

BOW RIVER ALLUVIAL DIAMOND PROJECT

**BOW RIVER, WESTERN AUSTRALIA
FREEPORT BOW RIVER PROPERTIES LIMITED**

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

**Environmental Protection Authority
Perth, Western Australia
Bulletin 307 October 1987**

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OF

THE ENVIRONMENTAL PROTECTION AUTHORITY

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i. **SUMMARY AND RECOMMENDATIONS**

Freeport Bow River Properties Limited has submitted a proposal to mine alluvial diamonds in the Bow River area of Western Australia.

The proposal involves the establishment of a plant to process riverine gravel. The fine waste material will be disposed of in a tailing dam and the coarse waste material dumped near the processing plant. The diamondiferous material will be concentrated in a Heavy Medium Separator and then sorted using an x-ray diamond sorter. The plant will process 4 000 tonne per day.

The orebody covers approximately 500 ha and has an average depth of 2 m. The deposit will be mined progressively allowing rehabilitation to be ongoing during the mining operation. All topsoils and black soils will be stockpiled for rehabilitation or placed directly over mined out areas. The expected lifetime of the project is seven years. It will employ approximately 80 people on-site and 2 or 3 in Kununurra.

On completion of the project all plant equipment and camp facilities would be removed and the areas rehabilitated.

The Authority determined that potential for environmental impact would not require it to be formally assessed under Part IV of the Environmental Protection Act 1986. Accordingly this report is not a formal assessment report of the Environmental Protection Authority and as such there are no appeal rights on the report and recommendations.

Upon assessment of the Notice of Intent the Authority concluded that the proposal is environmentally acceptable and makes the following recommendations.

RECOMMENDATIONS

The Environmental Protection Authority has concluded that the proposal to mine alluvial diamond in the Bow River Area is environmentally acceptable and recommends that it could proceed subject to:

- the proponent abiding by the commitments in the Notice of Intent for erosion control and prevention of sediment loading of the streams, including
 - (i) progressive rehabilitation of the mine area to the Department of Mines requirements,
 - (ii) construction of sediment traps along mine area, and
 - (iii) placement of fine material in the tailings dam,
- the proponent consulting with the Water Authority of Western Australia on the design of
 - (i) the petrochemical storage, and
 - (ii) the pipeline take off.

1. BACKGROUND

Freeport Bow River Properties Limited wishes to establish an operation for mining alluvial diamonds in the Bow River area of Western Australia. The project is located in the Kimberley Mineral Field about 90 km south of Kununurra and 6 km north-east of Lissadell Homestead (see Figure 1).

In September 1987 Freeport Bow River Properties Limited submitted a Notice of Intent to develop an alluvial diamond mine. The Authority discussed the proposal and decided to assess it under Part IV of the Environmental Protection Act 1986 and that the level of assessment would be Notice of Intent.

2. PROJECT DESCRIPTION

2.1 AIMS

The project aims to recover diamonds from alluvial deposits within the Bow River area. Up to 500 ha of riverine gravels will be mined. The deposit averaging 2 m in depth.

Vegetation will be stripped, together with the top 5 - 10 cm of soil and stockpiled. The black soils will then be stripped and stockpiled. These stockpiles will be used to rehabilitate mined out areas.

The diamondiferous riverine gravels will be removed by excavators and all material larger than 16 mm diameter will be screened out. The remainder will be deslimed and all the material less 1.5 mm diameter pumped into the tailings dam. The diamondiferous gravels 1.5 mm to 16 mm represent approximately 25% of the riverine gravels. These will be treated in a Heavy Medium Separator. The final concentrate will be sorted using X-ray diamond sorters. Stains on the surface of the diamonds will be removed using hydrochloric and hydrofluoric acid. Waste acid will be neutralized and disposed off in the tailings dam. Approximately 4 000 tonnes of riverine gravels will be processed per day.

Waste material coarser than 1.5 mm will be dumped near the processing plant to form an irregular flat topped hill 650 m x 650 m and approximately 10 m high. The fine sediment and clays will be pumped into the tailings dam and allowed to settle. The tailings dam will cover approximately 30 ha and be 10 to 15 m high.

The project will employ up to 80 people. There may be 2 or 3 staff based in Kununurra.

2.2 INFRASTRUCTURE

Water supplies will be drawn directly from either Limestone Creek or the Ord River for both process and potable water. A bore will be established for potable water during the wet season due to the sediment loading in the surface waters.

Power will be provided by generators located on-site near the process plant.

The camp site will be located in the south-western corner of the tenement and will house up to 80 people.

The road access will be made all weather.

3. THE EXISTING ENVIRONMENT

The project is situated on a pastoral lease, Lissadell Station. The area is tropical monsoonal in climate having distinct dry and wet season. The proposed mining tenement forms part of the Ord Sedimentary Basin. The soils are chiefly brown and grey cracking clays.

The surface hydrology consists in the wet season of surface flow across the black soil plains. The vegetation ranges from open woodlands to treeless grasslands. The vegetation types are common and widespread throughout Kimberley. The data available from Argyle faunal survey and a limited faunal conducted on-site indicated that no unique faunas or relict population of rare species are found in the area.

There are three Aboriginal site registered with the Western Australian Museum within the tenement. These are all limestone ridges. They will not be mined and will be unaffected by associated activities.

4. ENVIRONMENTAL ISSUES

In its assessment of the proposal the Authority considers the following as the major issues:

- . soil erosion and hence sediment loading of Lake Argyle;
- . protection of catchment area from spillage of fuel etc; and
- . rehabilitation of mined area and borrow pit.

The Bow River soils slake quickly to form fine aggregate and given the potential for high intensity rains, erosion and subsequent movement into the waterways is a significant hazard. To alleviate this problem, a series of sediment traps and contour banks will be constructed along the length of the mine. The mine itself will act as a sediment trap in large rainfall events. The removal of black soil and ore will be progressive with topsoil and black soil being placed into the mine pit as mining progresses. This will ensure that the minimum area of land surface is disturbed at any one time and that the maximum amount is already undergoing rehabilitation. All fines from the processing will be placed into a tailings dam and hence not enter the system. The tailing dam is designed to have walls 1 to 2 metres above the tailings level and therefore in the event of heavy rainfall would not overflow. Rainfall in the dam will be drained off by decant towers to the decant ponds.

Because the mining project is the catchment area of Lake Argyle there is concern about the potential for pollution, particularly petrochemical pollution. To minimize this pollution the process plant will be above 103.6 Above Sea Level (102 ASL = 100 year flood). The mine vehicle workshop and any building likely to store fuel or oil will be located above RL 106 m on Mary Hill. Holding moats sufficiently large to hold the entire volume of fuel will be constructed around the base of all fuel tanks. Campsite design will include a drainage and septic tank system to cope with high rainfall events and prevent overflow of sewerage into surface waters.

Rehabilitation of the mine area, borrow pits, tailing dam etc is considered of importance for two reasons:

- . retaining the land to its pastoral use; and

prevention of erosion and subsequent increase of sediment load in Lake Argyle.

Rehabilitation of the mine area will be progressive. Cattle access to regenerating grasslands will be prevented by fencing. Supplementary seeding will be carried out if necessary. The tailings dam wall will have low slopes (1:3) to reduce runoff and encourage revegetation. Borrow pits will have the topsoil stripped and stockpiled. After use, the slopes of the borrow pits will be flattened and the pits deeply ripped and then covered with topsoil and vegetation debris.

On completion of the project all plant equipment and camp facilities will be removed. Rubbish will be removed or buried above the 100 year flood contour. Compacted areas, roads and other annanted ground will be ripped and covered with topsoil. Artificial seeding will occur if necessary.

5. CONCLUSION

Upon assessment of Bow River Alluvial Diamond Project the Authority concluded that the project would be environmentally acceptable as proposed in the Notice of Intent. Although the area to be mined is large 500 ha, the progressive nature of the mining allows ongoing rehabilitation of the mine and hence reduces the area open to erosion during operation.

LIST OF ENVIRONMENTAL COMMITMENTS

1. The process plant will be situated above 103.6 m contour.
2. Vegetation and topsoil, will be stripped and stockpiled for rehabilitation or put directly back over the black soil, that has already been replaced in mined out area.
3. Black soil will be stripped and either stockpiled for rehabilitation or put directly back over mined out areas.
4. Waste acids will be neutralized and placed in tailing dam.
5. Fine sediments and clays will be pumped into tailings dam.
6. In all aspects of mine development and rehabilitation sharp local gradients will be avoided where possible.
7. A sediment traps and addition water supply of Lissadell station will be constructed at north end of mined out ground.
8. No disruption to known Aboriginal sacred sites.
9. All fuel and oil to be stored above 100 year flood level, and to be bunded with capacity to hold all fuel.
10. Dust to be kept to a minimum by using water trucks.
11. A series of sediment traps and contour banks to be built along the length of mine as required.
12. Borrow pits will be rehabilitated.
13. Drainage and sewerage system will be designed to cope with high rainfall events.
14. Cattle access will be denied by fencing regenerating grasslands.
15. The tailing dam will be rehabilitated.
16. On completion of project all unwanted roads and compacted areas will be ripped and revegetated.
17. All plant, equipment and camp facilities will be removed.
18. All rubbish will be removed or buried above 100 year flood level.