Magellan Lead Carbonate Project

Magellan Metals Pty Ltd

Report and recommendations
of the Environmental Protection Authority

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Summary and recommendations

Magellan Metals Pty Ltd proposes to develop an open-cut lead carbonate mine and processing facilities approximately 30 kilometres west of the Wiluna townsite to produce a lead concentrate. The lead concentrates will be refined at the Wiluna minesite to produce lead metal, or alternatively will be transported by road to the Geraldton Port and exported. This report provides the Environmental Protection Authority's (EPA's) advice and recommendations to the Minister for the Environment on the environmental factors relevant to the proposal.

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

Relevant environmental factors

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

(a) Particulates and Dust – preventing mining activities mobilising dust and particulates containing lead;

(b) Groundwater quality – avoidance of contamination with lead of the local and regional aquifers from the tailings storage facility and the waste rock dump;

(c) Rehabilitation – successful rehabilitation to ensure that the minesite is managed in the long term to protect the public and the environment from the adverse impacts of lead;

(c) Groundwater quantity – effects on groundwater availability resulting from abstraction of groundwater to supply the mine; and

(d) Subterranean fauna – effects on habitat of subterranean fauna (stygofauna) from groundwater abstraction at the mine.

Conclusions

The EPA has considered the proposal by Magellan Metals Pty Ltd to develop an open-cut lead carbonate mine and concentrator processing facilities at Wiluna.

The EPA notes that since the Consultative Environmental Review (CER) was released the proponent has advised it has no immediate intentions to export lead concentrates through the Geraldton Port. The proponent currently intends to further refine the concentrates at the Wiluna minesite to produce lead metal. The EPA has not assessed the construction and operation of the small refinery at Wiluna. The environmental matters relating to its construction and operation will be addressed through the Works Approval and Licensing provisions of the EP Act. However, the proponent has also advised that the option to produce lead concentrates for export remains open and hence, the EPA has continued with its assessment of the proposal with an expectation that exporting of lead concentrates through the Geraldton Port may occur at some time in the future.

The environmental issues relating to this proposal are primarily concerned with the management of lead at the Wiluna minesite and at the Geraldton Port so as to prevent health effects. Established management practices exist to enable the mining, storage, handling and transport of lead and the EPA is of the view that this provides a substantive framework for managing the environmental aspects of the proposal. Air quality, groundwater quality and soil criteria exist against which the proponent's performance can be evaluated, and based on the proponent's preliminary investigations the EPA is confident that the proponent can meet the criteria. To ensure that the proponent has clearly established the criteria against which its performance will be monitored and detailed its management measures and proposed monitoring, the EPA has recommended that the proponent prepare a combined Health, Hygiene and Environmental Management Program (HHEMP) which will address both the environmental and the health aspects of the proposal. The EPA has also recommended that the HHEMP be made publicly

available to provide the community with a level of confidence that the programs implemented by the proponent are commensurate with mining, storage and handling of a product such as lead, that has known health and environmental risks.

In the long-term, at the conclusion of mining, the minesite and areas disturbed by mining will require rehabilitation to ensure any areas contaminated with lead are cleaned up and the minesite is rehabilitated. To address this the proponent has developed a Decommissioning and Rehabilitation Plan which the EPA views as being an important tool to ensure that the proposal is managed to prevent the site becoming an ongoing source of contamination to the environment. Accordingly, the Decommissioning and Rehabilitation Plan has been made a condition of the proposal proceeding and will also be publicly available.

The development of a borefield to supply mining operations with water is likely to affect subterranean fauna (stygofauna). The EPA continues to be hampered in its ability to assess the impacts on stygofauna of individual proposals by a lack of regional baseline information on subterranean fauna in the State. The EPA is aware that there is a level of uncertainty with regard to the impacts on stygofauna based on the available information. However, the proposal provides an opportunity to contribute to the fundamental taxonomic knowledge of stygofauna and also to monitor the effects of variation in the natural hydrological regime on stygofauna to determine the capacity of the species to cope with change. Whilst this is not an ideal situation, the EPA considers that the ability to provide conclusive answers is only likely to be remedied through more surveys being undertaken in a managed way. The EPA has recommended a subterranean fauna sampling program be developed including a requirement to develop an action plan in the event that it is evident the EPA's environmental objectives would be compromised.

The EPA is concerned that there are reports, although not confirmed, that the existing facilities and procedures now used by others at Geraldton may not be adequate to prevent spillage of mineral products at the Geraldton Port. The EPA has recommended that the proponent be required to undertake a review of the existing facilities if they are intended to be used, and, dependent on the outcome of the review, determine if it is appropriate that they are used for lead concentrates. The EPA has also requested the DEP to investigate the reports of spillage by others, of mineral products at the existing facilities, in consultation with the Department of Minerals and Energy (DME), to confirm if there is any substance to the reports and address any matters that may arise from such an investigation.

The EPA has concluded that the proposal is capable of being managed in an environmentally acceptable manner such that it is most unlikely that the EPA's objectives would be compromised, provided there is satisfactory implementation by the proponent of the recommended conditions set out in Section 4 of this report, including the proponent's commitments.

Recommendations

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

- That the Minister notes that the project being assessed is for development of an open-cut lead carbonate mine and concentrator processing facilities at Wiluna to produce lead concentrates. The lead concentrates will be refined to lead metal at the minesite, or alternatively the concentrates will be transported by road to the Geraldton Port and exported;

- That the Minister considers the report on the relevant environmental factors as set out in Section 3;

- That the Minister notes that the EPA has concluded that it is unlikely that the EPA's objectives would be compromised, provided there is satisfactory implementation by the proponent of the recommended conditions set out in Appendix 4 and summarised in Section 4, including the proponent's commitments;

- That the Minister imposes the conditions and procedures recommended in Appendix 4 of this report; and
- That the Minister notes the EPA's 'Other advice' presented in Section 6 in relation to confirming if existing storage and ship loading of mineral products at the Geraldton Port are adequate to prevent contamination of the port environs. The EPA has taken this matter up with the Department of Environmental Protection.

Conditions

Having considered the proponent's commitments and the information provided in this report, the EPA has developed a set of conditions which the EPA recommends be imposed if the proposal by Magellan Metals Pty Ltd to develop an open-cut lead carbonate mine and concentrator processing facilities near Wiluna to produce a lead concentrate for further refining at the minesite to lead metal or alternatively for export through the Geraldton Port, is approved for implementation.

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

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

(b) That the proponent be required to prepare, make publicly available and implement a Health, Hygiene and Environmental Management Program.

(c) That the proponent be required to prepare and implement a Decommissioning and Rehabilitation Plan for the mine.

(d) That the proponent be required to prepare, make publicly available and implement a Subterranean Fauna (Stygofauna) Sampling Plan at the mine borefield.

Contents

1. Introduction and background

This report provides the advice and recommendations of the Environmental Protection Authority (EPA) to the Minister for the Environment on the environmental factors relevant to the proposal by Magellan Metals Pty Ltd to develop an open-cut lead carbonate mine and concentrator processing facilities approximately 30 kilometres west of the Wiluna townsite (Figure 1). Lead concentrate will be refined at the Wiluna minesite to produce lead metal or alternatively, the concentrate will be transported by road in fully enclosed kibbles to the Geraldton Port and exported. The refining of lead metal at the Wiluna minesite does not form part of this assessment as the EPA has resolved not to assess the small refinery. The environmental matters relating to the proposed refinery will be addressed through the Works Approval and Licensing provisions of the EP Act.

Further details of the proposal are presented in Section 2 of this report. Section 3 discusses environmental factors relevant to the proposal. The Conditions and commitments to which the proposal should be subject, if the Minister determines that it may be implemented, are set out in Section 4. Section 5 provides information about regulatory mechanisms associated with the proposal and Section 6 some other advice. Section 7 presents the EPA's conclusions and Section 8 sets out the EPA's Recommendations.

Appendix 1 contains a list of individuals and organisations which provided submissions on the proposal. Appendix 2, is a list of references used in the preparation of the report. Appendix 3 provides a summary of the process of identifying relevant environmental factors. The recommended environmental conditions and proponent's consolidated commitments are included as Appendix 4. Appendix 5 contains a summary of submissions and the proponent's response to submissions. It is included as a matter of information only and does not form part of the EPA's report and recommendations. Issues arising from this process and which the EPA has taken into account appear in the report itself.

2. The proposal

Magellan Metals Pty Ltd is proposing to develop a lead carbonate mine and concentrator processing facilities 30 km west of the Wiluna townsite. Mining operations will consist of an open-cut mine producing approximately 950 000 tonnes of ore per year with an expected mine life in excess of 10 years. The mine will be developed to an average depth of 50 metres. A waste rock dump will be built adjacent to the mining pit.

The concentrator processing facilities will consist of a crushing and grinding, and sulphidisation flotation circuits followed by pressure filtration to produce a lead concentrate suitable for further refining to lead metal or for road transport to the Geraldton Port where it would be exported. Tailings from the concentrator will be disposed to a paddock type tailings storage facility (TSF) with all decant water reclaimed and directed to a water storage dam for re-use at the process plant. The general arrangement of the mine and concentrator processing facilities are shown on Figure 2. Further detail of the plant layout is shown on Figure 3.

Power required by the mine and processing plant will be generated by a gas-fired power station located on site. The workforce will be accommodated in an 80-person village constructed 3.5 km east of the minesite.

Since the CER was released, the proponent has advised it has no immediate intentions to export lead concentrates through the Geraldton Port, however, the proponent has also advised this option remains open. The EPA has therefore continued with its assessment of the proposal including provision for the export of lead concentrates from the Geraldton Port at some time in the future.

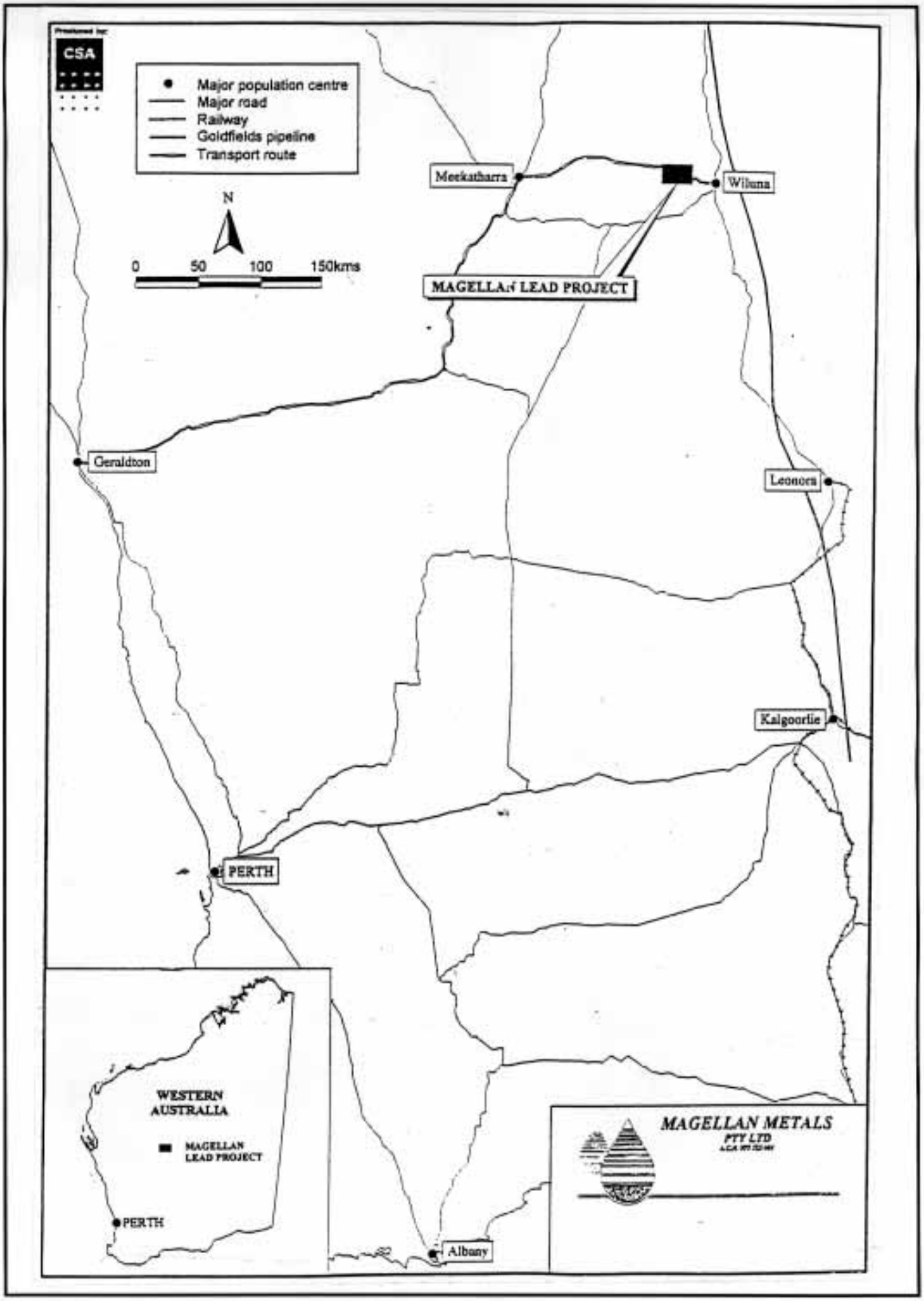

Figure 1. Location Plan, Magellan Metals Lead Project.

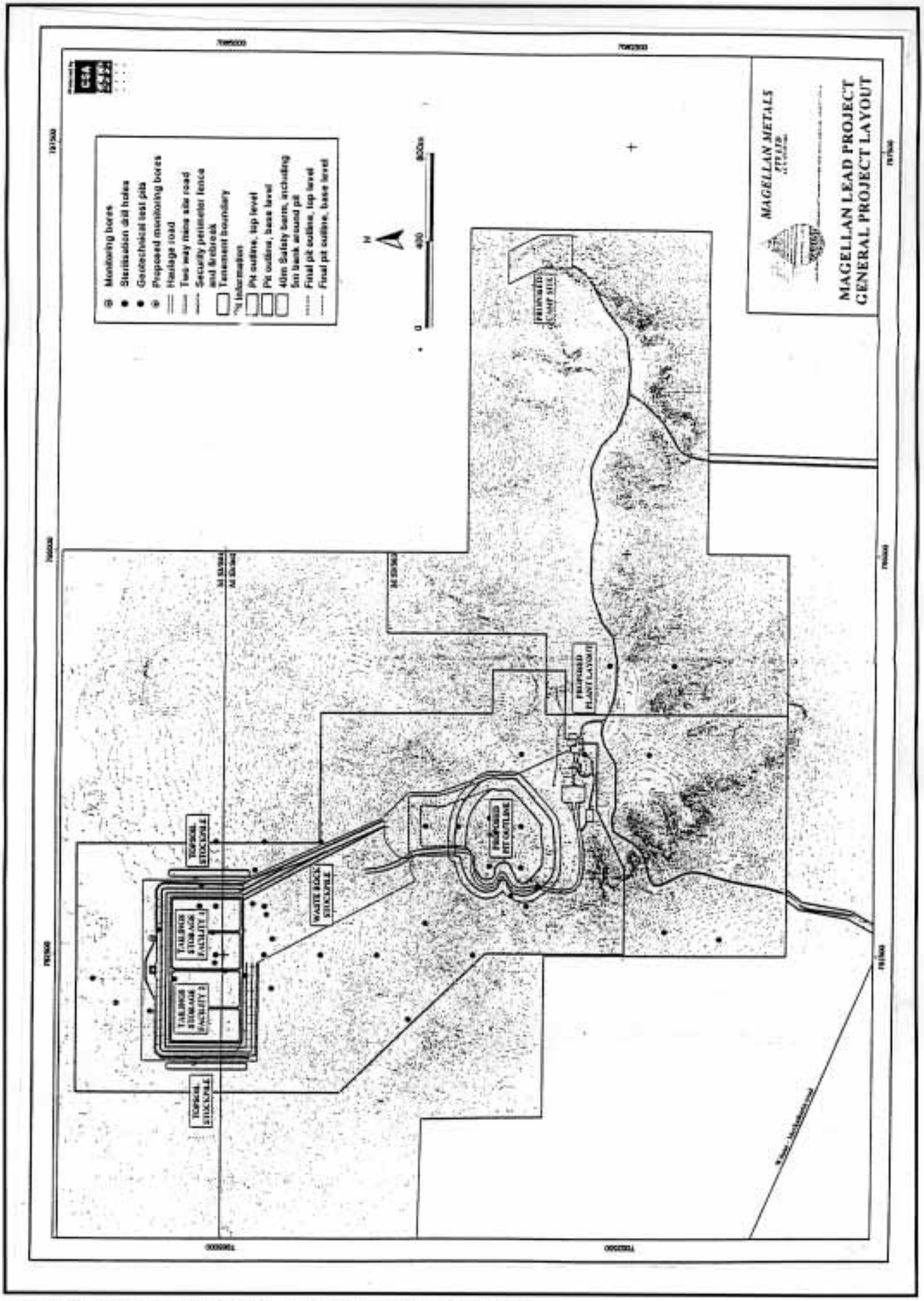

Figure 2. General arrangment of the Magellan Lead Project.

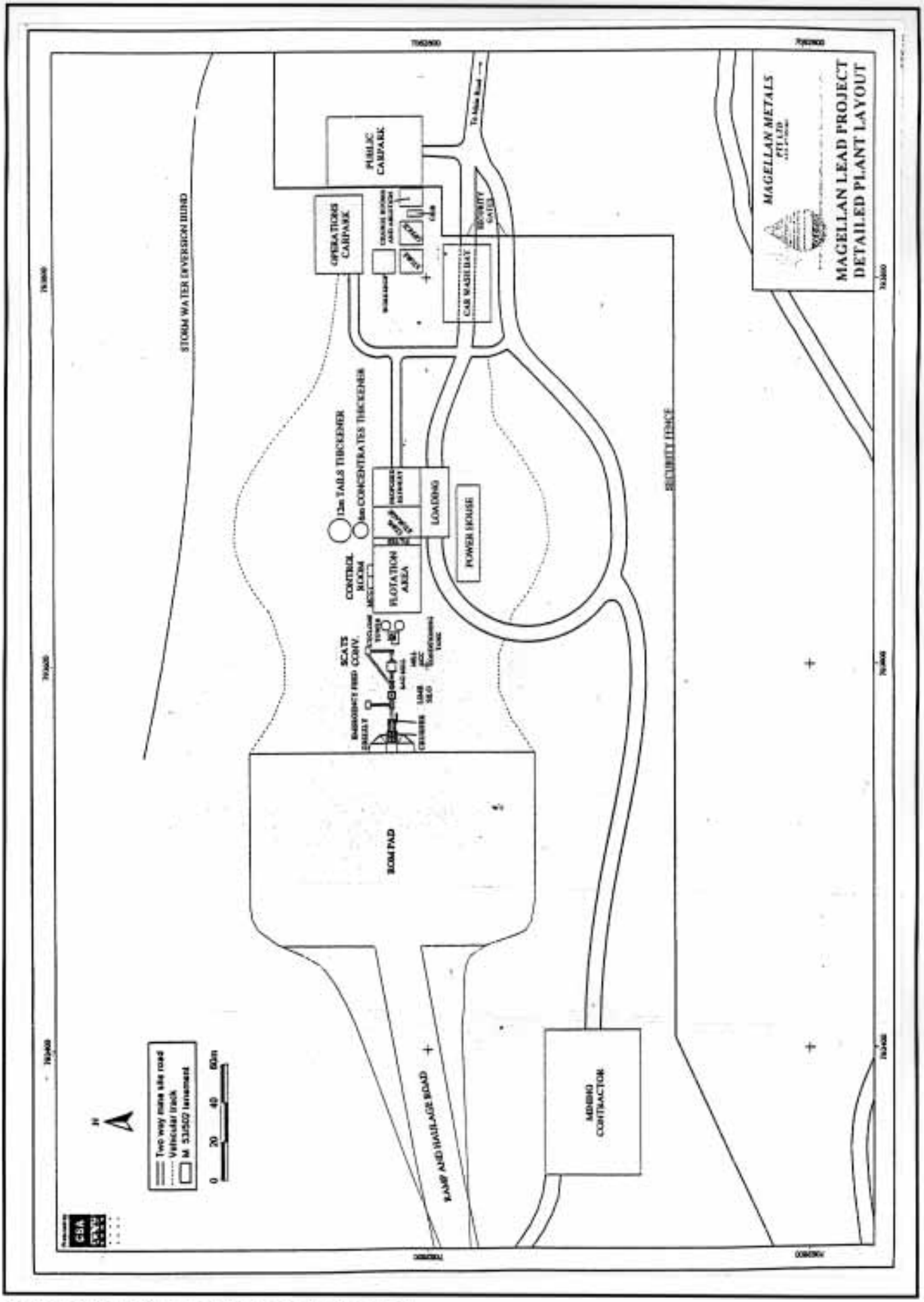

Figure 3. Magellan Lead Project Plant Layout.

In the event that lead concentrates are produced for export they will be transported in fully enclosed kibbles from the Wiluna mine by road train to the Geraldton Port. At the port, concentrates will be stored in enclosed sheds before being loaded via fully enclosed conveyors onto ships.

The Geraldton Port is a prescribed premise under the provisions of the EP Act and accordingly, the Geraldton Port Authority already has a DEP licence. The licence specifies, among other things, which mineral products can be stored at the port and transferred on the shared ship loading facilities and also sets licence limits, monitoring requirements and reporting obligations. Additional mineral products, such as lead, can be added to the Geraldton Port Authority's licence through the licence approvals process administered by the DEP. However, noting that there are presently some concerns regarding the existing facilities and procedures already in use at the port, the EPA in its assessment has considered and made recommendations regarding the suitability of the existing facilities to be used for lead products.

The proponent has also advised that it now intends to further refine the concentrates at the Wiluna minesite to produce lead metal. The EPA has decided not to assess the proposed small refinery and it therefore does not form part of this assessment. Environmental matters relating to the prevention of pollution when refining concentrates to produce lead metal will be addressed under the Works Approval and Licensing provisions of the EP Act. The Works Approval will require the proponent to construct the refinery in accordance with the environmental measures proposed by the proponent and subsequently amended by the DEP. The licence to operate the refinery will address the management of the refinery to prevent pollution. The licence reporting process will require the proponent to monitor and report its environmental performance, and, on the basis of monitoring, amend its environmental management as appropriate.

The main characteristics of the proposal are summarised in Table 1 below. A detailed description of the proposal is provided in Section 2 of the Consultative Environmental Review (CER), titled '*Magellan Lead Carbonate Project*', Magellan Metals Pty Ltd, September 1999.

Table 1. Summary of key proposal characteristics.

Element	**Quantities/Description**
Mine	
Life of project (mine production)	Approximately 10 years
Mine operation	Continuous operation
Size of ore body	Approximately 8.2 million tonnes
Depth of Mine Pit	Approximately 50 metres
Area of disturbance (including access)	Approximately 320 hectares
List of major components • open pit • waste dumps • infrastructure (plant site water supply, roads, accommodation camp, etc) • tailings storage facilities Total	 55 hectares 138 hectares 57 hectares 70 hectares 320 hectares
Accommodation camp	80 person
Tailings storage facility (2 cells)	Combined total capacity of 4 million tonnes
Ore mining rate • maximum	1 million tonnes per year

Solid waste materials • maximum	2.4 million tonnes per year
Water supply • source • maximum hourly requirement • maximum annual requirement	Calcrete and chert aquifers southeast of the minesite 170 kilolitres per hour 1.5 million kilolitres per annum
Lead concentrate transport	Road train in fully enclosed kibbles
Power generation	Natural gas - 139 terra joules /annum
Fuel storage • capacity • quantity used	50 kilolitres of storage 1.8 million litres per year (approximately)

3. Relevant environmental factors

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

In the EPA's opinion the following are the environmental factors relevant to the proposal:

(a) Particulates and Dust – preventing mining activities mobilising dust and particulates containing lead;

(b) Groundwater quality – avoidance of contamination with lead of the local and regional aquifers from the tailings storage facility and the waste rock dump;

(c) Rehabilitation – successful rehabilitation to ensure that the mine site is managed in the long term to protect the public and the environment from the adverse impacts of lead;

(d) Groundwater quantity – effects on groundwater availability resulting from abstraction of groundwater to supply the mine; and

(e) Subterranean fauna – effects on habitat of subterranean fauna (stygofauna) from groundwater abstraction at the mine.

The above relevant factors were identified from the EPA's consideration and review of all environmental factors (preliminary factors) generated from the CER document and the submissions received, in conjunction with the proposal characteristics. The identification process for the relevant factors is summarised in Appendix 3.

The relevant environmental factors have been assessed in relation to three key environmental issues. The relationship between relevant environmental factors and key environmental issues arising from the proposal is shown in Table 2.

Table 2. The relationship between the relevant environmental factors and environmental issues arising from the proposal

Issue	Relevant environmental factors affected by the issue
Management of lead at the minesite	Particulates and Dust, Groundwater quality and Rehabilitation
Groundwater at the mine borefield	Groundwater quantity and Stygofauna
Management of lead at the port	Particulates and Dust

Details on the relevant environmental issues and their assessment are contained in Sections 3.1 to 3.3. The description of each issue shows why it is relevant to the proposal and how it will be affected by the proposal. The assessment of each issue, combined with the consideration of the environmental factors relevant to it is where the EPA decides whether or not a proposal can be managed to meet its environmental objectives.

3.1 Management of lead at the minesite

Description

Lead present in the environment can cause toxic effects to humans and other organisms. Lead compounds do not degrade and are slow to disperse once an area becomes contaminated unless the lead is immobilised or cleaned up.

The minesite and concentrator processing facilities, proposed to be located approximately 30 km from the nearest existing residence and the Wiluna townsite, have the potential to elevate lead levels at the location of the mine and in the immediate vicinity. During mining, the key pathways, identified by the proponent for lead to enter the environment are considered to be lead dispersed as particulates and dust, mobilised by mining activities, or from lead entering the groundwater as a result of leachates emanating from the proposed TSF and waste rock dump.

In the long-term, once mining operations have ceased, it is intended to leave the mining void, however, the TSF and waste rock dump are proposed to be rehabilitated to prevent them becoming an ongoing source of lead contamination to the environment. The decision of the proponent to leave the mining void is based on its reasoning that the mining pit is competent rock and therefore is not substantially prone to erosion. The proponent has also predicted (based on its hydrological investigations) that the pit will remain dry and is also therefore considered unlikely to become an entry point for lead to enter the groundwater.

The proponent has conducted baseline biological monitoring, dust deposition monitoring, soil surveys and groundwater monitoring to determine background reference lead levels for the key pathways. The proponent has used the results of this monitoring as a basis for establishing its proposed management programs. The proponent's baseline monitoring results are described in some detail in the CER (see Section 5.5). Figure 4 shows the location and type of sampling conducted by the proponent. The key results of baseline monitoring, the conclusions the proponent has drawn from the results and the future management and monitoring programs proposed are discussed in brief below to give some context for the EPA's assessment.

Baseline monitoring

Fixed soil monitoring points were established at 500, 1000, 2500 and 5000 metres from the proposed location of the mine to provide pre-mining reference soil lead levels. Soil lead levels recorded in the pre-mining surveys ranged from 10-425 mg/kg. As a comparison, lead levels recorded in the soil survey along the proposed transport route were generally very low, ranging from 3-33 mg/kg. The highest lead levels were recorded at the location of the proposed minesite where there are natural surface expressions of the lead orebody and levels decreased markedly as sample sites were further from the mine.

Dust deposition monitoring conducted by the proponent at four locations near the mine and at two locations approximately 30 km from the mine (to give regional background levels) recorded no significant amount of dust and particulates. The insufficient volume of dust material collected meant that analyses for lead could not be undertaken by the proponent. The proponent has advised that the area of the proposed mine, although grazed, has not previously been subject to significant ground disturbance. In its present condition the area is relatively dust free. The EPA notes that, while dust deposition sampling was conducted by the proponent quantitative sampling using high volume samplers may have been a more appropriate method to determine representative background dust levels particularly, at the sampling sites located away from the mine where there is likely to be existing ground disturbance. The EPA considers that additional background high volume dust sampling is required prior to the commencement of mining and it is recommended that the DEP licence required before this proposal can proceed addresses the

Figure 4. Monitoring and Sampling Sites, Magellan Lead Project.

requirement for additional background sampling and continued monitoring of the sites during mining.

The proponent has also conducted geochemical characterisation of the waste rock and process tailings samples (Campbell, 1999a) to develop strategies to manage waste rock from the mine and tailings from the concentrator. Mine waste rock is proposed to be placed in a waste rock dump adjacent to the mining pit. Waste rock has been characterised as containing some lead (10 - 285 mg/kg). Tailings from the concentrator which is to be disposed of to a paddock style TSF contains approximately 10g/kg lead. Although the concentrator tailings contain lead, the chemicals used in the process to recover lead from the host rock do not dissolve any significant quantities of lead (relying mainly on the physical process of flotation). Analyses of the tailings liquor have confirmed this and the tailings liquor have been estimated to contain 1-2 mg/L lead (Campbell 1999b). The proponent has also investigated the capacity of the soils in the area of the mine to immobilise lead contained in leachates (Campbell, 1999b). The testwork indicates that there is a high potential for lead immobilisation through sorption reactions with the soils contacted by leachates. It has been shown by analyses that the soils are capable of maintaining a lead concentration in solution of less than 0.1 mg/L. It should be noted that the Australian Water Quality Guidelines for Fresh and Marine Waters (ANZECC, 1992) specify that lead in drinking water for livestock should not exceed 0.1 mg/L. In this regard the nearest livestock bore is located 4 km however, the hydrological investigations of the proponent (Morgan, 1999b) have indicated that this bore is not drawing from the aquifer below the TSF and waste rock dump.

The proponent has sited the TSF and waste rock dump to take advantage of the natural capacity of the underlying soils to immobilise lead from the leachates (Campbell, 1999b) and hence, lead in leachates is immobilised before entering the groundwater. Lead levels in the groundwater, an area where lead is already naturally present in the soils, are below detection limits and this supports the results of the proponent's testwork. The depth of soils below the TSF and waste rock dump before groundwater is encountered ranges from 10 to 40 metres and the groundwater is brackish to saline (~5000 ppm total dissolved solids). In addition, as a contingency measure, the proponent has proposed to install monitoring bores around the TSF to detect leachates. The bores have been designed to enable leachate recovery if it is required.

Proposed management programs

The Department of Minerals and Energy has principal authority with regard to worker health at the minesite under the provisions of the *Mines Safety and Inspection Act 1994*. The proponent has referred in its CER to preparing and implementing a Health and Hygiene Management Program (HHMP) that outlines measures proposed by the proponent to reduce lead contamination of the work environment including the mining and processing areas. Because of the occupational health and safety risks associated with lead, the proponent has based the development of its HHMP on the National Code of Practice for the Control and Safe Use of Inorganic Lead at Work [NOHSC:2015 (1994)] (Worksafe Australia 1994). The HHMP prepared by the proponent as part of satisfying the National Code of Practice will include:

- intensive education and training of the workforce to minimise exposure of personnel and identify areas of risk for lead exposure;
- rigorously applied rules and procedures to be implemented in mining and processing areas to minimise disturbance of lead and ensure lead uptake is minimised; and
- ongoing assessment of the risk of lead contamination including monitoring, evaluation of health risks and determining control measures.

The HHMP prepared by the proponent to address management of lead during mining to meet the OH and S requirements will be subject to assessment and approval by the DME and the proponent's implementation of the approved program will be supervised by the DME.

To address the environmental aspects of the proposal the proponent has prepared a preliminary Environmental Management Program (EMP) a draft of which has been included in the CER. The EMP specifies, among other things, the management systems, environmental procedures, risk assessment, monitoring, research, and auditing that will be implemented by the proponent.

The proponent has included a commitment to submit its EMP to statutory agencies for review and to amend the EMP if required, based upon their advice.

At the conclusion of mining operational controls will diminish and the minesite and other areas disturbed by mining will need to be left in a condition that ensures they do not become an ongoing source of lead contamination to the environment. To address the long-term management of the minesite the proponent has prepared a draft Decommissioning and Rehabilitation Plan that has also been included in the CER. A key element of the plan is the proponent's intention to schedule waste rock disposal during mining operations so that waste rock containing lead is contained within the core of the dump. The proponent, through its geochemical testwork (Campbell, 1999b), has identified sufficient barren waste materials 500 mg/kg lead) in the top 10 metres of the orebody that will be recovered during mining and eventually used to form the protective cover for the surface and embankments of the waste rock dump. Barren materials will also be used to cover the surface tailings of the TSF when it is rehabilitated. The barren materials placed on the waste rock dump and the TSF will provide a stable, lead reduced (comparable to background) cover suitable for revegetation. The rehabilitation and decommissioning plan prepared by the proponent also addresses the clean up (including decontamination) and decommissioning of other areas disturbed during mining. It includes the proponent's commitments to stabilise and revegetate areas disturbed by mining and to replace fauna habitat lost when the mine was established.

The EPA notes that the proponent's CER also includes a commitment to prepare and implement an Environmental Management System (EMS).

Submissions

A public submittor noted the commitment of the proponent to implement a dust control plan as part of its HHMP and to undertake air quality monitoring at the mine site with the objective of complying with the code of practice. The submittor questioned what statutory mechanisms would apply to the proposal to monitor the proponent's compliance with the code and, in the event of an exceedance, what action could be taken by statutory agencies to ensure compliance.

The Water and Rivers Commission (WRC) raised concerns regarding the potential for tailings storage facilities and the waste rock dump to contain lead and for the leachates they produce to become a continuing source of lead contamination to the groundwater. The WRC and the DME raised concerns regarding the potential impacts from a structural failure of the TSF and the consequences that such a failure may have on the environment.

Assessment

The area considered for assessment of this issue is the minesite and surrounds.

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

- ensure that the health of the public is protected from lead contamination;
- ensure that the minesite is managed in the long-term and rehabilitated to protect the public and the environment from the adverse impacts of lead; and
- ensure compliance with acceptable standards or guidelines for lead in the environment including:
    a) the National Environment Protection Measure (NEPM) (NEPC, 1998) for lead recommends the environmental limit for lead particulates in air at 0.5 micrograms per cubic metre as an annual average, reported as a fraction of total suspended particulate matter;
    b) Australian Water Quality Guidelines for Fresh and Marine Waters (ANZECC, 1992) specify that the concentration of lead in stock drinking waters should not exceed 0.1 mg/L;
    c) National Health and Medical Research Council (NHMRC) Australian Drinking Water Guidelines which based on health considerations specifies lead in drinking water should not exceed 0.01 mg/L; and

d) Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites (ANZECC/NHMMRC, 1992) recommends soil criteria for lead of 300 mg/kg for residential areas and 1500 mg/kg for industrial land.

These matters are considered below.

Particulates and Dust

The EPA notes that the proponent has completed a baseline biological, air quality monitoring and soil sampling program in the vicinity of the minesite and at locations away from the mine for the purposes of establishing pre-mining reference lead levels. Pre-mining monitoring indicates that the NEPM is not exceeded. The pre-mining data will be used during mining operations to determine if lead levels both on-site and off-site of the mine are increasing. Mining operations will disturb particulates and dust. In the first instance, particulates and dust are required to be managed to health standards necessary to ensure the health of workers at the mine. In this regard, it should be noted that the minesite is subject to the requirements of the Mines Safety and Inspection Act, administered by the DME. The Act requires the proponent to meet strict Occupational, Heath and Safety (O, H and S) obligations with respect to lead. This will include monitoring of individual personnel and monitoring of the minesite area to ensure health standards are being met.

To address the requirements of the DME, the proponent is proposing to develop a Health and Hygiene Management Program (HHMP) which is in accord with the National Code of Practice. The code of practice, which sets the industry standard, provides a framework for the proponent to develop a program to manage lead issues at the minesite to meet standards required to ensure worker health. The DME has advised that, as part of its approval processes, it will also undertake a risk assessment of the mine identifying the likely pathways for lead to enter the environment to validate the HHMP proposed by the proponent. The proponent's implementation of the approved HHMP would be rigorously supervised by the DME because of the occupational health risks associated with lead. The DME will require the proponent to undertake regular monitoring and to regularly evaluate the effectiveness of its management measures. If monitoring results which are required to be reported to the DME by the proponent indicate that the measures are not satisfying the O, H and S requirements of the Act, the proponent will be required by the DME to revise its practices and procedures accordingly.

The EPA is of the view that the proponent's obligations to satisfy its O, H and S requirements under the provisions of the Mines Safety and Inspection Act will also provide a rigorous ongoing process to ensure that lead is not mobilised into the environment by mining activities. During mining operations, this process is principally managed by the DME. The EPA's view is based on the premise that during mining one of the principle pathways for lead to enter the environment is as dust and particulates mobilised by mining activities. The proponent is required by the DME to manage dust and particulates so as to meet worker health requirements. Hence, the EPA is confident that because dust and particulates will be managed at their source the proponent will also be able to meet appropriate environmental standards (listed above) that apply to the minesite.

Notwithstanding the requirements of the DME, the proponent will also require a DEP licence for the minesite. It will specify limits for dust and particulates consistent with the NEPM and require the proponent to undertake regular dust monitoring within the mining area, to demonstrate that licence limits are being met. The results of monitoring are reported to the DEP and should the results of monitoring show that the proponent is not in compliance with the specified lead levels, statutory mechanisms exist that can require the proponent to amend its practices so as to meet its licence conditions. This provides the EPA with further confidence that there is sufficient monitoring occurring to ensure that exceedances in dust and particulates, should they occur, will be detected and the proponent will be required to take the necessary action to ensure its continued compliance.

With regard to management of lead outside of the mining area, it is noted that the DEP licence will also include conditions requiring monitoring of the dust deposition gauges and the additional recommended high volume sampling to be conducted. The continued sampling at these sites will provide a basis for determining if lead levels in air away from the mine are increasing as a result of mining activities. Similarly the continued monitoring of the dust deposition gauges will indicate if lead is being mobilised and deposited further away from the general area of mining. It is the expectation of the EPA that dust levels recorded off-site from the mine will not increase as the minesite will be managed (according to DME's requirements) to limit mobilisation of dust at its source. However, in the event that monitoring indicates a significant increase in dust and particulates and licence limits are not being met then the proponent would be required to prepare an action plan to meet the requirement. The proponent has already committed to preparing an EMP and to specifying the criteria and that will apply to the mining operations in its EMP. The requirement to develop an action plan in the event that specified criteria are exceeded can form part of this process.

However, noting the proponent's commitment to prepare and implement both an EMP and a HHMP and its requirement to satisfy its obligations to the DEP and the DME with regard to meeting the requirements of the respective Acts, the EPA is of the view that management of lead at the minesite to address health and environmental aspects of the proposal are inextricably linked and to be effective these management programs should not be considered or managed in isolation from each other. Accordingly, the EPA has recommended that the proponent prepare a single Health, Hygiene and Environmental Management Program (HHEMP) that incorporates both the EMP and HHMP proposed by the proponent. The combined HHEMP is recommended to be made a condition of the proposal proceeding. Furthermore, noting the importance of satisfying the community that the health, hygiene and environmental management measures proposed by the proponent are adequate to manage lead at the minesite, the EPA has recommended that the final program should be publicly available.

Groundwater quality

The EPA notes the results of the proponent's geochemical testwork that indicates soils underlying the tailings storage facility (TSF) and waste rock dump have a high capacity to immobilise lead in leachates which may seep from these facilities (Campbell, 1999b). This testwork which indicates that leachates from the facilities will not result in contamination of the groundwater above the drinking water for stock criteria of 0.1 mg/L provides the EPA with confidence that the TSF and waste rock dump will not lead to significant contamination of the groundwater. This is further supported by the results of initial sampling conducted by the proponent of the aquifer in the vicinity of the minesite where lead in the groundwater is below detection limits despite the presence of the lead orebody. This supports the view of the proponent that natural processes of immobilising lead in the soils before they enter the groundwater are effective.

The proponent's hydrogeological investigations have also shown that the aquifer underlying the proposed TSF and waste rock dump does not support any local users (Morgan, 1999b). The EPA notes that there is a stockwater bore in the vicinity of the mine however, it has been concluded from the hydrological investigations that the bore is not drawing water form the aquifer below the TSF and waste rock dump. The groundwater below the proposed location of the TSF is brackish to saline (~5000ppm) and is between 10 and 40 metres below the base of the facility. Groundwater has low transmissivity and a shallow gradient toward the paleochannel to the north-east indicating confidence in the ability of the seepage to be managed to prevent contamination of the groundwater in the immediate vicinity of TSF and waste dumps. The proponent's hydrological investigations (Morgan, 1999b) indicate there is unlikely to be hydraulic continuity with aquifers to the south of the orebody and hence, aquifers further afield are unlikely to be significantly affected by seepage into the aquifer below the waste facilities. In addition, it is noted that the proponent has proposed secondary measures to monitor seepage from the TSF to confirm its predictions and, if necessary, it has proposed to use these monitoring bores to recover seepage. It is recommended that the DEP licence issued to the proponent under the pollution prevention provisions of the EP Act require the proponent to

undertake monitoring and if necessary recovery of seepage in accordance with its proposed program.

The DME raised concerns regarding the structural integrity of the proposed TSF design primarily relating to the design criteria satisfying the Department's 'Guidelines on the Safe Design and Operating Standards for Tailings Storage'(DME, 1999). The preliminary design referred to in the CER was based on an earlier version of the guidelines. The proponent has subsequently revised its design (Magellan, 2000) and the DME has advised that the proponent has adequately addressed matters relating to structural integrity of the TSF.

The EPA supports the strategy developed by the proponent to site the TSF and waste rock dump on host rock capable, through natural processes, of immobilising lead in leachates that may emanate from the TSF and is confident that the facilities can be designed and managed so as not to lead to significant contamination of the groundwater. The final TSF design prepared by the proponent will be subject to the Works Approval requirements of the EP Act. This will require a detailed evaluation of the proposed final design by the DEP and result in binding conditions being placed on the construction requirements of the TSF and, the seepage detection and recovery systems. The advice of the DME and the WRC would also be sought as part of this assessment and approval process. The EPA understands that the proponent is also investigating alternative 'dry disposal' systems and in particular is examining the suitability of using 'paste technology' that results in disposal of tailing materials with a negligible excess of water when left to rest. The EPA also supports examination and application of such technology.

Rehabilitation

EPA notes that during mining the DME has principal authority to ensure that the mine is managed to prevent lead contamination in the mining area. However, at the conclusion of mining the area will not be as actively managed and therefore it will be necessary to rehabilitate the mine to ensure that it does not become a long-term source of lead contamination to the environment. In particular, the TSF and the waste rock dump require rehabilitation to prevent wastes containing lead remaining exposed to the environment. If they remained exposed they are likely, through mobilisation of surface particles and sediments blown or washed into the immediate surrounds, to contaminate the environment.

The EPA notes the Rehabilitation and Decommissioning Plan produced by the proponent and, in particular, the strategies it has developed to ensure that higher grade wastes containing lead are covered so that upon completion of rehabilitation areas can meet criteria specified for lead contamination in soils. In this regard, it is important to note that background lead levels in soils (425 mg/kg) exceed the recommended residential criteria (300 mg/kg) however, they are below the recommended industrial criteria of 1500 mg/kg. The DEP has advised that in the case of this proposal where background levels are naturally elevated, it is appropriate for the proponent to develop site specific criteria based upon a sound, adequate and ecological and/or health risk assessment. The development of a site-specific criteria would be reviewed by the DEP or appropriate government agencies to ensure that it is acceptable. As a minimum and in the absence of a site-specific assessment, it is the expectation of the EPA that the criteria are consistent with background soil lead levels recorded in pre-mining surveys. However, the EPA considers that a site-specific assessment is appropriate and once soil criteria are established they should be specified in the Decommissioning and Rehabilitation Plan.

The EPA considers that the implementation of the plan is an important aspect of ensuring that the TSF and waste rock dump and other areas disturbed by mining do not become an ongoing source of lead contamination to the environment. The EPA has therefore recommended that the preparation and implementation of the plan becomes a condition of the proposal proceeding. A site-specific assessment conducted by the proponent for the purposes of developing appropriate soil criteria is recommended to form part of this plan.

Having particular regard to the:

(a) proponent's commitment to prepare and implement an EMS;

(b) proponent's preparation of a preliminary EMP and its commitment to implement it;

(c) proponent's commitment to prepare and implement a HHMP;

(d) importance of ensuring the environmental and health aspects of the proposal are managed in a coordinated way;

(e) aquifers affected by the mining operations support no local users;

(f) results of the proponent's hydrological investigations indicate there is no hydraulic continuity with aquifers to the south of the mine and only limited connection with aquifers to the north;

(g) siting of the proposed waste rock dump and TSF in a location that can take advantage of natural processes which result in the immobilisation of lead in seepage and it is therefore predicted by the proponent that seepage will meet criteria specified for lead in groundwater;

(h) final design of the TSF is subject to detailed evaluation under the Works Approval and Licensing provisions of the EP Act which will result in legally binding conditions being placed on the TSF regarding construction requirements, ongoing monitoring and the management of the facility;

(i) development of a Rehabilitation and Decommissioning Plan by the proponent which has identified sufficient barren material (lead reduced) to cover the TSF and the waste rock dump so as to prevent them becoming an ongoing source of lead contamination to the environment and allow for their rehabilitation to an acceptable final landuse; and

(j) the Rehabilitation and Decommissioning plan prepared by the proponent addresses the revegetation of the minesite to a landuse compatible with its surrounds,

it is the EPA's opinion that the proposal is capable of being managed to meet the EPA's environmental objectives for management of lead at the minesite provided that the proponent:

- implements its commitments;
- prepares and implements a Decommissioning and Rehabilitation Plan; and
- prepares, makes publicly available and implements a combined Health Hygiene and Environmental Management Program.

3.2 Groundwater at the mine borefield

Description

The project requires 1.5 million cubic metres per annum (49 L/sec) of groundwater to supply mining and processing operations. Groundwater abstraction requires a Groundwater Well Licence (GWL) to be issued by the WRC under the provisions of the *Rights in Water and Irrigation Act (1914)* before groundwater can be abstracted.

The proponent's hydrological investigations (Morgan, 1999b) have identified a potential groundwater resource capable of meeting the supply requirements of the proposal. The groundwater will be drawn from a shallow calcrete and deeper chert aquifers south east of the minesite. Groundwater in the aquifers is brackish to slightly saline (~5000 ppm TDS). The proponent has indicated that there are no other users of the groundwater resource in the area.

The shallow calcrete aquifer is likely to contain stygofauna (groundwater fauna), although this has yet to be confirmed. Utilisation of groundwater for mining may draw down the calcrete aquifer with consequential effects on stygofauna.

Submissions

The WRC considered that the proponent provided insufficient information in the CER regarding groundwater supply requirements and identification of possible sources and sustainibility of proposed abstraction.

The DEP raised concerns that groundwater abstraction and the drawdown of the aquifers has potential to affect shallow and deep-rooted vegetation in the region.

In its submission, the Western Australian Museum (Museum) advised it considered that the region between Paroo and Lake Way, the location of the mine, is likely to contain a diverse and regionally distinct series of groundwater faunas (stygofauna). The Museum was of the view that the calcrete aquifer proposed for groundwater abstraction is likely to contain stygofauna and there is presently little background information on the species present or their abundance in the target aquifer from which to determine the conservation significance of stygofauna.

Assessment

The area considered for assessment of this issue is the mine borefield south east of the minesite.

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

- maintain the quantity of groundwater so that existing and potential uses, including ecosystem maintenance, are not affected; and
- maintain the abundance, species diversity and geographical distribution of subterranean fauna (stygofauna).

Groundwater quantity

The proponent, in its response to submissions advised that the detailed hydrological reports (Morgan, 1999b) have been forwarded to the WRC in preparation for its application for a GWL. The WRC has confirmed there is sufficient information to progress the GWL application should the proposal be allowed to proceed.

The proponent's hydrological report concludes that:

- The production bore in the shallow calcrete aquifer has a sustainable yield of 2160 kL per day that results in a drawdown of 1.6 metres in the aquifer to a maximum of 3.7 metres below ground level after ten years continuous pumping. The total available drawdown in the aquifer is 10.9 m. The bore would be fitted with a pump capable of abstracting 1650 kL per day or 76 % of the sustainable yield.
- The production bore in the deeper chert aquifer has a sustainable yield of 1920 kilolitres per day and would be fitted with a pump capable of abstracting 1450 kL per day. At this rate of abstraction, drawdown to 32.3 metres is calculated after ten years continuous pumping. Total available draw down is 75 metres.

The EPA notes the results of hydrological investigations indicating there is a source of supply capable of providing a sustainable yield over the ten-year life of the mining operation. The proponent is required to satisfy the WRC's licence approvals processes before a GWL will be issued. The GWL will specify the volume of water that can be abstracted from the calcrete and chert aquifers consistent with the proponent's predictions and the WRC's decision regarding sustainable yield. Monitoring is required to be undertaken as part of the proponent's obligations to comply with the conditions of its GWL. The results will be reported to the WRC to confirm the predictions of the proponent regarding sustainable yield and draw down impacts on the aquifers.

With regard to the DEP concerns about the impacts on shallow and deep-rooted vegetation, the proponent has provided additional information about the vegetation found in the area of the proposed borefield and the expected impacts of drawdown of the aquifer on vegetation.

The proponent has advised that the drawdown in the calcrete aquifer is expected to be 1.5 m. The proponent considers that this 1.5 m fluctuation is within the normal range of seasonal variations in the aquifer. The vegetation in the area where groundwater drawdown is expected is sparse, comprising grasses and shrub species characteristic of calcrete environments. The shrubs are generally not phreatophytic (dependent on groundwater in the aquifer) as they depend on the moisture contained in the soil. Approximately 300 metres from the proposed location of the production bore are some large white gums. These trees are expected to have roots within the calcrete aquifer, however, they are considered unlikely to be affected as the variation in the aquifer resulting from groundwater abstraction is not expected to be greater than existing seasonal fluctuations in the depth from the surface to groundwater (Morgan, 1999a).

The proponent's hydrological investigations indicate the calcrete aquifer is subject to very quick and large recharge from seasonal rains, therefore, water levels in the calcrete aquifer are predicted to return rapidly following seasonal rains.

The proponent does not expect that abstraction from the deeper chert aquifer will affect vegetation as the aquifer is below the rooting zone.

The EPA has considered the additional information provided by the proponent regarding the expected impacts of groundwater abstraction on vegetation. The proponent's conclusions, based on its hydrological and vegetation investigations, that shallow and deep-rooted vegetation will not be affected by the abstraction of groundwater from either the shallow calcrete or the deeper chert aquifers are noted. The EPA has sufficient confidence, based on the proponent's hydrological and vegetation investigations, that shallow and deep rooted vegetation will not be significantly impacted by groundwater abstraction and additional monitoring of groundwater impacts other than that required by the GWL is not required.

Potential impacts on subterranean fauna (stygofauna) from groundwater abstraction

The EPA is hampered, in assessing the likely impacts of an individual proposal, by the shortage of baseline information on subterranean fauna in the State. The concerns raised by the Museum confirm the shortage of this information. The EPA is also cognisant of the fact that one of the reasons for this shortage is the extent of infrastructure (boreholes and wells) required to gather the necessary information and as such, developments like the one proposed often provide the only impetus for collecting this type of information. In turn, the likely consequential effects of the proposed development cannot be conclusively determined or considered in a regional context given the shortage of baseline information.

In the case of this proposal, the EPA considers that the proponent's commitment to participate in a stygofauna sampling program and its hydrological investigations, in particular, its predictions with regard to the fluctuation of groundwater, provide a basis for considering the impacts of groundwater abstraction on stygofauna.

The sampling program committed to by the proponent will assist in providing information in relation to the conservation and protection of this element of the environment.

As a result of the proponent's hydrological investigations it has been concluded the groundwater drawdown will be in the order of 1.5 metres and this is expected to be within the normal range of seasonal fluctuations. The proponent also considers that the aquifer is recharged periodically following rainfall (Morgan, 1999a). It has been hypothesised that if the aquifer is maintained in the range of seasonal fluctuations (consistent with the proponent's predictions) there is likely to be an inherent capacity of stygofauna to survive such seasonal fluctuations and recover. The EPA considers that these predictions should be tested. The statutory requirements of the GWL issued by the WRC provide a mechanism to monitor and confirm the predictions of the proponent with regard to groundwater drawdown and aquifer recharge. Similarly, as the effects on the aquifer are being monitored consistent with the requirements of the GWL, the EPA considers that the consequential effects on stygofauna should be examined and that this will contribute to the understanding of the capacity of stygofauna to cope with such changes.

The EPA acknowledges there is a level of uncertainty with regard to the impacts on stygofauna based on the available information. However, the EPA is of the view that the risk of stygofauna species extinction as a result of this proposal is small. The proposal provides an opportunity to contribute to the fundamental taxonomic knowledge of stygofauna and also to monitor the effects of variation in the natural hydrological regime on stygofauna to determine the capacity of the species to cope with change. Whilst this is not an ideal situation, the EPA considers that the ability to provide conclusive answers is only likely to be remedied through more surveys being undertaken in a managed way. A collaborative approach to developing a regional program of study of subterranean fauna is recommended. Accordingly, in the absence of a regional program, the EPA has recommended a subterranean fauna sampling plan be developed in consultation with the Museum. A focus of the sampling plan is to confirm the predictions of the proponent with regard to groundwater drawdown being within the range of seasonal fluctuations, and to determine the impacts of the drawdown on stygofauna, to the

extent that this can be achieved by monitoring. It is also recommended that a report of the sampling plan be provided to the EPA and the WA Museum and if the results indicate that an EPA objective would be compromised, then an action plan is to be developed in consultation with the EPA.

Summary

Having particular regard to the:

(a) results of the proponent's hydrogeological investigations that indicate there is a groundwater resource capable of supplying a sustainable yield to the proposal;

(b) requirements of the *Rights in Water and Irrigation Act 1914* which require the proponent to seek approval for groundwater abstraction. The WRC will issue a GWL that specifies the volume of water that can be abstracted from the aquifers consistent with the decision of the WRC regarding the capacity of the aquifers to supply a sustainable yield;

(c) hydrological investigations of the proponent that indicate groundwater abstraction will result in a drawdown of approximately 1.5 metres in the calcrete aquifer and that this is predicted to be within the normal range of seasonal fluctuation of the aquifer;

(d) proponent's confidence that the aquifer has the capacity to recharge on a periodic basis; and

(e) proponent's commitment to sample groundwater for the presence of stygofauna to assist in providing information in relation to the conservation and protection of stygofauna,

it is the EPA's judgement that, on balance, after considering the risk of its environmental objectives for groundwater at the mine borefield being compromised against the benefits of improved basic knowledge of stygofauna, the proposal is capable of being managed provided a subterranean fauna sampling plan is prepared, made publicly available and implemented.

3.3 Management of lead at the port

Description

Lead concentrate produced at the mine may be transported by road in enclosed kibbles to the Geraldton Port. At the port, the concentrates are unloaded from the transport kibbles and stored in enclosed sheds. Mineral products are already exported through the Geraldton port and it is proposed to use the existing enclosed conveyors and ship loading facilities managed by the Geraldton Port Authority to load lead concentrates onto ships for export. In the event of spillage during transfer from the sheds and ship loading there is potential for lead to be mobilised into the air as dust and particulates or washed into the marine environment of the port, contaminating sediments.

Submissions

The DEP Mid West Region Office advised that the existing storage and ship loading operations at the port result in spillage of mineral products, although this has not been confirmed through monitoring. The DEP Mid West Region Office is concerned that use of the existing storage and ship loading facilities, and the loading practices currently in place, may not be adequate to prevent the environs of the port becoming contaminated with lead.

The DEP Mid West Region Office advised that the proponent's EMP included in the CER should identify all possible pathways for lead concentrate to enter the air and the waters of the Geraldton Port and set out procedures for use of equipment to minimise these losses. The DEP is of the view that the present loading and transfer facilities may require modification to ensure these losses to the environment are minimised. It is the Department's opinion the review should occur prior to it considering any application to add lead mineral products to the Geraldton Port Authority's licence.

The Department also advised that water quality within the Geraldton Port is becoming an issue of high public interest due to the value of live lobster storage facilities adjacent to the port, and the establishment of aquaculture within these waters. The DEP Mid West Region Office is

currently negotiating with port users, the fishing industry, Local and State Government Authorities, and the community to develop a cooperative marine water quality monitoring program for the Geraldton area, including the Geraldton Port.

Assessment

The area considered for assessment of this issue is the Geraldton Port.

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

- to ensure that the health of the public is protected from lead contamination;
- to ensure that the Geraldton Port is managed in the long-term and rehabilitated to protect the public and the environment from the adverse impacts of lead; and
- to ensure compliance with acceptable standards for lead in the environment.

The EPA notes that the proponent has, since the preparation of its CER, advised it has no immediate intentions to export lead concentrates through the Geraldton Port, instead opting to refine the concentrates at the Wiluna minesite to produce lead metal. However, the proponent has also advised that the option to export lead concentrates through the Geraldton Port remains open, and hence the EPA has continued with its assessment of this issue.

Although it is the proponent who is proposing to export lead concentrates, in the event that this part of the proposal proceeds, the responsibility for seeking environmental approval is the Geraldton Port Authority's as the Geraldton Port facilities are a prescribed premise under the provisions of the EP Act. Export of lead concentrates will be considered through the licensing provisions of the Act administered by the DEP. A DEP licence is already issued to the Geraldton Port Authority and a decision of the proponent to proceed with the export of lead concentrates using the port facilities will require the addition of "lead" to the approved mineral products list contained in the licence. The licence approvals process of the DEP will establish licence limits, monitoring and reporting requirements consistent with guidelines and standards appropriate for lead. In this regard, the National Environment Protection Measure (NEPM) (NEPC, 1998) for lead recommends the environmental limit for lead particulates in air at 0.5 micrograms per cubic metre as an annual average, reported as a fraction of total suspended particulate matter. The NEPM for lead particulates, which also specifies sampling protocols, will form the basis of the DEP establishing a licence limit for lead in air at the port.

Similarly, the Australian Water Quality Guidelines for Fresh and Marine Waters (ANZECC 1992) specify that the concentration of lead in marine waters should not exceed 5 micrograms/L. In marine sediments environmental quality criteria for lead are specified as 46.7 mg/kg.

The EPA notes that the proponent of the current proposal has not carried out background dust and particulate monitoring or sediment sampling at the port, as it is not responsible for the existing shiploading activities. However, in the event that the proponent proceeds with its proposal to export lead concentrates the proponent has confirmed its agreement to participate in a joint sampling program in order to establish an ambient air quality and marine sediment limits for lead at the port.

In conclusion, appropriate standards for lead in the air and the marine environment already exist and in the event that lead concentrates are proposed to be exported through the Geraldton Port, the DEP licence issued to the Geraldton Port Authority would require an amendment to allow this. The addition of lead mineral products to the licence would only occur where the Geraldton Port Authority can demonstrate to the satisfaction of the DEP, through its licence approvals process, that appropriate standards and guidelines for lead in the environment can be met. The licence, if amended, would then specify additional licence limits, monitoring and reporting requirements relevant to lead mineral products, which the Geraldton Port Authority would be required to meet.

Whilst the EPA notes that approvals from the DEP are required before export of lead concentrates can occur, the EPA is concerned that there are presently indications that mineral products may be entering the marine environment and the air from existing activities at the port.

The EPA notes the comments of the DEP Mid West Region Office and concurs with its recommendation to conduct a review of the port facilities and procedures to determine if they are appropriate to use for lead products. The EPA acknowledges that, as the proponent is not the operator of the port facilities, as a new user of the shared facilities it is likely to encounter difficulties effecting changes to existing equipment and procedures. However, the EPA is firmly of the view that if shared facilities are proposed to be used, then the onus is on the proponent to demonstrate that the facilities and procedures are adequate to protect the environment. Should the review identify limitations, the EPA considers the required changes to procedures are to be incorporated into the proponent's HHEMP previously recommended as a condition of the proposal proceeding. Appropriate changes to equipment, if required, would be expected to be effected in consultation with the Geraldton Port Authority and other users.

Accordingly, the EPA has recommended that, in the event the proponent proceeds with its proposal to export lead concentrates through the Geraldton Port, then the proponent shall conduct a review of the existing shiploading facilities and procedures and update its HHEMP to take account of the review. This is recommended to form part of the condition requiring the proponent to prepare a Health Hygiene and Environmental Management Program.

The EPA recognises that the recommended review is dependent on this proposal proceeding. In the event that it does not, there still remains a need to address concerns raised that the existing facilities are contributing to contamination by mineral products of the port environs. Accordingly, the EPA has also provided 'Other advice' with regard to identifying if existing storage and ship loading facilities are contributing to nuisance dust or contamination of the port.

The EPA notes and supports the initiatives of the DEP and other users to establish marine water quality guidelines in the Geraldton Port.

Summary

Having particular regard to:

- the proponent's commitment to participate in a dust and sediment sampling program during ship loading at the Geraldton Port to establish an ambient licence limit for lead;
- the NEPM for lead recommends an environmental limit for particulates and dust that is applicable to storage and ship loading activities at the Geraldton Port and an appropriate licence limit will be applied by the DEP through its statutory licence conditions;
- the Australian Water Quality Guidelines for Fresh and Marine Waters specify that the concentration of lead in marine waters should not exceed 5 micrograms/L. In marine sediments environmental quality criteria for lead are specified as 46.7 mg/kg;
- the proponent's preparation of an EMP; and
- the proponent's commitment to prepare a HHMP,

it is the EPA's opinion that the proposal can be managed to meet the EPA's environmental objective for management of lead at the port provided that;

- the proponent's commitments are made legally enforceable;
- a combined HHEMP is made a condition of the proposal proceeding and this program shall be publicly available; and
- in the event that the proposal to export lead concentrates proceeds, an audit of the ship loading facilities and procedures is conducted to identify possible pathways for lead to enter the environment and that this is addressed in the combined HHEMP prepared by the proponent.

4. Conditions and commitments

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

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

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

4.1 Proponent's commitments

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

4.2 Recommended conditions

Having considered the proponent's commitments and the information provided in this report, the EPA has developed a set of conditions (see appendix 4). The EPA recommends these conditions be imposed if the proposal by Magellan Metals Pty Ltd to develop an open-cut lead carbonate mine and concentrator processing facilities near Wiluna to produce a lead concentrate for further refining at the minesite to lead metal or alternatively, for export through the Geraldton Port, is approved for implementation.

Matters addressed in the conditions include the following:

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

(b) That the proponent shall be required to prepare, make publicly available and implement a combined Health, Hygiene and Environmental Management Program;

(c) That the proponent be required to prepare and implement a Decommissioning and Rehabilitation Plan for the mine; and

(d) That the proponent be required to prepare, make publicly available and implement a Subterranean Fauna (Stygofauna) Sampling Plan at the mine borefield.

5. Other regulatory mechanisms

Implementation of the proposal, should it be allowed to proceed, is also subject to approval processes under various regulatory mechanisms administered by State Government agencies with statutory authority to administer other Acts that are relevant to the proposal. These approval processes generally consider in some detail aspects of the proposal which have some influence on environmental matters. The Acts and agencies with approval processes that will contribute to environmental assessment and ongoing evaluation of the effectiveness of the proponent's environmental management of this proposal are listed below.

- The provisions of the *Explosives and Dangerous Goods Act 1961* administered by DME and the proponent's requirement to comply with the Act with respect to the transport and handling of lead product. The Act requires the proponent to prepare and implement transport and safety procedures and emergency response plans.

- The provisions of the *Mines Safety and Inspection Act 1994* administered by DME and the proponent's requirement to comply with the Act with respect to ensuring public safety is maintained and management of the mining void, waste dumps and decommissioning of plant infrastructure is adequate.

- The provisions of the *Mining Act 1978* administered by the DME; specifically the proponent's requirement to comply with the Act with respect to preparing mining and rehabilitation plans and establishing performance criteria. Preparation of rehabilitation plans and programs includes the DME requiring the proponent to determine an appropriate final landuse for mined areas and in this case the proponent's requirement to rehabilitate with native vegetation so as to replace vegetation and fauna habitat disturbed or lost as a result of mining operations. The proponent's reporting of the implementation of the plans and meeting rehabilitation performance criteria is managed by the DME. The Act allows for the application of rehabilitation performance bonds on mining tenements as a means for providing for necessary rehabilitation in the event that the proponent can not meet the agreed rehabilitation program and demonstrate that the area is satisfactorily rehabilitated. The eventual release of the proponent from mining tenement bonds and other obligations is subject to the DME being satisfied that areas are satisfactorily rehabilitated.

- The provisions of the *Rights in Water and Irrigation Act 1914* administered by the Water and Rivers Commission (WRC); specifically the proponent's requirement to comply with the Act to obtain a GWL. The GWL approval process will address management of the groundwater resource and availability of the resource to other users. The proponent is required to report groundwater monitoring data, assess impacts and amend its groundwater management strategy as appropriate.

- The provisions of the *Wildlife Conservation Act 1950* administered by the Department of Conservation and Land Management (CALM) and the proponent's requirement to comply with the Act with respect to disturbance or taking of DRF and Priority flora.

- The provisions of Part V of the *Environmental Protection Act 1986* administered by the DEP; specifically the requirement of the proponent to comply with the Act and obtain a Works Approval to construct processing infrastructure and a licence to operate processing facilities. The Works Approval requires the proponent to construct processing and TSF facilities in accordance with the environmental measures proposed by the proponent and subsequently amended by the DEP. The licence to operate will address management of the process plant and the TSF to prevent pollution. The licence reporting process will require the proponent to monitor and report its environmental performance, and, on the basis of monitoring, amend its environmental management as appropriate.

- The provisions of the *Aboriginal Heritage Act 1972* administered by the Aboriginal Affairs Department and the proponent's obligations to comply with the Act with respect to disturbance of Aboriginal archaeological and ethnographic sites.

6. Other advice

The EPA is concerned that there have been reports, although not yet confirmed through monitoring, that the existing facilities and procedures may not be adequate to prevent spillage of mineral products at the Geraldton Port. The EPA has advised the DEP of its concerns and the Department will investigate the matter under the pollution prevention provisions of the EP Act.

The EPA also understands that some of the facilities are subject to the provisions of the Mines Safety and Inspection Act and accordingly, it is recommended that the DEP consult with the DME with regard to investigating the substance of the reports and addressing any matters that may arise from such an investigation.

7. Conclusions

The EPA has considered the proposal by Magellan Metals Pty Ltd to develop an open-cut lead carbonate mine and concentrator processing facilities at Wiluna.

The EPA notes that since the Consultative Environmental Review (CER) was released the proponent has advised it has no immediate intentions to export lead concentrates through the Geraldton Port. The proponent currently intends to further refine the concentrates at the Wiluna minesite to produce lead metal. The EPA has not assessed the construction and operation of the small refinery at Wiluna. The environmental matters relating to its construction and operation will be addressed through the Works Approval and Licensing provisions of the EP Act. However, the proponent has also advised that the option to produce lead concentrates for export remains open and hence, the EPA has continued with its assessment of the proposal with an expectation that exporting of lead concentrates through the Geraldton Port may occur at some time in the future.

The environmental issues relating to this proposal are primarily concerned with the management of lead at the Wiluna minesite and at the Geraldton Port so as to prevent health effects. Established management practices exist to enable the mining, storage, handling and transport of lead and the EPA is of the view that this provides a substantive framework for managing the environmental aspects of the proposal. Air quality, groundwater quality and soil criteria exist against which the proponent's performance can be evaluated, and based on the proponent's preliminary investigations the EPA is confident that the proponent can meet the criteria. To ensure that the proponent has clearly established the criteria against which its performance will be monitored and detailed its management measures and proposed monitoring, the EPA has recommended that the proponent prepare a combined Health, Hygiene and Environmental Management Program (HHEMP) which will address both the environmental and the health aspects of the proposal. The EPA has also recommended that the HHEMP be made publicly available to provide the community with a level of confidence that the programs implemented by the proponent are commensurate with mining, storage and handling of a product such as lead, that has known health and environmental risks.

In the long-term, at the conclusion of mining, the minesite and areas disturbed by mining will require rehabilitation to ensure any areas contaminated with lead are cleaned up and the minesite is rehabilitated. To address this the proponent has developed a Decommissioning and Rehabilitation Plan which the EPA views as being an important tool to ensure that the proposal is managed to prevent the site becoming an ongoing source of contamination to the environment. Accordingly, the Decommissioning and Rehabilitation Plan has been made a condition of the proposal proceeding and will also be publicly available.

The development of a borefield to supply mining operations is likely to affect subterranean fauna (stygofauna). The EPA continues to be hampered in its ability to assess the impacts on stygofauna of individual proposals by a lack of regional baseline information on subterranean fauna in the State. The EPA is aware that there is a level of uncertainty with regard to the impacts on stygofauna based on the available information. However, the proposal provides an opportunity to contribute to the fundamental taxonomic knowledge of stygofauna and also to monitor the effects of variation in the natural hydrological regime on stygofauna to determine the capacity of the species to cope with change. Whilst this is not an ideal situation, the EPA considers that the ability to provide conclusive answers is only likely to be remedied through more surveys being undertaken in a managed way. The EPA has recommended a subterranean fauna sampling program be developed including a requirement to develop an action plan in the event that it is evident the EPA's environmental objectives would be compromised.

The EPA is concerned that there are reports, although not confirmed, that the existing facilities and procedures now used by others at Geraldton may not be adequate to prevent spillage of mineral products at the Geraldton Port. The EPA has recommended that the proponent be required to undertake a review of the existing facilities if they are intended to be used, and, dependent on the outcome of the review, determine if it is appropriate that they are used for lead concentrates. The EPA has also requested the DEP to investigate the reports of spillage by others, of mineral products at the existing facilities, in consultation with the Department of Minerals and Energy (DME), to confirm if there is any substance to the reports and address any matters that may arise from such an investigation.

The EPA has concluded that the proposal is capable of being managed in an environmentally acceptable manner such that it is most unlikely that the EPA's objectives would be compromised, provided there is satisfactory implementation by the proponent of the recommended conditions set out in Section 4, including the proponent's commitments.

8. Recommendations

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

1. That the Minister notes that the project being assessed is for development of an open-cut lead carbonate mine and concentrator processing facilities at Wiluna to produce lead concentrates. The lead concentrates will be refined to lead metal at the minesite, or alternatively the concentrates will be transported by road to the Geraldton Port and exported;
2. That the Minister considers the report on the relevant environmental factors as set out in Section 3;
3. That the Minister notes that the EPA has concluded that it is unlikely that the EPA's objectives would be compromised, provided there is satisfactory implementation by the proponent of the recommended conditions set out in Appendix 4 and summarised in Section 4, including the proponent's commitments;
4. That the Minister imposes the conditions and procedures recommended in Appendix 4 of this report; and
5. That the Minister notes the EPA's 'Other advice' presented in Section 6 in relation to confirming if existing storage and ship loading of mineral products at the Geraldton Port are adequate to prevent contamination of the port environs. The EPA has taken up this matter with the Department of Environmental Protection.

Appendix 1

List of submitters

Government agencies:

Aboriginal Affairs Department

Health Western Australia

Midwest Development Commission

Water and Rivers Commission

Western Australian Museum

Local government authority:

City of Geraldton

Appendix 2

References

Australian and New Zealand Environment and Conservation Council/National Health and Medical Research Council (ANZECC/NHMRC) (1992a) *Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites.*

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Appendix 3

Summary of identification of relevant environmental factors

Summary of identification of relevant environmental factors.

Preliminary Environmental factor	Proposal		Government Agency and Public Comments	Identification of Relevant Environmental Factors
	Comp-onent	Characteristic		
BIOPHYSICAL				
Vegetation communities – impacts from direct disturbance	Mine	Total area expected to be cleared or disturbed over the life of the mine is 320 ha.	No comments received.	Vegetation in the region is in poor to moderate condition due to a long history of grazing by domesticated stock. Baseline vegetation surveys indicated that none of the communities present in the area of the mine are unusual and are generally well represented in the region. The minesite and surrounds will be rehabilitated (including re-establishment of native vegetation) according to the requirements of the Mining Act. This includes the provision of a bond by the proponent which cannot be relinquished until the DME is satisfied that the area has been rehabilitated. **Factor does not require further EPA evaluation for this component.**
Declared Rare (DRF) and Priority flora – impacts from direct disturbance	Mine	Field surveys conducted within the project area. No DRF species known to occur within 80 km of the site. Several Priority species known to occur in the area including an *Eremophila* species and two species of herbaceous daisies.	No comments received.	No DRF or Priority flora identified during field surveys. **Factor does not require further EPA evaluation.**
Terrestrial Fauna	Mine	Clearing may potentially cause a loss and degradation of fauna habitat. Other impacts may occur from introduced feral fauna species, changed fire regimes,	No comments received.	Fauna surveys (trapping and visual) identified the fauna present consists mainly of 21 species of lizards, 4 species of snakes, 3 species of native mammals and 3 species of introduced mammals. Fifty four species of birds were also observed in the

Preliminary Environmental factor	Proposal		Government Agency and Public Comments	Identification of Relevant Environmental Factors
	Comp-onent	Characteristic		
		noise and vibration disturbance and restrictions to fauna movement.		area. There is generally a good range of vertebrate species present in the general area of the mine however, the number of individuals was found to be low. This is most likely due to the impacts on habitat from extensive grazing. Species found are not confined to the area of the mine and the minesite area is not considered to provide unique habitat. Rehabilitation of the mine site (required by the Mining Act) will replace fauna habitat lost as part of the mine development. **Factor does not require further EPA evaluation.**
Specially Protected (Threatened) fauna	Mine	Field surveys conducted to identify Specially protected fauna within the area considered to be potentially impacted.	No comments received.	No specially protected fauna located during field surveys. **Factor does not require further EPA evaluation.**
Subterranean fauna – impact of groundwater abstraction and mine dewatering on aquifer habitat of Stygofauna	Mine	Groundwater abstraction and mine development has potential to impact Stygofauna habitat.	**WA Museum**: The region between Paroo and Lake Way (mine location) contains a diverse and regionally distinct series of groundwater faunas (Stygofauna). The calcrete to the west of the project area, near Paroo, and that in the Lakeway and Lake Violet areas support distinct stygofaunas but the boundary between them is unknown. The project may impact on stygofauna especially through groundwater contamination by heavy metals and by the utilisation of groundwater for mining operations.	**Considered to be a relevant environmental factor and is discussed under the issue groundwater quantity at the mine borefield.**
Landform	Mine	The resulting mining pit will cover approximately 54 ha and be up to 50 metres deep. Waste	No comments received	Construction of the waste rock dump and TSF will be subject to the requirements of the Mining Act and be consistent with Department of Minerals and

Preliminary Environmental factor	Proposal		Government Agency and Public Comments	Identification of Relevant Environmental Factors
	Comp-onent	Characteristic		
		dumps and tailings dams will alter the landscape covering approximately 138 ha.		Energy (DME) guidelines for landform design. Rehabilitation of the waste rock dump is required by the Mining Act. **Factor does not require further EPA evaluation.**
Rehabilitation	Mine	Waste dumps, tailings dams and disturbed areas will total approximately 320 ha over the life of the mine. Disturbed areas require rehabilitation consistent with the surrounding existing vegetation and fauna habitat. Tailings dams and waste dumps contain lead and require rehabilitation to prevent ongoing contamination of surrounding environment.	No comments received	Rehabilitation to establish a stable landform, native vegetation and fauna habitat is required by the Mining Act and the DME requires the proponent to prepare decommissioning and rehabilitation plans. In addition, the DME places bonds on the Mining tenements according to the amount of area disturbed within the tenement and these will not be released until the DME is satisfied that the area is satisfactorily rehabilitated. **Potential for continued lead contamination of the environment from the surface and embankments of the waste rock dump and TSF is considered to be a relevant environmental factor and is discussed under the issue of management of lead at the minesite.**
POLLUTION				
Particulates/ dust	Mine	Dust generation from ore extraction, mobile equipment movements, crushing, concentration and loading.	**Public:** Magellan Metals give a commitment to implement dust control measures and to undertake air quality monitoring at the mine site with the objective of complying with the National Environmental Protection measure Ambient Air Quality Standards. Who will this information be reported to and what actions would be taken should there be exceedances?	**Considered to be a relevant factor and discussed under the issue of management of lead at the minesite.**

Preliminary Environmental factor	Proposal		Government Agency and Public Comments	Identification of Relevant Environmental Factors
	Comp-onent	Characteristic		
	Port	Dust generation from unloading of concentrate, storage and ship loading.	**DEP:** Lead carbonate concentrate, with initial moisture content of 8% will be transported in covered kibbles from the minesite to the port. The 670 km journey by road, particularly in summer, may result in a decrease in the 8% moisture content. Unloading of kibbles at a reduced moisture content may generate dust. The CER states that the mineral concentrate is a moist filter cake and will not easily be moved as a particulate. Other concentrates handled at the Geraldton Port have been observed to produce dust when strong prevailing summer winds mobilise small deposits of spillage beneath the conveyors. The Geraldton Port is located in close proximity to areas of public use and the local fishing industry and small boat harbour. Dust monitoring at the port during loading operations should be undertaken to confirm the immobility of the product.	**Considered to be a relevant environmental factor and is discussed under the issue of management of lead at the Geraldton Port.**
Gaseous emissions	Mine	Electrical power to operate the minesite facilities will be provided by a gas-fired power station comprising two units (one primary and one stand by) capable of generating 2.5 Mw.	No comments received.	Consideration of alternative power generation options indicated gas-fired power station (as opposed to diesel) was the preferred power source. Gas fired power stations result in considerably less gaseous emissions than comparable diesel fired stations. Additional benefits to the town of Wiluna may be realised from provision of a gas spur line to the minesite which is in proximity of the townsite. **Factor does not require further EPA evaluation.**

Preliminary Environmental factor	Proposal		Government Agency and Public Comments	Identification of Relevant Environmental Factors
	Comp-onent	Characteristic		
Gaseous emissions (NOx)	Mine	Estimated nitrogen oxides emissions from power station (16 tpa) and mobile fleet (61 tpa).	No comments received.	The small quantity of emissions is not considered significant. **Factor does not require further EPA evaluation.**
Greenhouse gases	Project	Greenhouse gases (CO2) will be emitted from electricity generation (6040 tp/a) and the mobile fleet (4750 tpa). Total predicted of 10 640 tpa.	No comments received.	Minor source Greenhouse gas emissions to be minimised through efficient use of energy (including selection of gas fired power station) and selection of mining plant and equipment. **Factor does not require further EPA evaluation for this component**.
Lead	Mine	Natural (pre-mining) lead in the surface soils is present at 0.1 %. baseline survey has provided soil lead levels of 10-425 ppm. Lead levels are naturally elevated due to surface expressions of the ore-body. Potential for further elevation of lead levels due to mining activities. In the longer term, the waste rock dump and TSF are a potential source of continuing lead contamination of the land and groundwater in the vicinity of the minesite.	**WRC:** The WRC raised concerns about the proposed design of the TSF and the potential impact on localised groundwater from tailings leachates. Similar concerns were raised about the seepage from the waste rock dump. Mining activities have potential to elevate lead levels at the mine and offsite in surrounding areas. Tailings dams and waste dumps will contain lead. At the completion of mining the TSF's and waste dumps have the potential to become an ongoing source of lead contamination, if they are not adequately rehabilitated. Refer to comments listed under the factors of "Particulates and Dust", "Groundwater quality" and "Rehabilitation".	**Considered to be a relevant environmental factor and is discussed under the issue of management of lead at the minesite.**
	Port	Storage of lead concentrate in Geraldton port sheds. Transfer of concentrate to ships via a shared loadout facility. Possible	**DEP:** The proponent is proposing to use existing shared shiploading facilities at the Geraldton Port. The DEP raised concerns that there is potential for lead	**Considered to be a relevant environmental factor and is discussed under the issue of management of lead at the Geraldton Port.**

Preliminary Environmental factor	Proposal		Government Agency and Public Comments	Identification of Relevant Environmental Factors
	Comp-onent	Characteristic		
		contamination of hard stand areas and marine environment from particulates, dust and spillage.	to enter the marine (sediments) environment and air (particulates and dust) as a result of concentrate storage and ship loading activities. It has been observed that spillage occurs during ship loading using the existing facilities. Refer to comments listed under the factors "Marine water quality" and "Particulates and Dust".	
	Transport route	Lead concentrate transported in covered kibbles 670 km from Wiluna minesite to the Geraldton Port.	**Public:** What contingency plan has been developed to control any spillage should there be a vehicle accident?	The storage, transporting and handling of all dangerous goods and other hazardous substances are administered under the *Explosives and Dangerous Goods Act 1961*. This requires development of transport and safety procedures and emergency response plans. The proponent is aware of its obligation in this regard and has included a commitment to develop a HHMP that will address the transport of lead products, emergency response planning and clean up requirements in the event of an emergency. As part of its preliminary planning for the project and recognising that the Act requires the development of plans and procedures, the proponent has conducted preliminary sampling along the proposed transport route in order to establish background lead levels. In the event of an accident, the background levels provide a basis for determining the extent of areas required to be cleaned up. **Factor does not require further EPA evaluation.**
Groundwater quantity	Mine and borefield	Water supply proposed from calcrete and chert aquifers southeast of the minesite.	**WRC:** The CER is lacking in information regarding groundwater supply requirements and identification	**Considered to be a relevant environmental factor and is discussed under the issue groundwater quantity.**

Preliminary Environmental factor	Proposal		Government Agency and Public Comments	Identification of Relevant Environmental Factors
	Comp-onent	Characteristic		
		Maximum annual requirement 1.5 million m^3 /annum (49L/sec). Groundwater is brackish to slightly saline (~500 ppm TDS).	of possible sources and sustainibility of proposed abstraction.	
	Mine and borefield	Open pit is not expected to intercept the water table. An unlined two-cell paddock style tailings storage facility (TSF) is proposed. Each cell will hold approximately 4 Mt of tailings. Potential contamination of groundwater from tailings leachates.	**WRC:** The CER states that investigations of the proposed TSF have shown that contamination of groundwater resources and consequences of major TSF embankment failure would be limited to the remote location of the TSF. The CER states that some monitoring bores will be installed around the TSF to monitor water level and quality but does not provide information on: • the number, placement and design of the bores; • frequency of monitoring and testing; and • analytical suites and detection limits. The CER is lacking in specific information required by the WRC to assess the proposal thoroughly.	**Considered to be a relevant environmental factor and is discussed under the issue management of lead at the minesite.**
Surface water quality and quantity	Mine	Potential for sediment contamination of drainage channels from high rainfall periods. Surface water quality may be affected by spillages of contaminants such as oils used in mining operations.	No comments received.	Localised modification of catchment and streams will be managed through the construction and operation of the project. Layout of the mine includes drainage designed to direct runoff to collection areas for containment, evaporation and or pumping to the process circuit. The design, construction and operation of this infrastructure is subject to the requirements of the Mining Act and consideration by the DME **Factor does not require further EPA evaluation.**.

Preliminary Environmental factor	Proposal		Government Agency and Public Comments	Identification of Relevant Environmental Factors
	Comp-onent	Characteristic		
Marine water and sediment quality	Port	Potential for contamination of marine waters and sediments from concentrate handling at the wharf and outloading to ships.	**DEP:** The mineral handling facilities at the Geraldton Port have been observed to cause spillage of materials during ship loading. The mineral products are spilled from conveyors and transport chutes onto the wharf, into the marine environment or onto the ships surfaces. Although material spilled on to the wharf is collected during loading, other spilled materials can end up in the marine environment. Stormwater drainage in the vicinity of the minerals handling area will also contribute to loss of mineral concentrate to the marine environment following rainfall. As the minerals loading facility at the Geraldton Port is a shared facility it is used for various mineral products. The loading equipment is washed down following loading operations. The wash water from this practice also results in some loss of material to the marine environment. Magellan Metals proposed EMP should identify all possible pathways for lead concentrate to enter the waters of the Geraldton Port and set out procedures for use of equipment to minimise these losses. The present loading and transfer facilities may require modification to ensure these losses to the marine environment are minimised. The Department is aware of water quality monitoring being undertaken by the Geraldton Port Authority. This program has not yet included	**Considered to be a relevant environmental factor and is discussed under the issue of management of lead at the Geraldton Port.**

Preliminary Environmental factor	Proposal		Government Agency and Public Comments	Identification of Relevant Environmental Factors
	Comp-onent	Characteristic		
			sediment sampling. Water quality within the Geraldton Port is becoming an issue of high public interest due to the value of live lobster storage facilities adjacent to the port, and the establishment of aquaculture within these waters. The DEP Mid West Region Office is currently negotiating with port users, the fishing industry, Local and State Government Authorities, and the community to develop a cooperative marine water quality monitoring programme for the Geraldton area, including the Geraldton Port.	
SOCIAL SURROUNDINGS				
Public health and safety (risk and hazard)	Mine	Open pits, the waste rock dump, TSF and mining infrastructure pose some threat to public safety during the operation and following decommissioning of the mine.	No comments received.	Aspects of public health and safety relating to lead are discussed under the issue management of lead at the minesite. Public safety relating to management of mining areas with respect to public health and safety is managed under the requirements of the Mining Act and the Mines Safety and Inspection Act **Factor does not require further EPA evaluation**.
	Transp-ort route	Transport of lead concentrate along public highways may cause elevated levels of lead along the transport route. A survey of existing lead levels along the transport route (highway) indicated background lead levels in the range of 3-33	**Public:** What contingency plan has been developed to control any spillage should there be a vehicle accident?	Lead concentrate is transported in fully enclosed kibbles. Background lead levels are known. In the unlikely event of spillage cleanup can occur to bring areas back to these levels. The HHMP prepared by the proponent will include emergency response and safety procedures. These procedures will include isolation of spilled

Preliminary Environmental factor	Proposal		Government Agency and Public Comments	Identification of Relevant Environmental Factors
	Comp-onent	Characteristic		
		ppm Pb. Potential for spillage of lead concentrates in the event of an accident.		concentrate and collection for reprocessing at the minesite. In the event of an accident the heavy nature of the lead concentrate would ensure that material would not disperse over a large area and could be easily recovered. Samples of concentrates will be evaluated to establish its Dangerous Goods category and the requisite handling procedures and precautions. This process is administered by the DME. **Factor does not require further EPA evaluation.**
	Port	Ensure that public safety is not compromised.	No comments received	Aspects of storage and transfer of lead concentrate are discussed under the issue of management of lead at the Geraldton Port. The port area and surrounds are managed by the Geraldton Port Authority so as to prevent unauthorised public access. **Factor does not require further EPA evaluation.**
Social	Road transpo rtation	Proposal will result in an increase in road trains along the transport route and into the port via Geraldton.	**Public** The proposal will result in up to 5 road trains per day (a further 23 road trains per week). Who will control, manage and ensure licensed vehicles transporting concentrate to Geraldton will comply with toxic cartage requirements? What are the licence conditions that will apply to these vehicles? Have (or will) cartage licence conditions set curfew times to avoid cartage at peak traffic periods in Geraldton (8:00 am to 9:30 am and 3:00 pm to 5:30 pm)?	An increase of 5 road trains per day is not considered to be a significant increase in the existing volume of traffic servicing the port. The Department of Transport issues a permit to the haulage contractor and this can contain conditions applying to transport of the concentrate. **Factor does not require further EPA evaluation.**

Preliminary Environmental factor	Proposal		Government Agency and Public Comments	Identification of Relevant Environmental Factors
	Comp-onent	Characteristic		
Aboriginal culture and heritage	Mine	No ethnographic or archaeological sites of Aboriginal significance identified from surveys.	**AAD:** The proponent appears to have adequately addressed all Aboriginal heritage and cultural issues. The proponent is requested to send copies of reports to the Aboriginal Affairs Department (AAD).	The EPA notes that the AAD is satisfied that the proponent has adequately addressed Aboriginal heritage and cultural issues. The proponent has advised that copies of the reports have been forwarded to the AAD. **Factor does not require further EPA evaluation.**
European heritage	Mine	Field surveys conducted to identify sites of European heritage.	No comments received.	No sites of European heritage identified from field surveys **Factor does not require further EPA evaluation.**

DME Department of Minerals and Energy

Health WA The Health Department of Western Australia

WRC The water and Rivers Commission

Appendix 4

Recommended Environmental Conditions and

Proponents Consolidated Commitments

Recommended Environmental Conditions

Statement No.

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

MAGELLAN LEAD CARBONATE PROJECT-WILUNA

Proposal: The proposal includes development of an open-cut lead carbonate mine and processing facilities 30 km west of the Wiluna townsite. A waste rock dump and tailings storage facility will be built adjacent to the mine.

Lead concentrate produced at the mine is suitable for further refining to lead metal or for road transport to the Geraldton Port where it would be exported. A gas fired power station and accommodation camp will be constructed to service the minesite. The mining operations will be supplied from a borefield southeast of the mine. The key characteristics of the proposal and figures showing the general arrangement of the minesite and monitoring sites are included in schedule 1 of this statement.

Proponent: Magellan Metals Pty Ltd

Proponent Address: Level 1,161 Great Eastern Highway
Belmont WA 6104

Assessment Number: 1262

Report of the Environmental Protection Authority: Bulletin 996

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

Procedures

1 Implementation

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

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

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

2 Proponent Commitments

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

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

3 Proponent

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

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

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

4 Commencement

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

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

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

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

5 Compliance Auditing

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

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

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

Environmental Conditions

6 Health, Hygiene and Environmental Management Program

6-1 Prior to the commencement of ground-disturbing activities, the proponent shall prepare a Health, Hygiene and Environmental Management Program to the requirements of the Environmental Protection Authority on advice from the Department of Environmental Protection and the Department of Minerals and Energy.

This program shall:

1. document standards and guidelines relating to the management of lead;
2. detail the education and training of the workforce so as to minimise exposure of personnel and identify areas of risk for lead exposure;
3. detail rules and procedures to be applied in mining, processing and storage areas at the Wiluna minesite to minimise disturbance of lead and ensure lead uptake is minimised;
4. detail the process that will be applied to ensure ongoing assessment of the risk of lead contamination including monitoring, evaluation of health risks and determining control measures;
5. address the review of existing storage and shiploading facilities at the Geraldton Port that is to be conducted by the proponent prior to the existing facilities being used for lead concentrates. It is to include a review of equipment, procedures and monitoring programs to identify potential pathways for lead to enter the environment, and if appropriate additional equipment, management or revised procedures are to be determined;
6. address emergency response procedures to respond to spillage of lead concentrate along the transport route or at the Geraldton Port; and
7. address monitoring of fixed soil sampling, dust deposition and air quality sampling sites.

6-2 The proponent shall implement the Health, Hygiene and Environmental Management Program required by condition 6-1 until such time as the Minister for the Environment, on advice from the Environmental Protection Authority, determines that decommissioning and rehabilitation are complete.

6-3 The proponent shall make the Health, Hygiene and Environmental Management Program required by condition 6-1 publicly available, to the requirements of the Environmental Protection Authority.

7 Decommissioning and Rehabilitation Plan

7-1 Prior to the commencement of productive mining, the proponent shall prepare a Decommissioning and Rehabilitation Plan to the requirements of the Environmental Protection Authority on advice of the Department of Environmental Protection, the Department of Minerals and Energy and the Water and Rivers Commission.

The objectives of this plan are:

- to render the minesite areas safe and stable; and
- to encourage the re-establishment of self-sustaining ecosystems.

This plan shall address:

1. removal or, if appropriate, retention of plant and infrastructure;
2. intended final land use;
3. landform design criteria for the mining pit, tailings storage facilities and waste rock dumps;
4. proposed scheduling arrangements to ensure sufficient barren material remains at the end of mining to rehabilitate tailings storage facilities and the waste rock dump;
5. recovery of rehabilitation resource materials such as topsoils;
6. a planning and recording mechanism to identify potential contaminated sites requiring future remedial action such as fuel storage areas, tailings dams, former ore storage areas, hardstands and landfills;
7. rehabilitation procedures;
8. development of site-specific criteria for lead contamination soils;
9. rehabilitation performance criteria including demonstrating compliance with appropriate standards for lead contamination, soil stability and ecosystem establishment;
10. proposed monitoring program to demonstrate compliance with rehabilitation performance criteria; and.
11. two years prior to the completion of mining, conduct a comprehensive review of the matters referred to in items 1-10 to determine if any additional planning, management measures or monitoring is required to ensure the objectives of this plan are met.

7-2 The proponent shall implement the Decommissioning and Rehabilitation Plan required by condition 7-1 until such time as the Minister for the Environment, on advice from the Department of Environmental Protection, determines that decommissioning and rehabilitation are complete.

8 Subterranean Fauna (Stygofauna) Sampling Plan

8-1 Prior to the commencement of productive abstraction of groundwater, the proponent shall prepare a Stygofauna Sampling Plan to the requirements of the Environmental Protection Authority on advice of the Department of Environmental Protection, the Museum of Western Australia and the Water and Rivers Commission.

The objective of this plan is to increase scientific knowledge about subterranean fauna to assist in conservation of this element of the environment.

This plan shall address:

1. subterranean fauna surveys of the areas to be affected by dewatering operations to assist in establishing the conservation significance of any species within the affected areas;
2. an appropriate groundwater monitoring program to ensure that groundwater drawdown is monitored and related to rainfall and climatic data so as to determine if groundwater drawdown is being managed within the expected seasonal fluctuations of the aquifer;
3. repeat subterranean fauna sampling of the aquifer to monitor the effects of groundwater abstraction; and
4. specific measures to record and preserve biological information on any species collected in the project area.

8-2 The proponent shall implement the Subterranean Fauna Sampling Plan required by condition 8-1.

8-3 The proponent shall make the Subterranean Fauna Sampling Plan required by condition 8-1 publicly available, to the requirements of the Environmental Protection Authority.

8-4 The results from the Subterranean Fauna Sampling Plan required by condition 8-1 shall be submitted to the Environmental Protection Authority and the Western Australian Museum.

8-5 Should the Environmental Protection Authority consider, based on the results of the Subterranean Fauna Sampling Plan required by condition 8-1 that, its objective would be compromised, then the proponent shall develop an action plan to the requirements and timing of the Environmental Protection Authority.

Note

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

Schedule 1

The Proposal

The development of an open-cut mine, waste rock dump, tailings storage facilities associated infrastructure, and processing facilities approximately 30 km west of Wiluna. Lead concentrates produced at the mine will be refined to lead metal at the Wiluna minesite or alternatively the concentrates will be transported by road to the Geraldton Port and exported. A gas fired power station and accommodation camp will be constructed to service the minesite. The mining operations will be supplied with water from a borefield southeast of the mine The general arrangement of the mine and process facilities and monitoring sites are documented in Figures 1 and 2 and 3 (attached).

Key Characteristics Table

Element	Quantities/Description
Mine	
Life of project (mine production)	Approximately 10 years
Mine operation	Continuous operation
Size of ore body	Approximately 8.2 million tonnes
Depth of Mine Pit	Approximately 50 metres
Area of disturbance (including access)	Approximately 320 hectares
List of major components • open pit • waste dumps • infrastructure (plant site water supply, roads, accommodation camp, etc) • tailings storage facilities Total	 55 hectares 138 hectares 57 hectares 70 hectares 320 hectares
Accommodation camp	80 person
Tailings storage facility (2 cells)	Combined total capacity of 4 million tonnes
Ore mining rate • maximum	1 million tonnes per year
Solid waste materials • maximum	2.4 million tonnes per year
Water supply • source • maximum hourly requirement • maximum annual requirement	Calcrete and chert aquifers southeast of the minesite 170 kilolitres per hour 1.5 million kilolitres per annum
Lead concentrate transport	Road train in fully enclosed kibbles
Power generation	Natural gas - 139 terra joules /annum

Fuel storage • capacity • quantity used	50 kilolitres of storage 1.8 million litres per year (approximately)

Note : The refinery is not part of the proposal. The level of assessment for the refinery was set at not assessed managed under Part V of the Environmental Protection Act.

Figure 1. General arrangment of the Magellan Lead Project.

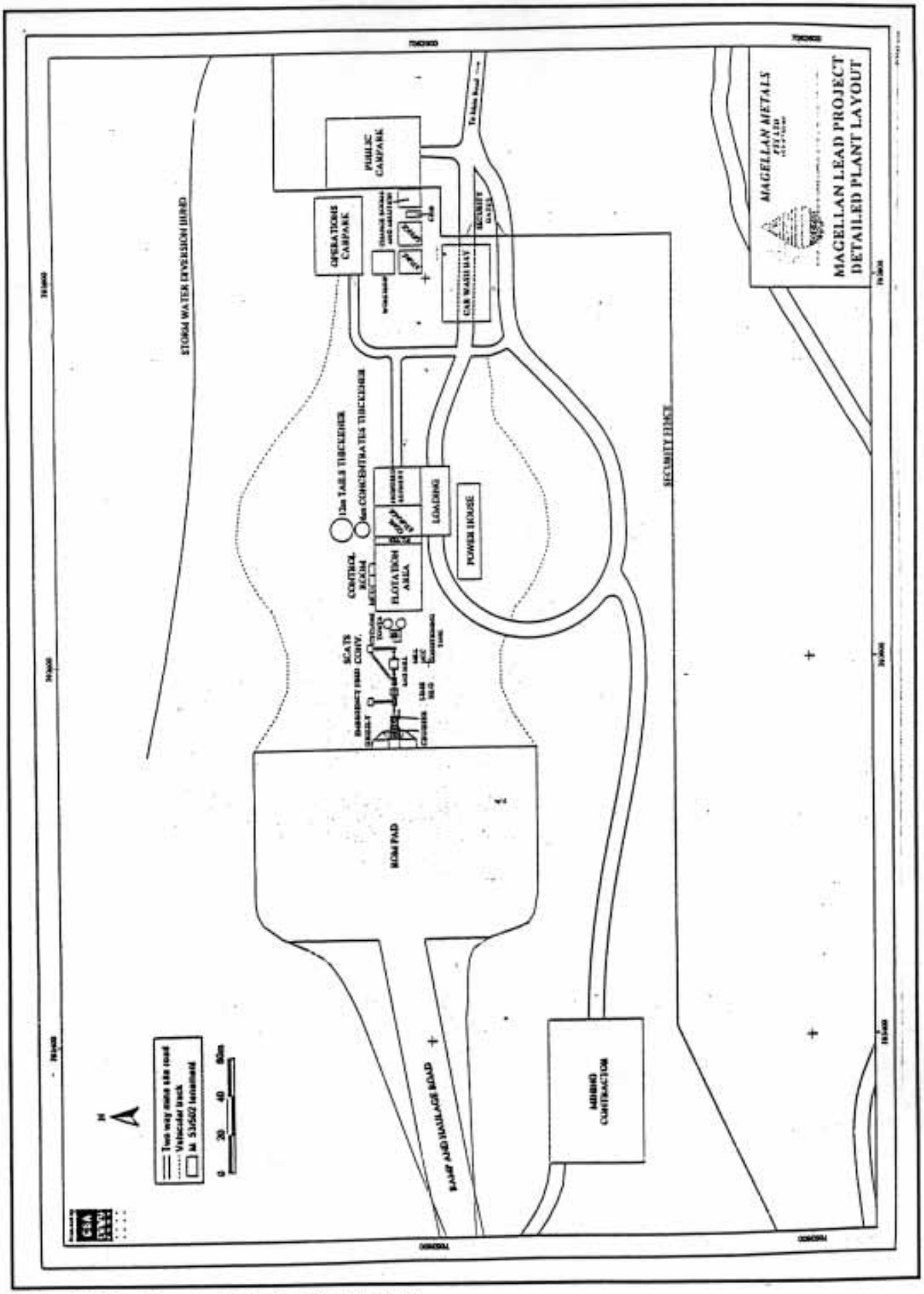

Figure 2. Magellan Lead Project Plant Layout.

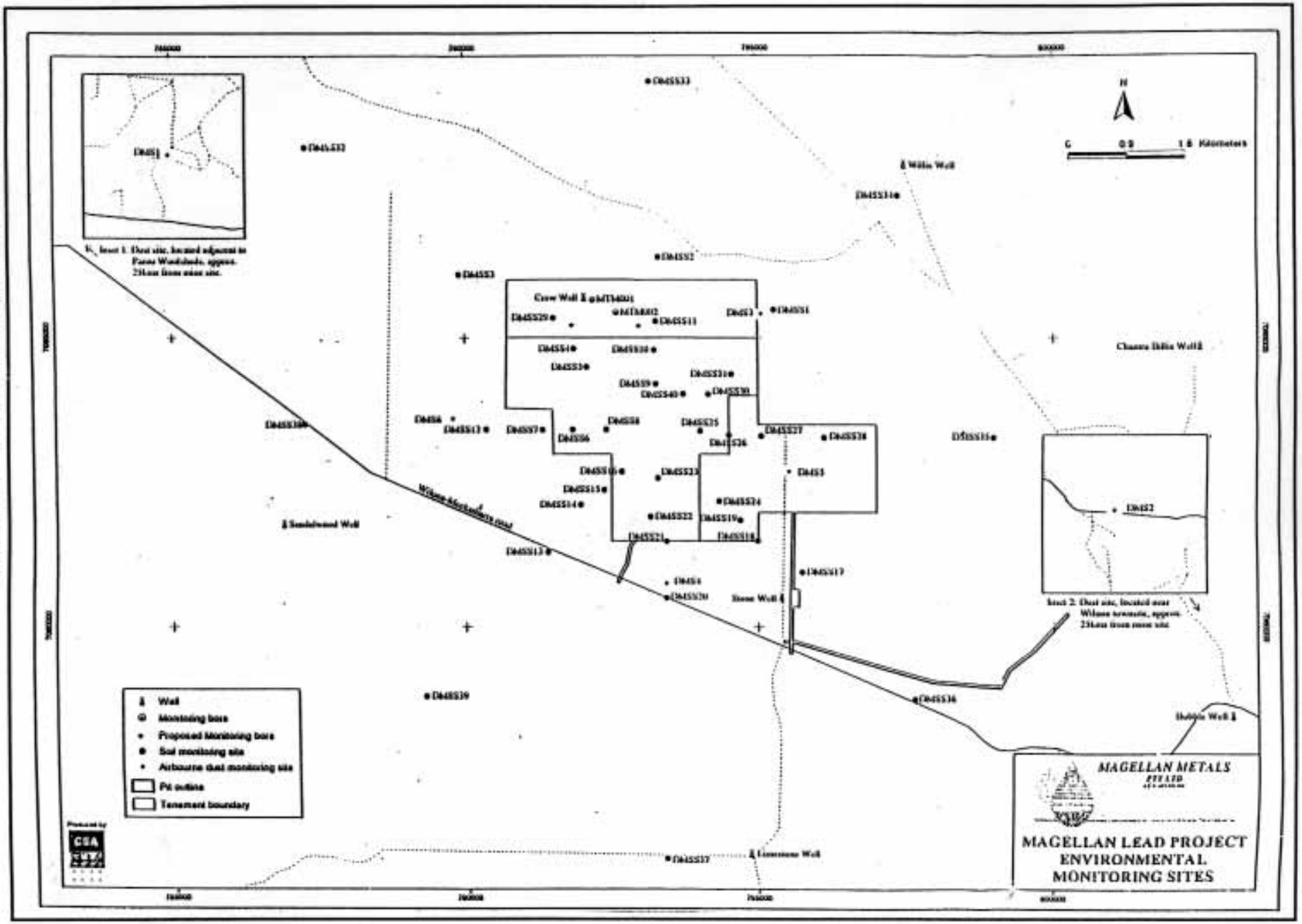

Figure 3. Monitoring and Sampling Sites, Magellan Lead Project.

Schedule 2: Proponent's Environmental Management Commitments – Magellan Lead Project

No.	Topic	Action	Objective	Timing	Advice to whom
1.	Environmental Management System	Prepare an Environmental Management System that includes the following elements: 1. An environmental policy and corporate commitment to it; 2. Mechanisms and processes to ensure; (1) planning to meet environmental requirements (2) implementation and operation of action to meet environmental requirements (3) measurement and evaluation of environmental performance; and 3. Review and improvement of environmental outcomes.	To manage the environmental impacts of the project and fulfil the requirements of statutory and other identified obligations.	Prior to the commencement of construction activities.	DME, WRC, and Healh WA
2.	Environmental Management System	Implement the Environmental Management System described in 1. Above.	As for 1 above.	Ongoing through the life of the operations until the site is deemed rehabilitated.	DME, WRC and, Health WA

No.	Topic	Action	Objective	Timing	Advice to whom
3.	Surface water drainage	Prepare a surface water and drainage management plan for the minesite that: 1. Identifies surface contours and drainage. 2. Identifies diversion drains and sumps to contain runoff and divert drainage into the pit. 3. Describes measures to monitor the effectiveness of the plan and take corrective action if required.	To maintain or improve the quality of surface water run-off to ensure that existing and potential uses including ecosystem maintenance, are protected.	Before the commencement of ground disturbing activities.	DME and WRC
4.	Surface water drainage	Implement the surface water and drainage management plan described in 3. above.	As for 3 above.	Ongoing throughout the life of the mining operations.	
5.	The waste rock dump and tailings storage facility will be reshaped to enable rehabilitation.	Prepare a contour plan consistent with the guidelines issued by the DME.	To ensure that the structures are stable, safe and erosion-free on closure of the site.	Before the commencement of construction of the waste rock dump and tailings storage facility.	DME

No.	Topic	Action	Objective	Timing	Advice to whom
6.	Revegetation trials on the waste rock dump and tailings storage facility.	Prepare a scope of works for revegetation trials that; 1. Describes the objectives of the proposed trial. 2. Outlines monitoring. 3. Outlines the timeframe for reporting of results. 4. Identifies mechanisms to consider and implement the recommendations at the conclusion of the trials.	To identify suitable techniques and plant species for site rehabilitation and revegetation.	Within two years of commencement of mining operations.	DME.
7.	Revegetation trials on the waste rock dump and tailings storage facility.	Implement revegetation trials described in 6. above	As for 6 above.	Ongoing until the trials are concluded and the recommendations implemented	DME
8.	Waste and recycling program.	Prepare a waste and recycling program that: 1. Includes a procedure for identifying wastes that are suitable for recycling or reuse. 2. Identifies designated areas for the storage of recyclables 3. designates materials that should be disposed to landfill. 4. Includes the proponent's commitment to participate in the "Ruggies" recycling program	To develop waste reduction practices and encourage re-use resources	Before commencement of construction.	DME.

No.	Topic	Action	Objective	Timing	Advice to whom
9.	Waste and recycling program	Implement the waste and recycling program described in 8 above.	As for 8 above.	Throughout the life of the mining operations until it is deemed rehabilitated.	DME
10.	Control of access	The active operations area will be fenced including a firebreak. It will be constructed around the minesite, plant, waste rock dump and Tailings storage facility.	To restrict third party and large animal access to the working parts of the operation.	Prior to commencement of operations.	DME, and Pastoral lease holders.
11.	Vegetation monitoring for lead uptake	Prepare a scope of works for the sampling program that describes; 1. Vegetation sampling and analysis; 2. Timing of sampling program; 3. Reporting and assessment of results.	To identify inadvertent uptake by plants during operations and to monitor rehabilitation success.	After commencement of operations.	DME, Health WA.
12.	Vegetation monitoring for lead uptake	Implement the sampling program described in 10 above	As for 11 above.	Ongoing until the minesite is deemed satisfactorily rehabilitated.	DME
13.	Dust and particulate sampling at the Geraldton Port	Prepare a sampling program to monitor dust produced during transfer of mineral products from storage areas via loading facilities to ships. The plan shall include: 1. The locations of sampling. 2. Sampling methods and analysis. 3. Reporting of results.	To determine if existing facilities at the Geraldton port are creating dust and particulates.	Prior to using storage areas or ship loading facilities of the Geraldton Port for lead concentrates.	DME

No.	Topic	Action	Objective	Timing	Advice to whom
14.	Dust and particulate sampling at the Geraldton Port	Implement the dust and particulate sampling plan described in 12 above.	As for 13 above	After commencement of operations.	DME, Health WA.
15.	Tailings storage facility	Prepare a tailings storage facility operating manual. The manual shall detail operating procedures, emergency response plans and monitoring.	To ensure the safe management of the tailings storage facility.	Prior to the commencement of tailings disposal to the facility	DME, WRC
16.	Tailings storage facility	Implement the tailings storage facility operating manual described in 15 above.	As for 15 above	Over the life of the tailings facility	DME, WRC

Appendix 5

Summary of Submissions and

Proponent's Response to Submissions

Mr Trevor Watters
Feasibility Manager
Magellan Metals Pty Ltd
Level 1, 161 Great Eastern Hwy
BELMONT WA 6104

Your Ref
Our Ref 96/99
Enquiries Mark Jefferies

Dear Mr Watters

MAGELLAN LEAD PROJECT-CONSULTATIVE ENVIRONMENTAL REVIEW, SUMMARY OF PUBLIC AND GOVERNMENT SUBMISSIONS

Further to previous discussions on answers to questions raised during the public submission period, please find attached a list of questions and comments for your response, summarised from 6 public submissions received.

The Department of Environmental Protection (DEP), in seeking your response to the attached summary of issues, does not necessarily endorse the issues raised. These have been summarised in good faith to enable you to become aware of these points, to respond to them as you see fit and, to modify your proposal or its environmental management accordingly.

A copy of the summary and your responses will be included with the Environmental Protection Authority's (EPA's) assessment report. The Authority will, if necessary, include specific comments on issues with potential environmental impacts, which are not adequately covered by your response.

Under the Environmental Protection Act 1986, the Authority's report is subject to a 14-day appeal period. During this period the public may appeal the Authority's Report and Recommendations. An incomplete answer to any of the attached questions, comments, and/or issues could cause the public to appeal and this would delay the setting of Ministerial conditions. Accordingly, please ensure that you give a full and reasoned answer to each item.

The general issues of concern in the submissions include:

- the transport of concentrate through the local communities and the impacts of increased numbers of trucks;
- the storage and transfer of lead concentrate at the Geraldton Port and concerns that the existing facilities and procedures may not be adequate to ensure that lead does not enter the marine environment;
- Magellan Metals obligation to participate in establishment of marine water quality guidelines for the Geraldton area, in particular, for the Geraldton Port;
- the impact that groundwater abstraction may have on regional groundwater aquifers; and
- the subsequent impact that ground water abstraction from these aquifers may have on Stygofauna whose species diversity and abundance have yet to be established.

The Authority looks forward to an early response so that it can finalise its assessment.

Should you have any queries about the attached questions, please contact Mark Jefferies on 9222 7141.

K J TAYLOR
DIRECTOR
EVALUATION DIVISION

12 November 1999

MAGELLAN LEAD PROJECT
(ASSESSMENT NO 1262)
WILUNA WESTERN AUSTRALIA
MAGELLAN METALS PTY LTD
SUMMARY OF SUBMISSIONS FOR RESPONSE

The public and government agency submissions have been summarised under the following series of headings.

1.0 GENERAL COMMENTS

1.1 There are concerns with any proposal, which has potential to adversely impact on the health, safety and or lifestyle of residents. In particular, this proposal could impact residents along the transport route, the port and loadout facilities, the marine environment and general air quality.

What processes will Magellan Metals Pty Ltd (Magellan Metals) utilise to ensure that there are no adverse impacts, and should any be identified after the proposal is implemented, how will any future concerns of the community be addressed?

1.2 The MidWest Development Commission confirms that they were consulted during the planning stages of this project and that they accompanied Magellan Metals during that part of the programme that covered consultation with the Local Government Authorities.

1.3 The document, on page 72, refers to the Mid-West Development Authority. Please ensure that future documentation refers to the Mid West Development Commission.

1.4 The Mid West Development commission encourages Magellan Metals to secure a proportion of their goods and services from the Mid West region rather than from Perth and /or Kalgoorlie as indicated in the document. Can Magellan Metals confirm if it is their intention to secure goods and services from the Mid West region?

2.0 BIOPHYSICAL

2.1 Subterranean Fauna (Stygofauna)

The region between Paroo and Lake Way contains a diverse and regionally distinct series of groundwater faunas (Stygofauna). The calcrete to the west of the project area, near Paroo, and that in the Lakeway and Lake Violet areas support distinct stygofaunas but the boundary between them is unknown. The project may impact on Stygofauna especially through groundwater contamination by heavy metals and by the utilisation of groundwater for mining operations. It is noted that a programme of lead monitoring in the water has been proposed. Stygofauna may be a suitable as an indicator of lead bioaccumulation.

The sites proposed for ground water abstraction have not been identified. Neither have groundwater monitoring procedures (to determine the presence of Stygofauna) been proposed. It is therefore difficult to determine the specific identity of Stygofauna and hence the potential impact on biodiversity. Answers to the following questions are sought.

2.1.1 Can Magellan Metals identify the prospective sites proposed for groundwater abstraction?

2.1.2 Is Magellan Metals intending to undertake a sampling programme for Stygofauna in the areas proposed for groundwater abstraction to enable an assessment of the impacts on biodiversity and ensure that informed decisions are made on the appropriate site for groundwater abstraction?

2.1.3 What are the sampling procedures proposed?

2.1.4 Will the company ensure that any monitoring wells are also designed to enable Stygofauna sampling to occur?

2.1.5 Is Magellan Metals proposing to use Stygofauna as an indicator of lead bioaccumulation?

3.0 POLLUTION MANAGEMENT

3.1 Particulates/Dust

3.1.1 Magellan Metals give a commitment to implement a dust control plan and to undertake air quality monitoring at the mine site with the objective of complying with the National Environmental Pollution Measure Ambient Air Quality Standards. Who will this information be reported to and what actions would be taken should there be exceedances?

3.1.2 The CER states that the mineral concentrate is a moist filter cake and will not easily be moved as a particulate. Other concentrates handled at the Geraldton Port have been observed to produce dust when strong prevailing summer winds mobilise small deposits of spillage beneath the conveyors. The Geraldton Port is located in close proximity to areas of public use and the local fishing industry and small boat harbour. Some dust monitoring at the port during loading operations should be undertaken to confirm the immobility of the product. Have Magellan metals committed to undertaking baseline and ongoing monitoring of dust at the Geraldton Port?

3.1.3 Lead carbonate concentrate, with initial moisture content of 8% will be transported in covered kibbles from the minesite to the port. The 670 km journey by road, particularly in summer, may result in a decrease in the 8% moisture content. Unloading of kibbles at a reduced moisture content may generate dust. Is Magellan Metals confident that the 8% moisture content will be maintained for the duration of the time taken to transport the product from the minesite to the port? What action will Magellan Metals instigate if it is found that the moisture content falls below the 8% threshold?

3.2 Land contamination and Marine (Port) Water Quality

The mineral handling facilities at the Geraldton Port have been observed to cause significant spillage of materials during ship loading. The mineral products are spilled from conveyors and transport chutes onto the wharf, into the marine environment or onto the ships surfaces. Although material spilled on to the wharf is collected during loading, other spilled materials can end up in the marine environment.

Stormwater drainage in the vicinity of the minerals handling area will also contribute to loss of mineral concentrate to the marine environment following rainfall.

As the minerals loading facility at the Geraldton Port is a shared facility and is used for various mineral products. The loading equipment is washed down following loading operations. The wash water from this practice also results in some loss of material to the marine environment.

3.2.1 Magellan Metals proposed EMP should identify all possible pathways for lead concentrate to enter the waters of the Geraldton Port and set out procedures for use of equipment to minimise these losses. Will this information be included in the EMP?

3.2.2 The present loading and transfer facilities may require modification to ensure these losses to the marine environment are minimised.

Who will have responsibility to ensure that any modifications to plant and equipment to reduce the loss to the marine environment are carried out?

3.2.3 Magellan Metals states that a water and sediment sampling programme is being undertaken in conjunction with Normandy Mining at the Geraldton port.

The DEP Mid West Region Office has advised that Normandy Mining, who export zinc concentrate, have indicated that they are investigating a suitable sampling programme to identify any contamination resulting from their export activities. However at this time the Department is not aware of any sampling being undertaken to date by Normandy.

The Department is aware of water quality monitoring being undertaken by the Geraldton Port Authority. This programme has not yet included sediment sampling.

Can Magellan Metals confirm if sediment sampling has occurred, and if so, will the results be made available? If a combined Magellan Metals/Normandy Mining programme of sampling cannot be organised, will Magellan Metals undertake its own sediment sampling programme to provide baseline data?

3.2.4 Water quality within the Geraldton Port is becoming an issue of high public interest due to the value of live lobster storage facilities adjacent to the port , and the establishment of aquaculture within these waters.

The DEP MidWest Region are currently negotiating with port users, the fishing industry, Local and State Government Authorities, and the community to develop a cooperative marine water quality monitoring programme for the Geraldton area, including the Geraldton Port.

Is Magellan metals aware of this initiative and are they prepared to be an active participant in the development of these guidelines? These guidelines could be included in Magellan Metals EMP.

4.0 SOCIAL SURROUNDINGS

4.1 Public Health and Safety

4.1.1 It is noted that proposed management procedures will comply with the National Code of Practice for the Control and Safe Use of Inorganic Lead at Work. This will ensure good working practices that will have positive impacts on public health.

4.1.2 With regard to supply of drinking water, all fitments/fittings shall be AS 4020 compliant and all drinking water shall comply with the Guidelines for Drinking Water in Australia. Is Magellan Metals aware of the requirements of AS 4020 and the guidelines?

4.1.3 It is a requirement that all water sampling results are forwarded to the Health Department of Western Australia as they become available. Has Magellan Metals committed to forwarding water sampling results to the Health Department of Western Australia?

4.1.4 Final approval of wastewater management will be subject to detailed specifications being lodged with the Executive Director Public Health, via the Shire of Wiluna. It is noted that septic tanks with evaporative ponds are proposed for the village. These will need to comply with the health (treatment of Sewage and Disposal of effluent and Liquid Waste) Regulations 1974. Care will need to be taken with the design of the effluent disposal system due to poor soil conditions. The CER notes that sewage management will be in accord with the requirements of the Shire of Wiluna. Is Magellan Metals aware that it is their responsibility and, not the Local Government Authority's, to ensure that adequate specifications, calculations and plan details are submitted for the wastewater treatment lagoons and leach drains?

4.1.5 No effluent re-use has been proposed for the rehabilitation, dust control or plant crusher process. Is this intended in the future? If so, an application to the Executive Director Public Health would be required.

4.2 Road Transportation

4.2.2 It is noted that the proposal will result in a further 23 road trains per week.

4.2.3 Who will control, manage and ensure licensed vehicles transporting concentrate to Geraldton will comply with toxic cartage requirements?

4.2.4 What are the licence conditions that will apply to these vehicles?

4.2.5 Have (or will) cartage licence conditions set curfew times to avoid cartage at peak traffic periods in Geraldton (8:00 am to 9:50 am and 3:00 pm to 5:30 pm)?

4.2.6 What contingency plan has been developed to control any spillage should there be a vehicle accident?

4.3 Aboriginal Heritage and Culture

4.3.1 Magellan Metals appears to have adequately addressed all Aboriginal heritage and cultural issues. Please forward a copy of the reports regarding the above area to the Aboriginal Affairs Department for assessment and inclusion in the Department's library.

November 24, 1999

Mr M Jefferies
Director
Evaluation Division
Department of Environmental Protection
P O Box K822
PERTH WA 6842

ASSESSMENT NUMBER 1262
RESPONSE TO THE SUMMARY OF PUBLIC SUBMISSIONS ON THE MAGELLAN CER

1.0 GENERAL

1.1 Magellan metals accepts that there can be "no" adverse impacts from this or any other mining development. However, Magellan will have monitoring systems in place and emergency response systems to identify any adverse impacts.

The monitoring systems and emergency response systems will be detailed in the Environmental Management Plan (EMP) to be submitted prior to commencement of construction.

During the preparation of the CER and the development feasibility for the project, an extensive consultation program was undertaken with regional and local bodies. This program is to continue through regular up-date meetings with relevant organisations and distribution of the Magellan newsletter to those on the mailing list (200 persons or groups to date).

This consultation system will enable the public to provide feedback on any concerns that they may require Magellan to take appropriate action to alleviate those concerns.

1.2 No response required.
1.3 Agreed.
1.4 Magellan Metals confirms that it will purchase in the Mid West region as many goods and services as possible that are economically attractive.

2.0 BIOPHYSICAL

2.1 *Stygofauana*

The testwork undertaken by Graeme Campbell and Associates indicates that mobile lead precipitates in the soil and will not reach any aquifer. Baseline analyses of groundwater show that lead levels are less than analytical detection limits.

2.1.1 The potential sites were identified in the CER on Figure 2 which indicated the Miscellaneous Licences (Water) from which project water would be abstracted (L53/106-107). The licence applications are expected to be granted in the near future.

On-going planning for the project indicates that potable water will be derived from a reverse osmosis plant with raw water supplied by a bore accessing the shallower calcrete (Negri-Paroo) groundwaters.

The process water will also be abstracted from the Proterozoic aquifer (MWP 2) and this aquifer is separate from the shallower, near-surface calcrete aquifer.

Other stand-by production bores (MWP 1) are located in the Negri-Paroo calcrete system. At Wiluna, this system has been abstracted at maximum pumping rates at the Wiluna Mines and there have been no hydrological changes.

No production bores at Magellan will be less than one kilometre apart.

2.1.2 As recorded as a commitment in the CER, Magellan will undertake the baseline stygofauana survey at the completion of the project feasibility study. This stygofauana study will be undertaken following Magellan Board concurrence to proceed with the project.

2.1.3 Bores will be sampled using a bailer and a sieve with collected samples identified by a competent zoologist. Initially, the sampling will be undertaken by a consultant and during operations, by the site Environmental Officer.

2.1.4 All bores in the calcrete Negri-Paroo system will be constructed to enable access for sampling.

2.1.5 This aspect will be discussed more fully with staff from the WA Museum and the WA Chemistry Centre. Dissolved lead reacts with carbonate bearing soils and sub-strata (hence lead carbonate) and initial water sampling from the bores indicate that lead is below detection limits in the bores.

3.0 POLLUTION MANAGEMENT

3.1 Particulates/Dust

3.1.1 Magellan's commitment relates to occupational health and safety of the workforce and consequently, control of any exceedance would have an environmental benefit. The information will be reported to the Department of Minerals & Energy (DME) and the WA Health Department.

If the levels are exceeded, action will be taken to identify the source of the excessive dust generation and remove or reduce that source. The response may involve simple actions such as increased water spraying or the use of soil binders.

3.1.2 Magellan believes that the moisture level in the concentrate will be maintained even during storage and ship loading. However, Magellan will commit to undertaking dust monitoring during any ship loading of concentrates.

3.1.3 Magellan is confident that the moisture level will be maintained (additional testwork has shown that the moisture content will be 12% not 8%). Unloading of the kibbles will occur in an enclosed area. In the unlikely event that dust generation does occur, Magellan will install a spray system to wet the concentrate while unloading.

3.2 Land Contamination and Marine (Port) Water Quality

Magellan Metals is committed to the actions detailed below, however, in the event that market forces dictate that only lead metal is exported from Geraldton, these commitment become redundant.

3.2.1 The EMP will include procedures for equipment usage to minimise concentrate losses at the port.

3.2.2 Any modifications of the loading and transfer equipment will, firstly, be discussed with Geraldton Port Authority and Normandy Mining to gain their concurrence.

3.2.3 At the time of lodging of the CER, negotiations were being undertaken with Normandy with a view to progressing the sediment and water sampling with the program commencing while the CER was under public review. However, during the period of public review, negotiations were halted when it was believed that a significant portion of the concentrate to be exported from the port would be replaced with lead metal blocks.

Magellan Metals will recommence negotiations with Normandy with a view to sharing of information once the program for export of concentrate is finalised.

It would be inappropriate for Magellan Metals to undertake its own sediment sampling program when another mining operator is exporting a similar base metal product from the port. The sediment sampling program should be a joint effort.

3.2.4 Magellan is not aware of the initiative but would want to be an active participant in the process if concentrate is to be exported. When guidelines are available they will be included in the EMP.

4.0 SOCIAL SURROUNDINGS

4.1 Public Health and Safety

4.1.1 No response required.

4.1.2 Magellan is aware of the requirements of Australian Standard 4020 and the "Guidelines for Drinking Water of Australia".

4.1.3 Magellan made a commitment (Section 5.5.3) to sample drinking water each month from a range of locations around the site. These samples will be collected according to procedures set down in the EMP. A commercial laboratory will undertake analyses. Any adverse findings will be followed-up by additional sampling and appropriate action to identify and remove any sources of contamination.

4.1.4 Magellan is aware of their responsibility regarding the design and construction of waste water treatment facilities and will comply.

4.1.5 No effluent re-use is proposed for this site.

4.2 Road Transportation

4.2.1 If the volume of lead carbonate concentrate to be exported is reduced due to production and export of lead metal, then there will be a proportionate reduction in the number of road trains each week.

4.2.2 The Department of Transport (DOT) has advised that it issues a "Permit to Haul" to the haulage contractor and this may contain conditions for operating. The permit and conditions are between the DOT and the haulage contractor and while Magellan is not directly responsible, the contractor will need to satisfy Magellan management that he complies with relevant legislation.

4.2.3 See 4.2.2 above.

4.2.4 See 4.2.2 above. The contract for haulage of concentrate has not been awarded at this time so a permit and associated conditions have not been issued.

4.2.5 As stated in the CER, the EMP will include emergency response and safety procedures. These procedures will include isolation of spilled concentrate, collection and removal of concentrate for reprocessing at the mine site, and rehabilitation of the spill site.

4.3 Aboriginal Heritage and Culture

4.3.1 Copies of the reports have been forwarded to the Aboriginal Affairs Department for their retention. Receipt has been acknowledged, and no further information has been requested.

5.0 GROUNDWATER

5.1 The monitoring bores to be used at the tailings storage facility are shown on Figure 20 of the CER. The frequency of sampling and suite of analytes will be set by conditions on the DEP Licence following discussion with Magellan.

5.2 Magellan is aware of the requirements of the AS 5667 and holds a copy.

5.3 Magellan knows of no other site in WA where a Sampling and Analysis Plan (SAP) is required. As the frequency and analytes are set by the DEP, this matter should be discussed with the DEP. Similarly, the frequency of sampling and analysis suite for abstraction will be set by the WRC licence conditions.

5.4 The matter of referral of reports to government departments needs to be agreed between the departments and then set by conditions on the DEP or WRC licences. Magellan has no objection to reports being copied to various departments but would require advice on the name of the department that has ultimate authority to deal with any identified environmental issues of concern.

5.5 The open pit is located on a plateau and no shallow groundwater has been identified beneath the orebody. This also applies to the sewage disposal areas, landfill/recycling sites and fuel and chemical storage areas.

The shallow potable water bodies occur on the calcrete flats some 3-4 km from mine site disposal sites.

The location of these disposal areas, their relevance to known aquifers and the baseline water quality will be forwarded to the WRC when details are finalised. In any event, the information will be submitted before construction commences.

It is understood that a copy of the hydrogeological report for the Magellan project has been forwarded, as required, to the WRC.

TREVOR WATTERS
Feasibility Manager