Poseidon Bow River
Alluvial Diamond Mine Expansion, Kimberleys

Report and Recommendations
of the
Environmental Protection Authority

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Contents

Page

Summary and recommendations i

1. Background 1

2. The proposal 1

3. Existing environment 1

4. Assessment and recommendations 2

4.1 Key issues 2

4.1.1 Erosion control 2

4.1.2 Rehabilitation 2

4.1.3 Environmental management 3

4.1.4 Decommissioning 3

4.1.5 Water level in Lake Argyle 3

4.1.6 Other issues 3

Tables

1. Agencies consulted 1

Figures

1. Location and features of area 5

Appendices

1. Proponents environmental commitments 7

2. Department of Mines proposed schedule of conditions 9

3. Comments on public submissions 13

Summary and recommendations

Poseidon Bow River Diamond Mine Limited (Poseidon) operates an alluvial diamond mine on part of Lissadell Station, which is at the southern end of Lake Argyle in the Kimberleys. The original mining proposal was for an area of about 500 hectares and operations have been progressing since 1988 under mining lease conditions. The original mining proposal was not assessed under Part IV of the Environmental Protection Act, 1986, but environmental conditions were set under several Works Approvals and Licences under Part V. This assessment report deals with a new proposal to expand the mining operation.

Exploration activity has identified a further area of about 400 hectares in low lying country along Limestone Creek, which flows into the Bow River near its junction with the Ord River. Most of this area would have been underwater when Lake Argyle was at its higher levels in the early 1980s and a significant proportion would be underwater if the lake returns to the spillway level. The current low level of the lake provides the opportunity to mine these low lying areas before they possibly become permanently inundated.

The expanded mining operation also involves the construction of a third tailings dam, an increase in the size of the coarse rejects dump and the installation of supplementary water supply bores. The time frame for the completion of these facilities is not as critically dependant upon the water level of the lake, as is the mining of the low lying area.

The key environmental issues are erosion control, rehabilitation, environmental management, water level in Lake Argyle and decommissioning. Other issues include Aboriginal concerns and the final height of the coarse rejects dump.

The erosion control strategy for the low lying area generally involves the retention of the creek bank as a sedimentation bund for the mining pit. The proponent has made a commitment that any proposal to mine the creek bank will require the specific approval of the District Mining Engineer, Department of Mines, and that the extent of mined bank at any time will be limited to 300m with restoration immediately following the mining.

The rehabilitation strategy is basically to restore the land to its pre-mining condition with regard to landform stability and vegetative cover, so that pastoral activity can resume. The proponent is committed to this strategy and consultations with various government agencies and the pastoral lessee are proceeding regarding the best method to achieve the required standard. The proponent will be required to provide an appropriate bond by the Minister for Mines as a guarantee of compliance.

The environmental management of the expanded mining operation requires a further commitment of resources to comply with all the environmental conditions and the proponent's commitments. The proponent has indicated an appreciation of this situation and has made an appropriate commitment in this regard.

The water level in Lake Argyle is at its lowest level ever because of three below-average wet seasons. The proponent will probably only have a short period of access into the low lying area.

The decommissioning of the mining operation will require consultation with several government agencies because of the future use of the land and the on-going uses of the lake. Accordingly, a recommendation requiring consultation with the Environmental Protection Authority on advice from the Department of Mines and the Water Authority of WA has been made.

A social issue involving Aboriginal concerns relating to employment and training has been identified and the Authority has been advised that the proponent could make a stronger commitment to addressing the issue. The Environmental Protection Authority has referred the matter to the appropriate agencies for action.

Other issues are relatively minor and have been satisfactorily resolved as discussed in the assessment report.

The current mining operation is regulated by mining lease conditions set under the Mining Act and by the commitments made by the original proponent (Freeport) in the Notice of Intent submitted on the initial mining proposal. The issues identified for the expanded mining proposal are addressed to some extent by these conditions and commitments, but these issues are fully addressed by the proponent's commitments in the Consultative Environmental Review and supporting documentation, proposed additional or modified lease conditions by the Department of Mines and the Authority's recommendations in this report.

Recommendation 1

The Environmental Protection Authority has concluded that the proposal by Poseidon to mine further alluvial diamond areas, as modified by the process of interaction between the proponent, the Environmental Protection Authority and the public and governmental agencies consulted, is environmentally acceptable.

In reaching this conclusion, the Environmental Protection Authority identified the main environmental factors requiring detailed consideration as:

- **erosion control;**
- **rehabilitation to future land use;**
- **environmental management issues;**
- **water level in Lake Argyle; and**
- **decommissioning.**

The Environmental Protection Authority notes that these environmental factors have been addressed adequately by either the environmental management commitments given by the proponent, the additions or modifications to the lease conditions proposed by the Department of Mines or by the Environmental Protection Authority's recommendations in this report. Accordingly, the Authority recommends that the proposed mining expansion could be approved subject to:

- **the proponent's commitments (appendix 1);**
- **the lease conditions proposed to be modified or added by the Department of Mines (appendix 2); and**
- **the Environmental Protection Authority's recommendations in this report.**

Recommendation 2

The Environmental Protection Authority recommends that the proponent submit a decommissioning and rehabilitation plan to the Authority at least one year prior to the cessation of the mining and processing operation for its approval on advice from the Department of Mines and the Water Authority of Western Australia.

1. Background

Poseidon Bow River Diamond Mine Limited (Poseidon) proposes to extend its alluvial diamond mining operation into low lying areas along Limestone Creek for which easier access is now available because of the historically low water level in Lake Argyle. The mine is located at the southern end of Lake Argyle on part of Lissadell Station about 205km from Kununurra by road (Figure 1). The nearby Argyle Diamond Mine which is operated by the Ashton Joint Venture is 20km to the west at the headwaters of Limestone Creek.

The original mining proposal was not assessed under Part IV of the Environmental Protection Act, 1986, but environmental conditions were set under several Works Approvals and Licences under Part V. It was approved by the Department of Mines in 1987 for Freeport Bow River Properties Ltd. (Freeport) which subsequently sold the project to Poseidon. Initial construction work was commenced in 1987 and mining commenced in 1988.

As the water level of the lake subsided, further exploration in the low lying area along Limestone Creek identified extensions of the ore body. Poseidon developed a proposal to mine this area and submitted a Consultative Environmental Review in May 1990 which was distributed to relevant agencies for comment (Table 1). The proponent submitted a response in August 1990 to the issues raised and the Authority was then able to conclude its assessment.

Shire of Wyndham-East Kimberley
Social Impact Unit
Department of Aboriginal Sites, WA Museum
Department of Mines
Argyle Diamond Mines Pty Ltd
Water Authority of WA
Lissadell Station Management
Australian Conservation Foundation
Conservation Council of WA Inc.

Table 1: Agencies consulted

2. The proposal

The proposal is to mine the diamondiferous alluvial gravels from the low lying area, which comprises about 400ha, before the water level of the lake rises and inundates part or all of the area. The mining method will be similar to that currently used whereby the topsoil and then the overburden is stripped and stockpiled, or spread over previously mined areas, and the diamondiferous gravels are removed prior to the overburden and then the topsoil being replaced.

Erosion control and rehabilitation procedures are implemented as the mining pit, which is maintained as an internally draining structure, moves across the land. The diamondiferous gravels are then hauled to the mill for treatment using a process as described in the Notice of Intent for the original proposal, which is held in the library of the Environmental Protection Authority.

The proposal also involves the construction of a third tailings dam, an increase in the size of the coarse rejects dump and the installation of a water supply borefield to supplement or replace the existing water supply from the Ord River. No increase in mining rate, processing capacity, power and water consumption or workforce is involved. A complete description of the mining proposal is contained in the CER.

3. Existing environment

The area has a tropical monsoonal climate having distinct dry and wet seasons. The mining tenements cover about 8800ha of the Ord Sedimentary Basin and the soils are predominantly grey and brown cracking clays, though commonly termed black soil plains.

The plains support a vegetation of very open *Eucalyptus* woodlands to treeless grasslands. The vegetation types are common and widespread throughout the Kimberleys and there are no declared rare flora in the area. There are unlikely to be any specific faunal types significantly affected by the mining operation apart from the reptile Ingram's Planigale, *Planigale ingrami*. Its preferred habitat is the cracking clay soils, but it is widespread throughout the cracking clay soils of the Kimberleys.

There are three Aboriginal sites registered with the Western Australian Museum, all limestone ridges, and twenty archaelogical sites known within the northern part of the mining tenement. None of these sites will be affected by the mining operation.

4. Assessment and recommendations

The formal assessment of the alluvial diamond mining proposal by Poseidon identified a number of key issues as well as many minor issues. The minor issues are addressed in the proponent's report titled "Comments on Public Submissions", August 1990, (Appendix 3).

4.1 Key issues

The key issues identified for the proposal are discussed below:

4.1.1. Erosion control

The erosion potential in the new area proposed for mining is significantly higher than in the existing mining areas and the proposed erosion control measures require detailed planning and competent implementation. The existing mining areas do not appear to have had adequate resources committed to erosion control which has resulted in poorly designed erosion control structures. There has been no quantitative monitoring of the additional sediment from the mining operation entering Limestone Creek and, subsequently, Lake Argyle, but it is not expected to be significant since little sediment escapes from the mine site because of the internally draining structure of the pits.

The scope for erosion from the new mining area, particularly if the creek bank is mined, is greater than from existing mining areas because of its proximity to the creek, the possibility of regular flooding and the difficulty in maintaining the internally draining structure of the pit. Considering the fluctuations in the level of the lake, some of the new mining area may be either permanently or temporarily under water, and the appropriate erosion control measures are difficult to identify. The use of coarse rock fragments and reno-mattresses (coarse rock in wire-mesh baskets) to armour the disturbed surface should be maximised.

The proponent has made appropriate commitments to an erosion control strategy for the mining of these sensitive areas. The strategy involves techniques such as limiting the extent of mining of the creek banks to a maximum of 300m at any one time with progressive restoration following immediately behind using coarse rip-rap, reno mattresses, etc. However, there will generally be no need to mine the creek banks at all and in most cases the bank will be left intact to function as a sedimentation bund.

For the 1990/91 wet season there will be no restriction on when the creek bank may be mined because of the possibility of permanent inundation of the lowest lying area if there is an above-average wet season. However, for following wet seasons any mining of the creek banks would finish by the end of October so that erosion control measures can be fully completed.

These techniques, along with those currently employed in the less sensitive areas, are considered sufficient to minimise the erosion potential from the mine site. The proponent's commitments, which are endorsed in the Authority's recommendations, are considered sufficient to resolve the issue.

4.1.2. Rehabilitation

The rehabilitation of the existing mining area has produced variable results which are generally poor. This is probably not because of the strategy or techniques used, but mainly because of the two poor wet seasons since the mining operation began. Considering the more variable land systems and higher erosion potential of the new area proposed for mining, it is important to ensure that adequate resources are committed to detailed planning and implementation of the rehabilitation strategy.

The recording and monitoring of the techniques and success of the current rehabilitation strategy has not been comprehensive and it is recommended that this monitoring be done on a regular and scientific basis in the future. A lease condition requiring this information on an annual basis has been proposed by the Department of Mines and is considered sufficient to resolve the issue (Appendix 2).

4.1.3. Environmental management

The environmental management of the mining operation relates to the recording and monitoring of the rehabilitation strategy, recording of water resource use, liaison with the various involved agencies and implementation of the measures needed to meet their environmental concerns and the annual reporting requirement. The satisfactory environmental management of both the existing and proposed expanded mining operation will require a greater commitment of resources on a regular basis by the proponent. The proponent has indicated an appreciation of this situation and is proposing to contract appropriate consultants and continue training the relevant on-site personnel in order to achieve the rehabilitation standard required and a satisfactory standard of environmental management.

4.1.4. Water level of Lake Argyle

If the water level of Lake Argyle returned to the spillway level (86.7m AHD) or just above, it would flood the lower lying area of the proposed mining operation. The proponent has to plan for this contingency which is further complicated by a proposal to raise the spillway level as part of a hydroelectric scheme which is currently being formally assessed by the Environmental Protection Authority.

The Water Authority of WA (WAWA) has the role to protect the water resources of Lake Argyle from pollution and to licence surface and ground water extraction in the area. Its approval is also required under condition 10 of Poseidon's mining lease for any mining activity within the area of Lake Argyle and the adjacent level 110m AHD, and under lease condition 13 for petrochemical storage and the water pipeline take off from the Ord River.

The protection of Lake Argyle from pollution from the mining activity relates to both erosion control and petrochemicals storage, and both these aspects have been satisfactorily resolved. The proponent is currently licensed for surface water extraction but is also proposing to establish a ground water supply. WAWA are considering that the area be declared a ground water protection zone for management purposes under the Rights in Water and Irrigation Act.

The management of the borefield would involve the regular monitoring of the bores, which is done by the proponent, and a lease condition will be placed by the Department of Mines requiring this information, along with any other data required by WAWA, as part of the annual report.

4.1.5. Decommissioning

The final decommissioning of the mine site, including the mill and related facilities, will need to take several possible land uses into account depending upon the final water level of the lake. Accordingly it is recommended that the Environmental Protection Authority, on advice from the Department of Mines and the Water Authority of WA, be involved in the approval of the decommissioning plan for the mine, which is six to ten years in the future. An appropriate recommendation has been made.

4.1.6. Other issues

Aboriginal concerns

A social issue involving Aboriginal concerns relating to employment and training has been identified and the Authority has been advised that the proponent could make a stronger commitment to addressing the

issue. The Environmental Protection Authority, noting that the neighbouring diamond mining operation by the Ashton Joint Venture at Argyle includes requirements for that company to address comparable issues, has referred the matter to the Department of Employment and Training for action.

Height of the coarse rejects dump

The waste or coarse rejects dump as originally described in the Notice of Intent was predicted to be about 650m by 650m by 10m. For the expanded mining operation it will nearly double in size if the height limit of 10m is maintained. In order to limit the size of the footprint of the dump, which would leave more land to be restored to pastoral use, and to minimise the amount of topsoil which would have to be removed and minimise other earthworks, the proponent wishes to extend the height to at least 20m.

Upon rehabilitation the dump would have the form of a flat topped hill similar to former natural landforms that have now been mined and would blend in with the much higher ranges to the north and the limestone ridges to the west and south of the mine site. Therefore, the Environmental Protection Authority has no objections to the proponent extending the height of the dump subject to appropriate engineering design criteria being acceptable to the District Mining Engineer, Department of Mines. The proponent has made a commitment to obtain the District Mining Engineer's approval prior to extending the height of the dump (Appendix 1).

Recommendation 1

The Environmental Protection Authority has concluded that the proposal by Poseidon to mine further alluvial diamond areas, as modified by the process of interaction between the proponent, the Environmental Protection Authority and the public and governmental agencies consulted, is environmentally acceptable.

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The Environmental Protection Authority recommends that the proponent submit a decommissioning and rehabilitation plan to the Authority at least one year prior to the cessation of the mining and processing operation for its approval on advice from the Department of Mines and the Water Authority of Western Australia.

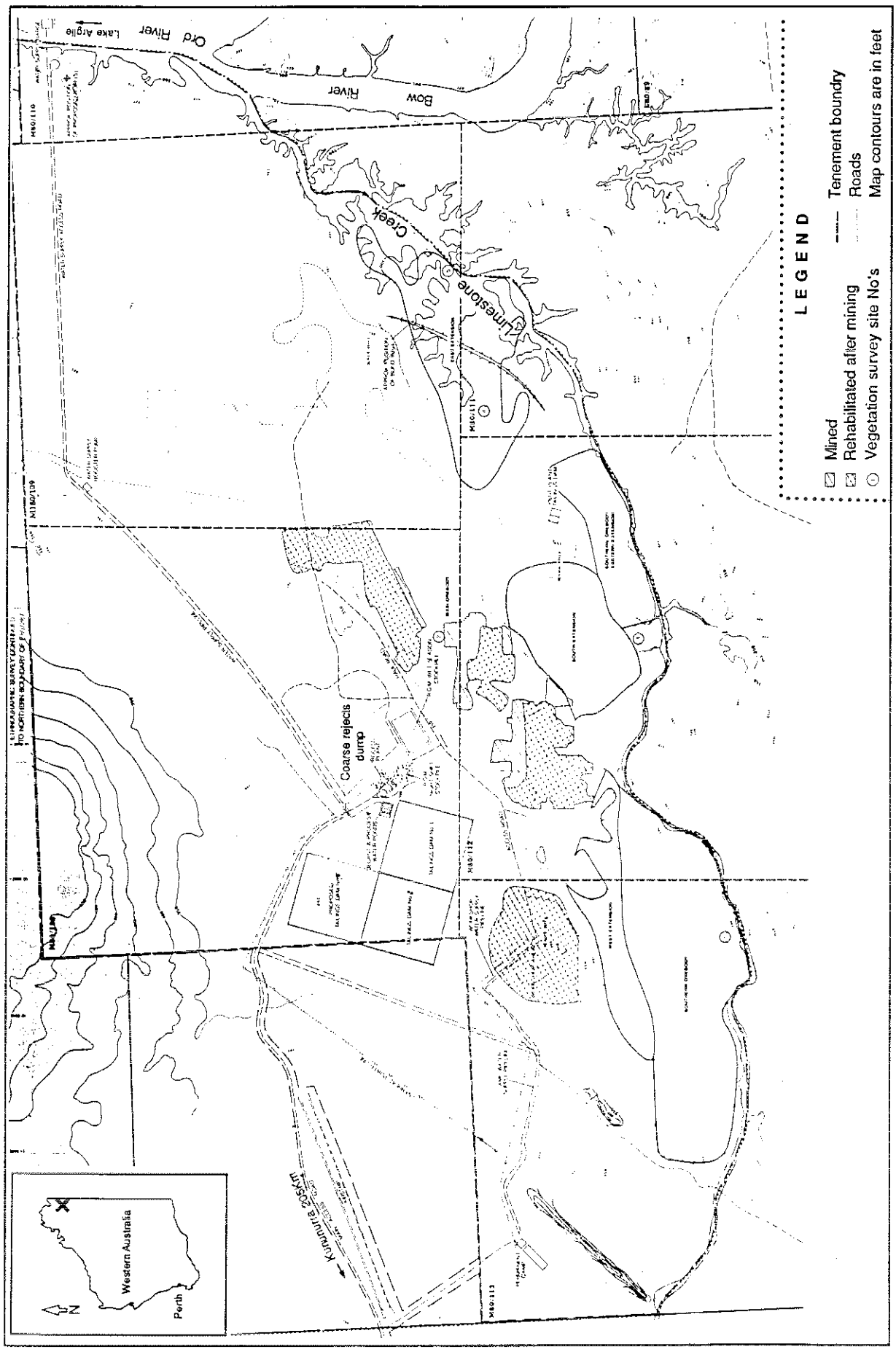

Figure 1: Location and features of area

Appendix 1

Proponent's environmental commitments

Proponent's environmental commitments

Poseidon Bow River Diamond Mine Pty Ltd makes the following specific commitments regarding environmental protection and rehabilitation:

1. Mining will occur only in those areas identified in this report and in the previous NOI.
2. Mining and rehabilitation will be progressive, with topsoil and overburden being used immediately, where possible, to rehabilitate mined-out pits.
3. Erosion control structures including bunds and sediment traps will be constructed along the length of the mining area to ensure that run-on and run-off are kept to a minimum.
4. When mining occurs close to Limestone Creek, special measures, as detailed in Sections 6.3 and 7.10.3 (of the Consultative Environmental Review) will be employed to minimise impacts on the creek.
5. Coarse waste dumps and tailings dams are, and will be, designed so as to minimise erosion and to remain stable in the long term.
6. The occurrence of *Parkinsonia aculeata* will be monitored and appropriate measures taken to control any serious infestations resulting from, or associated with, mining or rehabilitation activities.
7. At the end of the project, all equipment will be removed, all disturbed areas rehabilitated, rubbish removed or buried and the area left clean and tidy to the satisfaction of the EPA and the Mines Department.
8. The proponent intends to comply with all provisions of all relevant acts including the Mines Act and Regulations, and the Environmental Protection Act.
9. It is PBR's intention to set up a photographic monitoring procedure, to appoint a person or agency to provide monitoring reports as required, and to instigate remedial action if necessary.
10. PBR is also prepared to make a commitment that, when mining operations impinge on Limestone Creek, not more than 300m of the creek will be disturbed at any time. Thus, the 'window' of disturbed land will travel along the creek, with restructured land surface left behind. This will ensure that any erosion which did not occur in a rainfall event was localised and, if necessary, more easily controlled.
11. Poseidon Bow River will obtain the approval of the District Mining Engineer, Department of Mines, for the engineering design and rehabilitation of the coarse rejects dump prior to extending the height of the dump beyond 10m.

Appendix 2

Department of Mines proposed schedule of conditions

Department of Mines proposed schedule of conditions

Conditions 1 to 11 and 16 are existing mining lease conditions which are unchanged.

1. Compliance with the provisions of the Aboriginal Heritage Act, 1972, to ensure that no action is taken which would interfere with or damage any Aboriginal site.
2. No developmental or productive mining being commenced until the tenement holder has submitted a plan of the proposed operations and measures to safeguard the environment to the State Mining Engineer for assessment; and until his written approval has been obtained.
3. No mining being carried out that will pollute or unduly interfere with the natural water courses.
4. The rights in ingress to and egress from any mining operation being at all reasonable times reserved to the authorised officers of the Water Authority, for inspection purposes.
5. Such further conditions concerning the pollution of or interference with the natural water courses as the Minister for Minerals and Energy may, from time to time, determine.
6. The Rights in Water and Irrigation Act, 1914, as amended will apply.
7. Access gates to be provided and maintained to that portion of the area within the Lake Argyle Catchment Boundary Fence.
8. Access tracks to be minimised to ensure stability of the area.
9. All topsoil being removed ahead of mining operations and stockpiled for replacement in accordance with the directions of the Mining Engineer, District Inspector for Mines.
10. No mining activity being commenced within the area of Lake Argyle and the adjacent level 110m AHD without the written approval of the State Mining Engineer and the Managing Director, Water Authority of WA.
11. On completion of exploration in areas not intended for mining all plant, vehicles, machinery, buildings and equipment being removed and the area restored to a condition as close as possible to that existing prior to the commencement of works.
16. The lessee providing a bank guaranteed Unconditional Performance Bond in favour of the Minister for Mines in the sum of $50,000 for due compliance with the conditions of Mining Leases 80/108 to 80/113 and 80/289.

These proposed conditions will replace conditions 12 to 15:

On Mining Lease 80/108 delete Condition 12; on Mining Leases 80/109-113 delete Condition 13.

On Mining Lease 80/108 delete Condition 14; on Mining Leases 80/109-113 delete Condition 15 and replace these Conditions and add to Mining Leases 80/288-289 the following Condition:

> 'The lessee submitting to the State Mining Engineer in May of each year, a brief annual report outlining the operations and rehabilitation work undertaken in the previous 12 months and the proposed operations and rehabilitation programme for the next 12 months'.

On Mining Lease 80/108 delete Condition 15 and replace with the following Condition; on Mining Leases 80/109-113 and 80/288 add the following Condition; on Mining Lease 80/289 delete Condition 7 and replace with the following Condition:

> 'The construction and operation of the project and measures to protect the environment to be carried out generally in accordance with the documents titled "Bow River Alluvial Diamond Project Notice of Intent' dated September 1987, "Poseidon Bow River Diamond Mine, Proposal for a New Tailings Dam" submitted in September 1989, "Consultative Environmental Review, Bow River Alluvial Diamond Project Expansion" dated May 1990 and retained on Mines Department Files 281/88 and 393/88."

On Mining Leases 80/109 add the following Condition:

> "Prior to mining commencing on the eastern or central section of the Main Orebody East Extension, the lessee entering into and maintaining a further bank guaranteed Unconditional Performance Bond in favour of the Minister for Mines in the total sum of $60,000 to ensure compliance with the environmental conditions on the lease."

On Mining Lease 80/111 add the following Condition:

> "Prior to mining commencing on the western section of the Main Orebody East Extension, the lessee entering into and maintaining a further bank guaranteed Unconditional Performance in favour of the Minister for Mines in the total sum of $60,000 to ensure compliance with the environmental conditions on the lease."

On Mining Leases 80/112 and 80/113 add the following Condition:

> "Prior to mining commencing on the Southern Orebody or the Southern Orebody Eastern Extension, the lessee entering into and maintaining a further bank guaranteed Unconditional Performance Bond in favour of the Minister for Mines in the total sum of $60,000 to ensure compliance with the environmental conditions on the lease."

Appendix 3

Comments on public submissions

TABLE OF CONTENTS

		Page No.
1.0	INTRODUCTION	1
2.0	OPERATIONAL CONCERNS	1
2.1	EROSION MANAGEMENT	1
2.1.1	Sheet Runoff of Water	1
2.1.2	Impact of Unseasonal Rains	2
2.1.3	Monitoring of Sedimentation	2
2.2	REHABILITATION	3
2.3	POLLUTION ISSUES	3
2.4	GROUNDWATER EXTRACTION	4
2.5	TAILINGS DAM (No. 3) APPROVAL	4
2.6	PROTECTION OF ABORIGINAL SITES	5
3.0	SOCIAL CONCERNS	7
3.1	PUBLIC ACCESS	7
3.2	IMPACT ON LISSADEL STATION	7
3.3	ABORIGINAL CONSULTATION	7
3.4	ABORIGINAL EMPLOYMENT/TRAINING	8
3.5	COMMUNITY CONSULTATION AT DECOMMISSIONING	8
4.0	THE EPA'S REQUEST FOR SPECIFIC INFORMATION	9

POSEIDON BOW RIVER EXPANSION PROPOSAL
COMMENTS ON PUBLIC SUBMISSIONS

1.0 INTRODUCTION

In May 1990 Poseidon Bow River Diamond Mine (PBR) submitted to the Environmental Protection Authority (EPA) a Consultative Environmental Review document (CER) for a proposed expansion of operations.

In accordance with EPA requirements (EPA, 1989) the CER was released for four weeks public review and comment. This document represents PBR's response to those submissions.

A total of six submissions were reviewed by PBR. One submission (Shire of Wyndham-East Kimberley) fully supported the project and raised no questions. The remaining five submissions all had questions and these have been compiled into topics for ease of reply. Questions were basically operational or social in nature, and have been grouped accordingly. The EPA asked a number of very specific questions which could not easily be grouped. These are dealt with separately in Section 4.0 below.

2.0 OPERATIONAL CONCERNS

2.1 EROSION MANAGEMENT

2.1.1 Sheet Runoff of Water

One submission indicates that erosion is a particular concern because of the risk of uncontrolled sediment transport if surface sheet flow is left unchecked. It recommends that sediment traps, contour banks, riprap and Reno Mattresses should be installed. It also indicates that areas to be treated (and treatments) should be determined by PBR in consultation with the local Agriculture Department, the Water Authority of W.A. and Department of Mines environmental officers.

REPLY

PBR fully agrees with these statements, and intends to apply all these erosion-control measures as required. Details have been presented in Section 6.2 of the original Notice of Intent (NOI) (Dames & Moore, 1987), and are reiterated and modified in the CER (Sections 6.1 to 6.4 and 7.2). PBR believes that its present sediment control activities have been very successful and will proceed with similar measures in new areas. Liaison with relevant government agencies will continue.

2.1.2 Impact of Unseasonal Rains

One submission expressed concern about the possible impact of unseasonal rains in the dry season and calls for contingency plans to be in place.

REPLY

PBR is aware of the possibility of unseasonal rains and has designed its runoff and erosion management systems, as described in both the NOI and the CER, to be in full operation at all times, not just during the wet season. In other words, "contingency plans" are in operation throughout the mining process. Further, rehabilitation procedures are always underway. A "window" of mined land is open for processing, and as the "window" moves the area behind is immediately set into a rehabilitation scheme. Thus, if unseasonal rains did affect the project the total area of destabilised land is always at a minimum.

PBR is also prepared to make a commitment that when mining operations impinge on Limestone Creek, not more than 300m of the creek will be disturbed at any time. Thus the "window" of disturbed land will travel along the creek, with restructured land surface left behind. This will ensure that any erosion which did not occur in a rainfall event was localised and, if necessary, more easily controlled.

2.1.3 Monitoring of Sedimentation

One submission requested that a rudimentary sediment monitoring programme be implemented, together with annual situation reporting.

REPLY

There is no specific sediment monitoring programme in place, as this was not seen as necessary by the regulatory agencies when the project commenced.

An annual report of activities is submitted by PBR to the Department of Mines, in accordance with that Department's requirements. These annual reports would detail significant erosion events. As there has been no erosional event to report there has been no need to specifically discuss this issue up to the present.

2.2 REHABILITATION

One submission points out that rehabilitation has had various degrees of success, with results being poor on the remnant hills. It suggests that trials of rock mulching, seed mixes and direct plantings should be considered. The submission also states that the creek margins should receive a slightly different approach to revegetation than the plains. Another submission (from the Water Authority of Western Australia) wants to have the rehabilitation measures inspected annually by one of its officers.

REPLY

PBR agrees with the comments and is presently undertaking an analysis of rehabilitation success data in order to improve future methodology. The rehabilitation contractor responsible for the work will be informed of the concerns and instructed to take them into account.

With regard to annual inspections by the Water Authority, PBR is more than happy to comply, and any constructive advice from the Authority will be gratefully received.

2.3 POLLUTION ISSUES

The Water Authority submission requests that a report of waste disposal (hydrocarbon) pollution, sewage pollution, etc, be presented.

REPLY

All waste oils, etc., are removed from site, so there is no chance of loss into the environment. Sewage disposal is by sludge settling, then evaporation ponds. Polluting events would be discussed as a part of the annual reporting procedure.

2.4 GROUNDWATER EXTRACTION

The Water Authority submission indicates that yields from the proposed borefield aquifer could be poor, and asks that a hydrological assessment be made. The submission also requests that the Water Authority approve the extraction programme.

REPLY

Borefield details have already been forwarded to the Water Authority. Clearly, Poseidon would not proceed with a bore unless a hydrological assessment had been done, as to do otherwise would be inefficient and pointless. The second part of the request is redundant as the borefield has already been approved (copy of approval attached). Borefield monitoring data will be regularly forwarded to the Water Authority.

2.5 TAILINGS DAM (No. 3) APPROVAL

There is a request to ensure that Tailings Dam Number 3 receive Water Authority approval before commissioning.

REPLY

Tailings Dam No. 3 is identical to Tailings Dam No. 2, which has Water Authority and EPA approval (Works Approval 403 of 13 November 1989). Further approval will be sought from the Water Authority for Tailings Dam No. 3. As the dam designs are identical it is assumed that the new dam will also be approved.

2.6 PROTECTION OF ABORIGINAL SITES

2.6.1 The areas affected by the PBR project have been surveyed for Aboriginal sites.

REPLY

This is correct. The site identification process consisted of:

- o search of the Register of the Department of Aboriginal Sites (Dames & Moore, 1987, Section 4.9); and
- o survey by the Kimberley Lands Council, Aboriginal Legal Service, Mines Department Social Impact Group and the Western Australian Museum (ibid:, Section 4.9).

2.6.2 The CER states that there are three sites within the tenement but the Kimberley Lands Council report recorded 23 sites.

REPLY

This criticism is justified in that the CER document was not correctly worded. It should have indicated that there were three sites within the mining area, not within the tenement, which extends well beyond the area which will actually be affected by the operation. It should also be noted that only the three sites referred to are considered significant (sacred) by the Aborigines; the other twenty were not. Thus, the comment in Section 6.8 of the CER that there will not be any impact on sacred sites is correct. However, there will also not be any impact on non-sacred (archaeological, etc.) sites. This is indicated in the same section which states that employees will be discouraged from visiting significant (sacred) sites and that PBR will protect all sites to the best of its ability.

2.6.3 Figure 2 of the CER does not show archaeological sites.

REPLY

The locations of archaeological sites were deliberately omitted from the CER map because the sites contain material which could be physically removed, whereas the ethnographic sites are large landscape features. Their omission was one of the actions taken by Poseidon to protect the sites.

The locations of sites, especially K02153, K02158, K02152 and K02157 are known and the sites will be protected (where required) by fencing and will remain undisturbed by the operation. It should be noted, however, that cattle damage to some of the sites is significant.

2.6.4 Ministerial consent is required under Section 18 of the Aboriginal Heritage Act 1972-80, if any site is to be "impacted".

REPLY

PBR is aware of this requirement, but as no sites will be affected by the project the requirement does not apply at this time.

2.6.5 If any work is planned for areas outside those already surveyed a further survey will be required.

REPLY

PBR understands this requirement and will undertake surveys as necessary. There is also liaison with the Kimberley Lands Council in respect to any future activities which might occur.

3.0 SOCIAL CONCERNS

3.1 PUBLIC ACCESS

Community access to fishing areas along the Bow River and lower Limestone Creek should be maintained.

REPLY

Access has always been provided and will continue to be available.

3.2 IMPACT ON LISSADEL STATION

What impact will the proposed expansion have on the occupiers of Lissadel Station?

REPLY

There will be no additional impact. There is no increase in area disturbed at any one time and cattle will continue to be allowed into fully stabilised regrowth grass areas. Works will be no closer to the homestead than at present, and access to the area will not be diminished.

3.3 ABORIGINAL CONSULTATION

Which Aboriginal groups/individuals were consulted about the expansion?

REPLY

There was no specific consultation about the expansion. This is because there was extensive consultation prior to the project commencement, during site surveys, etc., in 1987, and ongoing dialogue since that time. The groups consulted are listed in Item 2.6.1 above.

Under the guidelines from the Australian Institute for Aboriginal and Torres Strait Islander Studies it is generally considered that there is no need to repeat detailed consultations if less than 4-5 years have transpired since previous discussions. As less than three years have elapsed since earlier discussions, and there has been ongoing dialogue, the whole process was not repeated.

3.4 ABORIGINAL EMPLOYMENT/TRAINING

What arrangements will the proponent put in place to monitor the level of Aboriginal employment generated from the operation.

REPLY

There is not, and will not in the foreseeable future, be a monitoring programme. There has been no interest expressed by Aboriginal people to join the project, despite soliciting that interest.

3.5 COMMUNITY CONSULTATION AT DECOMMISSIONING

Will the proponent involve community consultation when the project is finished?

REPLY

As the project has a remaining life-span of at least six years, this process has not been closely defined. However, all the appropriate community groups which are in operation at the time will be consulted in order to minimise disruption of the community during project closure.

In addition, in the Annual Report to the Department of Mines about twelve months before decommissioning, a statement will be made as to the decommissioning procedures to be employed. There will also be discussions held with relevant government agencies in respect to impending decommissioning, to define their concerns as early as possible.

4.0 THE EPA'S REQUEST FOR SPECIFIC INFORMATION

For the sake of brevity the EPA questions have been paraphrased.

QUESTION 1

What is the hydrology of the area, particularly in relation to the riverine gravels?

REPLY

The gravels have a heavy clay matrix and are effectively impermeable as is the clay overburden. Currently the gravels play no effective part in the drainage of the area. Removal of the gravels and formation of lower silt trap areas will cause retention of a higher proportion of surface run-off in the actual mined areas but will not effect groundwater drainage in any way.

QUESTION 2

The commitment in Section 4.4.2 of the CER for mining not to exceed 30ha was not mentioned in the list of commitments.

REPLY

When PBR mine all of their ore from the southern orebody (past 1993), they would be prepared to restrict to 30ha in sensitive areas. However, they would need something like 60-70ha/yr total to get all of the ore for a year. At any one time PBR could hold to 20ha under active mining, with seeding waiting suitable weather conditions in other areas.

In Area C, the area subject to inundation and where PBR will only mine for six months each year, PBR would be prepared to restrict activities to 30ha windows. However, the EPA has expressed the opinion that it is aware that this may be restrictive on PBR if it is necessary to complete mining in one dry season. The EPA would therefore be prepared to accept more than 30ha being mined at one time in order to work within the seasonal constraints. If such a decision is made by PBR the proposal will be discussed with the District Mining Engineer.

QUESTION 3

Why have estimates of the size of the waste dump been increased so much?

REPLY

The total quantity of ore to be mined is estimated to double and the resultant total of coarse rejects will increase accordingly. PBR would be prepared to reduce the dump area to 750m by 750m if the EPA will allow the central height, after battering of slopes, etc., to be 20m instead of 10m.

QUESTION 4

Has a water budget for the operation been calculated?

REPLY

PBR requires $0.5-0.7m^3$ of new water per tonne of ore treated. PBR gets an average of 65% of water sent to the tailings dam back to the plant to reuse in the process.

QUESTION 5

What is the strategy or commitment to maintain the stock exclusion fences after decommissioning?

REPLY

Arrangement will be made with a suitable local contractor for maintenance after cessation of mining but it is likely that there would be a company presence for some considerable time for decommissioning after cessation of actual mining.

QUESTION 6

Provide a statement on the impact of the mining operation on the feeding or breeding of fauna, particularly birds.

REPLY

An investigation of the fauna of the area (which is quite well known) was made as part of the NOI and CER preparation. It was the professional opinion of the ecologists and botanists involved that there would be negligible impact on any flora or fauna. The main evidence for this conclusion was the topographic and biological homogeneity of the area, the low biotic diversity of the impacted land and the relatively small area affected compared to available regional habitat.

QUESTION 7

There should be a minimum time between cessation of mining and completion of land surface restructuring so that the land is stabilised before the wet season begins. This should apply particularly near Limestone Creek.

REPLY

PBR agrees, and such timing is an integral part of mine planning.

QUESTION 8

Is there any monitoring of sediment loads in the creek, and is there a quantifiable target for satisfactory rehabilitation?

REPLY

There is currently no monitoring undertaken for Limestone Creek or Bow River sediment loadings. To undertake such a study would be very difficult and of dubious value. This is because there are extensive catchments upstream of the PBR project and considerable erosion in these catchments, both natural and/or exacerbated by pastoral activities.

The quantifiable target for successful rehabilitation is to:

- o restore the landscape to a surface at least as stable as it was before mining.
- o to replace grass cover to a canopy density at least equivalent to that prior to mining; and
- o to create a structural physiognomy of vegetation similar to that prior to mining.

Over the better areas of rehabilitation this has been achieved. Poorer areas with inadequate grass growth remain and these are being attended to as a part of ongoing restoration operations. While PBR is satisfied with the regrowth considering the two very dry wet seasons and poor dry season rains, it is accepted that the present condition of regrowth is unsatisfactory. PBR feels that, providing a good wet season is experienced in the 1990/91 period, regrowth next year should be satisfactory to the EPA and Department of Mines.

QUESTION 9

In Section 7.4 of the CER it is mentioned that the monitoring of regrowth is done. Is this a quantifiable monitoring procedure?

REPLY

PBR is at present applying only qualitative monitoring methods. It is felt by PBR that there is insufficient experience as yet to develop quantifiable monitoring procedures. It is intended to develop these methods based on varieties, ground cover and other factors but to date there has been insufficient analysis to identify the relevant parameters. Quantitative monitoring is currently being addressed in the review of 1989 rehabilitation work. It is PBR's intention to set up a photographic monitoring procedure, to appoint a person or agency to provide monitoring reports as required, and to instigate remedial action if necessary.

QUESTION 10

What is Poseidon's commitment to rehabilitation monitoring after decommissioning?

REPLY

As outlined in Question 5, the matter will be addressed. The Department of Mines will oversee the work as in other minesites and would take the usual action if PBR did not comply.

QUESTION 11

In Section 7.10.3 of the CER a reference is made to the apparent success of the existing rehabilitation strategy. However, other advice points out some problems with the existing strategy. Some qualification of this statement is required.

REPLY

The only standard against which PBR can measure their rehabilitation success is the condition of the undisturbed environment, prior to operations. It is not possible, for example, to compare PBR rehabilitation with that at the Argyle Diamond Mine. This is because the habitat types, soil characteristics, etc., are completely different.

It is estimated from visual inspection (no recent aerial photographs are available, although PBR has arranged for some to be flown) that the localised areas of best regrowth are much denser and more healthy, and the soil more stable, than in the undisturbed areas. This is not surprising considering that much of the region is overgrazed by cattle. The "pasture" within the better rehabilitated areas is so good that a major cattle-exclusion programme is necessary to prevent stock from forcing access to the restored areas. In the remainder the grass regrowth is poor and these areas are presently part of a re-treatment programme. It should also be borne in mind that PBR has had only two years to develop their rehabilitation scheme, and that both the wet seasons they have experienced have been below-average rainfall. There has also been almost no dry-season rains. Thus, although the rehabilitation success is, in that sense, poor, it is considered to be good in view of the unusually harsh weather conditions.