BODDINGTON GOLD MINE PROJECT

EXPANSION OF FACILITIES

STAGE 2

Worsley Alumina Pty Ltd

Report and Recommendations
of the
Environmental Protection Authority

Environmental Protection Authority
Perth, Western Australia
Bulletin 361 October 1988

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i SUMMARY AND RECOMMENDATIONS

Worsley Alumina Pty Ltd has submitted a proposal to upgrade the existing Boddington Gold Mine facilities by increasing the maximum daily process plant throughput from 12,000 tonnes/day (tpd) to 16,000 tonnes/day (tpd).

Ore would continue to be mined from the same orebody currently being mined. This proposal would involve the processing of additional ore currently classed as marginal. However, because of the increased process rate, the project life would remain unchanged at 10 years.

Plant facilities proposed in this upgrading include the installation of an additional dump hopper and crushing facility, upgrading of the milling and classification area, three additional leach/adsorption tanks, an additional residue surge tank, a re-arrangement of tank duties, the installation of a second elution column, the upgrading of the existing dosing pumps in the reagent preparation area, and the construction of an additional administration building.

The modifications to the residue disposal and reclaim return systems proposed are duplication of the residue disposal pipeline, the relocation of the existing residue disposal pipeline along the southern section of the Residue Storage Area, the construction of an additional reclaim water pump station, and the enlargement and relocation of the reclaim water collection tank.

To provide an adequate and secure process water system for the upgraded plant, it is proposed to enhance the water supply system by constructing an additional water supply reservoir of 3,060 ML capacity and to increase the maximum pumping rate from the Hotham River from 2,200 kL/h to 3,300 kL/h.

In its assessment of this proposal, the Authority recognised that this enhancement of facilities was an incremental development of the Stage I enhancement, approved in December 1987. However, because the Boddington Gold Mine and Hedges Gold Project share the water of the Hotham/Murray River system, the issue of water supply was extensively examined. The environmental impact of the increased pumping on the ecology of the Hotham River and downstream users, is considered acceptable.

Some concern was expressed by the Water Authority regarding seepage from the existing residue storage area. The Authority considered that experience gained from operating the 34 Mile Brook Storage, the process water dam and the initial start up operations in the residue disposal area could be used to rectify potential seepage problems, particularly seepage from modifications the existing residue disposal areas. The Authority noted that construction of the new water storage reservoir would be subject to licencing by the Water Authority of Western Australia with the conditions of licence covering various aspects including dam safety.

Additional forest clearing resulting from this proposal was limited to a total of less than 60 Ha of private land. No clearing of State Forest would be required. Other aspects of the proposal were considered by the Authority to be manageable and not to have a potential for significant environmental impact.

Upon assessment of the Notice of Intent that was submitted by the Company the Authority has determined that the proposed enhancement of facilities at the Boddington Gold Mine would be environmentally acceptable and makes the following recommendations.

RECOMMENDATION 1

The Environmental Protection Authority concludes that the proposal described in the Notice of Intent is environmentally acceptable and recommends that it could proceed subject to the Environmental Protection Authority's recommendations in this Assessment Report and the environmental commitments made by the proponent.

RECOMMENDATION 2

The Environmental Protection Authority recommends that upgraded operations are carried out in accordance with the commitments documentated in the Environmental Management Programme for the Boddington Gold Mine.

RECOMMENDATION 3

The Environmental Protection Authority recommends that construction techniques for both the new water storage reservoir and modifications to the existing residue storage area, should be to the satisfaction of the Water Authority of Western Australia.

RECOMMENDATION 4

The Environmental Protection Authority notes that as a consequence of Boddington Gold Mine's already approved second stage expansion and Alcoa's Hedges Gold Project, an agreement was negotiated between the major users of water from the Hotham River to the satisfaction of the Minister for Water Resources. This agreement delineates allowable water extraction levels to meet environmental objectives.

The Environmental Protection Authority recommends that the proponent re-negotiates this agreement, to the satisfaction of the Minister for Water Resources, such that the environmental objectives already delineated, are met.

1. BACKGROUND

The Boddington Gold Mine Project involves the mining and processing of an orebody located approximately 13 km north-west of the town of Boddington (Figure 1).

Approval for the commencement of the gold mining operations near Boddington was given to the Worsley Alumina Joint Venturers by the State Government in December 1985 following the assessment of the Environmental Review and Management Programme (ERMP) that was submitted to EPA for the project. In its report on the project the Environmental Protection Authority (EPA) concluded that it would be environmentally acceptable subject to the Joint Venturers adhering to the commitments made in their ERMP and subsequent submissions and compliance with nineteen specific recommendations. Further to the Authority's assessment of the proposal, an Environmental Management Programme was prepared by the Joint Venturers detailing all aspects of environmental management pertaining to this project.

The project was commissioned in July 1987, with initial operations designed for maximum daily process plant throughput of 8,000 tonnes per day (tpd) (3 million tonnes per annum (Mtpa)).

In February 1988, a proposal was approved to allow through parts of up to 12,000 tpd (4.5 Mtpa), subject to the following conditions:

1. that upgraded operations were carried out in accordance with the commitments documented in the Environmental Management Programme for the Boddington Gold Mine;

2. the company complied with all licence conditions set by the Water Authority of Western Australia for abstraction of water from the Hotham River;

3. that pumping from the Hotham River should only take place when the river flow was in excess of 342 kilolitres per hour and that total pumping from the river should not cause the remaining flow to be reduced below the level of 342 kilolitres per hour. (River flow measured at Marradong River bridge gauging station), and

4. that the proponent be required to negotiate an agreement, to the satisfaction of the Minister for Water Resources, with any other major user of water from the Hotham River in order to ensure that overall pumping does not reduce flow below 342 kilolitres per hour. The minimum flow rate of 342 kilolitres per hour to be reviewed by the Water Authority of Western Australia after two winter flows and advice given to the Environmental Protection Authority as to whether this rate is having undesirable environmental impacts.

In July 1988, Worsley Alumina Pty Ltd as the manager of the Boddington Gold mine Project, submitted a proposal to upgrade the existing Boddington Gold mine facilities and increase the maximum daily process plant throughput from 12,000 tpd to 16,000 tpd (6 Mtpa). This proposal would involve the processing of ore classified as marginal: at present, this material is either stock piled or left in situ in the mine pits. The total ore quantity processed over the life of the project would be 60 million tonnes (Mt), an increase of 15 Mt. Because of the increased process rate, the project life would be unchanged at 10 years.

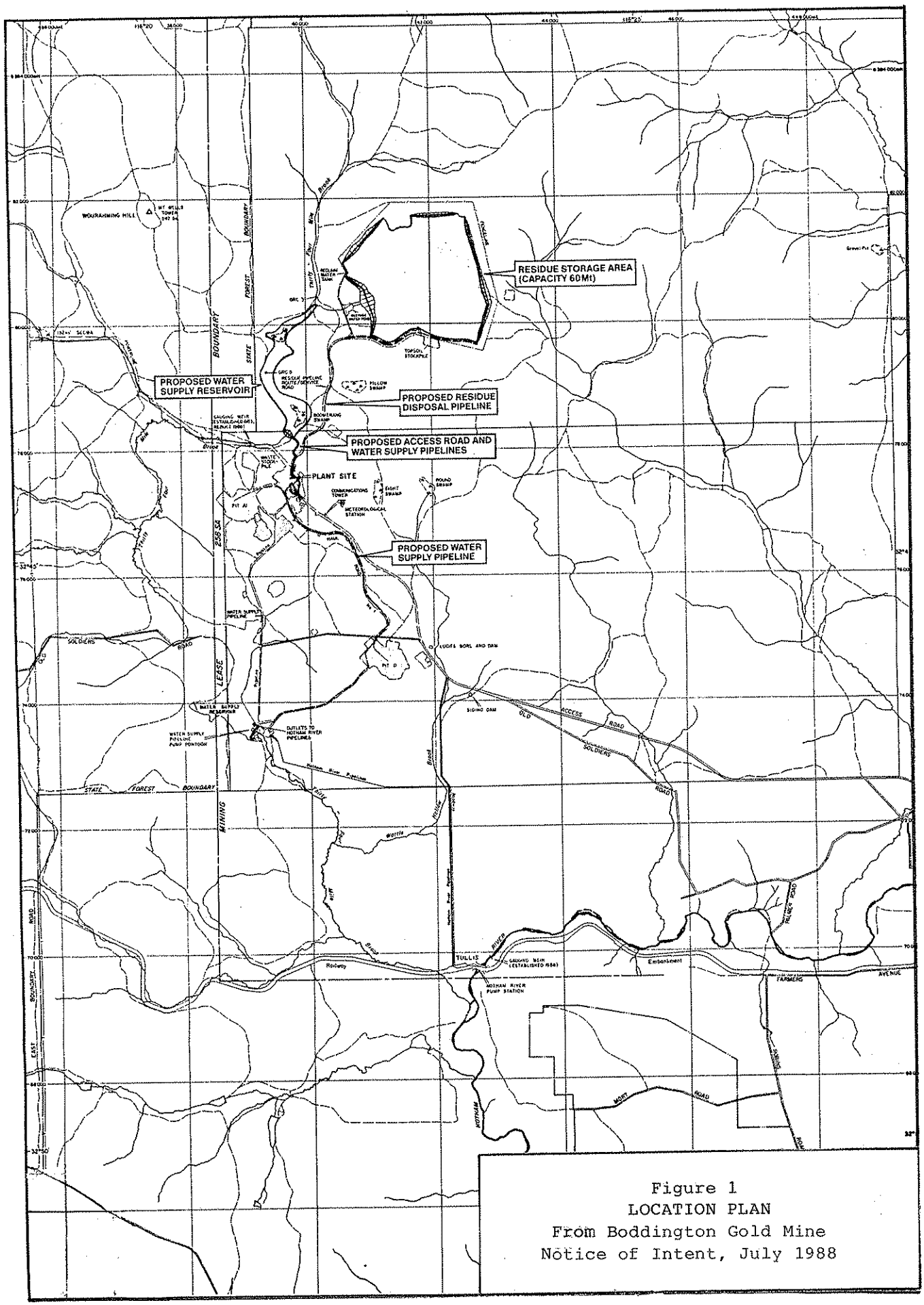


Figure 1
LOCATION PLAN
From Boddington Gold Mine
Notice of Intent, July 1988

2. PROPOSAL

The proposed expansion of the gold processing facilities would involve modification of the water supply, plant and residue disposal and reclaim return systems.

2.1 WATER SUPPLY UPGRADING

To provide an adequate and secure water supply for the expanded plant, it is proposed to construct an additional water supply reservoir of 3,060 ML capacity and to increase the maximum pumping rate from the Hotham River from 2,200 kL/h to 3,300 kL/h. The new water supply reservoir would be built on privately owned land on thirty-four Mile Brook immediately north of the plant site and will be subject to licensing by the Water Authority under the Rights in Water and Irrigation Act, with the conditions on the licence covering various aspects, including dam safety. Construction techniques will be to the satisfaction of the Minister for Water Resources. Construction would require clearing of 58 ha of private land.

2.2 TREATMENT PLANT MODIFICATIONS

The plant facilities proposed include the installation of an additional dump hopper and crushing facility, an upgrading of the milling and classification area, three additional leach/adsorption tanks, an additional residue surge tank, a re-arrangement of tank duties, the installation of a second elution column, the upgrading of the existing dosing pumps in the reagent preparation area, and the construction of an additional administration building. All of these, except the new administration building, would be accommodated within the existing Plant Site perimeter fence and would not involve any additional clearing; construction of the new administration building may require clearing of about 0.1 ha.

2.3 RESIDUE DISPOSAL AND RECLAIM RETURNS SYSTEMS MODIFICATIONS

The modifications to the residue disposal and reclaim return systems proposed, are a duplication of the residue pipeline, the relocation of the existing residue disposal pipeline along the southern section of the Residue Storage Area, the construction of an additional reclaim water pump station, and the enlargement and relocation of the reclaim water collection tank.

3. ENVIRONMENTAL ASSESSMENT

In considering the Company's initial proposal to upgrade the mining facilities the Authority determined that the proposal would require formal assessment under Part IV of the Environmental Protection Act, 1986 and that the level of assessment would be Notice of Intent.

A Notice of Intent has been submitted by the Company addressing the environmental aspects of the proposal in the context of the Environmental Management Programme that has been adopted for the existing operations.

4. ENVIRONMENTAL ISSUES

In its assessment of this proposal, the Authority recognised that this enhancement of facilities was a further incremental development of the Stage I enhancement of facilities proposal approved in December 1987. However, because the Boddington Gold Mine (BGM) and the Hedges Gold Project share the water of the Hotham/Murray River system, the issue of water supply was extensively examined.

An agreement between BGM and Hedges for sharing water was ratified by the Minister for Water Resources in June 1988. BGM have made a further commitment that, should BGM increase its licensed instantaneous rate of withdrawal of water from the Hotham River above the 2,200 kL/h currently provided by the Water Authority licence, then the Hedges entitlement of 2,000 kL/h would be preserved - ie during periods when streamflow is greater than the minimum flow but less than the minimum flow plus the sum of the licensed extraction rates for BGM and Hedges, water would continue to be shared in the ratio: BGM 4.5: Hedges 2.0 (the current design ore throughput rates ration), except when streamflow is such that BGM could extract water at a greater rate without diminishing Hedges' entitlement below that which would have existed in the absence of BGM's licensed increase above 2,200 kL/h. The Authority considers that this proposal is acceptable, subject to approval by the Minister for Water Resources.

Extensive modelling of the Hotham-pumping strategies for both the BGM and Hedges Gold Mine has shown the water extracted during winter rainfall conditions generally constitutes only a small proportion of the total Hotham River flow. Pumping capacities are such that maximum advantage may be taken of peak flows and the environmental impact of the increased pumping on the ecology of the Hotham River and downstream users, is seen as acceptable.

Some concern has been expressed by the Water Authority regarding seepage from the existing residue storage area. The proponent has given an undertaking to correct any problems, should they occur. Experience has now been gained with operating the 34 Mile Brook storage, the process water dam and the initial start up operations in the residue disposal area. This experience will be used to rectify potential problems with the residue disposal system, particularly relating to seepage from the main tailings dam and saddle dams.

Construction of the new water storage reservoir will be subject to licencing by the Water Authority of Western Australia under the Rights in Water and Irrigation Act, with the conditions of licence covering various aspects including dam safety.

Construction techniques for the the water storage reservoir and for modifications to the existing residue storage area, should be to the satisfaction of the Minister for Water Resources.

Additional forest clearing resulting from this proposal was limited to a total of less than 60 Ha of private land. No clearing of State Forest would be required. Other aspects of the proposal were considered to be manageable and not to have a significant environmental impact potential.

5. CONCLUSION

In its assessment of this proposal, the Authority recognised that this enhancement of facilities was a further incremental development of the Stage I enhancement of facilities proposal approved in December 1987. However, because the Boddington Gold Mine (BGM) and the Hedges Gold Project share the water of the Hotham/Murray River system, the issue of water supply was extensively examined.

The Environmental Protection Authority notes that pumping from the Hotham River can only take place when the river flow is in excess of 342 kilolitres per hour. Total pumping from the river can not cause the remaining flow to be reduced below a level of 342 kilolitres per hour.

Consequently, the Environmental Protection Authority concludes that in order to ensure that the pumping from the Hotham River does not reduce flow below 342 kilolitres per hour, the proponent should re-negotiate with the Hedges Project management, any changes to the water extraction agreement (as ratified by the Minister for Water Resources in June 1988), to the satisfaction of the Minister for Water Resources.

Upon assessment of the Worsley Alumina Pty Ltd proposal the Environmental Protection Authority has further concluded that the proposed enhancement of facilities at the Boddington Gold Mine would be environmentally acceptable provided that upgraded operations are carried out in accordance with the commitments documented in the Environmental Management Programme for the Boddington Gold Mine (Appendix A).

APPENDIX A

SUMMARY OF SUBMISSIONS

APPENDIX A

SUMMARY OF SUBMISSIONS

Submissions were received from the Department of Mines, Western Australia and the Water Authority of Western Australia.

The Department of Mines expressed concern as to the integrity of the projects dam structures and recommended that the annual report on monitoring and performance include an assessment of these structure to guidelines prepared by the Water Authority and the Department of Mines. They also considered it essential for the company to demonstrate that no competition for water would exist between the Hedges Gold Mines and the Boddington Gold Mine.

The Water Authority considered that the proposed increase in water extraction rates was acceptable. They noted that the current monitoring programme was largely satisfactory, but because the proposed new water storage lies between the gauging station and the tailings dam, a review of the monitoring programme was desirable.

The Water Authority was also concerned with the security of the residue storage area. They recommended that the Company use the experience gained in operating the 34 Mile Brook Storage, the process water dam on the plant site and the initial start up operations in the residue storage area to review their proposals for the residue storage area upgrade. They noted that the construction of the new water supply reservoir on 34 Mile Brook would be subject to licencing under the Rights in Water and Irrigation Act, with the conditions on the licence covering various aspects, including dam safety. The Water Authority concluded that the final techniques chosen for construction of that dam might be influenced by the outcome of the review of the disposal area operations and that this in turn might indicate that there was a role for this structure to control pollution in the longer term, with a consequent effect on the longer term objectives for rehabilitation of the storage basin.

APPENDIX B

PROPONENTS RESPONSE TO SUBMISSIONS

Appendix C

Worsley Alumina Pty Ltd.

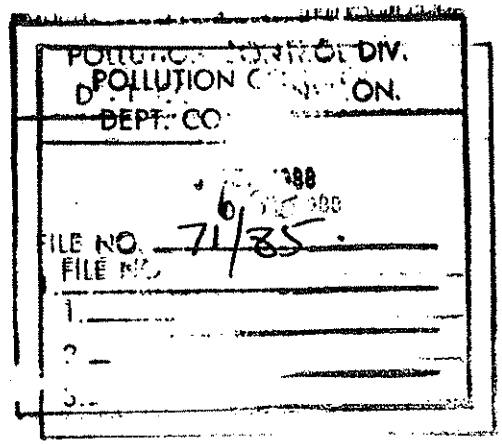
Incorporated in the State of Western Australia

ACTING AS MANAGER OF A JOINT VENTURE OF REYNOLDS AUSTRALIA ALUMINA LTD THE SHELL COMPANY OF AUSTRALIA LTD, BHP MINERALS LIMITED AND KOBE ALUMINA ASSOCIATES (AUSTRALIA) PTY LTD RESPONSIBLE ONLY SEVERALLY IN THE PROPORTIONS OF 40% 30% 20% and 10% RESPECTIVELY

Boddington Gold Mine, P.O. Box 48, Boddington, Western Australia, 6390
Telephone: (098) 83 8260; Facsimile: (097) 34 8108

CJ:dln:1.42

1st September 1988



The Acting Director
Evaluation Division
Environmental Protection Authority
57 Murray Street
PERTH WA 6000

Attention: Ms D. Peggs

BODDINGTON GOLD MINE: STAGE TWO EXPANSION - NOTICE OF INTENT

Thank you for your letter of 19 August 1988, with which you conveyed the submissions of the Department of Mines and the Water Authority on our NOI for the above project proposal. We have examined the matters raised in those submissions and provide the following responses.

WATER AUTHORITY

Surface Water Monitoring (Paragraph 2 of Water Authority submission)

Surface water flows and quality in Thirty-Four Mile Brook are monitored at the recently-installed gauging station north of the Plant Site and downstream of the proposed new Water Supply Reservoir (see Fig. 3.1 of July 1988 NOI).

Monitoring at this site should reflect impacts on water quality and quantity from all processing and residue storage activities, plus some mining activities.

Upstream of the proposed new Reservoir, flows in Thirty-Four Mile Brook are rare (negligible catchment yield has been assumed in modelling water balances); installation of stream gauging facilities is therefore considered to be of limited value in this uppermost part of the Thirty-Four Mile Brook Catchment.

The quality of water leaving the valley in which residue is stored is monitored by the network of bores which constitute part of the residue area monitoring regime (see Fig. 3 in January 1988 Quarterly Report No. 1 submitted in accordance with the Environmental Protection Act Licence for BGM). It is proposed to modify this monitoring programme by:

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(i) if, in consultation with the Water Authority, it is considered appropriate, relocation of the groundwater monitoring bore GRC5, which will be inundated by the proposed new water supply reservoir (see Section 4.2 of the July 1988 NOI); and

(ii) sampling Thirty-Four Mile Brook (for standard water quality assessments) at the point of entry of the stream into the proposed new reservoir - sampling would be weekly (when flowing).

It should be noted that inflows into the proposed new reservoir will be able to be determined from rainfall, evaporation and pumping data, together with data from the recently-installed gauging station downstream of the proposed new reservoir.

Residue Storage - Performance Review (Paragraph 3 of Water Authority submission)

In compliance with one of the conditions of the Environmental Protection Act Licence for the Boddington Gold Mine, Worsley Alumina is required, by the end of October 1988, to provide the State (the Water Authority) with an hydrogeological review of performance of the residue storage system over the first twelve months of operation. Work on this review has commenced, extending and building on on-going studies of consolidation and chemistry of deposited residue. A key part of the scope for this work is review of seepage from the main residue storage area embankment and review of proposals for future management of seepage from that embankment and from the saddle embankments which will be required as the level of stored residue rises.

New Water Supply Reservoir (Paragraph 4 of Water Authority submission)

The potential long-term role for the proposed new water supply reservoir on Thirty-Four Mile Brook in maintaining water quality downstream has been discussed with the Water Authority in recent days. Accordingly, Worsley Alumina plans to maintain close liaison with the Water Authority during the design of the proposed new reservoir, and during the review of performance of the residue management system.

DEPARTMENT OF MINES

Integrity of Dam Structures

Water supply reservoir dams will, as in the past, be monitored for dam safety as required by the Rights in Water and Irrigation Act and as agreed with the Water Authority for the re-licencing of the existing water supply reservoir following the installation of the inflatable rubber dam for the 4.5 Mt/a upgrade. Residue Storage Area embankments are similarly subject to the Dam Safety provisions of the Rights in the Water and Irrigation Act.

The comments made above in response to the Water Authority's submission on performance of the residue management system are considered to also be appropriate to the matters raised by the Department of Mines.

Competition for Water

Section 4.2.1 and Appendix A of the July 1988 NOI detailed our water balance modelling approach to predicting the impacts of both the BGM and Hedges operations on Hotham River flows, and outlined the agreed method for sharing Hotham flows so that the prescribed minimum flow is preserved during periods of pumping from the Hotham. The agreement between BGM and Hedges for sharing water was ratified by the Minister for Water Resources in June 1988.

It has been agreed verbally with Hedges that, should BGM increase its licensed instantaneous rate of withdrawal of water from the Hotham River above the 2 200 kL/h currently provided by the Water Authority licence, then the Hedges entitlement of 2 000 kL/h would be preserved - i.e. during periods when streamflow is greater than the minimum flow but less than the minimum flow plus the sum of the licensed extraction rates for BGM and Hedges, water would continue to be shared in the ratio:
BGM 4.5 : Hedges 2.0 (the current design ore throughput rates ratio), except when streamflow is such that BGM could extract water at a greater rate without diminishing Hedges' entitlement below that which would have existed in the absence of BGM's licensed increase above 2 200 kL/h.

This modification of the BGM/Hedges agreement on water sharing will be formalised in the near future and the modified agreement submitted to the Minister for Water Resources for his approval.

We note the Department of Mines' observation of an outstanding (non-environmental) matter on which negotiation is proceeding; we understand that this matter is not relevant to the EPA's assessment under the Environmental Protection Act.

We trust that the above responses are appropriate to the matters raised by the Water Authority and the Department of Mines. Please contact the undersigned or Dr Chris John should you require further information.

Yours faithfully
WORSLEY ALUMINA PTY LTD

P.A. Chare
GENERAL MANAGER - BODDINGTON GOLD MINE

APPENDIX C

SUMMARY OF ENVIRONMENTAL COMMITMENTS

SUMMARY OF ENVIRONMENTAL COMMITMENTS

The EMP (Worsley Alumina Pty Ltd 1987a) documented a comprehensive set of environmental management commitments (Section 9) which have been adhered to in the design, construction and operation of the Boddington Gold Mine. None of the aspects of the proposed expansion to 6 Mt/a would affect the integrity of these commitments. The Joint Ventures restate their commitment to environmental management, in accordance with the April 1987 EMP, for the proposed 6Mt/a operation.

The following list is a summary of those major environmental commitments, as previously stated for the Boddington Gold Mine Project. Some of the commitments relate to the recommendations of the EPA report on the project proposal (October 1985), as noted emboldened in square brackets after these commitments:

- clearing for project activities will be kept to a minimum, consistent with safe operating practices;

- topsoil from areas cleared for project activities will be salvaged for use in decommissioning and other rehabilitation programmes **[EPA Recommendation 12]**;

- environmentally-sensitive construction and operational practices, including stringent forest hygiene measures, will be employed throughout the project area (see Exhibit H, Appendix A; Environmental Checklist, Appendix E);

- the operation will be licensed in accordance with the requirements of the Environmental Protection Act, 1986 (includes air, water and noise pollution control);

- the State will continue to be compensated for clearing of State Forest under the terms of the Alumina Refinery (Worsley) Agreement Act, 1973 (as amended);

- alternative access from private land around the Water Supply Reservoir to State Forest to the west of the project area has been provided for local bush fire brigades and CALM;

- biological monitoring programmes, based on information provided to the State in the draft report on baseline biological investigations, will be developed in consultation with the State. Results of these monitoring programmes will be reported to the State and changes to management and procedures developed as necessary with the State **[EPA Recommendation 1 and 2]**;

- a quantified assessment of likely of project clearing on streamflow and quality of Thirty-Four Mile Brook has been carried out with the Water Authority of Western Australia (see Appendix B). In consultation with the EPA and the Water Authority, existing surface and groundwater monitoring programmes are being extended to facilitate progressive planning and management of project activities, particularly mining and residue storage, to minimize adverse hydrological and hydrogeological effects **[EPA Recommendations 9 and 10]**;

- rehabilitation of project areas will be carried out in consultation with the State and, where appropriate, the land owner, with the aim of maintaining the water quality of Thirty-Four Mile Brook so that the Water Supply Reservoir would be a viable long-term source of public water supply. If, at the time of decommissioning, the State requires the Water Supply Reservoir as a potable water source, the water quality in the reservoir will be reassessed and, should it prove to be unsuitable, the Joint Ventures will drain the dam, allowing it to refill naturally **[EPA Recommendation 11]**;

- the downstream user of Thirty-Four Mile Brook is being compensated for reduced flows due to the construction of the Water Supply Reservoir;

- a programme for regular assessments of forest health, including tree growth monitoring, is being established adjacent to the Mining Area in consultation with the EPA and CALM. If disease spread unacceptable to the State is detected, operational practices will be reviewed and modified **[EPA Recommendation 3]**;

- the State has been provided with the results of studies and assessments on the likely effects on the environment of cyanide, caustic soda and viscosity modifier used in the process and deposited with residue **[EPA Recommendation 5]**;

- as part of applications for permission to divert water (Rights in Water and Irrigation Act, 1914 [as amended]) and for a Works Approval (Environmental Protection Act, 1986), the State has been provided with the detailed design reports and reports on geotechnical, hydrological investigations carried out for the Water Supply Reservoir and the Residue Management System, including monitoring/recovery borefields **[EPA Recommendations 6 and 8]**;

  Additional information has been provided in relation to atmospheric emissions and noise aspects of the Works Approval.

- if unacceptable quality is detected in groundwater monitoring bores around the Residue Disposal Area, one of the remedial actions described in Section 8.3.3. will be adopted.

- material from residue and reclaim pipeline leaks/breakages will be contained at low points along the residue pipeline route and transported to the Residue Disposal Area. If spills are not fully contained, WAPL will carry out clean-up and rehabilitation of affected areas in consultation with the State.

- in the unlikely event of a dam failure, including the overtopping of the Process Water Pond, the Joint Venturers will assume responsibility for clean-up and rehabilitation to the satisfaction of the State **[EPA Recommendation 7]**;

- the Hotham River Pump Station has been designed (size of structure, colour of structure and equipment) to minimize visual impact. Noise from the electrically-driven pumps and from temporary diesel alternators (permanent power is scheduled for connection in mid-1987) has been evaluated in relation to neighbourhood noise legislation and appears unlikely to be a problem; however, equipment modification will be evaluated should problems arise **[EPA Recommendation 17]**;

- all waste and spilt materials in the Metallurgical Treatment Plant area will be contained within the process operation for reuse, or disposed of as appropriate;

- caustic soda used in the Metallurgical Treatment Plant will have a mean mercury content of less than 100 ug/L, with a maximum of 1,000 ug/L **[EPA Recommendation 4]**;

- stormwater runoff from the cleared area of the Plant Site will flow into the Process Water Pond, which has been lined with clay to minimize leakage. The pond will have sufficient capacity to accommodate rainfall runoff from a one in one hundred year storm event;

- noise during blasting operations will be limited, by the conditions of the Mining Contractor's contract, to less than 120 dB linear at the nearest residence, some 6 km from the blast site;

- drainage will be installed in the mine pits, with runoff either used for dust suppression, or drained via spilt traps to natural watercourses;

- perimeter drains will be installed around mine pits and stockpiles; water from these and from haul roads will drain through silt traps into natural watercourses;

- the objective of the management of runoff from the mining operations will be to minimize the potential spread of forest disease and to reduce the longterm salinity and turbidity impact on Thirty-Four Mile Brook;

- mine waste not used in road construction will be returned as back fill to mine pits during the life of the project;

- if it is decided not to process marginal ore, this material will be returned to mined-out pits;

- shallow mine pits will be contoured to slopes generally consistent with natural landforms **[EPA Recommendation 13]**;

- deeper pits will be rehabilitated it, at the time of completion of mining the weathered profile, no decision to mine bedrock has been made. Should a decision to mine bedrock be made, detailed plans will be submitted to the State for approval **[EPA Recommendations 15 and 16]**;

- final rehabilitation will ensure that runoff will drain to natural watercourses or into the deeper pits;

- ten-year mining plans will be prepared and submitted to the State as part of the existing arrangements for the Worsley Alumina Project, and will be regularly updated **[EPA Recommendation 14]**, and

- the state will be provided with brief annual and comprehensive triennial environmental management reports as part of existing arrangements for the Worsley Alumina Project **[EPA Recommendation 19]**.