# HIsmelt iron ore smelting project, Kwinana — Changes to environmental conditions

HIsmelt Corporation Pty Ltd

Report and recommendations
of the Environmental Protection Authority

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## Summary and recommendations

HIsmelt Corporation Pty Ltd (Hismelt) operates a Research and Development (R&D) facility for direct iron ore smelting to produce commercially saleable iron product. The facility is located on the BHP Steel site within the Kwinana industrial area. The project was formally assessed by the Environmental Protection Authority (EPA) in 1990, and environmental approval was issued by the Minister for the Environment. HIsmelt now seeks an extension to the approval of an additional five years, and changes to its environmental management commitments relating to cooling water discharge, environmental noise surveys and provision of monitoring data. This report provides the EPA's advice and recommendations to the Minister for the Environment on the factors, conditions and procedures relevant to the proposed changes.

Under the provisions of Section 46 of the *Environmental Protection Act 1986*, the Minister for the Environment has requested the EPA to assess and report on the proposed changes to the environmental conditions. In addition, the EPA may make recommendations as it sees fit.

### Environmental factors

In the EPA's opinion, the following environmental factors are relevant to the proposed changes and thus require detailed evaluation in the report:

(a) waste outputs; and

(b) noise.

### Conclusion

Following consideration of the above environmental factors, the EPA has concluded that the proposal by HIsmelt for an extension to the project lifetime and for changes to the environmental management commitments do not compromise the EPA's current objectives, provided that the amended conditions recommended in Section 4 and set out in detail in Appendix 3, are imposed.

### Recommendations

The EPA recommends that:

1. The Minister for the Environment considers the report on the relevant environmental factors of waste outputs (3.2) and noise (3.3);
2. The Minister for the Environment notes that the EPA has concluded that the proposed changes do not compromise the EPA's current objectives, and thus do not impose an unacceptable or increased impact on the environment, provided there is satisfactory implementation by the proponent of the recommended conditions set out in Section 4;
3. The Minister for the Environment imposes the amended conditions and procedures consistent with Section 4 and set out in detail in Appendix 3 of this report.

### Conditions

The EPA recommends that the following conditions, which are set out in formal detail in Appendix 3, be imposed if the proposed changes by Hismelt are approved for implementation:

(a) the proponent shall fulfil the commitments in the Consolidated Commitments statement set out as an attachment to the recommended conditions in Appendix 3; and

(b) in order to reflect the current standard in environmental management, the proponent shall be required to prepare, within 6 months of the amended conditions being issued, environmental management system documentation with components such as those adopted in Australian Standards AS/NZ ISO 14000 series.

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# 1. Introduction and background

HIsmelt Corporation Pty Ltd (HIsmelt) operates a Research and Development (R&D) facility for a direct iron ore smelting process to produce commercially saleable iron. The iron produced from this process is used as a feed material to make steel. The facility is located on the BHP Steel site within the Kwinana industrial area (Figure 1). The project was formally assessed by the Environmental Protection Authority (EPA) in 1990 (EPA, 1990), and conditions were set by the Minister for the Environment in the environmental approval for the project (Statement of 17 September 1990, Appendix 1).

The key factors considered in the 1990 assessment were sulphur dioxide and dust emissions, liquid and solid wastes, and cooling water discharge to Cockburn Sound (EPA, 1990).

HIsmelt now seeks extension to the life of the project to 1999, and changes to its environmental management commitments relating to cooling water discharge, noise surveys and provision of monitoring data. In view of the nature of the proposed changes, the EPA chose not to seek public comment on these changes.

Further details of the proposed changes are presented in Section 2 of this Report. Section 3 discusses environmental factors relevant to the proposed changes. Conditions and procedures to which the project should be subject if the Minister for the Environment accepts the EPA's advice and approves the proposed changes are set out in Section 4. Section 5 presents the EPA's conclusion and Section 6 the EPA's recommendations.

Appendix 1 provides original conditions of environmental approval (Statement of 17 September 1990). References are listed in Appendix 2, and recommended conditions and procedures and proponent's commitments are provided in Appendix 3.

# 2. The proposed changes

The HIsmelt process involves production of molten iron from iron ore and coal - via a molten bath reactor, with minimal pre-treatment of the key materials. This technology eliminates the need for sinter plants and coke ovens required in conventional methods. A process diagram is provided in Figure 2, and the layout of the facility is shown in Figure 3.

In the 1990 proposal, the research project was expected to operate for a three to four year period (originally from 1991 to 1994). The facility has a nominal design production capacity of 14 tonnes per hour of iron product, equivalent to a rated capacity of 100,000 tonnes per year, and is operated on an intermittent basis depending on test results. The annualised capacity and inputs/outputs are provided in Table 1.

HIsmelt has requested changes to the environmental conditions as approved by the Minister for the Environment in 1990 and set out in Appendix 1 to:

- extend the life of the project by an additional five years (up to the year 1999) beyond that originally proposed and approved in Condition 8;
- delete Proponent's Commitments 5, 6 and 7 relating to the discharge and monitoring of cooling water;
- amend the frequency of noise surveys required under Proponent's Commitment 8, from bi-annual to bi-ennuel; and
- amend Proponent's Commitment 11 relating to annual provision of monitoring data.

The project life extension is being sought for the following reasons:

- commissioning of the facility which was originally scheduled for 1990, was delayed until 1993, ie. operation of the facility did not occur until three years after environmental approval was granted;
- periods of downtime during operation of the facility have resulted in the need to extend the research phase of the project; and

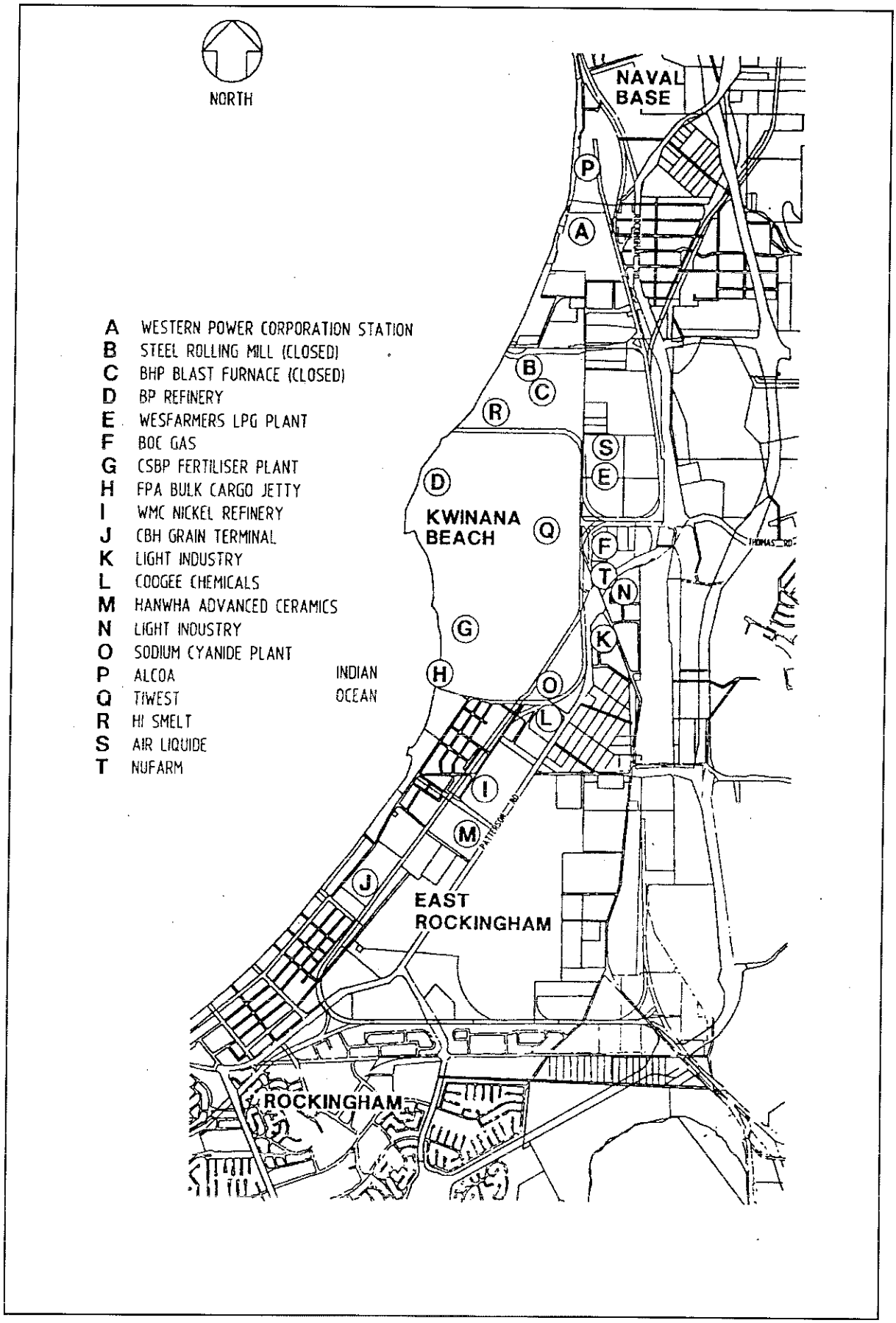


*Figure 1. Location of HIsmelt facility.*

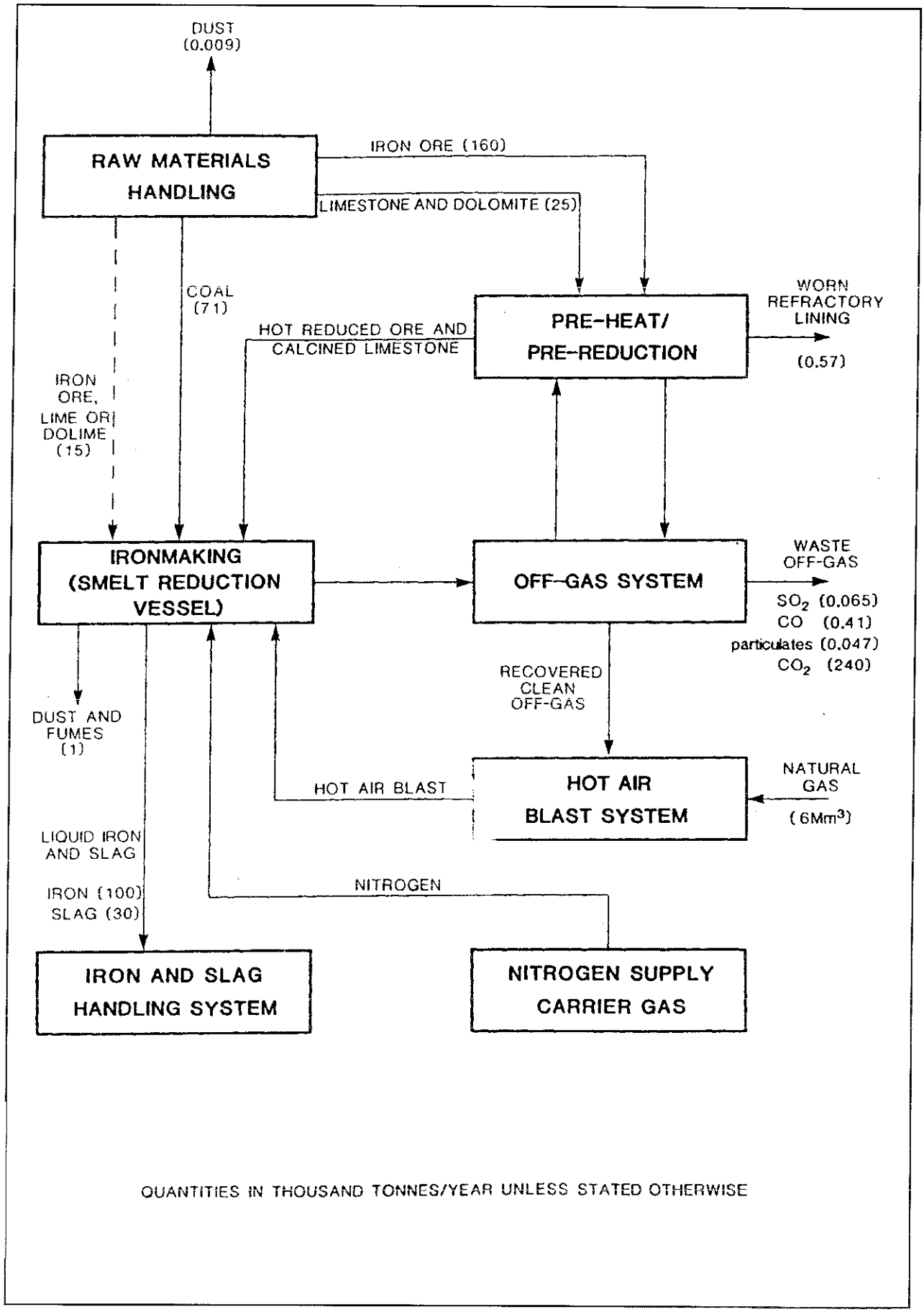


*Figure 2. Process flow diagram.*

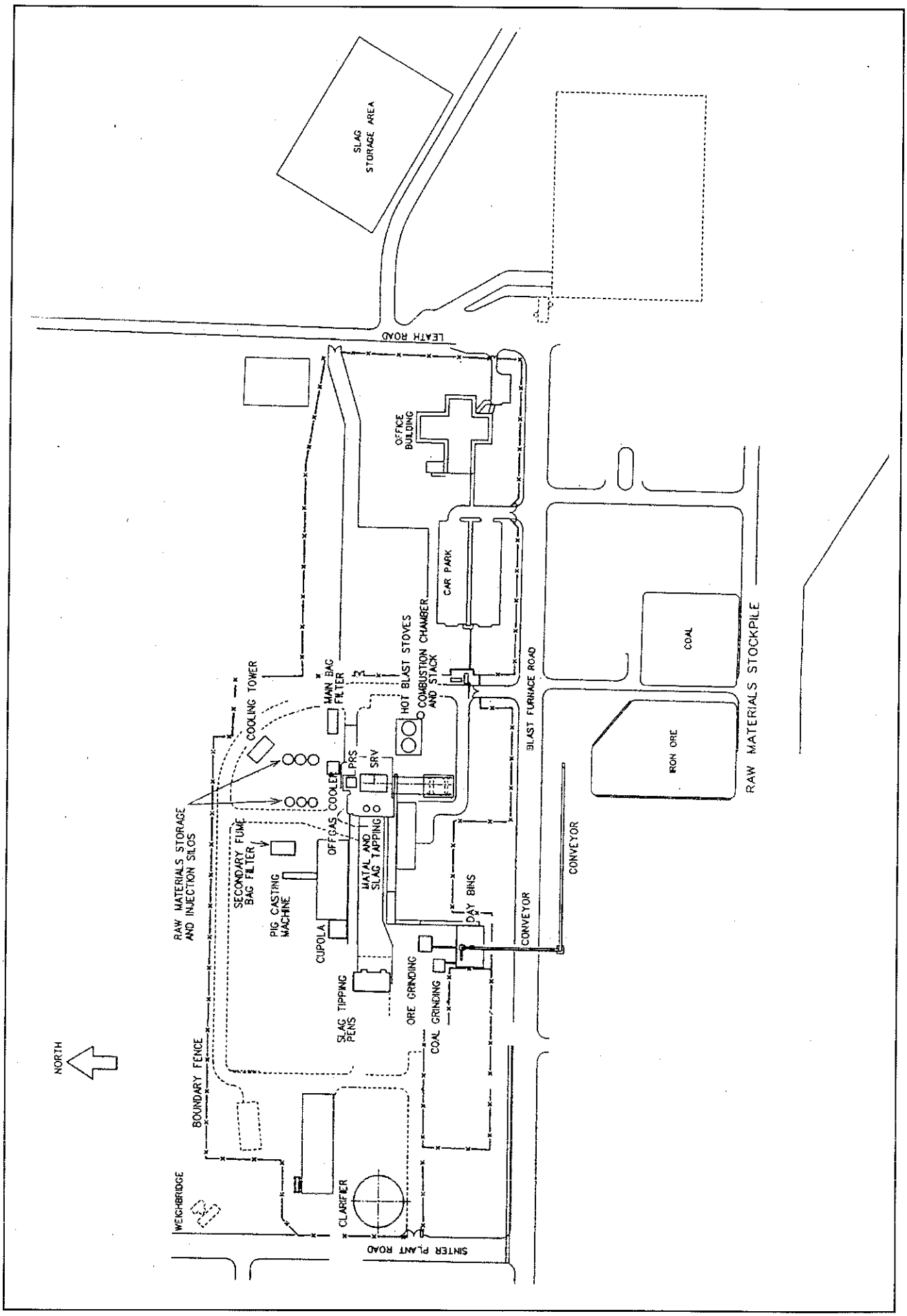


***Figure 3. Plant layout.***

**Table 1. Major research and development facility annualised capacity[1]**

| | Hourly rate | ANNUALISED CAPACITY 1991 (1,250hr) | 1992 (3,375hr) | 1993-94 (5,000hr) |
|---|---|---|---|---|
| Product | | | | |
| Iron units, t | | 25,000 | 67,500 | 100,000 |
| Raw materials | | | | |
| Iron ore, t | | 41,000 | 111,000 | 160,500 |
| Coal, t | | 19,000 | 52,000 | 71,000 |
| Limestone, t | | 3,500 | 9,500 | 13,700 |
| Dolomite, t | | 2,700 | 7,400 | 11,200 |
| Lime, t | | 2,200 | 6,000 | 8,200 |
| Dolime, t | | 1,800 | 5,000 | 6,700 |
| Calcium fluoride, t | | 50 | 150 | 200 |
| Coke, t | | 50 | 150 | 200 |
| Utilities | | | | |
| Natural gas | | | | |
| • Minimum usage, $Nm^3 \times 10^3$ | 1.159 | 1,450 | 3,900 | 5,800 |
| • Normal usage, $Nm^3 \times 10^3$ | 1.209 | 1,500 | 4,100 | 6,000 |
| • Maximum usage, $Nm^3 \times 10^3$ | 4.599 | 5,700 | 15,500 | 23,000 |
| Electricity [2] | | | | |
| Fresh water | | | | |
| • Normal, ML | 0.052 | 104 | 160 | 200 |
| Seawater, ML | 8.712 | 11,000 | 29,000 | 43,600 |
| Waste By-products | | | | |
| Gaseous waste | | | | |
| • Sulphur dioxide | | | | |
| - normal, t | 0.013 | 16 | 44 | 65 |
| - emergency, t | 0.126 | 160 | 420 | 630 |
| • Carbon monoxide | | | | |
| - normal, t | 0.081 | 100 | 270 | 410 |
| - emergency, t | 0.100 | 125 | 340 | 500 |
| • Total suspended particulates | | | | |
| - normal, t | 0.0091 | 11 | 30 | 47 |
| - emergency, t | 0.0098 | 12 | 33 | 50 |
| • Fugitive dust, t | 0.0018 | 5 | 7 | 9 |
| Liquid waste | | | | |
| • Rainwater runoff | | | | |
| - stockpiles, ML | 0.030 | 40 | 40 | 40 |
| - main plant, ML | 0.125 | 160 | 160 | 160 |
| • Plant site wash-down, ML | 0.0042 | 5 | 14 | 21 |
| • Domestic sewage, ML | 0.0015 | 2 | 5 | 7 |
| • Cooling water, ML | 8.712 | 11,000 | 29,000 | 44,000 |
| Solid waste | | | | |
| • Dust, t | | 120 | 340 | 500 |
| • Fume, t | | 120 | 340 | 500 |
| • Molten slag, t | | 7,600 | 20,600 | 30,500 |
| • Refractory lining, t | | 140 | 380 | 570 |
| Subtotal solid waste, t | | 8,000 | 21,700 | 32,100 |

1. Figures have been rounded off for presentation purposes.
2. Total absorbed power requirement would be 8MW.
3. The hourly fugitive dust emission rate refers to full scale operations, and includes ship unloading operations.

- additional testing is envisaged in order to further refine the smelting process.

As a consequence, the predicted 1994 target for completion of project, as specified in the proponent's 1989 Public Environmental Review (PER) document (Dames & Moore, 1989) and in Condition 8, is no longer appropriate.

The proponent has also requested that environmental management commitments relating to cooling water discharge, noise surveys and provision of monitoring data, as mentioned above, should either be modified or removed for the following reasons:

- discharge of cooling water to Cockburn Sound no longer occurs as all process waste waters are currently recycled or evaporated;
- results of past noise surveys indicate compliance with the prescribed noise levels in the noise regulations; and
- the annual provision of monitoring data in Commitment 11 is not consistent with the current licence requirement for the facility, and there is a need to avoid double reporting to the Department of Environmental Protection (DEP).

The proposed changes are summarised in Table 2 below:

**Table 2. Proposed changes**

| Existing condition/commitments | Changes sought |
|---|---|
| Condition 8: Proponent to obtain approval from EPA to extend the life of the project. | Proponent seeks approval to extend project lifetime to 1999, as there was a 3 years delay in the original schedule for the plant commissioning. |
| Commitments 5, 6 and 7: Proponent to<br>• monitor total chlorine and temperature levels in the cooling water discharge;<br>• review and reduce these levels if unacceptable; and<br>• inspect the beach outfall structures. | Proponent seeks to have these commitments deleted, since discharge of cooling water to Cockburn Sound no longer occurs. |
| Commitment 8: Proponent to<br>• establish baseline noise data;<br>• monitor plant noise level bi-annually; and<br>• reduce unacceptable noise levels. | Proponent seeks to change plant noise monitoring from bi-annually to bi-ennially, as results of past noise surveys indicate compliance. |
| Commitment 11: Proponent to<br>• submit annual report to EPA documenting results of monitoring programmes;<br>• notify EPA of unplanned events; and<br>• submit a final report to the EPA at the end of project | Proponent seeks to amend this commitment relating to annual provision of monitoring data, to be consistent with the current DEP licence requirement for the facility and to avoid double reporting to the DEP. |

## 3. Environmental factors

### 3.1 Relevant environmental factors

In assessing the environmental acceptability of the proposed changes, it is the EPA's opinion that the following environmental factors are relevant and require detailed consideration in this report:

(a) waste outputs; and

(b) noise.

The above factors relate to the proposed changes in project time extension, provision of monitoring data and noise surveys (as outlined in Section 2 above). These were identified from the EPA's review of 1989 PER document, the 1990 EPA assessment, and reports submitted to date on environmental performance of the project as required under environmental conditions (Statement of 17 September 1990) and licence conditions (Part V of the *Environmental Protection Act 1986*), including an Environmental Management Programme report (HIsmelt, 1993) and monitoring data reports (HIsmelt, 1991-97).

In the original proposal and assessment, cooling water was to be extracted from Cockburn Sound, chlorinated, circulated through the process, and then discharged back to the Sound via the main southern drainage channel. Accordingly, HIsmelt made commitments to regularly monitor total chlorine and temperature levels in the cooling water discharge, and to inspect the beach outfall structures (Commitments 5, 6 and 7, Appendix 1), to prevent unacceptable impacts. However, based on environmental and economic considerations, HIsmelt later decided to use scheme water for cooling purposes (via a cooling water system) and all process waters are recycled or evaporated in the settling pond. As a result, there is no discharge of cooling water to Cockburn Sound. Thus, the EPA agrees that the commitments relating to cooling water discharge are no longer applicable to the current operation of the project and should be deleted.

The relevant environmental factors are discussed in the following Sections 3.2 to 3.3 of this report.

## 3.2 Waste outputs

### Description

In assessing the environmental acceptability of the proponent's request to extend the project life by additional five years to 1999, the EPA needs to consider the overall impacts of wastes generated from the project on the surrounding environment in Kwinana.

In the 1989 proposal, the research project was expected to operate for up to four years (1991 to 1994), on an intermittent basis. Table 1 provides the project inputs/outputs in terms of hourly rates and annualised capacity. The term "annualised capacity" reflects the research and development nature of the facility, as hours of operation of the facility were to increase from 1,250 hours initially (first year of operation) to 3,375 hours (second year of operation), up to a maximum of 5,000 hours at full scale (the last two years of operation). Although the annualised discharges of gases, particulates, cooling water and solid wastes increase in proportion, the hourly mass emission rates of these wastes were to remain the same throughout the operation of the facility.

As indicated in Table 1, the total throughput of iron ore over the four year period of operation is about 475,000 tonnes of iron ore. The proponent has advised that since the start-up of the plant in 1993, approximately 25,000 tonnes of iron ore has been used.

In order that emissions of sulphur monoxide and particulates comply with the *Environmental Protection (Kwinana) (Atmospheric Wastes) Policy 1992* (the Kwinana EPP), HIsmelt has set discharge criteria of 35 grams per second of sulphur dioxide (which is the Maximum Permissible Quantity (EPA, 1992a)), and 150 milligrams of particulates per cubic meter of process off-gas (via bag filters). Emissions of carbon dioxide are minimal under normal operating conditions (due to post combustion of the off-gas at the base of the stack prior to discharge to atmosphere), and well within the World Health Organisation (WHO) ambient guideline of 25ppm (one hour average ground level concentration) under abnormal conditions (such as plant startups, shutdowns and upset conditions).

The DEP licence conditions require continuous real time stack monitoring for particulate emissions, stack and ambient monitoring for sulphur dioxide and monthly submission of the sulphur dioxide monitoring data to the DEP (in accordance with the Kwinana EPP).

In regard to liquid wastes, contaminated surface runoff, wash-down water and cooling water blowdown are collected and directed to a concrete clarifier, for subsequent recycling and/or evaporation (Figure 4). As mentioned above, cooling water is no longer discharged into Cockburn Sound.

Solid wastes generated from the HIsmelt project are mainly slags, process dust and other solid wastes (Table 3). Although slags were considered inert in the 1990 assessment and have been stored in an area to the west of the BHP property that has been previously used for disposing of other inert solid materials, HIsmelt will carry out a concentration testing of the slags to confirm the inert nature of the slag material against the DEP's current criteria. Process dust from bag filters is either recycled back to the process or disposed of at an approved landfill site. Waste oils are recycled, and other solid wastes, including refractory linings, are disposed of at approved landfill sites.

**Table 3. Quantity and composition of solid and non-aqueous wastes.**

| SOURCE | DESCRIPTION OF MATERIAL | MAJOR CHEMICAL CONSTITUENTS (% wt) | | QUANTITY (tpa) | | |
|---|---|---|---|---|---|---|
| | | | | 1991 | 1992 | 1993-94 |
| BAG FILTER | (1) Dust | FeO | 63 | | | |
| | | Coal | 28 | | | |
| | | Limestone | 5 | | | |
| | | Dolomite | 4 | 120 | 340 | 500 |
| | (2) Fume | FeO | 45 | | | |
| | | CaO | 21 | | | |
| | | CaS | 10 | | | |
| | | SiO | 9 | | | |
| | | $Al_2O_3$ | 5 | | | |
| | | MgO | 4 | | | |
| | | $CaF_2$ | 3 | 120 | 340 | 500 |
| SLAG LADLES | Molten Slag | FeO | 5 | | | |
| | | $SiO_2$ | 26 | | | |
| | | CaO | 36 | | | |
| | | $Al_2O_3$ | 16 | | | |
| | | MgO | 12 | 7,600 | 20,600 | 30,500 |
| LADLES & VESSELS | Refactory Lining | $SiO_2$ | 3 | | | |
| | | $Al_2O_3$ | 2 | | | |
| | | $Fe_2O_3$ | 5 | | | |
| | | CaO | 2 | | | |
| | | MgO | 88 | 140 | 380 | 570 |
| SUBTOTAL SOLID WASTE | | | | 8,000 | 21,700 | 32,100 |

The DEP licence conditions require groundwater monitoring at quarterly intervals, via a number of monitoring bores on site (Figure 5), for physical and specified chemical parameters (Table 4), and annual submissions of the monitoring data to the DEP.

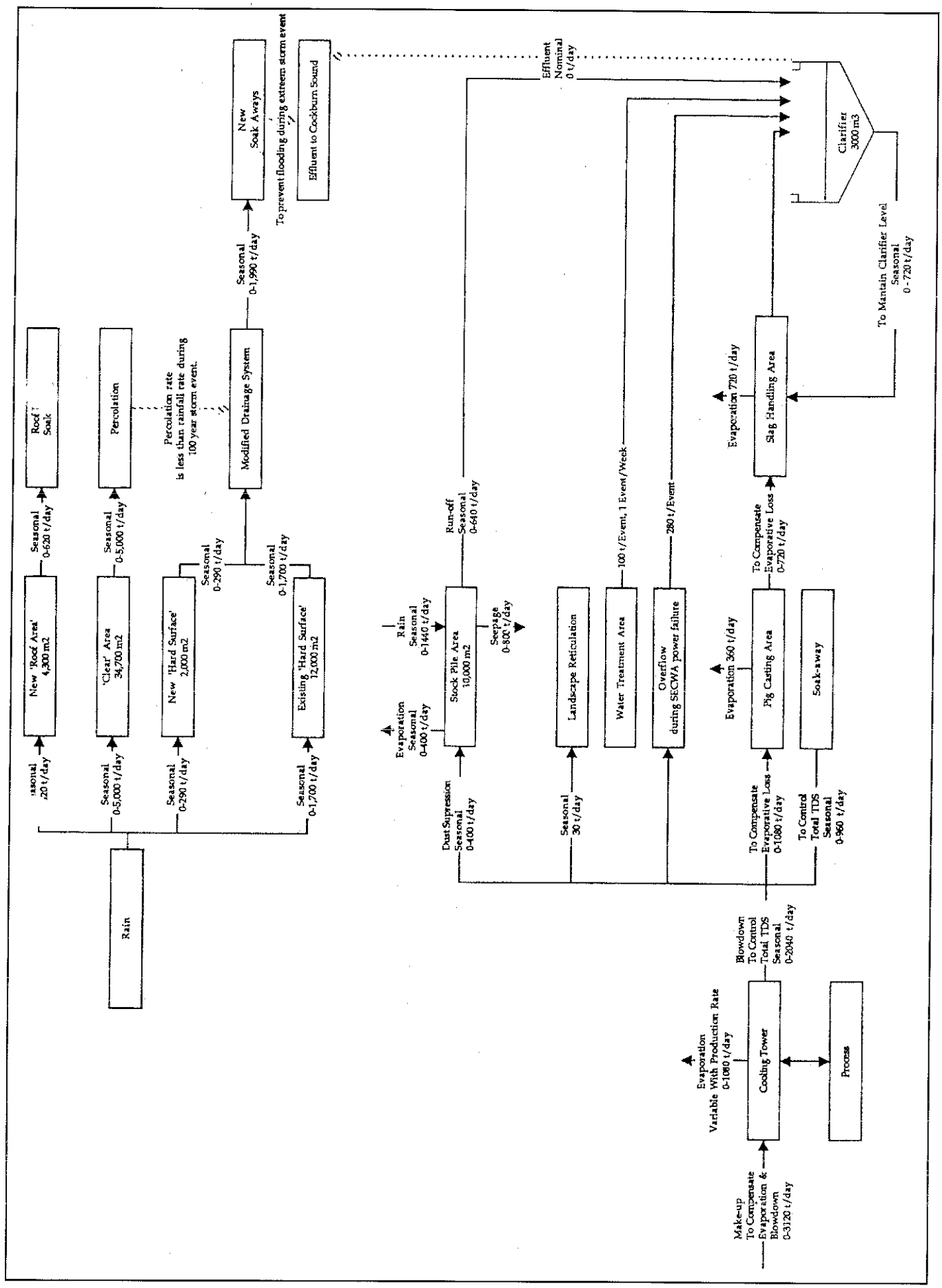


*Figure 4. Sources and volumes of wastewater.*

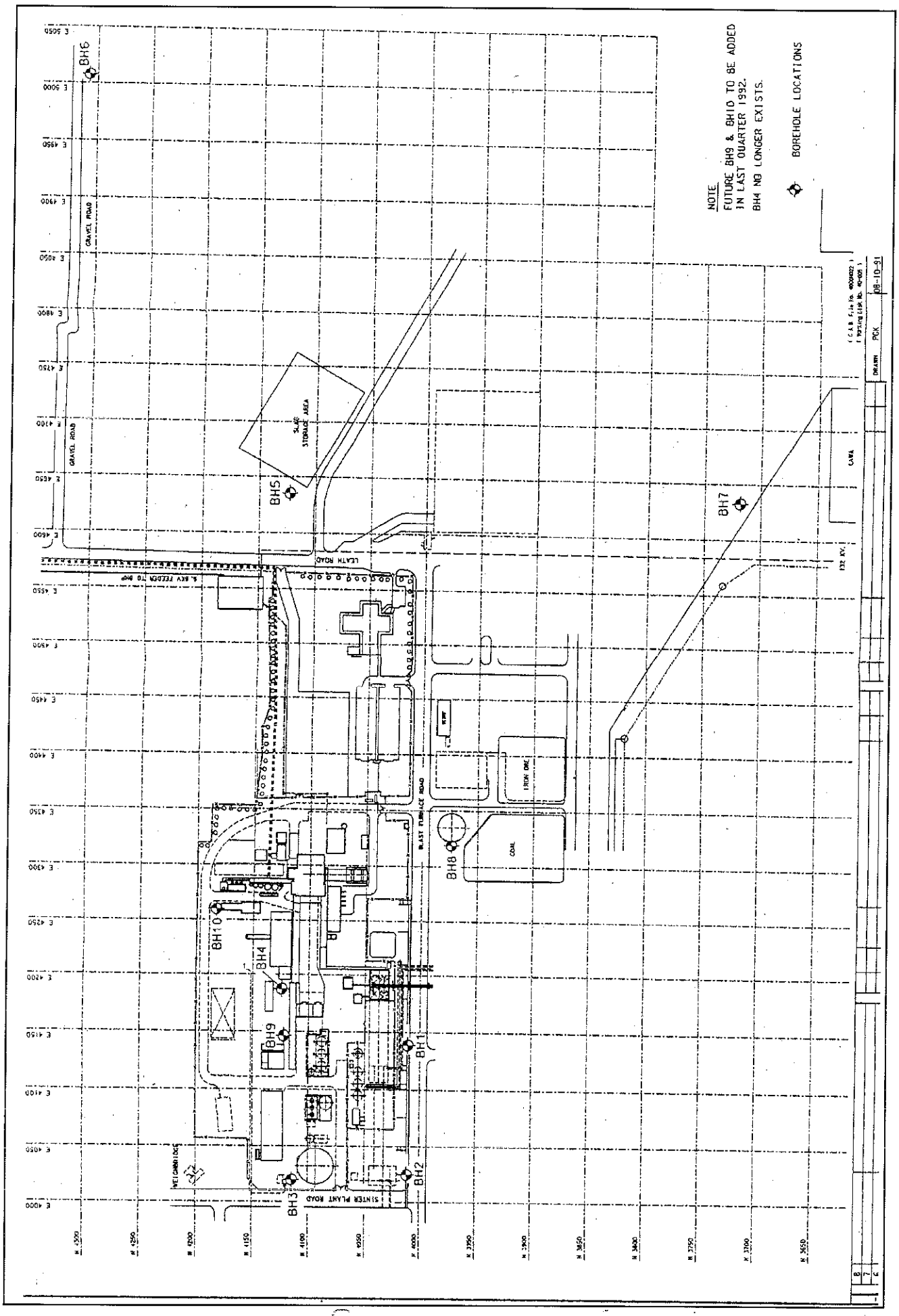


*Figure 5. Borehole locations.*

**Table 4. Analyses performed for groundwater monitoring.**

| BORE NO. | CHEMICAL/ PARAMETER | POLLUTION SOURCE INDICATOR |
|---|---|---|
| All | Na | |
| All | Ca | |
| All | Mg | |
| All | Fe | Hismelt activity |
| 5,6 | Cr | Slag Leaching |
| 6,7,8 | Se | Coal Leaching |
| All | Cl | |
| All | $SO_4$ | |
| All | $NO_3$ | |
| All | $CO_3$ | |
| All | $HCO_3$ | |
| 5,6,7 | Non-sulphate S | Slag Leaching |
| All | TDS | |
| All | pH | |
| 1,3 | Oil | Prior Contamination |
| 1,6,7,8 | COD | |
| 1,6,7,8 | TOC | |
| All | $CO_2$ | |
| All | Conductivity | |
| All | Water Depth | |

**Assessment**

The area considered for assessment of this environmental factor is the area defined in the Kwinana EPP, the groundwater beneath and down gradient of the project site, and Cockburn Sound.

The EPA's objectives in regard to this factor are to ensure that the total loading of wastes into the above areas over the life of the project is not increased as a result of the project life extension, and to:

- ensure the air quality standards and limits stated in the Kwinana EPP and other relevant air quality standards/guidelines are met;
- maintain the quality of groundwater in accordance with the requirements of the draft Western Australian Water Quality Guidelines for Fresh and Marine Waters (EPA, 1993), and
- avoid potential contamination of soil, surface and groundwater (DEP's recommended guidelines for contamination assessment).

The EPA notes that since the start-up of the plant in 1993, only approximately 25,000 tonnes of iron ore, or 5% of the original total throughput of iron over the life of the project (475,000 tonnes), has been used.

The Pollution Prevention Division of the DEP has confirmed that management of atmospheric, liquid and solid wastes generated from the facility has been satisfactory to date, on the basis of the submitted monitoring results.

The results of the monitoring data to date on atmospheric emissions of sulphur dioxide, particulates and carbon monoxide indicate compliance with the Kwinana EPP and acceptable standards.

At full scale operation, the carbon dioxide emissions are estimated at 240,000 tonnes per annum, which is about 1% of the state's annual total. The proponent has been undertaking greenhouse gas audits, as a component of the project's Environmental Management Programme (EMP).

Since all process waste waters generated from the project are currently either recycled or evaporated, there is zero discharge of liquid waste into the marine, surface and groundwater environment.

The results of groundwater monitoring to date indicate no contamination from the stockpiled slags or from the operation of the facility (HIsmelt, 1991-97).

Having particular regard to the:

(a) demonstrated management of atmospheric, liquid and solid wastes at the facility;

(b) results of atmospheric and groundwater monitoring to date; and

(c) small portion (5%) of the original total throughput of iron ore over the life of the project that has been used,

it is the EPA's opinion that the proposed extension of the project life to the year 1999, or beyond that time, does not compromise the EPA's objectives, provided that the total throughput of iron ore over the life of the project does not exceed the nominal figure of 475,000 tonnes originally specified in the PER, and that the current environmental management practices are maintained.

The EPA considers that the proposed change in provision of monitoring programmes to the DEP/EPA, as required by environmental approval conditions/commitments and by the licence conditions, can be managed administratively. The EPA believes that there should be consistency and coordination within the DEP in the requirements for reporting of monitoring data/programmes. For this project, the EPA considers that the monitoring programmes/data essentially relate to the pollution control aspect of the project, and the requirements for reporting of those and of emergency discharges are more appropriately and adequately managed under the licence conditions and Part V of the *Environmental Protection Act 1986*. Accordingly, it is recommended that Commitment 11 be amended to contain the following wording "The proponent will submit a final report to the EPA at the end of the research and development programme".

## 3.3 Noise

### Description

In the original proposal, a preliminary estimate of noise emissions indicated that sound levels at the facility boundary during normal operation would not exceed 70 dB (A) at all times, which are considered acceptable under the existing *Noise Abatement (Neighbourhood Annoyance) Regulations 1979*. Since the preliminary noise estimate was made on the basis of previous experience of similar plant items and did not include the intermittent noise impact of the snort valve and blowdown valve, HIsmelt made a commitment to carry out noise surveys at the plant boundary, prior to start-up and bi-annually during operation of the facility (Commitment 8, Appendix 2).

The new *Environmental Protection (Noise) Regulations 1997* were gazetted on 31 October 1997, to come into effect on 31 January 1998. These regulations will then replace the existing *Noise Abatement (Neighbourhood Annoyance) Regulations 1979.* The new regulations set assigned noise levels for various types of premises such as noise sensitive, commercial and industrial and utility premises. For "industrial and utility" premises, such as HIsmelt facility and other industries located in the Kwinana industrial area, the assigned noise levels are 65 dB(A) for 90% of the time ($L_{A10}$), which are 5 dB(A) below the current acceptable noise levels of 70 dB(A). If the assigned noise levels cannot reasonably or practically be met in genuine cases, application can be made to the Minister for the Environment, under Regulation 17 of the new noise regulations, to allow the noise emission to exceed or vary from the assigned level.

The existing DEP licence conditions do not stipulate any requirements for noise emissions, due to the anticipated gazettal of the new noise regulations.

### Assessment

The area considered for assessment is the HIsmelt site and surrounding premises and properties.

The EPA's objective in regard to this factor is to ensure that noise emissions from the operations of the facility comply with the *Environmental Protection (Noise) Regulations 1997.*

The DEP advised that, on the basis of the results of the proponent's noise surveys during plant operation to date, the measured noise levels comply with the existing noise regulations, and largely comply with the new assigned noise levels at the boundary of the facility (EMP and HIsmelt, 1991-97). The measured noise levels at the eastern side of HIsmelt employees car park were generally dominated by background noise, and occasionally exceeded the assigned noise level of 65dB(A). However, there have not been any complaints associated with noise emissions from the facility.

The EPA notes the proponent's request to change the noise monitoring component of Commitment 8 from a bi-annual to bi-ennual basis. However, the EPA considers that, as the noise issues can be effectively managed under the provisions of the new noise regulations (as from 31 January 1998), and as Commitment 8 was made by HIsmelt in the context of the existing noise regulations, all components of this commitment are no longer necessary and the whole commitment should be deleted.

Having particular regard to the:

(a) noise emissions from the plant operation being in compliance with the existing noise regulations and largely in compliance with the new noise regulations; and

(b) comprehensive provisions of the new noise regulations to effectively manage noise issues;

it is the EPA's opinion that the deletion of Commitment 8 can meet the EPA's objective.

## 4. Conditions

Under Section 46 of the *Environmental Protection Act 1986* the EPA is required to report to the Minister for the Environment on the proposed changes to the conditions and procedures to which the project should be subject.

The EPA recommends that the following conditions, which are set out in detail in Appendix 3, be imposed if the proposed changes are approved:

(a) the proponent shall fulfil the commitments in the Consolidated Commitments statement set out as an attachment to the recommended conditions in Appendix 3;

(b) in order to reflect the current standard in environmental management, the proponent shall be required to prepare, prior to implementation of the proposal, environmental management system documentation with components such as those adopted in Australian Standards AS/NZ ISO 14000 series.

## 5. Conclusions

The EPA has considered the proposed changes by HIsmelt to extend the life of the research project by an additional five years to 1999, and to amend/delete environmental management commitments relating to cooling water discharge, noise surveys and provision of monitoring data. This assessment involved consideration of these proposed changes against the EPA current objectives.

The EPA notes the research nature of the HIsmelt facility and the satisfactory environmental performance of the facility to date, and has concluded that the proposed changes not compromise the EPA's objectives, provided that the amended conditions recommended in Section 4, and set out in detail in Appendix 3, are imposed.

## 6. Recommendations

Under Section 46 of the *Environmental Protection Act 1986* the EPA submits the following recommendations to the Minister for the Environment:

1. That the Minister for the Environment considers the report on the relevant environmental factors and the EPA's objectives set for each factor.

2. That the Minister for the Environment notes that the EPA has concluded that the proposed changes do not compromise the EPA's current objectives.

3. That the Minister for the Environment imposes the conditions and procedures consistent with Section 4 of this report.

**Table 5: Summary of EPA's Assessment of Proposed Changes**

| PROPOSED CHANGES | RELEVANT FACTOR | EPA's OBJECTIVES | EPA's ASSESSMENT | EPA's ADVICE |
|---|---|---|---|---|
| **Extend life of project to 1999 (Condition 8, Appendix 1)**<br><br>**Provision of monitoring data (Commitment 11, Appendix 1)** | Waste outputs | • Total loading of wastes do not increase over life of project.<br>• Meet Kwinana EPP and other relevant air quality standards.<br>• Maintain or improve the quality of groundwater in accordance with the draft Western Australian Water Quality Guidelines for Fresh and .<br>• Avoid contamination of soil, surface and groundwater. | Ongoing monitoring of sulphur dioxide, particulates and carbon monoxide emissions has been satisfactory to date. Greenhouse gas audits have been carried out..<br><br>Ongoing monitoring of groundwater has been satisfactory to date. No detectable contamination of groundwater.<br><br>All process wastewaters are recycled or evaporated.<br><br>Only 5% of the original total throughput of iron ore has been used.<br><br>Co-ordinated provision of monitoring programmes to the EPA/DEP is not an environmental matter and can be arranged administratively. | Proposed extension of the project life to the year 1999, or beyond that time does not compromise the EPA's objectives, provided that the total throughput of iron over the life of the project does not exceed 15% above the originally estimated figure of 475,000 tonnes specified in the PER (or 550,000 tonnes), and that the current environmental management practices are maintained.<br><br>Commitment 11 (Appendix 1) should be amended to contain the following wording only "The proponent will submit a final report to the EPA at the end of the research and development programme". |
| **Noise surveys (Commitment 8, Appendix 1)** | Noise | Comply with the existing *Noise Abatement (Neighbourhood Annoyance) Regulations 1979* and meet the requirements of the new *Enviromental Protection (Noise) Regulations 1997* | Noise surveys during plant operation to dates indicate compliance with the existing noise regulations, and compliance with the new assigned noise levels at the boundary of the facility for a majority of the time.<br><br>The measured noise levels were generally dominated by background noise,. There have not been any complaints associated with noise emissions from the facility.<br><br>New noise regulations will be effective as from 31 January 1998, which will have comprehensive provisions to effectively manage noise issues. | Commitment 8 (Appendix 1) is no longer necessary and should be deleted. |

# Appendix 1

## Original environmental conditions for HIsmelt Project Statement of 17 September 1990

WESTERN AUSTRALIA

MINISTER FOR THE ENVIRONMENT

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

## HISMELT IRON ORE SMELTING PROJECT, KWINANA

This proposal may be implemented subject to the following conditions:

1. In implementing the proposal, the proponent shall fulfil the commitments (which are not inconsistent with the conditions or procedures contained in this statement) made in the Public Environmental Review and which are consolidated in Environmental Protection Authority Bulletin 432. (A copy of consolidated commitments is attached).

2. Subject to these conditions, the manner of detailed implementation of the proposal shall conform in substance with that set out in any designs, specifications, plans or other technical material submitted by the proponent to the Environmental Protection Authority with the proposal. Where, in the course of that detailed implementation, the proponent seeks to change those designs, specifications, plans or other technical material in any way that the Minister for the Environment determines on the advice of the Environmental Protection Authority, is not substantial, those changes may be effected.

3. The proponent shall construct the facility recognising that sulphur dioxide and dust emissions will need to be controlled to comply with conditions set by a licence issued under the Environmental Protection Act, 1986. These conditions will be consistent with the intent of the Draft Environmental Protection Policy for Sulphur Dioxide and Dust in the Kwinana Region.

   Subsequently, the proponent shall meet emission levels, revised as necessary to conform with the approved Environmental Protection Policy.

4. Prior to commissioning, the proponent shall prepare and subsequently implement an environmental management programme, to the satisfaction of the Minister for the Environment on advice of the Environmental Protection Authority.

   This programme shall include the following:

   (1) Solid (slag and filter dust), liquid (pond overflow and stormwater run-off) and gas emissions (waste stack) monitoring, disposal and management methods;

   (2) Details of sampling sites, times and frequency of reporting to the Environmental Protection Authority;

   (3) Baseline data acquisition (including the marine environment), prior to commissioning the facility;

Published on

16 SEP 1998

(4) Monitoring of the liquid waste disposal system to include pH, turbidity, total dissolved solids, suspended solids, heavy metals and fluoride; and

(5) A 'greenhouse' gas audit.

The proponent shall report monitoring results annually to the Environmental Protection Authority in the format required. The Environmental Protection Authority shall subsequently make these reports available to the public.

5. At least six months prior to the cessation of operations, the proponent shall prepare and submit an adequate decommissioning and rehabilitation plan to the Environmental Protection Authority.

Within the six month period following the cessation of operations, the proponent shall remove all structures and facilities constructed for the proposal, and shall rehabilitate the site and the environs where affected by the proposal (including soil, surface and groundwater) such that the state of the environment is not inferior to that indicated in the 'environmental audit' documents submitted to the Environmental Protection Authority by the proponent and entitled 'Preliminary Environmental Audit' (March 1990) and 'Environmental Audit - Stage II' (April 1990).

Exception may be made in the case of certain structures and/or facilities where the landowners have notified the Environmental Protection Authority in writing that they agree to these structures and/or facilities remaining on the site.

An extension of the above period of six months following the cessation of operations may be granted provided that a written application requesting such an extension is made to the Environmental Protection Authority within the six-month period prior to the cessation of operations.

Clearance of this condition will be by the Minister for the Environment on the advice of the Environmental Protection Authority.

6. No transfer of ownership, control or management of the project which would give rise to a need for the replacement of the proponent shall take place until the Minister for the Environment has advised the proponent that approval has been given for the nomination of a replacement proponent. Any request for the exercise of that power of the Minister shall be accompanied by a copy of this statement endorsed with an undertaking by the proposed replacement proponent to carry out the project in accordance with the conditions and procedures set out in the statement.

7. If the proponent has not substantially commenced the project within five years of the date of this statement, then the approval to implement the proposal as granted in this statement shall lapse and be void. The Minister for the Environment shall determine any question as to whether the project has been substantially commenced. Any application to extend the period of five years referred in this condition shall be made before the expiration of that period, to the Minister for the Environment by way of a request for a change in the condition under Section 46 of the Environmental Protection Act. (On expiration of the five year period, further consideration of the proposal can only occur following a new referral to the Environmental Protection Authority).

8. In the event that the proponent wishes to extend the life of the project beyond that specified in the Public Environmental Review, then the proponent shall submit to the Environmental Protection Authority a new proposal.

Bob Pearce, MLA
MINISTER FOR THE ENVIRONMENT

17 SEP 1990

HIsmelt CORPORATION PTY LTD

MAJOR RESEARCH AND DEVELOPMENT FACILITY

LIST OF CONSOLIDATED COMMITMENTS

The following is a consolidated list of commitments which have been made by the Proponent to manage any potential environmental impacts associated with the Major Research and Development Facility at Kwinana.

Commitments 1 to 4 and 7 to 12 are as originally stated in the Public Environmental Review. Commitments 5 and 6 have been modified in response to public review comments. These commitments are presented below:

- Commitment 1

  The Proponent commits to preparing and subsequently implementing an Environmental Management and Monitoring Programme prior to construction of the Major Research and Development Facility at Kwinana, that will include:

  - details of parameters to be monitored;
  - an initial baseline sampling period;
  - sampling sites and times;
  - reporting arrangements to the Environmental Protection Authority; and
  - a commitment to modify the management programme, if necessary, to reduce the impact of pollution.

  All of the above will be determined in consultation with the Environmental Protection Authority and other relevant government authorities.

- Commitment 2

  Continuously during the operation of the Major Research and Development Facility at Kwinana, the Proponent will undertake real-time monitoring of stack emissions for sulphur dioxide and total suspended particulates. Should the emission monitoring programme indicate that the Major Research and Development Facility is exceeding acceptable air quality criteria for any emission, then the Proponent will undertake to review and reduce these emissions.

- Commitment 3

  Should dust from the Major Research and Development Facility exceed acceptable air quality criteria in areas beyond the plant boundary, then the Proponent will undertake to review and reduce dust emissions.

- Commitment 4

  The Proponent will co-operate with the Environmental Protection Authority to assist in achieving the air quality objectives that the Proponent understands will be incorporated in the Environmental Protection Policy for the Kwinana region.

- Commitment 5

  During each chlorine dosing period throughout the operation of the Major Research and Development Facility, the Proponent will collect and analyse seawater samples near the cooling water discharge beach outfall for residual chlorine. Should the monitoring programme indicate that the total residual chlorine levels exceed acceptable water quality criterion (2ug/L per six month average and 10ug/L for any single reading) beyond the reasonable zone of influence of the beach outfall, then the Proponent will undertake to review and reduce the residual chlorine levels.

- Commitment 6
  Continuously during the operation of the Major Research and Development Facility, the Proponent will undertake monitoring of the cooling water discharge at the beach outfall for temperature. Should the monitoring programme indicate that the temperature rise of the cooling water exceeds the water quality criterion for the preservation of aquatic ecosystems ($4^{o}C$ for waters south of latitude $27^{o}S$ during all seasons of the year) beyond the reasonable zone of influence of the beach outfall, then the Proponent will undertake to review and reduce the temperature levels.

- Commitment 7
  At quarterly intervals during the operation of the Major Research and Development Facility, and immediately following major storm events, the Proponent will inspect the beach outfall structure for evidence of sand erosion or accretion, and to ensure soundness of handrails and other safety features. Should the inspection indicate that coastal processes are being significantly impacted, then the Proponent will undertake to reduce these impacts.

- Commitment 8
  Prior to start-up and biannually during operation of the Major Research and Development Facility, the Proponent will monitor noise levels at the plant boundary. Should the noise monitoring programme indicate that the noise generated by the Major Research and Development Facility is causing unacceptable impact on nearby receptors, then the Proponent will undertake to review and reduce noise levels.

- Commitment 9
  Prior to start-up of the Major Research and Development Facility, the Proponent will develop an Employee Safety and Emergency Response Plan for the Major Research and Development Facility as part of its Operations Manual.

- Commitment 10
  The Proponent will participate in and contribute to the development of the Kwinana Integrated Emergency Management System.

- Commitment 11
  The Proponent will submit annual reports to the Environmental Protection Authority documenting the results of the monitoring programmes, and will immediately advise the Environmental Protection Authority of any unplanned events as they occur, that may adversely impact the surrounding environment, such as spillages and excessive emissions. A final summary report will be submitted at the end of the research and development programme.

- Commitment 12
  The Proponent will remove all HIsmelt equipment and modifications not required by the site lessor at the close of the project, and leave the site as near as practicable in the condition it was in when it was made available to the Proponent.

In response to comments received during the public review period, the Proponent has made the following additional commitments :

- Commitment 13
  The Proponent will consult with the relevant authorities including the Town of Kwinana to determine appropriate approvals/procedures for any extension of activities beyond the scope of examining the feasibility of the HIsmelt direct iron ore smelting process.

- Commitment 14
  The Proponent will ensure that the HIsmelt plant is operated as per the Department of Mines regulations.

- Commitment 15
  The Proponent will take the following actions to improve the aesthetic appeal of the HIsmelt lease area:

  - design and build new buildings to current industrial standards; and
  - implement a landscaping programme in consultation with the owner of the site (BHP) and the Town of Kwinana.

- Commitment 16
  The Proponent is conducting an environmental audit which is scheduled for completion prior to the commencement of site works. The audit will establish the baseline groundwater quality of the site. Monitoring bores are being established which will enable ongoing monitoring of groundwater quality (see Commitment 17).

- Commitment 17
  The Proponent will undertake a monitoring and management programme for solid waste disposal. This will incorporate an appropriate drainage and wastewater treatment system to manage potentially contaminated leachates from raw material stockpile or solid waste disposal areas.

  Groundwater quality downstream of these areas will be sampled at regular intervals. The drainage and wastewater treatment system will also be inspected regularly and properly maintained.

- Commitment 18
  The Proponent will implement a water resources management plan to ensure that the consumption of water is minimised.

LEJ:aml/19099-001-071

# Appendix 2

## References

Dames & Moore (1989) *Major Research & Development Facility for Direct Iron Ore Smelting Research at Kwinana - Public Environmental Review* for HIsmelt Corporation Pty Ltd, November 1989.

EPA (1990) *HIsmelt Iron Ore Smelting Project at Kwinana.* Environmental Protection Authority Bulletin 432, April 1990.

EPA (1992) *Development of an Environmental Protection for Air Quality at Kwinana* Environmental Protection Authority Bulletin 644, August 1992.

EPA (1993) *Draft Western Australian Water Quality Guidelines for Fresh and Marine Waters.* Environmental Protection Authority Bulletin 711, October 1993.

HIsmelt (1993) *Environmental Management Programme - HIsmelt Research and Facility* HIsmelt Corporation, 1993.

HIsmelt (1991 -97 ) Various monitoring reports on sulphur dioxide, particulates, groundwater and noise, from 1991 to 1997, submitted by HIsmelt Corporation to the Department of Environmental Protection.

# Appendix 3

## Recommended environmental conditions and proponent's consolidated list of commitments

Statement No.

# STATEMENT TO AMEND CONDITIONS APPLYING TO A PROPOSAL (PURSUANT TO THE PROVISIONS OF SECTION 46 OF THE ENVIRONMENTAL PROTECTION ACT 1986)

| | |
|---|---|
| PROPOSAL: | HISMELT IRON ORE SMELTING PROJECT, KWINANA (297 / 1099) |
| CURRENT PROPONENT: | HISMELT CORPORATION PTY LTD |
| CONDITIONS ORIGINALLY SET ON: | 17 SEPTEMBER 1990 |

The implementation of this proposal is now subject to the following conditions which replace all previous conditions:

## 1 Proponent Commitments

The proponent has made a number of environmental management commitments in order to protect the environment.

1-1 In implementing the proposal, including the documented modifications of December 1996, the proponent shall fulfil the relevant environmental management commitments in the Public Environmental Review (1990), published in Environmental Protection Authority Bulletin 432, as modified and reported on in Environmental Protection Authority Bulletin 87X; provided that the commitments are not inconsistent with the conditions or procedures contained in this statement.

In the event of any inconsistency, the conditions and procedures shall prevail to the extent of the inconsistency.

The consolidated environmental management commitments in Attachment 1 of this statement form the basis for consideration by the Chief Executive Officer of the Department of Environmental Protection for auditing of this proposal in conjunction with the conditions and procedures contained in this statement.

## 2 Implementation

Changes to the proposal which are not substantial may be carried out with the approval of the Minister for the Environment.

2-1 Subject to these conditions, the manner of detailed implementation of the proposal shall conform in substance with that set out in any designs, specifications, plans or other technical material submitted by the proponent to the Environmental Protection Authority initially with the proposal and subsequently in December 1996, as part of further consideration under Section 46 of the Environmental Protection Act 1986.

2-2 Where, in the course of the detailed implementation referred to in condition 2-1, the proponent seeks to change the designs, specifications, plans or other technical material submitted to the Environmental Protection Authority in any way that the Minister for the Environment determines, on the advice of the Environmental Protection Authority, is not substantial, those changes may be effected.

## 3 Proponent

These conditions legally apply to the nominated proponent.

3-1 No transfer of ownership, control or management of the project which would give rise to a need for the replacement of the proponent shall take place until the Minister for the Environment has advised the proponent that approval has been given for the nomination of a replacement proponent. Any request for the exercise of that power of the Minister shall be accompanied by a copy of this statement endorsed with an undertaking by the proposed replacement proponent to carry out the project in accordance with the conditions and procedures set out in the statement.

## 4 Environmental Management System

The proponent should exercise care and diligence in accordance with best practice environmental management principles.

4-1 In order to manage the relevant environmental factors, to meet the environmental objectives in Environmental Protection Authority Bulletin 87X, and to fulfil the requirements of the conditions and procedures in this statement, prior to implementation of the modified proposal, the proponent shall prepare environmental management system documentation with components such as those adopted in Australian Standards AS/NZS ISO 14000 series, to the requirements of the Environmental Protection Authority on advice of the Department of Environmental Protection.

4-2 The proponent shall implement the environmental management system referred to in condition 4-1.

## 5 Environmental Management Plans

5-1 Prior to commissioning, the proponent shall prepare environmental management plans to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.

These plans shall address:

1 Solid (slag and filter dust), liquid (pond overflow and storm water run-off) and gas emissions (waste stack) monitoring, disposal and management methods;

2 Details of sampling sites, times and frequency of reporting to the Department of Environmental Protection;

3 Baseline data acquisition prior to commissioning the facility; and

4 A "greenhouse gas" audit.

5-2 The proponent shall report monitoring results to the Department of Environmental Protection as required by a licence issued under the *Environmental Protection Act 1986.*

Note: The Department of Environmental Protection will make these reports available to the public on request.

5-3 The proponent shall implement the Environmental Management Plans required by condition 5-1.

## 6 Liquid Effluent

6-1 The proponent shall not discharge liquid effluent such that it discharges into Cockburn Sound.

## 7 Sulphur Dioxide and Dust Emissions

7-1 The proponent shall construct the facility recognising that sulphur dioxide and dust emissions will need to be controlled to comply with conditions set by a licence issued under the Environmental Protection Act 1987. These conditions will be consistent with the intent of the Environmental Protection Policy for Sulphur Dioxide and Dust in the Kwinana Region.

7-2 Subsequently, the proponent shall meet emissions levels, revised as necessary to conform with the approved Environmental Protection Policy.

## 8 Decommissioning and Rehabilitation Plan

8-1 At least six months prior to the cessation of operations, the proponent shall prepare a decommissioning and rehabilitation plan to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.

8-2 Within the six month period following the cessation of operations, the proponent shall remove all structures or facilities constructed for the proposal, and shall rehabilitate the site and the environs where affected by the proposal (including soil, surface and groundwater) such that the state of the environment is not inferior to that indicated in the 'environmental audit' documents submitted to the Environmental Protection Authority by the proponent and entitled 'Preliminary Environmental Audit' (March 1990) and 'Environmental Audit - Stage II' (April 1990) to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.

Note:

1 Exception may be made in the case of certain structures and/or facilities where the landowners have notified the Environmental Protection Authority in writing that they agree to these structures and/or facilities remaining on the site.

2 An extension of the above period of six months following the cessation of operations may be granted provided that a written application requesting such an extension is made to the Environmental Protection Authority within the six month period prior to the cessation of operations.

8-3 The proponent shall implement the decommissioning and rehabilitation plan required by condition 8-1.

## 9 Commencement

The environmental approval for the substantial commencement of the proposal is limited.

9-1 If the proponent has not substantially commenced the project within five years of the date of this statement, then the approval to implement the modified proposal shall lapse and be void. The Minister for the Environment shall determine any question as to whether the project has been substantially commenced.

Any application to extend the period of five years referred to in this condition shall be made before the expiration of that period to the Minister for the Environment.

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

9-2 In the event that the proponent wishes to extend the project beyond the nominal total throughput of iron ore specified in the Consultative Environmental Review (475,000 tonnes), the proponent shall make an application to the Minister for the Environment.

## 10 Compliance Auditing

To help determine environmental performance and compliance with the conditions, periodic reports on the implementation of the proposal are required.

10-1 The proponent shall submit periodic Performance and Compliance Reports, in accordance with an audit programme prepared by the Department of Environmental Protection in consultation with the proponent.

### Procedure

1 Unless otherwise specified, the Department of Environmental Protection is responsible for assessing compliance with the conditions contained in this statement and for issuing formal clearance of conditions.

2 Where compliance with any condition is in dispute, the matter will be determined by the Minister for the Environment.

### Note

1 The Environmental Protection Authority reported on the proposal in Bulletins 432 (May 1990) and 87X (December 1997).

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

## ATTACHMENT 1

ATTACHMENT 1

# Proponent's Environmental Management Commitments

May 1997

# HISMELT IRON ORE SMELTING PROJECT, KWINANA (297 / 1099)

HISMELT CORPORATION PTY LTD

HISMELT CORPORATION PTY LTD
MAJOR RESEARCH AND DEVELOPMENT FACILITY

## LIST OF CONSOLIDATED COMMITMENTS

The following is a consolidated list of commitments which have been made by the Proponent to manage any potential environmental impacts associated with the Major Research and Development Facility at Kwinana.:

- Commitment 1
  The Proponent commits to preparing and subsequently implementing an Environmental Management and Monitoring Programme prior to construction of the Major Research and Development Facility at Kwinana, that will include:

  - details of parameters to be monitored;
  - an initial baseline sampling period;
  - sampling sites and times;
  - reporting arrangements to the Environmental Protection Authority; and
  - a commitment to modify the management programme, if necessary, to reduce the impact of pollution.

  All of the above will be determined in consultation with the Environmental Protection Authority and other relevant government authorities.

- Commitment 2
  Continuously during the operation of the Major Research and Development Facility at Kwinana, the Proponent will undertake real-time monitoring of stack emissions for sulphur dioxide and total suspended particulates. Should the emission monitoring programme indicate that the Major Research and Facility is exceeding acceptable air quality criteria for any emission, then the Proponent will undertake to review and reduce these emissions.

- Commitment 3
  Should dust from the Major Research and Development Facility exceed acceptable air quality criteria in areas beyond the plant boundary, then the Proponent will undertake to review and reduce dust emissions.

- Commitment 4
  The Proponent will co-operate with the Environmental Protection Authority to assist in achieving the air quality objectives that the Proponent understands will be incorporated in the Environmental Protection Policy for the Kwinana region.

- Commitment 5
  Prior to start-up of the Major Research and Development Facility, the Proponent will develop an Employee Safety and Emergency Response Plan for the Major Research and Development Facility as part of its Operations Manual.

- Commitment 6
  The Proponent will participate in and contribute to the development of the Kwinana Integrated Emergency Management System.

- Commitment 7
  The Proponent will submit a final summary report will be submitted at the end of the research and development programme.

- Commitment 8
  The Proponent will remove all Hismelt equipment and modifications not required by the site lessor at the close of the project, and leave the site as near as practicable in the condition it was in when it was made available to the Proponent.

In response to comments received during the public review period, the Proponent has made the following additional commitments:

- Commitment 9
  The Proponent will consult with the relevant authorities including the Town of Kwinana to determine appropriate approvals/procedures for any extension of activities beyond the scope of examining the feasibility of the Hlsmelt direct iron ore smelting process.

- Commitment 10
  The Proponent will ensure that the Hlsmelt plant is operated as per the Department of Mines regulations.

- Commitment 11
  The Proponent will take the following actions to improve the aesthetic appeal of the Hlsmelt lease area:

  - design and build new buildings to current industrial standards; and
  - implement a landscaping programme in consultation with the owner of the site (BHP) and the Town of Kwinana.

- Commitment 12
  The Proponent is conducting an environmental audit which is scheduled for completion prior to the commencement of site works. The audit will establish the baseline groundwater quality of the site. Monitoring bores are being established which will enable ongoing monitoring of groundwater quality (see Commitment 13).

- Commitment 13
  The Proponent will undertake a monitoring and management programme for solid waste disposal. This will incorporate an appropriate drainage and wastewater treatment system to manage potentially contaminated leachates from raw material stockpile or solid waste disposal areas.

  Groundwater quality downstream of these areas will be sampled at regular intervals. The drainage and wastewater treatment system will also be inspected regularly and properly maintained.

- Commitment 14
  The Proponent will implement a water resources management plan to ensure that the consumption of water is minimised.