII plus town and Rail)	**3,270 ML/year (PP and EII plus town and Rail)**
Shipping Movements	Approx 500-550 ships per year	**Approx 700 ships per year**
Workforce	Operations approx 440 personnel	**Operations approx 445 personnel**

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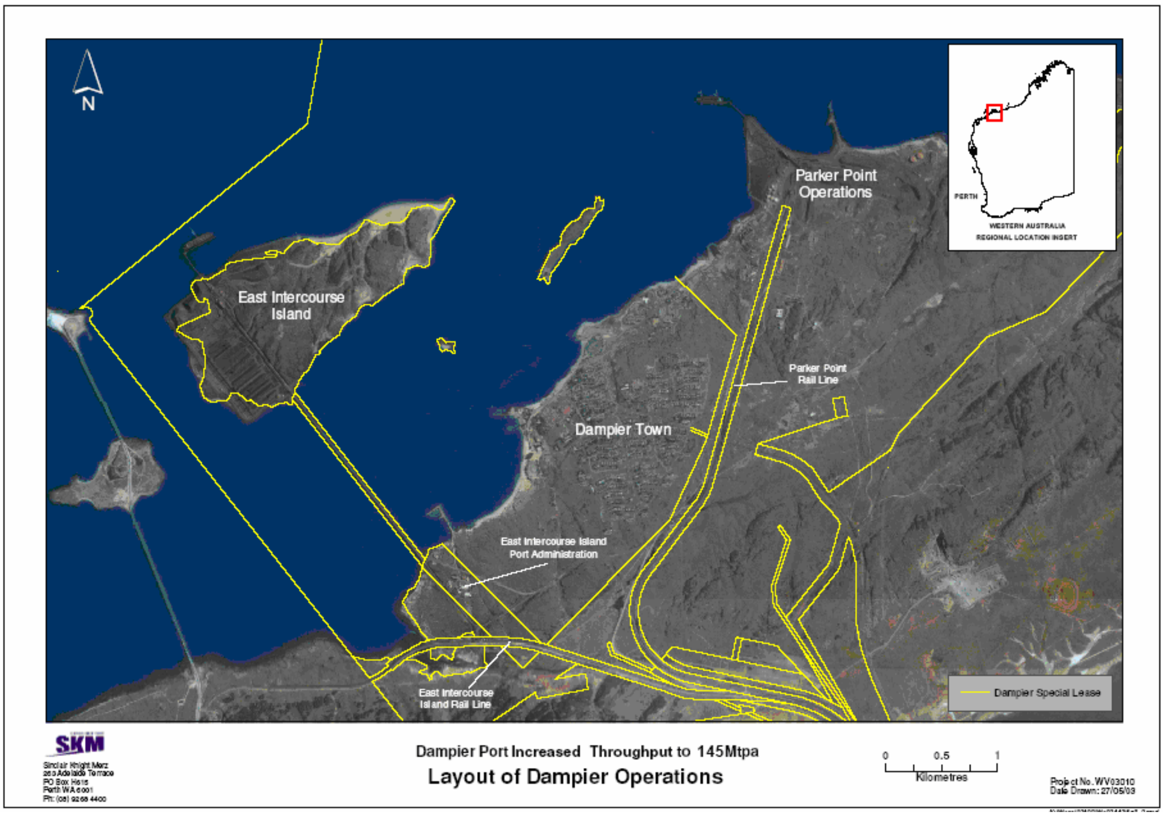
No change in capacity is proposed for the facilities at East Intercourse Island, with the capacity remaining at 45 Mtpa. The most significant works proposed are an upgrade of the East Intercourse Island dust management systems, including dust suppression on tippers, covering of the 5E conveyor, a new weather station, water storage facilities and pumping equipment for dust control purposes.

- **Figure 1: Dampier Port Operations Locality and Layout**



1.2 Current Operations

Currently, ore arrives at the Dampier Port Operation by train from the inland mining operations. The ore is dumped from the trains at rotary car dumpers, weighed and moved to the Parker Point and East Intercourse Island ore stockpiles via conveyor. The ore is blended into the stockpiles using stackers, and removed to be shipped using bucket wheel reclaimers. The lump ore is then rescreened and fines are removed prior to sampling and loading onto ships and the fines returned to the stockpiles. **Figure 2** shows the current process description for the Dampier Port Operations, which will be subject to changes associated with any alteration in the product strategy for the Port Operations.

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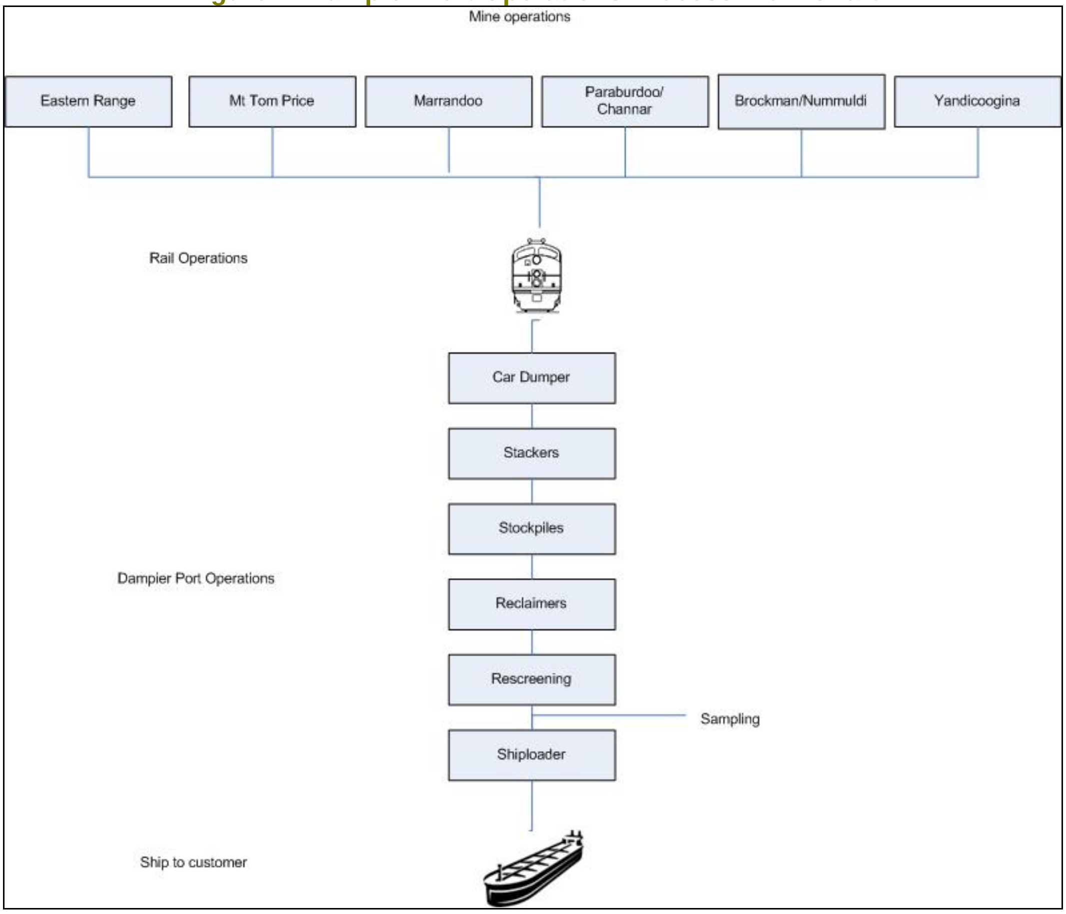
Figure 2: Dampier Port Operations Process Flow Chart



1.3 Purpose

The purpose of this greenhouse gas assessment is to quantify the projected greenhouse gas emissions from the Dampier Port Operations, including facilities at Parker Point and East Intercourse Island.

Major greenhouse gas sources have been identified for the Port Operations, and emissions from the entire Port Operations have been estimated for the operational phase at 145 Mtpa capacity. These estimations will aid in the development and documentation of knowledge of greenhouse gas emission for the Operations, as well as providing a basis for the determination of future reduction targets and control and reduction programs.

1.4 Sources of Greenhouse Gas Emissions

Possible sources of greenhouse gas emissions from Port Operations include the following:

- Combustion of fuel in machinery, vehicles, tugs and other equipment;
- Use of electricity generated offsite;
- Use of electricity generated onsite;
- Sewage produced on site;
- Solid waste produced on site;
- Explosives used on site; and
- Land clearing for the project.

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2. Methodology

2.1 EPA Guidance

The Environmental Protection Authority (EPA) has produced a Guidance Statement for Minimising Greenhouse Gases (EPA, 2002), which is relevant to this project. The EPA's environmental objective for greenhouse gas management is to

> *"Reduce emissions to a level which is as low as practicable"*.

A key strategy identified by the EPA to address greenhouse gas management in the planning, design and operation of projects is the development of an ongoing emissions monitoring and reporting program. This strategy is consistent with the Rio Tinto guidelines and Objectives for greenhouse gas management, as outlines in Section 2.2 and Section 5 of this document. This report will provide a baseline assessment of greenhouse gas emissions for the Dampier Port Operations, at a capacity of 145 Mtpa.

The Guidance Statement also recommends calculation of greenhouse gas emissions using a nationally agreed methodology, such as that produced by the National Greenhouse Gas Inventory Committee (now produced by the Australian Greenhouse Office). The Australian Greenhouse Office methodology has been adopted for the estimation of greenhouse gas emissions at the Dampier Port Operations, and is detailed in **Sections 2.3** and **2.4.**

2.2 Rio Tinto Guidelines

Greenhouse gas reporting is undertaken for all Rio Tinto Iron Ore (RTIO) Western Australian operations as a part of the annual Social and Environment (S & E) Report. The methodologies applied in S & E reports are derived from the Australian Greenhouse Office (AGO) methodologies and workbooks.

RTIO also produce a set of Environment Standards and associated guidelines for all Rio Tinto Business Units and managed operations. Standard E4: Greenhouse Gas Emissions (Rio Tinto, 2003b) outlines the RTIO intent, scope, requirements, implementation and performance measurement in regards to the management of greenhouse gas emissions. The RTIO Environment Standards are implemented using a set of guidelines developed for each of the Standards. The RTIO Greenhouse Gas Emissions Guidance Note (Rio Tinto, 2003a) assists operations in interpreting and addressing the requirements of the Greenhouse Gas Standard.

Key requirements from the Greenhouse Gas Emissions Standard and Guidance Note for all significant facilities, i.e. these which consistently produce 3kT CO_2 –e or greater include:

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- Develop, document and maintain knowledge of greenhouse gas emissions, including current and future greenhouse gas sources and the factors that effect emission levels;
- Identify and assess the greenhouse gas related risks and opportunities for the business or operation, including the use of emissions abatement cost curves[3], assessments of emissions trading and offset opportunities where necessary;
- Develop and achieve greenhouse gas emissions reduction targets;
- Ensure that technical and commercial consideration of greenhouse gas emission issues are included in the appropriate external and internal publications;
- Implement and maintain greenhouse gas emission control and reduction programs;
- Assign clear responsibilities and accountabilities for greenhouse gas management;
- Ensure appropriate measures are in place for metering or estimating greenhouse gas emissions; and
- Conduct periodic reviews to identify potential risks and opportunities associated with greenhouse gas issues.

2.3 Australian Greenhouse Office Methodology

The methods for calculating greenhouse gas emissions in this report are derived using the AGO methodology. This methodology is based on emission factors derived for the National Greenhouse Gas Inventory (AGO, 2002) and is designed to allow consistent reporting of greenhouse gas emissions across Australia. The methodology is summarised in the AGO Factors and Methods Workbook (AGO, 2004) and detailed in a series of workbooks, also developed by the AGO (AGO, 2003a-j). The workbooks cover various sources of greenhouse gas emissions, including:

- Energy (Stationary Sources, Transport and Fugitive Fuel Sources);
- Industrial Processes;
- Solvents;
- Agriculture;
- Land Use, Land Use Change and Forestry (Plantations and Forest-Land Conversion); and
- Waste.

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[3] Emissions abatement cost curves are required for operations which produce greenhouse gas emission of greater than 50 kT CO_2 –e and are smelters, refineries or mines with a life expectancy of > 5 years (RTIO, 2003a). Hence, cost curves are **NOT** a requirement for Port Operations, even though Dampier Port has a life expectancy of > 5 years, and annual greenhouse gas emissions of > 50 kT CO_2 –e.

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2.4 Adopted Methodology for the Dampier Port Operations

The emissions estimated in this assessment are based on AGO methodologies and derived for a worst-case scenario. The estimates are based on the maximum possible fuel consumption, electricity consumption and number of personnel. This leads to a conservative estimate of greenhouse gas emissions (i.e. overestimation rather than underestimation of emissions).

2.4.1 AGO Energy Methodology

End Use Electricity Emissions

Use of electricity sourced from the Dampier supply results in greenhouse gas emissions due to the production of greenhouse gases from energy generation. Energy generated at the Dampier Power Station has been assigned an average emission factor of 0.7 kg CO_2 -e / kWh. This emission factor is based on data collected in the 2004 Social and Environmental Report for Dampier Operations (Hamersley Iron, 2005).

East Intercourse Island

It is assumed that Energy demand from the East Intercourse Island facilities is unlikely to change as a result of the proposed increase in throughput to 145 Mtpa. In 2005, the recorded energy use at East Intercourse Island was 54,155 MWh, and this figure will be used for operations at 145 Mtpa.

Parker Point

There are currently two systems supplying the Parker Point Operations (one 33kV and one 11kV).

33kV System

The average projected demand on the 33 kV system is estimated at 27.7 MVA, with a nominal capacity of 20,000 t/hour for all inloading and outloading circuits.

The energy demand of the plant varies according to the product being processed. When lump ore is being shipped, the plant is assumed to require 32.5 MVA. When fines are being shipped, some operating equipment, including conveyors and stackers, are not required and the power demand is reduced to 24.5 MVA. It is assumed that the port will be shipping lump ore for 40% of its operating time and fines for the remaining 60%.

Based on a port capacity of 100,000 Mtpa and a total circuit capacity of 20,000 t/hour, the port will be operating for approximately 5000 hours/year. If a power factor of 0.8 is assumed, this results in an approximate annual energy use for the 33 kV system of 110,800 MWh.

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11 kV System

The 11 kV system currently provides power to the existing operating plant as follows:

- Shiploader 1;
- Car Dumper 1;
- Sample Station 1;
- Screenhouse 1; and
- Various conveyors.

The system will still be in operation when the upgrade is completed, but loads will be significantly reduced due to the removal of the plant listed above. The 11 kv system is planned to provide energy for some offices and lighting at the Port Operations when the proposed upgrade is completed. The loading on the 11 kv system has been considered insignificant when compared with the 33 kv system requirements (Taylor, 2006).

Total

The total annual energy use for the Dampier Port operating at 145 Mtpa has been estimated at 164,955 MWh, supplied from the Dampier Power Station. This estimation is compared with historical energy data for the Dampier Port in **Table 4**. Historical data is available for the years 2001 to 2005. No data for 2006 is presented, as the reporting year is incomplete.

Table 4: Energy Use for Dampier Port

Year	Throughput (Mtpa)	Energy Use (MWh)	Comparison Energy Rate (MWh/Mt)
2001	69.0	79,322	1,149
2002	69.5	80,060	1,152
2003	71.1	83,539	1,175
2004	73.9	83,464	1,129
2005	82.9	104,309	1,258
Full Capacity	145	164,955	1,138

The methodology for emissions estimations for electricity end use is detailed in **Text Box 1**.

Electricity Use Emissions
GHG Emission (t CO_2 –e) = Q * EF
Where Q = Quantity of electricity used (kWh) EF = Emission Factor = 0.7 kg CO_2 -e / kWh

- **Text Box 1: Electricity Use Emissions Methodology (AGO, 2003a)**

Diesel Fuelled Generators

Greenhouse gas emissions as a result of the generation of electricity onsite using diesel fuelled generators have been included in **Section 2.4.3**, Combustion of Diesel Fuel.

2.4.2 AGO Waste Methodology

Greenhouse gas emissions from waste can be broken down into two categories; emissions from solid waste, and emissions from wastewater.

Wastewater Generation Emissions

Greenhouse gas emissions arise from the treatment of wastewater and sludge. The major greenhouse gas emission is methane (CH_4) which is converted to a CO_2-e emission by the use of a global warming potential scaling factor. The methodology for estimating emissions from wastewater treatment takes into account emissions from both sludge and wastewater treatment.

The quantity of wastewater produced by the workforce at Dampier is determined by the application of an emission factor of 18.25 kg per person per year (AGO, 2004 and IPCC, 1997). The on-site population of Port Operations at maximum capacity is likely to be 445 (SKM, 2006).

Wastewater Generation Emissions
GHG Emission = $[(P*DC_w*(1-F_{sl})*EF_{W =}) + (P*DC_W*F_{sl}*EF_{sl})-R]*21$
Where P = Population DC_w = Mass BOD / person / year ≈ 22.5 kg/person/year F_{sl} = Fraction of organic component removed as sludge ≈ 0.29 EF_w = Methane emission factor (wastewater) ≈ 0.22 EF_{sl} = Methane emission factor (sludge) ≈ 0.22 R = Recovered methane = 0t 21 = Conversion factor from CH_4 to CO_2

- **Text Box 2: Wastewater Generation Emissions Methodology**

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Solid Waste Emissions

Emissions from solid waste refer to emissions generated from landfill. The major greenhouse gas emitted from solid waste disposal is methane, (CH_4). Typical solid waste types include those listed in **Table 5**. Historical waste data for the Dampier Port provides records of only co-mingled waste and paper products. A large proportion of the waste categorised as co-mingled is likely to consist of inert waste types such as concrete, metal, glass and plastic. These inert wastes do not produce significant greenhouse gas emissions. Since more detailed data is not available, greenhouse gas estimations for solid waste are likely to be overestimated.

Estimations of solid waste production for the Port at full capacity have been estimated based on the number of employees. Waste data collected for 2005 showed 273.9 t of co-mingled waste and 12.3 t of paper were produced by a population of 440 employees. During full production, the population is expected to rise to 445. Projected waste figures for the Dampier Port at maximum capacity are listed in **Table 5.**

- **Table 5: Estimated Dampier Port Operations Waste Production**

Waste Type	Operations Annual Production (t)
Paper	12.7
Textile and Textile Synthetic	0
Wood / Straw	0
Garden / Park	0
Food	0
Co – mingled	283.6

The methodology for estimation of solid waste emissions is based on Australian Greenhouse Office methods (AGO, 2003j and 2004) and is summarised in **Text Box 3.**

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Solid Waste Emissions

GHG Emission = $[(Q*DOC*DOC_f*F_1*16/12) – R]*(1 – OX)*21$

Where
Q = Quantity of waste (t)
DOC = Dissolved Organic Carbon proportion of waste type (Table 3)
DOC_f = Fraction dissimilated for waste type (Table 3)
F_1 = Carbon fraction of landfill gas ≈ 0.5
R = Recovered methane = 0t
OX = Oxidation factor ≈ 0.1
16/12 = Conversion factor from C to CH_4
21 = Conversion factor from CH_4 to CO_2

- **Table 6: Waste Parameters**

Waste Type	DOC	DOC_f
Paper	0.4	0.55
Textile	0.4	0.77
Textile Synthetic	0	0
Wood / Straw	0.3	0.55
Garden / Park	0.17	0.55
Food	0.15	0.77
Co – mingled	0.15	0.66
Concrete / Metal / Glass / Plastic	0	0

Total Solid Waste GHG Emission = ∑ GHG Emissions (per fuel type)

- **Text Box 3: Solid Waste Emissions Methodology**

2.4.3 Diesel Fuel Combustion Emissions Methodology

The combustion of fossil fuels in vehicles, generators and other stationary equipment are sources of greenhouse gas emissions at the Dampier Port Operations.

The methodology for estimating greenhouse gas production by these sources is outlined in **Text Box 4**. The major greenhouse gas emitted is carbon dioxide (CO_2). Other greenhouse gases emitted as by-products include methane (CH_4) and nitrous oxide (N_2O). The AGO Transport and Stationary Sources Workbooks (AGO, 2003a and 2003b) includes methodologies for calculating non-CO_2 greenhouse gas emissions. The methodologies are also presented in **Text Box 4** but the emissions are considered to be insignificant when compared to the emissions of CO_2[4] and as such are not included in the projected emissions in **Section 3**.

Diesel Fuel Combustion Emissions

CO_2 GHG Emission (t CO_2 –e) = Q * EC * EF/1000

Where
Q = Quantity of fuel used (kL)
EC = Energy content of fuel (GJ/kL) = 39.6 GJ/kL
EF = Emission Factor (kg CO_2 –e / GJ) = 69.7 kg CO_2 –e / GJ

CH_4 GHG Emission (t CO_2 –e) = Q*EC*EF*CF

Where
Q = Quantity of fuel used (t)
EC = Energy content of fuel (GJ/kL) = 0.0000396 PJ/t
EF = Emission Factor (Mg CH_4 –e / PJ) = 4 Mg CO_2 –e / PJ
CF = Global Warming Potential Conversion factor = 21

N_2O GHG Emission (t CO_2 –e) = Q*EC*EF*CF

Where
Q = Quantity of fuel used (t)
EC = Energy content of fuel (GJ/kL) = 0.0000396 PJ/t
EF = Emission Factor (Mg CH_4 –e / PJ) = 0.6 Mg CO_2 –e / PJ
CF = Global Warming Potential Conversion factor = 310

Total Transport Energy GHG Emission = ∑ GHG Emissions (per fuel type)

- **Text Box 4: Diesel Fuel Combustion Emissions Methodology**

Table 7 presents the historical diesel fuel use from 2002 to 2005 at the Dampier Port Operations, and **Figure 3** shows the projected future fuel consumption, based on the historical data.

[4] Combustion of 1 tonne of diesel fuel produces over 2.7 t of CO_2, compared with 3.3 kg of CO_2 -e as CH_4, and 7.3 kg of CO_2 -e as N_2O

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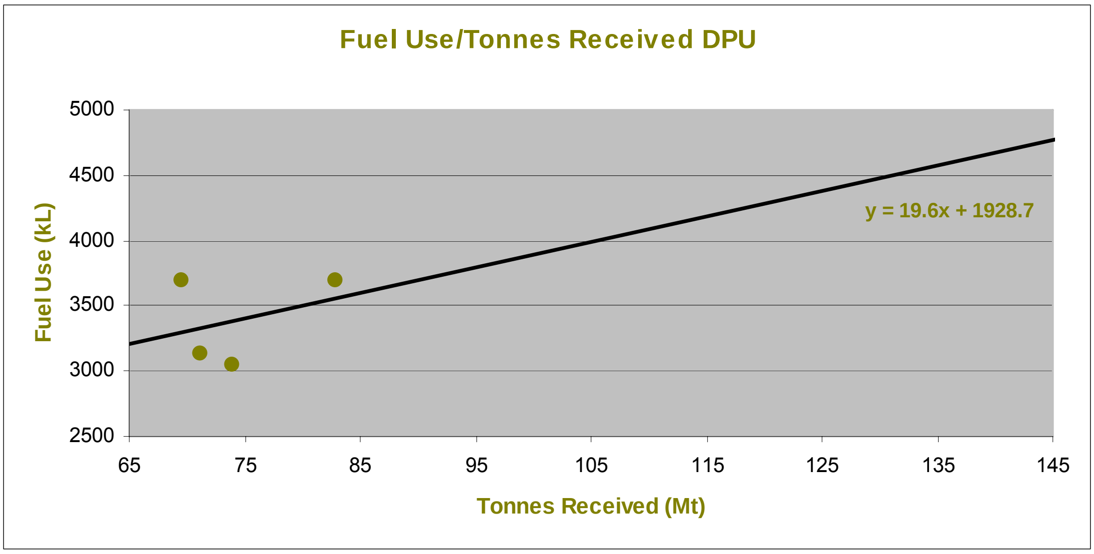
- **Table 7: Historical Diesel Use at Dampier Port Operations**

Year	Tonnes Received (Mt)	Diesel Use (kL)
2002	69.5	3687
2003	71.1	3125
2004	73.9	3047
2005	82.9	3687
Full Capacity	145	4770[5]

(Source: Hamersley Iron, 2005)

It is estimated that the Port Operations will have an annual diesel fuel consumption of 4770 kL when operating at 145 Mtpa capacity.

- **Figure 3: Dampier Port Operations Projected Diesel Use**



2.4.4 Land Clearing Emissions

It is assumed that no land will be cleared as part of ongoing operational processes at the Dampier Port Operations.

2.4.5 Explosives Emissions

It is assumed that no explosives (for example ANFO - Ammonium Nitrate/Fuel Oil) will be used as a part of ongoing operational processes at the Dampier Port Operations.

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[5] Estimated fuel use for the upgraded Dampier Port Operations at full capacity, based on historical data as shown in Figure 3.

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3. Projected Emissions

Table 8 summarises the estimated greenhouse gas emissions for the Dampier Port Operations at full capacity of 145 Mtpa.

▪ **Table 8: Annual Greenhouse Gas Emissions**

Emission type	Projected Use	Emissions (t CO_2 –e/ yr)
Electricity	164,955 MWh	115,468
Wastewater	Population of 445	38
Solid Waste	12.7 t Paper, 283.6 t Co-mingled	389
Diesel Fuel Combustion	4,770 kL	13,356
Land Clearing	0	0
Explosives	0	0
Total	n/a	**129,251**

The majority of greenhouse gas emissions arise from the use of electricity at the Port Operations. The calculations for electricity use at the Port assume maximum demand is continually achieved for fines and lump processing at Parker Point. In reality, it is unlikely that this maximum demand will be sustained throughout operations. The resulting actual demand should be significantly lower than this figure. However, at this stage of the upgrade, the maximum demand is the only information available which can be used to estimate electricity use at Parker Point.

The other significant contribution to greenhouse gas emissions is the combustion of diesel fuel. This combustion estimate takes into account all diesel fuel use on site. Estimates for diesel use at full capacity were not available for use in this assessment, so historical diesel use figures for the Port were used to calculate an estimate based on 145 Mtpa throughput.

Emissions due to solid waste and wastewater were both estimated to contribute minimal greenhouse gas emissions at the Port Operations when compared with the emissions due to electricity use and diesel combustion.

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4. Comparisons

Historical greenhouse gas emissions records were available for this assessment of Dampier Port from January 2001 to April 2006 (**Table 9**). Averages for 2006 have not been presented due to limited up to date data availability.

- **Table 9: Historical Greenhouse Gas Emissions: Dampier Port**

Year	Total Greenhouse Gas Emissions (tCO_2 -e)	Dampier Port Railed Tonnes Received (Mtpa)	Total Emissions per Railed Tonne Received (kg CO_2 -e/t)
2001	59878	69.0	0.87
2002	65990	69.5	0.95
2003	66908	71.1	0.94
2004	72965	73.9	0.99
2005	82602	82.9	1.00
145 Mtpa	**129251**	**145.0**	**0.89**

The estimated emissions for Dampier Port at full throughput of 145 Mtpa result in greenhouse gas emissions of 0.89 kg CO_2 -e/ railed tonne received. This figure represents a decrease from recent figures from 2002 to 2005. Given that the 129,251 t CO_2 –e estimated for the Port at full production is generated as a worst case scenario, the actual emissions recorded at the Port are likely to be less than the estimate.

To 2005, the trend over the past five years has been a gradual increase in emissions per railed tonne. This may be due to a number of factors, including changes in ore source and type, and increases in infrastructure and machinery required at the Port Operations over time.

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5. Conclusions

The estimated annual greenhouse gas emissions of 129,251 t CO_2 –e identifies the Dampier Port Operations as a significant contributor (>3000 t CO_2 –e per annum) of greenhouse gas emissions for Rio Tinto Iron Ore facilities. The extra emissions due to the increase in throughput to 145 Mtpa do not change the greenhouse significance of the Operations.

The existing management processes undertaken for the Operations should continue, with the objective of controlling and reducing greenhouse gas emissions from the Operations remaining a long term priority.

The significant sources of greenhouse gas emissions for the Operations have been identified as electricity use from the Dampier Power Station and diesel fuel combustion. This information could be used to fulfil the Operations requirements as set out in the Rio Tinto Greenhouse Gas Emissions Standard:

- Identification and assessment of greenhouse gas related risks and opportunities for the Operations;
- Development and refinement of greenhouse gas emissions reduction targets;
- Development of emission control and reduction management initiatives; and
- Documentation of greenhouse gas emissions estimation at the Cape Lambert Port Operations.

Rio Tinto formally recognises the contribution of greenhouse gas emissions from human activities to climate change (Rio Tinto, 2005), and has developed a climate change program to achieve reduction in greenhouse gas emissions. The following commitment has been taken from the Rio Tinto Climate Change Position of March 2005 (Rio Tinto, 2005).

> *"Rio Tinto will take a proactive, pragmatic and transparent approach to achieve greenhouse gas emissions reductions from our operations and the use of our products."*

To achieve this broad goal, it is recommended that tangible emission reduction targets are implemented for the Dampier 145 Mtpa Port Operations, and that specific management processes are developed in order to meet and exceed these requirements.

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(a) Energy (Stationary Sources)
(b) Energy (Transport)
(c) Energy (Fugitive Fuel Sources)
(d) Industrial Processes
(e) Solvents
(f) Agriculture
(g) Land Use, Land Use Change and Forestry
(h) Land Use, Land Use Change and Forestry (Plantations)
(i) Land Use, Land Use Change and Forestry (Forest Land Conversion)
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