

Silicon Project, Kemerton and Mine at Moora – Addition of a Fourth Submerged Arc Furnace at the Kemerton Smelter

Simcoa Operations Pty. Ltd.

**Report and recommendations
of the Environmental Protection Authority**

**Environmental Protection Authority
Perth, Western Australia
Report 1317
April 2009**

Environmental Impact Assessment Process Timelines

Date	Progress stages	Time (weeks)
27/11/08	Referral received	
24/2/09	Proponent's Final ARI document received by EPA	13
1/4/09	EPA report to the Minister for Environment	5
6/4/09	ARI Level of Assessment advertised	1

Appeals Close: 20/4/09

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1. Introduction and background

This report provides the Environmental Protection Authority's (EPA's) advice and recommendations to the Minister for Environment on the proposal by Simcoa Operations Pty. Ltd. (Simcoa) to add a fourth submerged electric arc furnace at the Kemerton smelter and the associated increase in annual production of silicon of approximately 33%.

Section 44 of the *Environmental Protection Act 1986* (EP Act) requires the EPA to report to the Minister for Environment on the outcome of its assessment of a proposal. The report must set out:

- The key environmental factors identified in the course of the assessment; and
- The EPA's recommendations as to whether the proposal may be implemented, and, if the EPA recommends that implementation be allowed, the conditions and procedures to which implementation should be subject.

The EPA may include in the report any other advice and recommendations as it sees fit.

The proponent has submitted a referral document setting out the details of the proposal, potential environmental impacts and proposed commitments to manage those impacts.

The EPA considers that the proposal, as described, can be managed to meet the EPA's environmental objectives, subject to the EPA's recommended conditions being made legally binding.

The EPA has therefore determined under section 40 of the EP Act that the level of assessment for the proposal is 'Assessment on Referral Information' (ARI), and this report provides the EPA advice and recommendations in accordance with section 44 of the EP Act.

As part of this assessment the EPA has reviewed and provided advice in relation to the existing conditions applying to Simcoa's project.

2. The proposal

This is a proposal for an increase from the currently approved three submerged electric arc furnaces to four submerged electric arc furnaces at Simcoa's Kemerton site, and the associated increase in silicon production. Section 45B.(b) of the EP Act makes provision for revised conditions and procedures following the referral of a revised proposal to the EPA.

The operations of the original proposal, for which the initial approval was granted by the Minister for Environment on 13 May 1988, have been taking place for around twenty years on two separate sites:

- The mining of silica (quartzite) rock approximately 15 kilometres north of Moora, in the Shire of Moora; and
- The smelting of the mined quartzite to produce silicon, employing wood, charcoal and coal in the Kemerton Industrial Area approximately 20 kilometres north of Bunbury in the Shire of Harvey.

Following the Minister's approval of May 1988 (Statement No. 027), successive changes were made over the years to the conditions and procedures under section 46 of the EP Act as follows:

- Statement No. 279 published on 10 August 1992;
- Statement No. 575 published on 31 October 2001; and
- Statement No. 593 published on 5 June 2002.

The current consolidated environmental conditions, based on Statements Nos 027, 279, 575 and 593, are presented in Appendix 3.

More recently, changes to the proposal under section 45C. were approved. On 17 May 2006 these changes permitted the addition of a third submerged electric arc furnace and associated production and consumption increases. A copy of this approval is included in Appendix 3 (final page).

The original approval included mining of silica on Mining Leases M70/191 and M70/1055 (Cairn Hill). The latter was originally available for mining, but has been surrendered to become a nature reserve. Other mining leases nearby have also been explored for suitable quartzite, including Mining Leases M70/424, M70/425 and M70/2750.

The main characteristics of the revised proposal are summarised in Tables 1(a) and 1(b) below for the Kemerton plant and Moora mine, respectively.

Table 1(a) – Summary of Key Proposal Characteristics, Kemerton Plant.

Element	Quantities/Description
Silicon Production	64,000 tonnes per annum (approximately)
Quartzite Consumption	160,000 tonnes per annum (approximately)
Wood for Charcoal	110,000 tonnes per annum (approximately)
Charcoal Production	27,000 tonnes per annum (approximately)
Smelter Furnaces	4 x submerged electric arc furnaces
Off-gas Cleaning Plant (Baghouses)	One large baghouse with stacks One large baghouse without stacks
Greenhouse Gas Emissions: Scope 1 (emissions from processing) Scope 2 (emissions generated off-site by electricity generation) Total	147,000 tonnes per annum CO ₂ -e (approximately) 656,000 tonnes per annum CO ₂ -e (approximately) 803,000 tonnes per annum CO ₂ -e (approximately)
Electric Power Consumption	190,000 kWh per annum per furnace (approximately)
Natural Gas Consumption	100,000 GJ per annum (approximately)
Water Consumption (Groundwater)	290,000 kL per annum (approximately)

Element	Quantities/Description
Truck Movements	44 trucks per day (approximately, averaged over 365 days)

Table 1(b) – Summary of Key Proposal Characteristics, Moora Mine.

Element	Quantities/Description
Quartzite Production	160,000 tonnes per annum of lump quartz (approximately)
Operational life	10 years (approximately) – under current mine plan
Total area of disturbance	60 hectares (approximately)
Area of rehabilitation	All disturbed areas
Depth of pit	To 215 metres RL (approximately)
Water requirements (Groundwater)	80,000 kL per annum (approximately)
Water source	Superficial Formation

The proponent has prepared and submitted a referral document entitled *Addition of a 4th Submerged Arc Furnace at the Kemerton Smelter of Simcoa Operations Pty Ltd*, dated February 2009 (ARI document). The potential impacts of the revised proposal are discussed by the proponent in this ARI document.

Apart from consideration of the environmental factors of the revised proposal, there is an opportunity to remove conditions and commitments which are no longer relevant and/or can be managed under Part V of the EP Act, and consolidate the existing approvals into one statement (See Section 5).

3. Consultation

During the preparation of the ARI document, the proponent has undertaken consultation with government agencies and key stakeholders. The agencies, groups and organisations consulted are listed in section 4.3 of the proponent’s document (Simcoa 2009). The comments received and the proponent’s responses are detailed in Appendix G of the proponent’s document.

A number of environmental issues were raised by the stakeholders during the consultation. Table 2 summarises the main issues raised and details the actions taken or to be taken by the proponent to address the issues.

The EPA considers that the consultation process has been appropriate and that reasonable steps have been taken to inform the community and stakeholders on the proposed development.

Table 2: Summary of issues raised and proponent’s response during stakeholder consultation

Issue raised	Stakeholder	Proponent Response
Greenhouse Gas impact	Community members, Shire of Harvey, WA Non-government organisations	<p>Most of Simcoa’s emissions are Scope 2 (indirect electricity emissions) rather than Scope 1 (direct emissions).</p> <p>Whilst the expansion will increase Scope 1 emissions in the short term due to increased coal usage, Simcoa aspires to use a much greater proportion of biogenic carbon by expanding charcoal production in the future. This will be subject to adequately addressing any noise issues, availability of clearing residues and receiving future environmental approvals.</p> <p>Silicon is an integral part of modern society and plays an important role in global sustainability, being found in many modern components such as photovoltaic (solar) cells, optical fibre, computer chips, semi-conductors, synthetic oils and aluminium alloys. Many of these products are pivotal in improving manufacturing efficiencies, reducing emissions and minimising anthropogenic climate change.</p> <p>The power for the proposal will be primarily sourced from Verve Energy, which has diversified generation capacity. The expansion will not underpin increased coal-fired power generation.</p> <p>To manage its Greenhouse gas (GHG) impact, Simcoa has committed to implementing a GHG Management Plan. Some of the measures to be incorporated in this plan include an energy recovery study, furnaces designed for energy recovery and research and development in photovoltaic grade silicon production at Kemerton.</p> <p>Simcoa will also be subject to considerable regulatory liability in respect to GHG, namely:</p> <ul style="list-style-type: none"> • The proposed Commonwealth Carbon Pollution Reduction Scheme, • Expanded Commonwealth Mandatory Renewable Energy Target (MRET) scheme, • Energy Efficiency Opportunities Legislation, and • National Greenhouse and Energy Reporting Regulations.
Use of native timber	Community members, Shire of Harvey, SW Environment Centre, WA Non-government organisations	<p>The proposal will only require a marginal increase in wood supply: approximately 10,000 tonnes per annum of wood residue. The wood will be sourced from wood waste recovered from mine site clearing operations.</p> <p>Simcoa is not dependant on an extension of native forest logging beyond the 2004–2013 Forest Management Plan.</p>
Noise emissions	Community members, Shire of Harvey	<p>There will not be a significant increase in noise from the plant because the proposal does not include the construction of another charcoal retort, the dominant noise source.</p>
Air quality	Community members, Shire of Harvey	<p>Simcoa will use low sulphur reductants and construct its new baghouse with stacks to increase dispersion and minimise the impact on air quality.</p> <p>Modelling predicts that the ambient concentration of pollutants will comfortably meet the NEPM for air quality.</p>

4. Key environmental factors

Factors relating to the Kemerton site and considered in the ARI document as potentially relevant to the proposal were as follows:-

- Flora, vegetation and fauna (Clearing of native vegetation);
- Wetlands;
- Water;
- Air quality;
- Noise;
- Greenhouse Gas emissions;
- Traffic; and
- Visual amenity.

There are no changes proposed for the Moora mine site which was most recently assessed and reported on in EPA Bulletin 1027 in September 2001. Therefore the key environmental factors for that site are not considered in this report.

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

- (a) Greenhouse Gas emissions;
- (b) Clearing of native vegetation;
- (c) Air quality; and
- (d) Noise.

The key environmental factors are discussed in Sections 4.1 to 4.4 below. 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 objectives set for that factor.

4.1 Greenhouse Gas emissions

Description

The silicon production process and its ancillary activities generate Greenhouse gases (GHG), both directly through the use of fuels and reductants, and indirectly through the generation and consumption of electricity.

The production of silicon is both energy and carbon intensive, requiring large amounts of electricity and carbon-based reductants to reduce quartzite (SiO_2) to elemental silicon (Si), also known as "silicon metal". Because of this, the emission intensity of silicon production is high, with each tonne of silicon produced by Simcoa, generating approximately 12 tonnes of carbon dioxide equivalent ($\text{CO}_2\text{-e}$).

Simcoa's total emissions are dominated by Scope 2 emissions (from the off-site generation of electricity used at the smelter), which account for approximately 85% of the total emissions due to the project. Scope 1 emissions, primarily from the use of coal and carbon electrodes in smelting, account for the remainder of emissions.

The addition of a fourth submerged electric arc furnace will increase the Scope 1 emissions from the project, based on the *NGA Factors Workbook*, by approximately 42,000 tonnes per annum (tpa) and the Scope 2 emissions by approximately 164,000 tpa CO₂-e, leading to total Scope 1 and Scope 2 emissions of approximately 147,000 and 656,000 tpa CO₂-e, respectively. The total Greenhouse gas emissions (Scope 1 plus Scope 2) will amount to approximately 803,000 tpa CO₂-e. A breakdown of emission sources is shown in Table 3.

Policy and Legislation

In recent years, important developments in policy and legislation include the Federal Government's proposed Carbon Pollution Reduction Scheme, the *Energy Efficiency Opportunities Act 2006* and the *National Greenhouse Energy Reporting Act 2007*. The purpose and intent of these schemes and legislation are consistent with many of the objectives of the EPA in relation to GHG management and are relevant because Simcoa will be a liable entity under the schemes.

The Commonwealth Government has made it clear that from 2010 large emitters, such as Simcoa, will have a liability under the Carbon Pollution Reduction Scheme requiring that they either generate or purchase carbon credits. Whilst it is to be expected that Simcoa will have some respite in the early years of the scheme, the level of support will be rapidly reduced as Australia moves to meet its international obligations. Simcoa will also be liable under the existing Commonwealth Mandatory Renewable Energy Target (MRET) scheme to source a proportion of its electricity from renewable sources.

Furthermore, for many years successive Western Australian Ministers for Environment have been setting implementation conditions on proposals under section 45 of the EP Act following EPA recommendations aiming to minimise GHG emissions.

Existing Emission Intensity

Since the existing furnaces were commissioned in 1989/90, Simcoa has improved efficiencies and reduced greenhouse emissions per tonne of silicon produced from approximately 16.2 to 12.0 tonnes CO₂-e. This has been achieved through the optimisation of operating practices, the implementation of new materials to reduce energy losses, and the sourcing of wood residues from sawmills and clearing operations to replace logs from trees felled to supply Simcoa. Simcoa is recognised as the most energy efficient silicon producer in the world (ARI Document, section 3.6.3).

Benefits of Silicon Products

Silicon plays an important role in global sustainability and is used to produce many modern components such as photovoltaic solar cells, optical fibre, computer chips, semi-conductors, synthetic oils and aluminium alloys. Many of these products are pivotal in improving manufacturing efficiencies and reducing carbon emissions.

Management Commitments

To complement the existing and developing regulatory framework addressing GHG emissions, the proponent has committed to preparing and implementing a Greenhouse Gas Management Plan which would include:

- (1) Mechanism(s) to ensure that best practice is applied to maximise energy efficiency and minimise emissions;

- (2) Comprehensive analysis to identify and implement appropriate offsets; and
- (3) An ongoing program to monitor and report emissions and periodically assess for opportunities to further reduce greenhouse gas emissions over time.

Some of the key opportunities which will be part of this program include:

1. The new furnaces will be designed (Note: Furnace 3 has been approved, but is not yet built.) to be compatible with future energy recovery options;
2. Provision for a study to be undertaken jointly with Simcoa's power provider to assess the viability of energy recovery from furnaces 3 and 4 and the charcoal retorts;
3. Ongoing research and development into technology to produce low cost photovoltaic grade silicon, bypassing the energy-intensive and high cost Siemens process. Simcoa has already invested approximately \$1.5 million into this project. Should the project be successful it is anticipated that Simcoa will use a significant proportion of the proposal's additional capacity to produce this grade of silicon on an ongoing basis. Irrespective of this research, a significant proportion of Simcoa's increased capacity is expected to be supplied to the rapidly expanding market for the downstream processing of metallurgical grade silicon to produce photovoltaic grade silicon;
4. An aspirational goal to replace a significant proportion of coal reductant with charcoal generated from waste wood residue. This has the potential to completely mitigate the proposal's increase in Scope 1 emissions; and
5. Continued membership in the Commonwealth's Greenhouse Challenge Plus Program.

Assessment

The EPA's environmental objectives for this factor 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, mindful of Commonwealth and State greenhouse gas strategies and programs.

The EPA notes the awareness of the proponent regarding current and foreshadowed policy and legislation pertaining to GHG. The EPA also notes the improved energy efficiencies and reduction in greenhouse gas emissions per tonne of silicon produced from approximately 16.2 to 12.0 tonnes CO₂-e at Kemerton since commissioning the smelter. The EPA considers the energy efficiency of the new furnaces to be best practice.

Summary

Having particular regard to:

- the awareness of the proponent regarding current and foreshadowed policy and legislation pertaining to GHG;
- the energy efficiency of the Kemerton plant; and
- recognising the role of silicon in global sustainability,

it is the EPA's opinion that the proposal can be managed to meet the EPA's environmental objectives for this factor provided that a GHG Abatement implementation condition is set by the Minister for Environment.

4.2 Clearing of native vegetation

Description

The expansion of the silicon production process and its ancillary activities would potentially require two areas cleared of native vegetation of variable condition:

Area A, on the eastern side of the site, has approximately 2.7 hectares of native vegetation comprising of three vegetation types and some non-indigenous screening trees. The non-indigenous trees were planted on topsoil pushed up when the original site civil works were undertaken in 1988/89. A flora survey in October 2008 (Trudgen, 2009) did not identify flora of conservation significance (Declared Rare or Priority Flora).

For two of the three vegetation communities in this area, a mosaic of degraded and good quality environments was observed. None of the good quality areas were adjacent but rather scattered along the area. In the degraded areas, weed species had invaded and suppressed juvenile recruitment. The third community was also a degraded community, heavily infested with weed species.

The clearing of this area would be necessary to provide a construction lay down area and to divert an internal road around the construction area.

Area B, on the western side of the site, has approximately 0.3 hectares of *Eucalyptus calophylla* – *Xanthorrhoea preissii* woodland and shrubland. The flora survey of the area did not identify flora of conservation significance (Declared Rare or Priority Flora). The proponent had intended clearing this area to extend the existing high voltage/transformer yard westwards. This could impact on fauna through the removal of several large mature trees.

It is Simcoa's preference to clear both these areas due to safety considerations, in particular the proximity of construction and other activities to the only heavy vehicle road. However, Simcoa has now modified the proposal and will not clear native vegetation in Area B on the western side of the site.

Assessment

The EPA's environmental objectives for this factor are to:

- maintain the abundance, species diversity, geographic distribution and productivity of vegetation communities through the avoidance or management of adverse impacts and improvement in knowledge.

The EPA notes that there are no DRF or Priority Species present in Areas A and B. The EPA also notes that the proponent has modified its plans and will now avoid the clearing of Area B. The EPA therefore considers that clearing will not result in unacceptable environmental impact.

Summary

Having particular regard to:

- the small area intended to be cleared (Area A is less than three hectares);
- the absence of flora of conservation significance in the area;
- the presence of non-indigenous trees along the length of Area A; and
- avoidance of clearing the vegetation in “good condition” of Area B,

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

4.3 Air Quality

The Department of Environment and Conservation (DEC) advised that it is unlikely that sulphur dioxide (SO₂) concentrations exceed the current ambient air quality standards outside the Kemerton Buffer Area.

However, the EPA notes that the SO₂ limits specified in Simcoa’s licence issued under Part V of the EP Act are expressed in ambient terms and are well in excess of both its current emissions and proposed future emissions resulting from the expansion. The EPA considers that in this respect the licence is inconsistent with best practice emissions control.

The EPA therefore recommends that a licence review be undertaken and emissions limits be changed to specify stack emissions (which can readily be monitored). The current licence limit is more than five times the actual emission level, and should be revised to reflect Simcoa’s proposed emissions. This would also provide airshed capacity and facilitate future industries which may wish to locate in the Kemerton Industrial Park (KIP).

4.4 Noise

The DEC advised that noise emissions from the Kemerton Silicon Plant due to the proposed expansion will not exceed the noise criteria assigned to the Kemerton Industrial Park Policy Area, neither will they “significantly contribute to” a level of noise which exceeds these assigned noise levels.

Prior to the introduction of noise regulations, noise limits were imposed by Ministerial Conditions. However, the *Environmental Protection (Noise) Regulations 1997* now cater specifically for the KIP (in Schedule 3) and the existing noise conditions are no longer required.

The EPA understands that noise from the retort incinerator is quite likely low-frequency in nature, and has the potential to cause noise annoyance even when the A-weighting noise level is below the assigned noise level. The proponent has proposed to trial a noise barrier on the wood loading level (Referral Document, Appendix G). It is recommended that this noise reduction trial be supported in liaison with the DEC Noise Branch.

Table 3: Greenhouse Gas Emission Inventory (Based on National Greenhouse Accounts Factors Workbook, January 2008)

EMISSION SOURCE	Existing Project (tpa CO ₂ -e)		Existing Project + Proposal (tpa CO ₂ -e)		Change (tpa CO ₂ -e)	
	Scope 1	Scope 2	Scope 1	Scope 2	Scope 1	Scope 2
Energy						
Electricity		492,204.4		656,272.6		164,068.1
Natural Gas	4,157.4		4,988.8		831.5	
Petrol	94.5		94.5		0	
Automotive Diesel Oil (Mobile plant)	1,469.3		1,959.0		489.8	
Automotive Diesel Oil (Electricity)	1,484.5		1,979.4		494.8	
LPG	30.5		40.7		10.2	
Energy Sub-Total	7,236.2	492,204.4	9,062.4	656,272.6	1,826.2	164,068.1
Reductants						
Coal	69,760.7		97,740.7		27,980.0	
Carbon Electrodes	12,615.7		17,241.4		4,625.7	
Char	15,124.2		22,675.8		7,551.5	
Reductants Sub-Total	97,500.6		137,657.9		40,157.3	
TOTAL	104,736.7	492,204.4	146,720.3	656,272.6	41,983.6	164,068.1
SINKS						
Emissions offset schemes	-68.3		-68.3		0	
Sinks Sub-Total	-68.3		-68.3		0	
NET EMISSIONS	104,668.4	492,204.4	146,652.0	656,272.6	41,983.6	164,068.1
Notes (1):	Emissions from combustion of wood waste 3,492 tonnes CO ₂ -e		Emissions from combustion of wood waste 4,123 tonnes CO ₂ -e		Emissions from combustion of wood waste 632 tonnes CO ₂ -e	

(1) Under international guidelines and the National Greenhouse Accounts Factors methodology, CO₂ released from combustion of biogenic carbon fuels is not reported under facility totals.

5. Recommended Conditions

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.

For this project, there are four existing statements, being Statement Nos 027, 279, 575 and 593, dated 13 May 1988, 10 August 1992, 31 October 2001 and 5 June 2002, respectively. As such, the EPA considers it appropriate to review and consolidate these into a single set of conditions. However, the EPA has not revisited the intent of the existing conditions, but has updated them from an administrative point of view, and presented them as outcome-based conditions as far as possible. Certain conditions are presented substantially as they were originally, since they do not lend themselves to modification.

5.1 Proponent's commitments

The EPA recognises that the commitments 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. Some of those commitments have been modified and included as recommended conditions, as set out in Appendix 2, to which the proposal should be subject, if it is to be implemented.

5.2 Recommended conditions

Since a number of the current conditions and commitments (which are consolidated in Appendix 3) have been cleared and/or are no longer relevant, the greater part of the environmental management of the project can either be managed under revised implementation conditions, or handed over, at least in part, to be managed under the provisions of Part V of the EP Act.

Following consideration of the appropriateness of each of the current conditions and commitments for future management of the revised proposal, the action recommended (i.e. deletion, modification or retention) is summarised and shown in Tables A and B, respectively (Appendix 4).

Having reviewed the current conditions in Appendix 3; the original (1988) and subsequent commitments; the regulatory aspects under Part V of the EP Act; and the information provided in this report, the EPA has developed a set of conditions which the EPA recommends be imposed if the revised proposal by Simcoa Operations Pty. Ltd., being the Silicon Project, Kemerton and Mine at Moora – Addition of a Fourth Submerged Arc Furnace at the Kemerton Smelter, is approved for implementation.

The recommended revised conditions are presented in Appendix 2.

6. Conclusions

The EPA has considered the proposal by Simcoa Operations Pty. Ltd., to add a fourth submerged electric arc furnace at the Kemerton smelter and the associated increase in annual production of silicon.

The EPA has concluded that noise and air quality can be managed to meet the EPA's environmental objectives by the proponent meeting the requirements of Part V of the EP Act. There are no recommended implementation conditions for these environmental factors.

The EPA notes that greenhouse gas emissions had not been an environmental factor considered in historical assessments dating back to 1988, however the proponent has improved energy efficiencies and reduced greenhouse gas emissions per tonne of silicon produced from approximately 16 tonnes to 12 tonnes CO₂-e at Kemerton over the years.

The EPA has concluded that the proposal can be managed to meet the EPA's environmental objectives, provided there is satisfactory implementation by the proponent of the recommended revised implementation conditions, including a new greenhouse gas abatement condition, as set out in Appendix 2.

7. Recommendations

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

1. That the Minister notes that the proposal being assessed is a revised proposal for the addition of a fourth submerged electric arc furnace at the Kemerton smelter by Simcoa Operations Pty. Ltd. and the associated increase in production;
2. That the Minister considers the report on the key environmental factors as set out in Section 4;
3. That the Minister notes that the EPA has concluded that the proposal can be managed to meet the EPA's environmental objectives, provided that there is satisfactory implementation by the proponent of the recommended revised conditions set out in Appendix 2, and that there is satisfactory conformity by the proponent with the requirements of Part V of the EP Act; and
4. That the Minister imposes the recommended revised conditions and procedures included in Appendix 2 of this report.

Appendix 1

References

EPA (1988). *Proposed Silicon Project at Kemerton*, Environmental Protection Authority Bulletin 328, April 1988.

EPA (1992). *Silicon Project, Kemerton*, Environmental Protection Authority Bulletin 631, June 1992.

EPA (2001). *Extension of Quartz Mining and Strategy for Resource Access and Biodiversity Conservation*, Environmental Protection Authority Bulletin 1027, September 2001.

EPA (2002). *Silicon Project, Kemerton*, Environmental Protection Authority Bulletin 1038, 2002.

Maunsell (1987). *Barrack Silicon Project Public Environmental Report*. Maunsell and Partners Pty Ltd, Perth, WA (1987).

Simcoa (2009). *S.38 Referral Documentation: Addition of a 4th Submerged Arc Furnace at the Kemerton Smelter of Simcoa Operations Pty Ltd*. Simcoa Operations Pty. Ltd., Kemerton, WA (2009).

Trudgen (2009). *A vegetation and flora survey of two small areas on the Simcoa Smelter Property at Kemerton*, Prepared for Simcoa Operations Pty Ltd by M.E. Trudgen & Associates, January 2009.

Appendix 2

Recommended Environmental Conditions

RECOMMENDED ENVIRONMENTAL CONDITIONS

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

SILICON PROJECT, KEMERTON AND MINE AT MOORA

Proposal: The mining of silica (quartzite) rock approximately 15 kilometres north of Moora on Mining Lease M70/191, and smelting to produce silicon, employing wood, charcoal, coal and the silica mined at Moora, in the Kemerton Industrial Area approximately 20 kilometres north of Bunbury in the Shire of Harvey.

The revised proposal is for the increase from the approved three submerged electric arc furnaces to four submerged electric arc furnaces at the Kemerton site, and the associated increase in production. The proposal is documented in schedule 1 of this statement.

Proponent: Simcoa Operations Pty. Ltd.

Proponent Address: Lot 22 Marriott Road, WELLESLEY WA 6233

Assessment Number: 1783

Previous Assessment Numbers: 165, 737, 1383 and 1382

Previous Statement Numbers: 027, 279, 575 and 593

Report of the Environmental Protection Authority: Report 1317

Previous Reports of the Environmental Protection Authority: Reports 328, 631, 1027 and 1038

The conditions and procedures of this statement supersede the conditions and procedures of Statements Nos. 027, 279, 575 and 593 in accordance with section 45B of the *Environmental Protection Act 1986*.

The revised proposal referred to in the above report of the Environmental Protection Authority may be implemented. The implementation of that proposal is subject to the following conditions and procedures:

1 Proposal Implementation

1-1 The proponent shall implement the proposal as assessed by the Environmental Protection Authority and described in schedule 1 of this statement subject to the conditions and procedures of this statement.

2 Proponent Nomination and Contact Details

- 2-1 The proponent for the time being nominated by the Minister for Environment under sections 38(6) or 38(7) of the *Environmental Protection Act 1986* is responsible for the implementation of the proposal.
- 2-2 The proponent shall notify the Chief Executive Officer (CEO) of the Department of Environment and Conservation of any change of the name and address of the proponent for the serving of notices or other correspondence within 30 days of such change.

3 Time Limit of Authorisation

- 3-1 The authorisation to implement the proposal provided for in this statement shall lapse and be void five years after the date of this statement if the proposal to which this statement relates is not substantially commenced.
- 3-2 The proponent shall provide the CEO of the Department of Environment and Conservation with written evidence which demonstrates that the proposal has substantially commenced on or before the expiration of five years from the date of this statement.

4 Compliance Reporting

- 4-1 The proponent shall prepare and maintain a compliance assessment plan to the satisfaction of the CEO of the Department of Environment and Conservation.
- 4-2 The proponent shall submit to the CEO of the Department of Environment and Conservation, the compliance assessment plan required by condition 4-1 at least six months prior to the first compliance assessment report required by condition 4-6.

The compliance assessment plan shall indicate:

- 1 the frequency of compliance reporting;
 - 2 the approach and timing of compliance assessments;
 - 3 the retention of compliance assessments;
 - 4 reporting of potential non-compliances and corrective actions taken;
 - 5 the table of contents of compliance assessment reports; and
 - 6 public availability of compliance assessment reports.
- 4-3 The proponent shall assess compliance with conditions in accordance with the compliance assessment plan required by condition 4-1.
- 4-4 The proponent shall retain reports of all compliance assessments described in the compliance assessment plan required by condition 4-1 and shall make those reports

available when requested by the CEO of the Department of Environment and Conservation.

4-5 The proponent shall advise the CEO of the Department of Environment and Conservation of any potential non-compliance as soon as practicable.

4-6 The proponent shall submit a compliance assessment report annually from the date of issue of this Implementation Statement addressing the previous twelve-month period or other period as agreed by the CEO of the Department of Environment and Conservation.

The compliance assessment report shall:

1 be endorsed by the proponent's Vice-President or a person, approved in writing by the CEO of the Department of Environment and Conservation, delegated to sign on the Vice-President's behalf;

2 include a statement as to whether the proponent has complied with the conditions;

3 identify all potential non-compliances and describe corrective and preventative actions taken;

4 be made publicly available in accordance with the approved compliance assessment plan; and

5 indicate any proposed changes to the compliance assessment plan required by condition 4-1.

5 Performance Review and Reporting

5-1 The proponent shall submit to the CEO of the Department of Environment and Conservation Performance Review Reports at the conclusion of the second and fourth years after the commencement of operation of the fourth submerged arc furnace and then, at such intervals as the CEO of the Department of Environment and Conservation may regard as reasonable, which address:

1 the major environmental risks and impacts; the performance objectives, standards and criteria related to these; the success of risk reduction/impact mitigation measures and results of monitoring related to the management of the major risks and impacts;

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

3 significant improvements gained in environmental management which could be applied to this and other similar projects.

6 Flora

6-1 The proponent shall manage mining activities such that, outside those areas in which approval has been granted to take flora under the provisions of the *Wildlife Conservation Act 1950*, there are no discernible detrimental changes in the following flora:

1. the Coomberdale Chert Threatened Ecological Community;
2. populations of *Regelia megacephala*; and
3. other Priority and Declared Rare flora species.

6-2 The proponent shall provide annual reports to the CEO of the Department of Environment and Conservation on mining activities, indicating those areas cleared, and shall advise the CEO of the Department of Environment and Conservation as soon as practicable in the event that detrimental effects on any of the abovementioned flora are observed. Close liaison with the Department of Environment and Conservation should take place.

7 Mining and Conservation Strategy

7-1 Prior to expansion of mining into the Eastern Ridge area, the proponent shall revise and update the Mining and Conservation Strategy, in co-operation with the Department of Environment and Conservation, and to the requirements of the Minister for Environment on advice of the Department of Environment and Conservation.

The objective of this strategy is to ensure that conservation of biodiversity values is achieved whilst maintaining long-term access to the chert resource.

The Mining and Conservation Strategy shall address the following matters:

- 1 Additional reconnaissance exploration to identify other parts of the Coomberdale Chert formation, both within and outside current lease areas, which may contain sufficiently high grade quartz in areas where the chert-associated vegetation is already absent or degraded;
- 2 Provision of support (subject to negotiation) to the Department of Environment and Conservation for regional flora surveys to identify and map other parts of the Coomberdale Chert formation which may contain the same or other significant flora associated with the chert;
- 3 Based on the outcomes of (1) and (2) above, and in cooperation with the Department of Environment and Conservation, development of the best strategy to ensure both access to the resource and conservation, in secure reserves, of the flora of the Coomberdale Chert formation;
- 4 Additional conservation offsets such as the Cairn Hill North area and other significant areas of vegetation to form 'linkages' with Cairn Hill and other ridges in the area; and

- 5 Provision for fencing of significant areas of vegetation, whether part of reserves or other properties, and, during the operational life of the mine, provision of resources for conservation management.
- 7-2 The proponent shall implement the Mining and Conservation Strategy required by condition 7-1 in liaison with the Department of Environment and Conservation.

8 Rehabilitation

- 8-1 Prior to the commencement of ground-disturbing activities in an area to be mined, the proponent shall conduct surveys of the area to collect baseline information on the following:
- 1 pre-mining soil profiles;
 - 2 groundwater levels;
 - 3 surface water flows;
 - 4 vegetation complexes; and
 - 5 landscape and landforms.
- 8-2 The proponent shall conduct/commence rehabilitation trials to determine criteria for successful re-growth, using local native flora species, including Priority and Declared Rare flora species, to the requirements of the CEO of the Department of Environment and Conservation.
- 8-3 As mining progresses, the proponent shall commence rehabilitation of the mined area in accordance with the following:
- 1 Re-establishment of vegetation in the rehabilitation area to be comparable with that of the pre-mining vegetation such that the following criteria are met within four years following the cessation of productive mining in the area:
 - (1) flora and vegetation are re-established with not less than 70 percent coverage (not including weed species); and
 - (2) weed coverage less than 10 percent.
 - 2 A schedule of the rate of rehabilitation acceptable to the CEO of the Department of Environment and Conservation.
- 8-4 In liaison with the Department of Environment and Conservation, the proponent shall monitor progressively the performance of rehabilitation required by condition 8-3.
- 8-5 The proponent shall submit annually a report of the rehabilitation performance monitoring required by condition 8-4 to the CEO of the Department of Environment and Conservation.

Note: In fulfilling the above rehabilitation condition/s, the Environmental Protection Authority expects the proponent to liaise with the Department of Mines and Petroleum.

9 Greenhouse Gas Abatement

9-1 Prior to commencement of the Commonwealth's Emissions Trading Scheme, the proponent shall prepare and submit to the Minister for Environment a Greenhouse Gas Abatement Report which meets the objectives set out in condition 9-2, as determined by the Minister for Environment.

9-2 The objectives of the Greenhouse Gas Abatement Report required by condition 9-1 are to:

- 1 Demonstrate that maximising energy efficiency and opportunities for future energy recovery have been given due consideration in the design of the third and fourth submerged electric arc furnaces;
- 2 Ensure that the "greenhouse gas" intensity ("greenhouse gas" per unit of silicon produced) is equivalent to, or better than benchmarked best practice; and
- 3 Achieve continuous improvement in "greenhouse gas" intensity through the periodic review, and if practicable, adoption of advances in technology and process management.

Procedures

1. Where a condition states "on advice of the Environmental Protection Authority", the Environmental Protection Authority will provide that advice to the Department of Environment and Conservation for the preparation of written notice to the proponent.
2. The Environmental Protection Authority may seek advice from other agencies or organisations, as required, in order to provide its advice to the Department of Environment and Conservation.
3. The Minister for Environment will determine any dispute between the proponent and the Environmental Protection Authority or the Department of Environment and Conservation over the fulfilment of the requirements of the conditions.
4. Where a condition lists advisory bodies, it is expected that the proponent will obtain the advice of those listed as part of its compliance reporting to the Department of Environment and Conservation.
5. The proponent is required to apply for a Works Approval and for an amendment to the Licence for this project under the provisions of Part V of the *Environmental Protection Act 1986*.

Schedule 1

Silicon Project, Kemerton and Mine at Moora (Revised proposal - Assessment No. 1783)

The mining of silica (quartzite) rock approximately 15 kilometres north of Moora on Mining Lease M70/191, and smelting to produce silicon, employing wood, charcoal, coal and the silica mined at Moora, in the Kemerton Industrial Area in the Shire of Harvey. Mining Lease M70/1055 (Cairn Hill) was originally available for mining, but has been surrendered to become a nature reserve. The mined silica is transported by rail and road to Kemerton.

The revised proposal is for the increase from the approved three submerged electric arc furnaces to four furnaces at the Kemerton site, and the associated increase in production.

The proponent engaged consultants Maunsell and Partners to prepare a Public Environmental Report, dated November 1987. For the increase to a fourth submerged electric arc furnace, the proponent has submitted a referral document entitled *Addition of a 4th Submerged Arc Furnace at the Kemerton Smelter of Simcoa Operations Pty Ltd*, dated February 2009.

The Key Proposal Characteristics for the Kemerton and Moora sites are shown in Tables 1(a) and 1(b), respectively, below.

Table 1(a) – Key Proposal Characteristics, Kemerton Plant.

Element	Quantities/Description
Silicon Production	64,000 tonnes per annum (approximately)
Quartzite Consumption	160,000 tonnes per annum (approximately)
Wood for Charcoal	110,000 tonnes per annum (approximately)
Charcoal Production	27,000 tonnes per annum (approximately)
Smelter Furnaces	4 x submerged electric arc furnaces
Off-gas Cleaning Plant (Baghouses)	One large baghouse with stacks One large baghouse without stacks
Greenhouse Gas Emissions: Scope 1 (emissions from processing) Scope 2 (emissions generated off-site by electricity generation) Total	147,000 tonnes per annum CO ₂ -e (approximately) 656,000 tonnes per annum CO ₂ -e (approximately) 803,000 tonnes per annum CO ₂ -e (approximately)
Electric Power Consumption	190,000 kWh per annum per furnace (approximately)
Natural Gas Consumption	100,000 GJ per annum (approximately)
Water Consumption (Groundwater)	290,000 kL per annum (approximately)
Truck Movements	44 trucks per day (approximately, averaged over 365 days)

Table 1(b) – Key Proposal Characteristics, Moora Mine.

Element	Quantities/Description
Quartzite Production	160,000 tonnes per annum of lump quartz (approximately)
Operational life	10 years (approximately) – under current mine plan
Total area of disturbance	60 hectares (approximately)
Area of rehabilitation	All disturbed areas
Depth of pit	To 215 metres RL (approximately)
Water requirements (Groundwater)	80,000 kL per annum (approximately)
Water source	Superficial Formation

Figures (attached)

Figure 1 – Site layout plan, Kemerton Plant.

Figure 2 – Mining tenements, Moora.

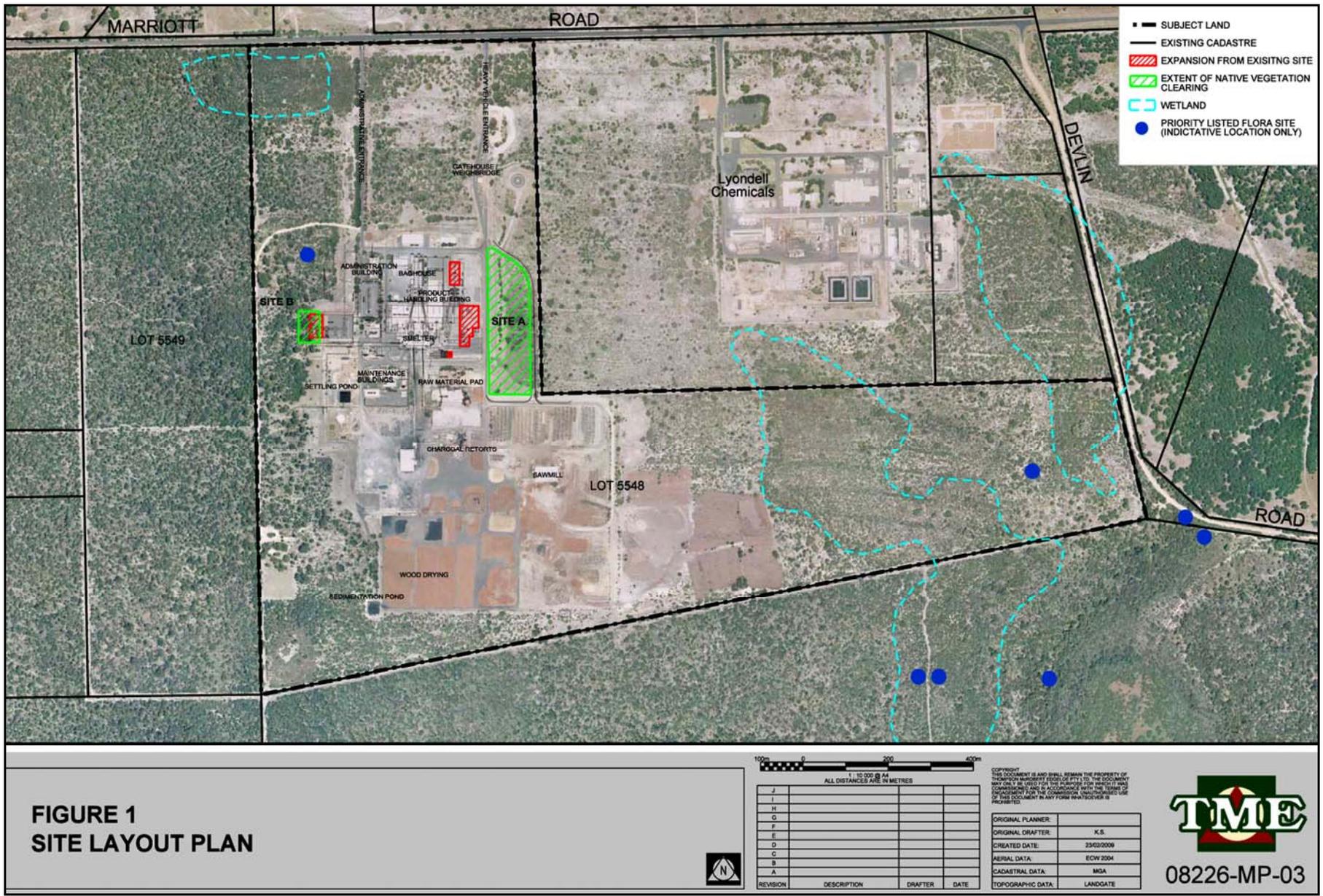


Figure 1: Site layout plan, Kemerton Plant.

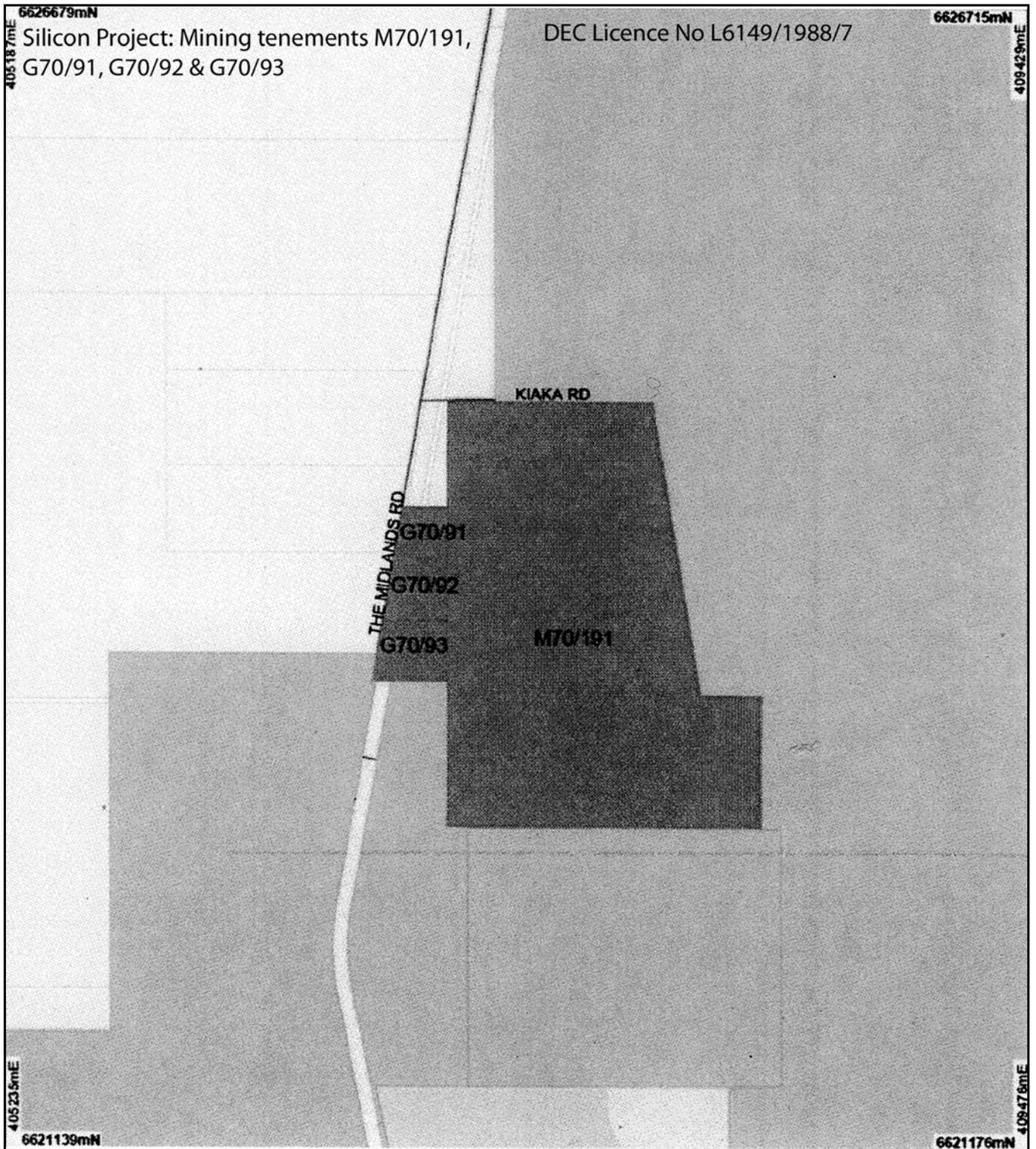


Figure 2: Mining tenements, Moora.

Appendix 3

Current Consolidated Environmental Conditions and Commitments

(Based on Statements 027, 279, 575 and 593)

**Consolidated version of Conditions and Commitments
incorporating Ministerial Statements 027, 279, 575 and 593**

**PROPOSED SILICON PROJECT
KEMERTON AND MINE AT MOORA**

BARRACK MINES LIMITED (Original Proponent)

This proposal may be implemented subject to the following conditions:

- 1-1 In implementing the proposal, including the proposed amendment reported on in Environmental Protection Authority Bulletin 631, the proponent shall fulfil the commitments of statement no. 027 (13 May 1988).
- 1-2 The proponent shall implement subsequent commitments which the proponent makes as part of the fulfilment of the conditions in this and previous statements.
- 1-3 Where the proponent seeks to change any aspect of the proposal 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.
- 1-4 Where the proponent seeks to change any aspect of the proposal 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. Any proposal to upgrade significantly or re-route road access to the Kemerton plant site shall be to the satisfaction of the Local Authority and the Environmental Protection Authority.
- 3A The proponent shall pass all furnace off-gases through an approved dust collection facility except as otherwise permitted by the Environmental Protection Authority during planned maintenance or emergencies.
- 3B Within three months of the date of this statement [10 August 1992], the proponent shall prepare and subsequently implement a contingency plan as an additional part of the environmental monitoring and management plan required by condition 19, with the specific objective of minimising the periods of direct venting, to meet the requirements of the Environmental Protection Authority.
4. The proponent shall ensure that ground level concentrations of silica fume in the surrounding 'special residential' and 'special rural' areas do not exceed an annual average of 0.07 mg/m³ and a 24-hour average of 0.10 mg/m³ at any time.
5. The proponent shall ensure that the introduced noise from the project does not cause the noise in the surrounding 'special residential' or 'special rural' areas to exceed 50dB(A) from 0700 to 1900 hours, 45dB(A) from 1900 to 2200 hours, and 40dB(A) from 2200 to 0700 hours. These levels should not be viewed as normal operating

levels for the plant. They are the legal upper limits above which action will be taken by the Environmental Protection Authority. These levels should be reviewed after 12 month's normal operation of the plant or earlier if recommended by the Environmental Protection Authority. As a result of this review these noise levels may be varied by the Authority so as to protect the amenity of the 'special residential' and 'special rural' areas adjacent. In order to ascertain the existing noise climate at relevant localities, the Environmental Protection Authority shall ensure that noise monitoring studies are undertaken before commissioning of the plant.

6. The proponent shall include noise control as a design criterion and all attenuation considered necessary by the Environmental Protection Authority shall be built-in during construction by the proponent.
7. To assist in meeting the requirements of Condition 5, the proponent shall submit prior to construction and subsequently implement plans to the satisfaction of the Environmental Protection Authority with respect to environmental noise considerations, for the effective attenuation of noise produced by all relevant items of plant, including:
 - outdoor mobile plant;
 - vehicles transporting materials to and from the site;
 - sawmilling and logsplitting operations;
 - feed system for the charcoal retorts;
 - gas handling system for the retorts and incinerator;
 - charcoal screening system;
 - outdoor conveyors;
 - furnace feed systems;
 - stinger and taphole shotgun;
 - ladle cleaning, oxygen lance and mould breaker;
 - product crushing and screening systems;
 - fans and ducting for the control of general dust;
 - baghouse and associated fans and ducting;
 - compressed air supply;
 - pumps for the supply and disposal of water; and
 - electrical transformer.

Meeting this requirement does not in any way absolve the proponent from its responsibility to meet occupational health noise levels administered by the Department of Mines.

8. The proponent shall install and operate the charcoal retorts, the retort off-gas incinerator and the wood waste incinerator so as to ensure that no offensive vapours or odours are detectable in 'special residential' or 'special rural' areas adjacent to the project site to the satisfaction of the Environmental Protection Authority.
9. The proponent shall ensure that at least four regular meetings are convened in the first year including the local authority for the purpose of promoting communication. The frequency of meetings after the first year shall be as mutually agreed between

the proponent and the Local Authority. These meetings shall commence before commissioning.

10. The proponent shall obtain a Works Approval (prior to construction) and a Licence (prior to commissioning) for the proposed facility under the provisions of Part V of the *Environmental Protection Act 1986*.
11. During construction of the plant, the proponent shall:
 - stabilise disturbed soil and take other appropriate measures to ensure that dust levels at the plant boundary do not exceed a 15 minute average of 1 mg/m³; and
 - take appropriate short term measures to control run-off and oil spills to the satisfaction of the Environmental Protection Authority.
- 12-1 Within one year following the formal authority issued to the decision-making authorities under Section 45(7) of the *Environmental Protection Act 1986* [6 November 2001], the proponent shall prepare a monitoring and management programme to manage the effect of mining activities on the Coomberdale Chert Threatened Ecological Community, and on populations of *Regelia megacephala* and other priority and declared rare flora species, to the requirements of the Minister for the Environment and Heritage on advice of the Environmental Protection Authority and the Department of Conservation and Land Management.
- 12-2 The proponent shall implement the monitoring and management programme required by condition 12-1 to the requirements of the Minister for the Environment and Heritage on advice of the Environmental Protection Authority and the Department of Conservation and Land Management.
- 13-1 The proponent shall not allow emissions from the existing baghouse (plus an additional one of the same height if required by future expansion) to exceed the sulphur dioxide (SO₂) levels shown in Table 1.

Table 1 - Ambient limits for sulphur dioxide (SO₂).

Location	Limit (ppm)	Limit (µg/cubic metre)
Revised buffer boundary	0.20 1-hour averaging	572 1-hour averaging
Revised buffer boundary	0.08 1-day averaging	229 1-day averaging
Revised buffer boundary	0.02 1-year averaging	57 1-year averaging

Note:

The reference to a second baghouse is not intended to constitute pre-approval of future expansion, and relates to the results of the air modelling which showed that the emissions 'footprint' would not change if a second baghouse of the same height were installed. A higher building or a baghouse with a stack would lead to changes from what has been modelled.

14. The proponent shall prepare and implement a detailed plan for the supply of water for the project at Kemerton and at the Moora minesite to the satisfaction of the Environmental Protection Authority, the Water Authority of WA and the Department of Conservation and Land Management before the commissioning of the plant. An objective of the water supply plan and the assessment of its impact shall be the protection of wetlands in the Kemerton locality.
15. The proponent shall prepare and implement a detailed management plan for the disposal of waste water and storm water to the satisfaction of the Environmental Protection Authority, the Local Authority and the Water Authority of WA before the commissioning of the plant.
16. During operation of the plant the proponent shall stabilise stockpiles and unsealed access roads on the plant site and take other appropriate measures to ensure that dust levels at the plant boundary do not exceed a level specified by the Environmental Protection Authority. This level and the associated management measures required by the Environmental Protection Authority will be set as part of the Works Approval process.
17. The proponent shall prepare and implement a plan for the management and disposal of silica fume to the satisfaction of the Environmental Protection Authority before commissioning of the plant.
18. Prior to land clearing the proponent shall prepare a preliminary landscape plan and subsequently, prior to commissioning, the more detailed landscape and screening plan as proposed, both plans to be to the satisfaction of the Environmental Protection Authority, the Local Authority and the Department of Conservation and Land Management.
19. Prior to commissioning, the proponent shall prepare an overall monitoring and management plan for the total proposal to the satisfaction of the Environmental Protection Authority. This plan shall, amongst other things include details of monitoring, review, reporting and corrective measures to be taken by the proponent to ameliorate any adverse impacts of the project identified.
20. Prior to expansion of mining into the Eastern Ridge area, the proponent shall prepare, and then subsequently implement, a Mining and Conservation Strategy, in co-operation with the Department of Conservation and Land Management, and to the requirements of the Minister for the Environment and Heritage on advice of the Environmental Protection Authority.

The objective of this strategy is to ensure that conservation of biodiversity values is achieved whilst maintaining long-term access to the chert resource.

The Mining and Conservation Strategy shall address the following matters:

- (1) Additional reconnaissance exploration to identify other parts of the Coomberdale Chert formation, both within and outside current lease areas,

which may contain sufficiently high grade quartz in areas where the chert-associated vegetation is already absent or degraded;

- (2) Provision of support (subject to negotiation) to the Department of Conservation and Land Management for regional flora surveys to identify and map other parts of the Coomberdale Chert formation which may contain the same or other significant flora associated with the chert;
 - (3) Based on the outcomes of (1) and (2) above, and in cooperation with the Department of Conservation and Land Management, development of the best strategy to ensure both access to the resource and conservation, in secure reserves, of the flora of the Coomberdale Chert formation;
 - (4) Additional conservation offsets, if required, such as the Cairn Hill North area and other significant areas of vegetation to form 'stepping stones' or 'linkages' with Cairn Hill and other ridges in the area; and
 - (5) Provision for fencing of significant areas of vegetation, whether part of reserves or other properties, and, during the operational life of the mine, provision of resources for conservation management.
21. The proponent shall surrender Mining Lease no. M70/1055 covering Cairn Hill at such time as requested by the Minister for the Environment and Heritage on advice of the Environmental Protection Authority and the Department of Conservation and Land Management. The Mining Lease shall be surrendered in accordance with procedure 3 below.
22. Within one year following the formal authority issued to the decision-making authorities under Section 45(7) of the *Environmental Protection Act 1986* [November 2001?], the proponent shall prepare a Rehabilitation Plan and commence rehabilitation trials, using local native flora species, including priority and declared rare flora species, to the requirements of the Minister for the Environment and Heritage on advice of the Environmental Protection Authority and the Department of Conservation and Land Management.

Procedure

1. The Environmental Protection Authority is responsible for verifying compliance with the conditions contained in this statement, with the exception of conditions stating that the proponent shall meet the requirements of either the Minister for the Environment or any other government agency.
2. If the Environmental Protection Authority, other government agency or proponent is in dispute concerning compliance with the conditions contained in this statement, that dispute will be determined by the Minister for the Environment.

3. Surrender of Mining Lease no. M70/1055 covering Cairn Hill (See condition 21).

The proponent will effect surrender of Mining Lease no. M70/1055 immediately following gazettal of the A-Class Reserve at Cairn Hill. The Department of Mineral and Petroleum Resources has confirmed that it has no objection to the establishment of the A-Class Reserve.

BARRACK SILICON PROJECT
ENVIRONMENTAL COMMITMENTS

May 1988

1.0 PREAMBLE

Barrack Silicon Project Pty Ltd as proponent for the Barrack Silicon Project to be located at Kemerton undertakes to make various environmental commitments in relation to the project. This document outlines those commitments.

2.0 PUBLIC ENVIRONMENTAL REPORT

The proponent engaged consultants Maunsell & Partners to prepare a Public Environmental Report, dated November 1987. That report should be read in conjunction with this document.

3.0 ENVIRONMENTAL COMMITMENTS

- 3.1 Kemerton Site - General
- 3.2 Quartzite Supply
- 3.3 Wood Supply
- 3.4 Charcoal Production
- 3.5 Silicon Production

4.0 ATTACHMENTS

- 4.1 Wood Transport Corridors

BARRACK SILICON PROJECT COMMITMENTS

3.1 KEMERTON SITE GENERAL

3.1.1 The proponent is committed to being a good corporate citizen and to complying with reasonable and justifiable EPA requirements, but in particular to the two main environmental issues of the project, dust emissions and noise control.

3.1.2 A site specific landscaping plan capable of tolerating the local environment adjacent to a chloride plant and opposite the future Aluminium Smelter, will be developed in consultation with CALM.

3.1.3 The proponent expects to draw water from the 'Yarragadee' aquifer and is committed to monitor/test bore water as required by WAWA. Adoption of a closed circuit water cooling circuits in the silicon process greatly help to conserve water usage. The proponent will optimize usage of plant water to its fullest practical extent.

3.1.4 In the event that runoff water is required to be treated, application will be made with EPA prior to discharge into nearby water courses. As appropriate the local authority and WAWA will be consulted should existing drains be used.

- 3.1.5 The wood stockpile and the plant site in general has a ground level graded to drainage falls into surface drains which in turn are routed to a stormwater sedimentation pond designed to cater for a one in five year return period storm.
- 3.1.6 The proponent is committed to the installation and maintenance of a first-aid vehicle, a fire tender, appropriate trained personnel and developing safety and contingency planning both during construction and operation of the project. Application annually will be made to the Minister for Emergency Services through the Bush Fires Board of Western Australia to operate fire risk areas of the plant during the high risk summer months of November through to March.
- 3.1.7 The proponent will develop a comprehensive air emission and atmospheric monitoring programme in consultation with the EPA, to establish the environmental impacts from the project's operation.
- 3.1.8 The proponent, in addition to seeking practicable and economic methods to consistently reduce noise emissions at their source, will routinely monitor the efficiency of silencers and noise attenuation equipment and will take remedial actions where necessary to maintain efficiency of same.
- 3.1.9 Solid wastes will be carefully monitored to maximise recycling and resale wherever possible. Solids requiring disposal will be collected and transported to an approved landfill and will be subject to control by EPA.

3.2 QUARTZITE SUPPLY

- 3.2.1 Quarrying operations will be managed to ensure minimum practicable noise disturbance to the surrounding environment and to that end quarrying operations will generally be restricted to the hours of 0600 to 1700 Monday to Friday, during annual mining campaigns not expected to exceed three to five months each year.
- 3.2.2 The contract quarry operators will be required to implement appropriate blasting techniques to achieve a maximum of 115 dB peak linear limit. This may include the use of sequential timers or alternative approved methods of blast initiation.
- 3.2.3 Blasting activities will not proceed during periods when wind conditions would result in the transport of significant dust from such blasting operations towards the nearby vicinity of neighbouring farms.
- 3.2.4 With the exception of the first year of operations when the delayed timetable for the Project may necessitate a summer/autumn mining campaign, quarrying operations will be scheduled for the period mid-August through mid-December when post winter moist soil conditions should assist in dust suppression and dust control around the mine site.
- 3.2.5 The proponent is committed to mine site rehabilitation in accordance with the requirements of the Department of Mines. This plan will include rehabilitation where practicable using local native vegetation. In addition the proponent will seek advice from CALM on the management of *Regelia megacephala* populations,

including the practicality of establishing trial experimental plots to determine criteria for successful regrowth. Where there is a risk of direct impact of mining or service equipment on populations of *Regelia megacephala* these populations will be fenced off.

- 3.2.6 Haul roads will be selectively routed by the proponent to provide minimum disturbance to the environment. Dust suppression by water spray on haul roads and at the crushing plant will be implemented should significant dust occur. Tree-planting for screening purposes will be undertaken, in consultation with the farmer/landowner, where necessary and practicable.
- 3.2.7 Mining operations will leave some areas of inferior grade ore thereby preserving to some degree the visual amenity of the quartzite hills to the north of Moora.
- 3.2.8 Mining operations including drilling, excavation, quartz haulage and crushing and screening will include dust suppression and dust control measures designed to ensure compliance with occupational health statutes.

In particular drilling will be carried out by an airtrack drill fitted with a 'filterclone' dust control system or similar, with separated dust being disposed of in accordance with the Mines Department requirements.

Fine mist water sprays will be installed at the receival hopper and crusher, and provision will be made to damp down muck piles, haulroads and stockpile areas to control fugitive dust.

- 3.2.9 Efforts will be made to recycle extracted waters to minimise water consumption where practicable.

3.3 WOOD SUPPLY

Wood supply to the Silicon Plant at Kemerton is a responsibility of the WA Department of Conservation and Land Management through its contract with the proponents to fall, extract, load, transport and deliver log timber onto the Kemerton site. The proponent will rely on CALM to meet its contractual obligations in relation to the following commitments.

- 3.3.1 Wood will be transported on 20m long articulated 70 tonne log haulage trucks. Proposed routes for the period 1989 - 1992 and for the period 1993 - 1998 are shown in the attached figure. These routes are presently used by log haulage trucks.

Major transport corridors for the first 5 years will be developed in consultation with MRD and CALM subject to EPA approval.

- 3.3.2 Log haulage vehicles, immediately after entrance to the site, will be specifically diverted away from day to day traffic primarily for safety reasons. Timber will only be received at the plant site during daylight hours Monday to Friday, with possible extensions to Saturday if agreed between CALM and the proponents.

- 3.3.3 The proponent intends to purchase wood to produce charcoal from the Department of Conservation and Land Management (CALM) under the Government approved Department's General Working Plan No. 87. CALM has developed and is committed as is the proponent to the quarantine and hygiene procedures designed to minimize and reduce the risk of spreading jarrah dieback.
- 3.3.4 The proponent recognizes that the maintenance of flora and fauna within the State Forrest is highly desirable. Currently there is no information on the use of tree hollows by fauna in the Jarrah forest so the proponent will fund and supervise with CALM a post graduate research project to evaluate these predictions and the effects of silvicultural practices specifically for the project. Information from this project will be made available to EPA within 3 years of the start of plant production.
- 3.3.5 If the research project detects any significant impact of the silicon project on fauna, wood collection operations will be more widely dispersed over the areas being cut for timber to reduce the effect subject to CALM approval. Alternatively some firewood trees and logs will be left in the forest to ensure niche retention.
- 3.3.6 The General Forest Working Plan No. 87 divides the forest into areas with different Management Priority Areas (MPA's). Subject to hygiene controls firewood extraction is permitted within MPA's however timber extraction from MPA's for recreation will not be carried out under this proposal.
- 3.3.7 Forrest areas allocated to flora, fauna and landscape conservation are not available for timber extraction.
- 3.3.8 The proponent through CALM, is committed to the current silvicultural management practices for jarrah forests which will, wherever practicable, be enforced for wood produced for this project to provided optimal conditions for the growth of preferred young trees by reducing competition. The objective of the proponent is to ensure an economical supply of dry wood substance to the Project for the purposes of charcoal and silicon manufacture consistent with forest conservation through comprehensive long term strategy planning.

3.4 CHARCOAL PRODUCTION

- 3.4.1 The design of the overall docking mill complex is under review. The concept selected will incorporate systems designed to reduce noise levels in the vicinity of the complex, consistent with the proponents overall undertakings for control of noise as contained with the PER.
- 3.4.2 An incinerator will be incorporated by the proponent in the retort complex to combust volatile material in the rinse gas and pyroligneous vapour.
- 3.4.3 Retort loading arrangement consists of:

- 1) Upper retort door (swing gate design).
- 2) Lower retort door (slide gate design).

The system is designed to minimise gas release during charging of the retort.

- 3.4.4 The retort upper compartment will be operated slightly below atmospheric pressure as a further safeguard against accidental release of retort vapours.
- 3.4.5 Charcoal dust generated at the belt discharge chute into the furnace bins will be contained by a suppression system or dust collector and re-cycled back to the bin.
- 3.4.6 Transfer points on belt conveyors transporting charcoal will be fitted with dust suppression systems. The charcoal screen will be fitted with a dust collector, collected dust will be combined with charcoal fines from the screening operation.
- 3.4.7 The design of the waste wood handling system is under review; should an incinerator be utilised for burning wastes it will be of the 'smokeless' refractory silo type.
- 3.4.8 The comprehensive fire suppression system for the charcoal process will consist of a water tank and pumping station which will feed a ring main and hydrant system around the charcoal retorts and docking mill area as well as the remainder of the plant. A sprinkler system will be installed for fire protection in the docking mill.

Personnel will be trained in fire-fighting procedures, equipment locations clearly marked and a fully operational fire tender will be maintained on site. Portable fire extinguishers and serviced hose reels will be located within the buildings as required.

- 3.4.9 Provision will be made for bleeding gas cooling water to a settling pond prior to further treatment. Washdown water will be fed through an oil separator prior to entering an evaporation pond or leach drain.
- 3.4.10 The retort controls will incorporate automatic shutdown system in the event of serious malfunction in shutdown mode top gases would continue to be passed through the high temperature incinerator until a stable cycle has been achieved.

3.5 SILICON PRODUCTION

- 3.5.1 The quartzite hopper, transfer point and conveyor system will be fitted with water mist sprays for dust suppression.
- 3.5.2 Each charcoal bin will be fitted with an emergency dumping gate, fitted to the lower section of bin, for use in case of spontaneous combustion of the charcoal.
- 3.5.3 The proponent will be exerting its best efforts to minimise and if practicable, eliminate the use of petcoke in its furnaces consistent with its commitment for safe and economical operations. The operation will be both environmentally and quality conscious.
- 3.5.4 The exhaust gas from each furnace and the entrained amorphous silica fume will be collected by the furnace and tapping area hoods and ducted through pre-collector/spark arrester units and a baghouse.

- 3.5.5 The fume will be discharged from the filter bags into sealed collection hoppers from where it will be pneumatically conveyed to storage silos. The fume will be discharged into sealed road vehicles or pelletised.
- 3.5.6 The proponent will introduce a programme for regularly sampling the fume and submitting the samples to X-ray diffraction analysis to detect any contamination by crystalline silica. (Public Health Implications Study p15).
- 3.5.7 The building housing the electric furnaces will be steel-clad. Appropriate ventilation and housekeeping measures will be adopted to ensure control and containment of dust within this building.
- 3.5.8 Waste water system is being reviewed. A disposal strategy for this waste water will be developed in consultation with the EPA after chemical analyses have been made.
- 3.5.9 The oxygen storage facility of approximately 6000 litres will be isolated from the heat of the furnace, and fire hydrants will be installed in the general area.
- 3.5.10 The baghouse system will have reserve capacity to deal with abnormal dust burdens.
- 3.5.11 A monitoring programme will be established around the plant. That programme will be designed after consultation with the EPA.
- 3.5.12 Silicon dust generated in the product treatment area will be collected via hoods and extraction fans and ducted to a baghouse. Residual dust levels will be regularly monitored to ensure that the control system is operating with the required efficiency.
- 3.5.13 Although no significant discharge of organics is predicted, samples of emissions will be collected during early operation of both furnaces and baghouses.

**Attachment 1 to Statements 27 & 279
Change to Description of Proposal**

Proposal: Silicon Project, Kemerton
Proponent: Simcoa Operations Pty Ltd
Change: to add the third of four furnaces

From:

Element	Quantities/Description
Silicon Production	32,000 tpa (current licensed capacity)
Quartzite	80,000 tpa
Wood for Charcoal	100,000 - 110,000 tpa
Charcoal production	26,000 tpa (current licensed capacity)
Smelter	2 submerged electric arc furnaces

To:

Element	Quantities/Description
Silicon Production	48,000 tpa
Quartzite	120,000 tpa
Wood for Charcoal	110,000 tpa
Charcoal production	27,000 tpa
Smelter	3 submerged electric arc furnaces

Figure 1. Plant layout plan.

[S45C.] Approval Date: 17/05/06

Appendix 4

**Table A - Recommended Action for Current Conditions
&
Table B - Recommended Action for Current Commitments**
(Retention, Modification or Deletion)

Table A – Recommended Action for Current Conditions

Condition No. / Statement No.	Condition	Recommendation
1-1 / 575	In implementing the proposal, including the proposed amendment reported on in Environmental Protection Authority Bulletin 631, the proponent shall fulfil the commitments of statement no. 027 (13 May 1988).	Delete as commitments are no longer included in statement.
1-2 / 575	The proponent shall implement subsequent commitments which the proponent makes as part of the fulfilment of the conditions in this and previous statements.	Delete as commitments are no longer included in statement.
1-3 / 575	Where the proponent seeks to change any aspect of the proposal 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.	Replace with standard implementation condition.
1-4 / 575	Where the proponent seeks to change any aspect of the proposal 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.	Replace with standard implementation condition.
2 / 027	Any proposal to upgrade significantly or re-route road access to the Kemerton plant site shall be to the satisfaction of the Local Authority and the Environmental Protection Authority.	Any clearing for access can be assessed as part of this proposal. Condition not required. Delete.
3A / 279	The proponent shall pass all furnace off-gases through an approved dust collection facility except as otherwise permitted by the Environmental Protection Authority during planned maintenance or emergencies.	Regulate under Part V*. Delete condition.
3B / 279	Within three months of the date of this statement [10 August 1992], the proponent shall prepare and subsequently implement a contingency plan as an additional part of the environmental monitoring and management plan required by condition 19, with the specific objective of minimising the periods of direct venting, to meet the requirements of the Environmental Protection Authority.	Regulate under Part V licensing process (s62A.(1)(f)) EP Act. Delete condition.
4 / 027	The proponent shall ensure that ground level concentrations of silica fume in the surrounding 'special residential' and 'special rural' areas do not exceed an annual average of 0.07 mg/m ³ and a 24-hour average of 0.10 mg/m ³ at any time.	Regulate under Part V licensing process. Delete condition.
5 / 027	The proponent shall ensure that the introduced noise from the project does not cause the noise in	Addressed in Noise Regulations**. Delete

Condition No. / Statement No.	Condition	Recommendation
	<p>the surrounding 'special residential' or 'special rural' areas to exceed 50dB(A) from 0700 to 1900 hours, 45dB(A) from 1900 to 2200 hours, and 40dB(A) from 2200 to 0700 hours. These levels should not be viewed as normal operating levels for the plant. They are the legal upper limits above which action will be taken by the Environmental Protection Authority. These levels should be reviewed after 12 month's normal operation of the plant or earlier if recommended by the Environmental Protection Authority. As a result of this review these noise levels may be varied by the Authority so as to protect the amenity of the 'special residential' and 'special rural' areas adjacent. In order to ascertain the existing noise climate at relevant localities, the Environmental Protection Authority shall ensure that noise monitoring studies are undertaken before commissioning of the plant.</p>	condition.
6 / 027	<p>The proponent shall include noise control as a design criterion and all attenuation considered necessary by the Environmental Protection Authority shall be built-in during construction by the proponent.</p>	Cleared. Delete condition.
7 / 027	<p>To assist in meeting the requirements of condition 5, the proponent shall submit prior to construction and subsequently implement plans to the satisfaction of the Environmental Protection Authority with respect to environmental noise considerations, for the effective attenuation of noise produced by all relevant items of plant, including:</p> <ul style="list-style-type: none"> • outdoor mobile plant; • vehicles transporting materials to and from the site; • sawmilling and logsplitting operations; • feed system for the charcoal retorts; • gas handling system for the retorts and incinerator; • charcoal screening system; • outdoor conveyors; • furnace feed systems; • stinger and taphole shotgun; • ladle cleaning, oxygen lance and mould breaker; • product crushing and screening systems; • fans and ducting for the control of general dust; 	Cleared. Further regulation under Noise Regulations. Delete condition.

Condition No. / Statement No.	Condition	Recommendation
	<ul style="list-style-type: none"> • baghouse and associated fans and ducting; • compressed air supply; • pumps for the supply and disposal of water; and • electrical transformer. <p>Meeting this requirement does not in any way absolve the proponent from its responsibility to meet occupational health noise levels administered by the Department of Mines.</p>	This clause not relevant. Delete.
8 / 027	The proponent shall install and operate the charcoal retorts, the retort off-gas incinerator and the wood waste incinerator so as to ensure that no offensive vapours or odours are detectable in 'special residential' or 'special rural' areas adjacent to the project site to the satisfaction of the Environmental Protection Authority.	Regulate under Part V (s49 EP Act). Delete condition.
9 / 027	<p>The proponent shall ensure that at least four regular meetings are convened in the first year including the local authority for the purpose of promoting communication.</p> <p>The frequency of meetings after the first year shall be as mutually agreed between the proponent and the Local Authority. These meetings shall commence before commissioning.</p>	<p>First part cleared. Delete.</p> <p>Second part “satisfactory to date”. Delete.</p>
10 / 027	The proponent shall obtain a Works Approval (prior to construction) and a Licence (prior to commissioning) for the proposed facility under the provisions of Part V of the <i>Environmental Protection Act 1986</i> .	Delete.
11 / 027	<p>During construction of the plant, the proponent shall:</p> <ul style="list-style-type: none"> • stabilise disturbed soil and take other appropriate measures to ensure that dust levels at the plant boundary do not exceed a 15 minute average of 1 mg/m³; and • take appropriate short term measures to control run-off and oil spills to the satisfaction of the Environmental Protection Authority. 	Cleared. Delete.
12-1 / 575	Within one year following the formal authority issued to the decision-making authorities under section 45(7) of the <i>Environmental Protection Act 1986</i> [6 November 2001], the proponent shall prepare a monitoring and management programme to manage the effect of mining activities on the	Replaced by new outcome-based condition 6-1.

Condition No. / Statement No.	Condition	Recommendation												
	Coomberdale Chert Threatened Ecological Community, and on populations of <i>Regelia megacephala</i> and other priority and declared rare flora species, to the requirements of the Minister for the Environment and Heritage on advice of the Environmental Protection Authority and the Department of Conservation and Land Management.													
12-2 / 575	The proponent shall implement the monitoring and management programme required by condition 12-1 to the requirements of the Minister for the Environment and Heritage on advice of the Environmental Protection Authority and the Department of Conservation and Land Management.	No longer applicable. Delete.												
13-1 / 593	<p>The proponent shall not allow emissions from the existing baghouse (plus an additional one of the same height if required by future expansion) to exceed the sulphur dioxide (SO₂) levels shown in Table 1.</p> <p>Table 1 - Ambient limits for sulphur dioxide (SO₂)</p> <table border="1" data-bbox="355 1066 1011 1514"> <thead> <tr> <th data-bbox="355 1066 571 1178">Location</th> <th data-bbox="571 1066 791 1178">Limit (ppm)</th> <th data-bbox="791 1066 1011 1178">Limit (µg/cubic metre)</th> </tr> </thead> <tbody> <tr> <td data-bbox="355 1178 571 1290">Revised buffer boundary</td> <td data-bbox="571 1178 791 1290">0.20 1-hour averaging</td> <td data-bbox="791 1178 1011 1290">572 1-hour averaging</td> </tr> <tr> <td data-bbox="355 1290 571 1402">Revised buffer boundary</td> <td data-bbox="571 1290 791 1402">0.08 1-day averaging</td> <td data-bbox="791 1290 1011 1402">229 1-day averaging</td> </tr> <tr> <td data-bbox="355 1402 571 1514">Revised buffer boundary</td> <td data-bbox="571 1402 791 1514">0.02 1-year averaging</td> <td data-bbox="791 1402 1011 1514">57 1-year averaging</td> </tr> </tbody> </table> <p>Note: The reference to a second baghouse is not intended to constitute pre-approval of future expansion, and relates to the results of the air modelling which showed that the emissions 'footprint' would not change if a second baghouse of the same height were installed. A higher building or a baghouse with a stack would lead to changes from what has been modeled.</p>	Location	Limit (ppm)	Limit (µg/cubic metre)	Revised buffer boundary	0.20 1-hour averaging	572 1-hour averaging	Revised buffer boundary	0.08 1-day averaging	229 1-day averaging	Revised buffer boundary	0.02 1-year averaging	57 1-year averaging	<p>Regulated under Part V licensing process (condition A5). Delete condition.</p> <p>This paragraph not required. Delete.</p>
Location	Limit (ppm)	Limit (µg/cubic metre)												
Revised buffer boundary	0.20 1-hour averaging	572 1-hour averaging												
Revised buffer boundary	0.08 1-day averaging	229 1-day averaging												
Revised buffer boundary	0.02 1-year averaging	57 1-year averaging												
14 / 027	The proponent shall prepare and implement a detailed plan for the supply of water for the project at Kemerton and at the Moora minesite to	Partly cleared. Supply of water managed by Department of Water.												

Condition No. / Statement No.	Condition	Recommendation
	the satisfaction of the Environmental Protection Authority, the Water Authority of WA and the Department of Conservation and Land Management before the commissioning of the plant. An objective of the water supply plan and the assessment of its impact shall be the protection of wetlands in the Kemerton locality.	Delete.
15 / 027	The proponent shall prepare and implement a detailed management plan for the disposal of waste water and storm water to the satisfaction of the Environmental Protection Authority, the Local Authority and the Water Authority of WA before the commissioning of the plant.	Regulate under Part V licensing process (waste water), plus Department of Water management. Delete condition.
16 / 027	During operation of the plant the proponent shall stabilise stockpiles and unsealed access roads on the plant site and take other appropriate measures to ensure that dust levels at the plant boundary do not exceed a level specified by the Environmental Protection Authority. This level and the associated management measures required by the Environmental Protection Authority will be set as part of the Works Approval process.	Regulate under Part V licensing process. Delete condition.
17 / 027	The proponent shall prepare and implement a plan for the management and disposal of silica fume to the satisfaction of the Environmental Protection Authority before commissioning of the plant.	Partly cleared. Regulate under Part V licensing process (s62A.(1)(f)). Delete condition.
18 / 027	Prior to land clearing the proponent shall prepare a preliminary landscape plan and subsequently, prior to commissioning, the more detailed landscape and screening plan as proposed, both plans to be to the satisfaction of the Environmental Protection Authority, the Local Authority and the Department of Conservation and Land Management.	Cleared. Delete.
19 / 027	Prior to commissioning, the proponent shall prepare an overall monitoring and management plan for the total proposal to the satisfaction of the Environmental Protection Authority. This plan shall, amongst other things include details of monitoring, review, reporting and corrective measures to be taken by the proponent to ameliorate any adverse impacts of the project identified.	Partly cleared. Monitoring, review, reporting and corrective measures will continue to take place under a variety of requirements for the proposal. Delete.
20 / 575	Prior to expansion of mining into the Eastern Ridge area, the proponent shall prepare, and then subsequently implement, a Mining and Conservation Strategy, in co-operation with the Department of Conservation and Land	Included as new conditions 7-1 and 7-2, substantially unchanged.

Condition No. / Statement No.	Condition	Recommendation
	<p>Management, and to the requirements of the Minister for the Environment and Heritage on advice of the Environmental Protection Authority.</p> <p>The objective of this strategy is to ensure that conservation of biodiversity values is achieved whilst maintaining long-term access to the chert resource.</p> <p>The Mining and Conservation Strategy shall address the following matters:</p> <p>(1) Additional reconnaissance exploration to identify other parts of the Coomberdale Chert formation, both within and outside current lease areas, which may contain sufficiently high grade quartz in areas where the chert-associated vegetation is already absent or degraded;</p> <p>(2) Provision of support (subject to negotiation) to the Department of Conservation and Land Management for regional flora surveys to identify and map other parts of the Coomberdale Chert formation which may contain the same or other significant flora associated with the chert;</p> <p>(3) Based on the outcomes of (1) and (2) above, and in cooperation with the Department of Conservation and Land Management, development of the best strategy to ensure both access to the resource and conservation, in secure reserves, of the flora of the Coomberdale Chert formation;</p> <p>(4) Additional conservation offsets, if required, such as the Cairn Hill North area and other significant areas of vegetation to form 'stepping stones' or 'linkages' with Cairn Hill and other ridges in the area; and</p> <p>(5) Provision for fencing of significant areas of vegetation, whether part of reserves or other properties, and, during the operational life of the mine, provision of resources for conservation management.</p>	
21 / 575	The proponent shall surrender Mining Lease no. M70/1055 covering Cairn Hill at such time as	Cleared. Mining Lease surrendered. Delete

Condition No. / Statement No.	Condition	Recommendation
	requested by the Minister for the Environment and Heritage on advice of the Environmental Protection Authority and the Department of Conservation and Land Management. The Mining Lease shall be surrendered in accordance with procedure 3 below.	condition.
22 / 575	Within one year following the formal authority issued to the decision-making authorities under Section 45(7) of the <i>Environmental Protection Act 1986</i> [6 November 2001], the proponent shall prepare a Rehabilitation Plan and commence rehabilitation trials, using local native flora species, including priority and declared rare flora species, to the requirements of the Minister for the Environment and Heritage on advice of the Environmental Protection Authority and the Department of Conservation and Land Management.	Satisfactory to date. To be partly combined with standard condition in new condition 8-2.
Proc. 1 / 279	The Environmental Protection Authority is responsible for verifying compliance with the conditions contained in this statement, with the exception of conditions stating that the proponent shall meet the requirements of either the Minister for the Environment or any other government agency.	Replace with current standard procedure.
Proc. 2 / 279	If the Environmental Protection Authority, other government agency or proponent is in dispute concerning compliance with the conditions contained in this statement, that dispute will be determined by the Minister for the Environment.	Replace with current standard procedure.
Proc. 3 / 575	Surrender of Mining Lease no. M70/1055 covering Cairn Hill (See condition 21). The proponent will effect surrender of Mining Lease no. M70/1055 immediately following gazettal of the A-Class Reserve at Cairn Hill. The Department of Mineral and Petroleum Resources has confirmed that it has no objection to the establishment of the A-Class Reserve.	Lease surrendered. No longer required. Delete procedure.

- * “Part V” means Part V of the *Environmental Protection Act (1986)* Part V provisions include works approval, licence, environmental harm provisions, notices and regulations.
- ** “Noise Regulations” means *Environmental Protection (Noise) Regulations 1997*.

Table B – Recommended Action for Current Commitments

Statements Nos 027/279/575

Commitment No. /	Commitment	Recommendation
3.1.1	The proponent is committed to being a good corporate citizen and to complying with reasonable and justifiable EPA requirements, but in particular to the two main environmental issues of the project, dust emissions and noise control.	Not relevant. Delete.
3.1.2	A site specific landscaping plan capable of tolerating the local environment adjacent to a chloride plant and opposite the future Aluminium Smelter, will be developed in consultation with CALM.	Not relevant. Delete.
3.1.3	The proponent expects to draw water from the 'Yarragadee' aquifer and is committed to monitor/test bore water as required by WAWA. Adoption of a closed circuit water cooling circuits in the silicon process greatly help to conserve water usage. The proponent will optimize usage of plant water to its fullest practical extent.	Department of Water management. Delete.
3.1.4	In the event that runoff water is required to be treated, application will be made with EPA prior to discharge into nearby water courses. As appropriate the local authority and WAWA will be consulted should existing drains be used.	Regulate under Part V licensing process (See monitoring requirements condition W3), plus Department of Water management. Delete.
3.1.5	The wood stockpile and the plant site in general has a ground level graded to drainage falls into surface drains which in turn are routed to a stormwater sedimentation pond designed to cater for a one in five year return period storm.	Cleared. Delete.
3.1.6	The proponent is committed to the installation and maintenance of a first-aid vehicle, a fire tender, appropriate trained personnel and developing safety and contingency planning both during construction and operation of the project. Application annually will be made to the Minister for Emergency Services through the Bush Fires Board of Western Australia to operate fire risk areas of the plant during the high risk summer months of November through to March.	Not relevant. Delete.
3.1.7	The proponent will develop a comprehensive air emission and atmospheric monitoring	Regulated under Part V licensing process (See

Commitment No. /	Commitment	Recommendation
	programme in consultation with the EPA, to establish the environmental impacts from the project's operation.	condition A4). Delete.
3.1.8	The proponent, in addition to seeking practicable and economic methods to consistently reduce noise emissions at their source, will routinely monitor the efficiency of silencers and noise attenuation equipment and will take remedial actions where necessary to maintain efficiency of same.	Regulate under Part V licensing process. Delete.
3.1.9	Solid wastes will be carefully monitored to maximise recycling and resale wherever possible. Solids requiring disposal will be collected and transported to an approved landfill and will be subject to control by EPA.	Regulate disposal under Part V. Delete.
3.2.1	Quarrying operations will be managed to ensure minimum practicable noise disturbance to the surrounding environment and to that end quarrying operations will generally be restricted to the hours of 0600 to 1700 Monday to Friday, during annual mining campaigns not expected to exceed three to five months each year.	Regulate under Noise Regulations**. Delete.
3.2.2	The contract quarry operators will be required to implement appropriate blasting techniques to achieve a maximum of 115 dB peak linear limit. This may include the use of sequential timers or alternative approved methods of blast initiation.	Regulate under Noise Regulations. Delete.
3.2.3	Blasting activities will not proceed during periods when wind conditions would result in the transport of significant dust from such blasting operations towards the nearby vicinity of neighbouring farms.	Regulate under Part V licensing process. Delete.
3.2.4	With the exception of the first year of operations when the delayed timetable for the Project may necessitate a summer/autumn mining campaign, quarrying operations will be scheduled for the period mid-August through mid-December when post winter moist soil conditions should assist in dust suppression and dust control around the mine site.	Regulate under Part V licensing process. Delete.
3.2.5	The proponent is committed to mine site rehabilitation in accordance with the requirements of the Department of Mines. This plan will include rehabilitation where practicable using local native vegetation. In addition the proponent will seek advice from CALM on the management of <i>Regelia megacephala</i> populations, including the practicality of establishing trial experimental plots to determine criteria for successful	Combine with old condition 22 and new standard rehabilitation condition in new conditions 8-2 and 8-3. Partly also to new condition 6-2.

Commitment No. /	Commitment	Recommendation
	<p>regrowth.</p> <p>Where there is a risk of direct impact of mining or service equipment on populations of <i>Regelia megacephala</i> these populations will be fenced off.</p>	Delete. Covered by new outcome-based condition 6.
3.2.6	<p>Haul roads will be selectively routed by the proponent to provide minimum disturbance to the environment.</p> <p>Dust suppression by water spray on haul roads and at the crushing plant will be implemented should significant dust occur.</p> <p>Tree-planting for screening purposes will be undertaken, in consultation with the farmer/landowner, where necessary and practicable.</p>	<p>Satisfactory to date. Not auditable. Delete.</p> <p>Satisfactory to date. Regulate under Part V licensing process. Delete.</p> <p>Satisfactory to September 1993. Delete.</p>
3.2.7	Mining operations will leave some areas of inferior grade ore thereby preserving to some degree the visual amenity of the quartzite hills to the north of Moora.	Limited value. Delete.
3.2.8	<p>Mining operations including drilling, excavation, quartz haulage and crushing and screening will include dust suppression and dust control measures designed to ensure compliance with occupational health statutes.</p> <p>In particular drilling will be carried out by an airtrack drill fitted with a 'filterclone' dust control system or similar, with separated dust being disposed of in accordance with the Mines Department requirements.</p> <p>Fine mist water sprays will be installed at the receival hopper and crusher, and provision will be made to damp down muck piles, haulroads and stockpile areas to control fugitive dust.</p>	<p>Not relevant. Managed under Department of Mines and Petroleum legislation. Delete.</p> <p>Not relevant. Delete.</p> <p>Regulate under Part V licensing process. Delete.</p>
3.2.9	Efforts will be made to recycle extracted waters to minimise water consumption where practicable.	Not auditable. Delete.
3.3.1	<p>Wood will be transported on 20m long articulated 70 tonne log haulage trucks. Proposed routes for the period 1989 - 1992 and for the period 1993 - 1998 are shown in the attached figure. These routes are presently used by log haulage trucks.</p> <p>Major transport corridors for the first 5 years</p>	<p>Not relevant. Delete.</p> <p>Not relevant. Delete.</p>

Commitment No. /	Commitment	Recommendation
	will be developed in consultation with MRD and CALM subject to EPA approval.	
3.3.2	Log haulage vehicles, immediately after entrance to the site, will be specifically diverted away from day to day traffic primarily for safety reasons. Timber will only be received at the plant site during daylight hours Monday to Friday, with possible extensions to Saturday if agreed between CALM and the proponents.	Noise Regulations regulation of hours for noise management. Delete.
3.3.3	<p>The proponent intends to purchase wood to produce charcoal from the Department of Conservation and Land Management (CALM) under the Government approved Department's General Working Plan No. 87.</p> <p>CALM has developed and is committed as is the proponent to the quarantine and hygiene procedures designed to minimize and reduce the risk of spreading jarrah dieback.</p>	<p>Not relevant. Delete.</p> <p>“Control and eradication of forest diseases” is regulated under <i>Forest Management Regulations 1993</i>. Delete.</p>
3.3.4	The proponent recognizes that the maintenance of flora and fauna within the State Forrest is highly desirable. Currently there is no information on the use of tree hollows by fauna in the Jarrah forest so the proponent will fund and supervise with CALM a post graduate research project to evaluate these predictions and the effects of silvicultural practices specifically for the project. Information from this project will be made available to EPA within 3 years of the start of plant production.	Cleared. Delete.
3.3.5	If the research project detects any significant impact of the silicon project on fauna, wood collection operations will be more widely dispersed over the areas being cut for timber to reduce the effect subject to CALM approval. Alternatively some firewood trees and logs will be left in the forest to ensure niche retention.	Not auditable. Delete.
3.3.6	The General Forest Working Plan No. 87 divides the forest into areas with different Management Priority Areas (MPAs). Subject to hygiene controls firewood extraction is permitted within MPAs however timber extraction from MPAs for recreation will not be carried out under this proposal.	Forest Products Commission management. Delete.
3.3.7	Forrest areas allocated to flora, fauna and landscape conservation are not available for	Not relevant. Delete.

Commitment No. /	Commitment	Recommendation
	timber extraction.	
3.3.8	The proponent through CALM, is committed to the current silvicultural management practices for jarrah forests which will, wherever practicable, be enforced for wood produced for this project to provided optimal conditions for the growth of preferred young trees by reducing competition. The objective of the proponent is to ensure an economical supply of dry wood substance to the Project for the purposes of charcoal and silicon manufacture consistent with forest conservation through comprehensive long term strategy planning.	Forest Products Commission management. Delete.
3.4.1	The design of the overall docking mill complex is under review. The concept selected will incorporate systems designed to reduce noise levels in the vicinity of the complex, consistent with the proponents overall undertakings for control of noise as contained with the PER.	Cleared. Delete.
3.4.2	An incinerator will be incorporated by the proponent in the retort complex to combust volatile material in the rinse gas and pyroligneous vapour.	Cleared. Regulate emissions under Part V licensing process. Delete.
3.4.3	Retort loading arrangement consists of: 1) Upper retort door (swing gate design). 2) Lower retort door (slide gate design). The system is designed to minimise gas release during charging of the retort.	Cleared. Regulate emissions under Part V licensing process. Delete.
3.4.4	The retort upper compartment will be operated slightly below atmospheric pressure as a further safeguard against accidental release of retort vapours.	Regulate under Part V licensing process. Delete.
3.4.5	Charcoal dust generated at the belt discharge chute into the furnace bins will be contained by a suppression system or dust collector and re-cycled back to the bin.	Regulate under Part V licensing process (Condition A1(b)). Delete.
3.4.6	Transfer points on belt conveyors transporting charcoal will be fitted with dust suppression systems. The charcoal screen will be fitted with a dust collector, collected dust will be combined with charcoal fines from the screening operation.	Regulate under Part V licensing process (Condition A1(b)). Delete.
3.4.7	The design of the waste wood handling system is under review; should an incinerator be utilised	Cleared. Delete.

Commitment No. /	Commitment	Recommendation
	for burning wastes it will be of the 'smokeless' refractory silo type.	
3.4.8	<p>The comprehensive fire suppression system for the charcoal process will consist of a water tank and pumping station which will feed a ring main and hydrant system around the charcoal retorts and docking mill area as well as the remainder of the plant. A sprinkler system will be installed for fire protection in the docking mill.</p> <p>Personnel will be trained in fire-fighting procedures, equipment locations clearly marked and a fully operational fire tender will be maintained on site. Portable fire extinguishers and serviced hose reels will be located within the buildings as required.</p>	<p>Not relevant. Delete.</p> <p>Not relevant. Delete.</p>
3.4.9	Provision will be made for bleeding gas cooling water to a settling pond prior to further treatment. Washdown water will be fed through an oil separator prior to entering an evaporation pond or leach drain.	Regulate emissions and discharges under Part V. Delete.
3.4.10	The retort controls will incorporate automatic shutdown system in the event of serious malfunction in shutdown mode top gases would continue to be passed through the high temperature incinerator until a stable cycle has been achieved.	Cleared. Delete.
3.5.1	The quartzite hopper, transfer point and conveyor system will be fitted with water mist sprays for dust suppression.	Regulated under Part V licensing process (Condition A1(b)). Delete.
3.5.2	Each charcoal bin will be fitted with an emergency dumping gate, fitted to the lower section of bin, for use in case of spontaneous combustion of the charcoal.	Cleared. For additional bins, regulate under Part V works approval. Delete.
3.5.3	The proponent will be exerting its best efforts to minimise and if practicable, eliminate the use of petcoke in its furnaces consistent with its commitment for safe and economical operations. The operation will be both environmentally and quality conscious.	Not auditable. Delete.
3.5.4	The exhaust gas from each furnace and the entrained amorphous silica fume will be collected by the furnace and tapping area hoods and ducted through pre-collector/spark arrester units and a baghouse.	Regulate under Part V licensing process. Delete.
3.5.5	The fume will be discharged from the filter bags into sealed collection hoppers from where it will	Partly cleared. Regulate dust management under

Commitment No. /	Commitment	Recommendation
	be pneumatically conveyed to storage silos. The fume will be discharged into sealed road vehicles or pelletised.	Part V licensing process. Delete.
3.5.6	The proponent will introduce a programme for regularly sampling the fume and submitting the samples to X-ray diffraction analysis to detect any contamination by crystalline silica. (Public Health Implications Study p15).	Regulated by another agency. Delete.
3.5.7	The building housing the electric furnaces will be steel-clad. Appropriate ventilation and housekeeping measures will be adopted to ensure control and containment of dust within this building.	Regulate dust management under Part V licensing process. Delete.
3.5.8	Waste water system is being reviewed. A disposal strategy for this waste water will be developed in consultation with the EPA after chemical analyses have been made.	Emissions can be regulated under Part V licensing process (Condition W3 - monitoring). Delete.
3.5.9	The oxygen storage facility of approximately 6000 litres will be isolated from the heat of the furnace, and fire hydrants will be installed in the general area.	Managed by Department of Mines and Petroleum. Delete.
3.5.10	The baghouse system will have reserve capacity to deal with abnormal dust burdens.	Regulate under Part V licensing process. Delete.
3.5.11	A monitoring programme will be established around the plant. That programme will be designed after consultation with the EPA.	Regulated under Part V licensing process. (Includes ambient, stack emissions and water quality monitoring). Delete.
3.5.12	Silicon dust generated in the product treatment area will be collected via hoods and extraction fans and ducted to a baghouse. Residual dust levels will be regularly monitored to ensure that the control system is operating with the required efficiency.	Worksafe WA management. Delete.
3.5.13	Although no significant discharge of organics is predicted, samples of emissions will be collected during early operation of both furnaces and baghouses.	Not relevant. Not audited. Delete.

- * “Part V” means Part V of the *Environmental Protection Act (1986)*. Part V provisions include works approval, licence, environmental harm provisions, notices and regulations.
- ** “Noise Regulations” means *Environmental Protection (Noise) Regulations 1997*.