

SPINIFEX RIDGE MOLYBDENUM PROJECT

Moly Metals Australia Pty Ltd

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

**Environmental Protection Authority
Perth, Western Australia
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Environmental Impact Assessment Process Timelines

Date	Progress stages	Time (weeks)
9/10/2006	Level of Assessment set (following any appeals upheld)	
20/8/2007	Proponent Document Released for Public Comment	45
2/10/2007	Public Comment Period Closed	6
6/3/2008	Final Proponent response to the issues raised	22
14/04/2008	EPA report to the Minister for the Environment	5

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Summary and recommendations

This report provides the Environmental Protection Authority's (EPA's) advice and recommendations to the Minister for the Environment on the proposal by Moly Metals Australia (Pty Ltd) (Moly Mines) to develop an open pit mine and process 20 million tonnes per annum (Mtpa) of ore to produce 23,000 tonnes per annum (tpa) of molybdenum concentrate and 48,000 tpa of copper concentrate.

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

- The key environmental factors identified in the course of the assessment; and
- The EPA's recommendations as to whether or not the proposal may be implemented, and, if the EPA recommends that implementation be allowed, the conditions and procedures to which implementation should be subject.

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

The EPA is also required to have regard for the principles set out in section 4A of the *Environmental Protection Act 1986*.

Key environmental factors and principles

The EPA decided that the following key environmental factors relevant to the proposal required detailed evaluation in the report:

- (a) Groundwater – impact from dry stack tailings and waste dumps;
- (b) Surface Water and Drainage – impact from diversion channel, tailings and waste dumps;
- (c) Terrestrial Fauna – impact from clearing;
- (d) Closure and Rehabilitation; and
- (e) Amenity values.

There were a number of other factors which were very relevant to the proposal, but the EPA is of the view that the information set out in Appendix 3 provides sufficient evaluation.

The following principles were considered by the EPA in relation to the proposal:

- (a) The precautionary principle;
- (b) Inter-generational equity;
- (c) Conservation of biological diversity and ecological integrity; and
- (d) Waste hierarchy.

The Commonwealth Department of the Environment, Water, Heritage and Arts found the proposal to be a controlled action under the EPBC Act due to the presence of Listed threatened fauna species; Northern Quoll, Orange Leaf-nosed Bat, Mulgara and Pilbara Olive Python. The EPA has assessed the proposal in accordance with the

bilateral agreement between the Commonwealth and Western Australia relating to environmental impact assessments.

Conclusion

The EPA has considered the proposal by Moly Mines to develop an open pit mine and process 20 Mtpa of ore to produce 23,000 tpa of molybdenum concentrate and 48,000 tpa of copper concentrate.

Water

Groundwater and surface water are both present in the area of the mine and processing plant.

Surface water is the primary component of water, and groundwater and surface flow to the north from both areas. Mining, waste dumps and processing (including the tailings storage facility) have potential to adversely affect surface water quality.

Environmental objectives for surface and groundwater are largely the same, with subterranean fauna being the difference.

Groundwater and Stygofauna

Groundwater from the De Grey River and Canning Basin will be used for water supply for mine operations. Groundwater abstraction has the potential to lower the water table, which potentially can impact on both subterranean fauna and vegetation. Hydraulic modeling indicates that drawdown is unlikely to impact subterranean fauna in the proximity of the De Grey Borefield.

Surface water

Water quality of Coppin Gap could be impacted by mining activities such as the construction of the diversion channel and waste dumps.

Eroded sediment material from the diversion channel could potentially impact water quality in Coppin Gap Pool. The EPA notes, however, that construction of the majority of the diversion channel would be cut into competent rock material with a low potential for additional sediment generation. The creek bed and creek bank surfaces would be designed with low potential erodibility. Vegetation would be established along the diversion channel soon after it is constructed using material from the original creek that overlies the pit. The channel would incorporate a constructed floodplain that would allow for vegetation establishment in the area adjacent to the main channel flow.

Waste dumps have the potential to release sediments and impact water quality of Coppin Gap Pool. Waste dumps 1 and 2, in particular, will contain potential acid forming (PAF) material which has the potential to produce acidic runoff or runoff that may contain elevated concentrations of heavy metals.

Waste rock (overburden) generated during mining may contain PAF material. This material may contain molybdenum, copper and sulphur. PAF material will be placed in dumps 1 and 2 on at least 15m base of non-acid forming (NAF) material and capped with at least 10m of NAF material. The final design of the cap will be adjusted

to minimise infiltration of water into the PAF material and to reduce the potential of leachate into groundwater.

Waste dump 3, located south-east of the mine pit, has been redesigned. The northern extent of waste dump 3 has been altered to ensure that the landform does not encroach on minor creek lines that flow into Coppin Creek. The western boundary of the landform has also been modified away from the diversion channel to prevent flood water entering the waste landform area.

The EPA considers that the construction of the diversion channel and waste landforms are unlikely to have a detrimental impact on water quality of Coppin Gap.

Dry stack tailings management

A dry stack tailings storage facility (TSF) is proposed for use at the site. This form of tailings management has been implemented in North and South America in industrial operations, however these facilities operate under significantly different climatic conditions to that of the project area within the Pilbara.

The EPA notes that dry stack tailings in the Pilbara would need to be managed in a manner which ensures that high intensity rainfall events do not cause overflow and impact to surface or groundwater. Provided appropriate engineering design ensures that potential leachate and surface run-off do not impact groundwater, the EPA considers the dry stack TSF could be managed in an environmentally acceptable manner. The EPA has recommended conditions which requires appropriate design, water quality management to ensure that surface and groundwater quality is not significantly impacted.

The TSF would be progressively rehabilitated at a rate greater than 45ha per year and the unrehabilitated area of the TSF would not exceed 150ha at any time during operation and decommissioning. The EPA supports the progressive rehabilitation of the TSF.

In terms of water quality and quantity the EPA expects that management of surface and groundwater will ensure that:

- Australian water quality criteria are met for protection of potable water supply and ecosystem maintenance;
- Recreational and environmental values are protected;
- Water quality is monitored; and
- Department of Environment and Conservation regulate discharges under Part V of the *EP Act 1986*.

Terrestrial Fauna

The EPA notes that while a small area of potential Northern Quoll habitat would be cleared within the project area, it is unlikely to affect the conservation status of the Northern Quoll. The other listed species may forage or traverse the project area but are unlikely to be impacted.

An undescribed species of terrestrial snail, "*Quistrachia sp.*" (Camaenidae) was identified within the project area and the EPA has recommended a condition which

requires an autumn 2008 short range endemic (SRE) survey and with the development and implementation of appropriate management actions to protect significant species.

Amenity

Coppin Gap Pool is the focus of local tourist activities. To protect its scenic values, the EPA considers that there should be no visual intrusion within Coppin Gap of project activities. The EPA has thus recommended a condition that requires infrastructure and facilities to be designed and managed so that they are not visible from Coppin Gap Pool.

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 recommended conditions set out in Appendix 4, and summarized in Section 4.

Recommendations

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

1. That the Minister notes that the proposal being assessed is for Moly Metals Australia (Pty Ltd) to develop an open pit mine and process 20 Mtpa of ore to produce 23,000 tpa of molybdenum concentrate and 48,000 tpa of copper concentrate;
2. That the Minister considers the report on the key environmental factors and principles 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; and
4. That the Minister imposes the conditions and procedures recommended in Appendix 4 of this report.

Conditions

Having considered the proponent's information provided in this report, the EPA has developed a set of conditions that the EPA recommends be imposed if the proposal by Moly Mines to develop an open pit mine and produce 23,000 tpa of molybdenum concentrate and 48,000 tpa of copper concentrate is approved for implementation. These conditions are presented in Appendix 4. Matters addressed in the conditions include the following:

1. Groundwater and Subterranean Fauna
2. Surface Water and Drainage
3. Terrestrial Fauna
4. Closure and Rehabilitation
5. Visual Amenity

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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 key environmental factors and principles for the proposal by Moly Metals Australia (Pty Ltd) (Moly Mines) to develop an open pit mine and process 20 million tonnes per annum (Mtpa) of ore to produce 23,000 tonnes per annum (tpa) of molybdenum concentrate and 48,000 tpa of copper concentrate.

Moly Mines is a company that specialises in the exploration and development of major specialty, base and precious metals projects. Spinifex Ridge is currently the company's main project proposed for development with other molybdenum prospects in New South Wales.

Molybdenum is used as an alloying agent in steel, cast iron, and superalloys to enhance hardness, strength, toughness and corrosion resistance. The ability of molybdenum to withstand extreme temperatures without significantly expanding or softening makes it useful in applications that involve intense heat.

The proposal was referred to the EPA in October 2006 and the Level of Assessment was set at Public Environmental Review (PER) with a 6 week public review period under the Western Australian *Environmental Protection Act 1986* (EP Act). The proposal was also considered a controlled action under the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act). The public review period commenced on the 20 August 2007 and closed on 2 October 2007. The proponent's response to submissions was received by the EPA on 4 December 2007.

Details of the proposal are presented in Section 2 of this report. Section 3 discusses the key environmental factors and principles for the proposal. The conditions 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 Other Advice by the EPA, Section 6 presents the EPA's conclusions and Section 7, the EPA's Recommendations.

Appendix 5 contains a summary of submissions and the proponent's response to submissions and is included as a matter of information only. It does not form part of the EPA's report and recommendations. Issues arising from this process, and which have been taken into account by the EPA, appear in the report itself.

2. The proposal

The proposal is located approximately 50km north-east of Marble Bar and 200km south-east of Port Hedland. It lies within the Shire of East Pilbara and within the boundaries of the Yarrie Pastoral Station (see Figure 1). An A Class Reserve No. 31047 for the purpose of Nature Reserve vested in the Shire of East Pilbara which encompasses Coppin Gap, is located within the Spinifex Ridge Project mine

tenement. A timber reserve and water reserve are also located within the project mineral tenement boundary.

The project involves the development of an open cut mine, transport tunnel, diversion channel, processing plant, tailings storage facility (TSF), waste dumps, accommodation camp, airstrip and other associated infrastructure. A detailed description of the proposal is provided in Section 3 of the PER (Moly Mines, 2007).

Mining of overburden and ore would be by open pit methods using conventional mining equipment and techniques such as drill and blast, and load and haul. As the location of the pit intersects Coppin Creek, a diversion would be constructed around the proposed pit area. Ore would be conveyed via a transport tunnel through the Talga Range to secondary crushing facilities. Crushed ore would be drawn from stockpiles and fed to a mill circuit to prepare it for processing by floatation, followed by thickening, leaching and filtration. The main components of the proposed development are shown in Figure 2.

The processing of ore would produce tailings as a waste product. Thickened tailings would be pumped to a bank of belt filters which dewater the tailings to approximately 15-17% moisture content. The tailings would then transported by conveyor to a stacker for placement in a 600ha tailings storage area. Tailings would be stacked to a maximum height of 25m and would be progressively rehabilitated.

Overburden would be stockpiled to form three large waste rock landforms, covering a total area of approximately 400ha. The waste rock landforms would be located to the south, southwest and west of the pit (Figure 2).

Power for the operational stage of the project would be supplied by an onsite gas power plant. The gas would be reticulated to site by the installation of a branch pipeline from the existing Port Hedland to Telfer gas pipeline. The pipeline would follow existing tracks and would be adjacent to the water supply pipeline from the Canning Borefield. Diesel generators would be used during the initial construction stages of the project and would be decommissioned when the gas power plant is operational.

Water would be sourced from the De Grey River Borefield for the initial phase of the project and for peak demand (see Figure 3). The main water source would be a series of bores located in the Canning Borefield located approximately 70km north of the site. The total annual abstraction for the two borefields combined would be approximately 10 GL/yr.

The main characteristics of the proposal are summarised in Table 1 below. A detailed description of the proposal is provided in Section 3 of the PER (Moly Mines, 2007).

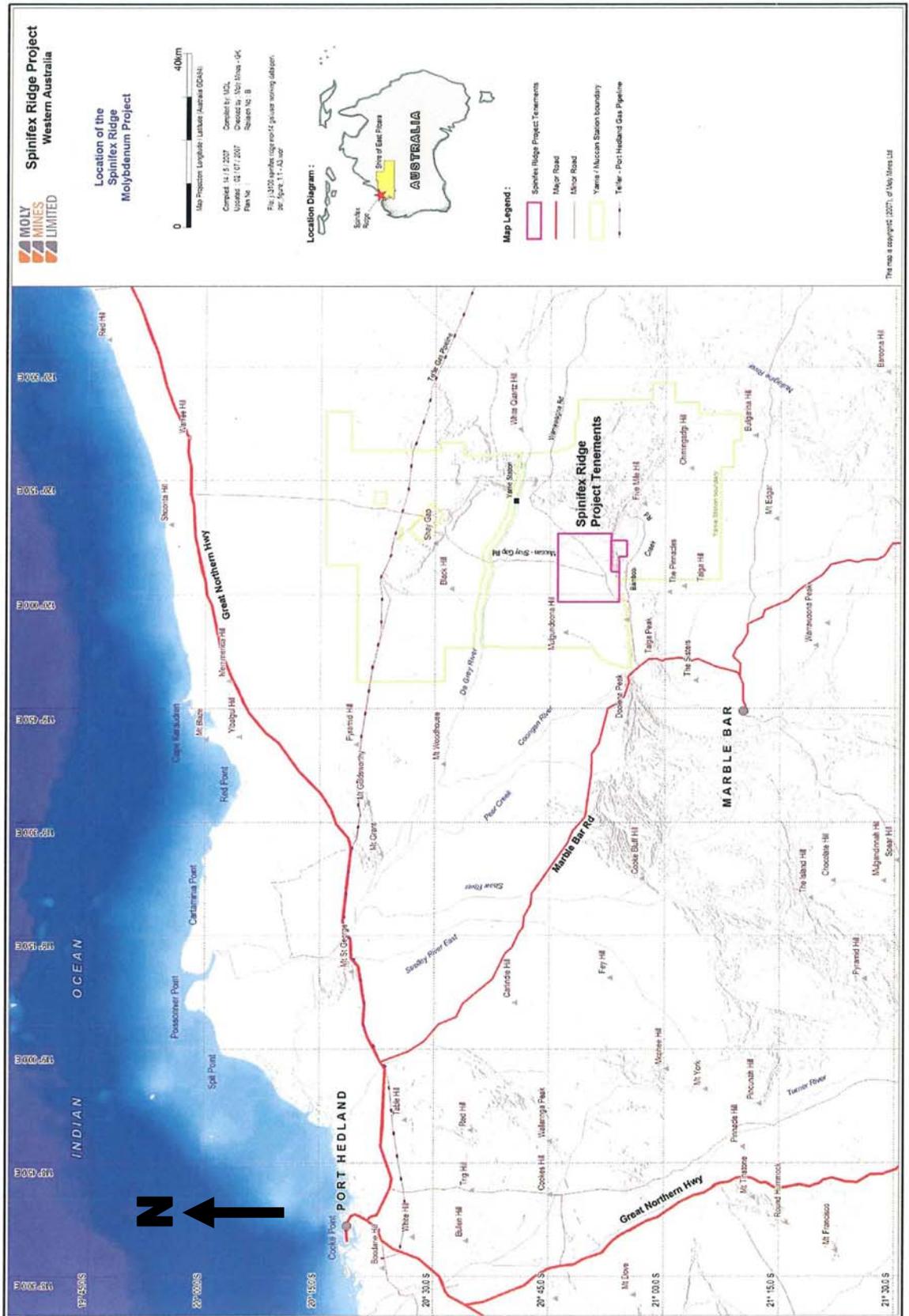


Figure 1: Regional location map

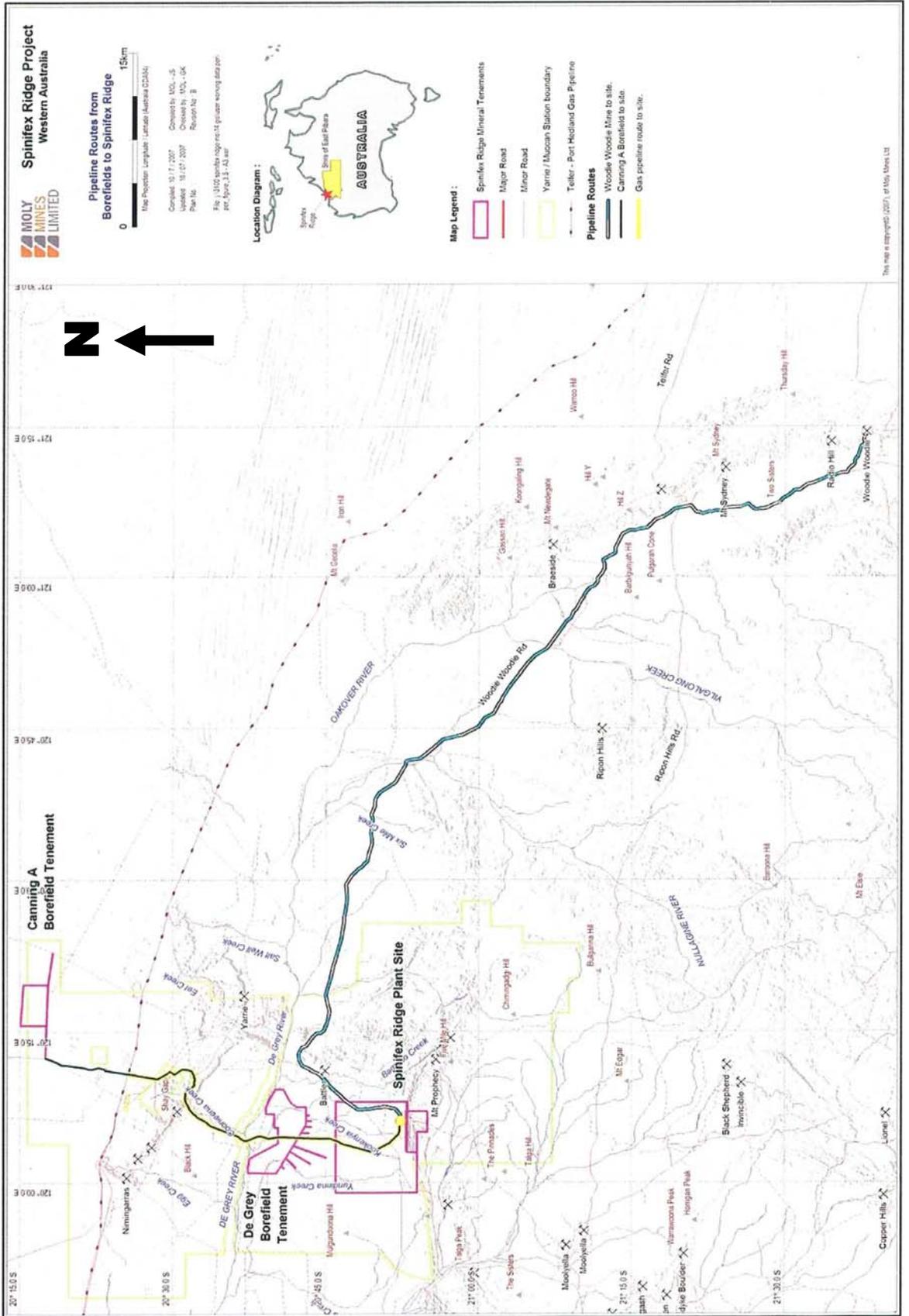


Figure 3: Pipeline corridors from borefields

* Woodie Woodie corridor option will no longer be undertaken.

Table 1: Summary of key proposal characteristics

Element	Description
General	
Life of Mine	10 years
Total Area of Disturbance	Approximately 1600 hectares
Total Area of Rehabilitation	All disturbed areas excluding final pit area
Final Depth of Pit	Approximately 430 metres below creek level
Treatment Rate	20 million tonnes per annum
Molybdenum concentrate production	Approximately 23 000 tonnes per annum (max ~ 25 000 tonnes per annum)
Copper concentrate production	Approximately 48 000 tonnes per annum
Power Requirements	600 Gigawatt hours per annum
Power Generation	Gas fired power plant
Water Requirements	Approximately 10.5 Gigalitres per year
Water Source	Groundwater bores from De Grey and Canning Borefields
Annual Greenhouse Gas Emissions	Approximately 640 000 tonnes of carbon dioxide equivalent
Processing Plant	Secondary and tertiary crushing, grinding and milling circuit, float and leach circuits.
Tailings Storage Facility	Approximately 600 hectare filtered dry stacked tailings design.

Since release of the PER, a number of modifications to the proposal have been made by the proponent. These include:

- A change to the management of the process plant tailings. The modification involves the filtration and stacking of the filtered tailings as a “dry” cake material instead of slurried tailings. Maximum height of the tailings would be 25m. The new design would enable progressive rehabilitation during the operational phase of the project at a rate of approximately 50ha per year. There are currently no dry stack tailings facilities of this size in Australia, however, this process and technology has been implemented in North and South America with more than 55 metal or industrial operations using the dry stack technology (Moly Mines, letter 21 February 2008).
- The waste dump footprint has been modified based on environmental considerations. The northern extent of Waste Dump 3 has been altered to ensure that the dump does not encroach on the minor creek line that flows into Coppin Creek just south of Coppin Gap during episodic rainfall events. The western boundary of this waste dump has been adjusted away from the diversion channel to ensure that flood waters in the channel do not impact the dump.
- The airstrip has been moved closer to the camp and processing plant. The new location is impacted less by drainage lines and allows for a more consolidated

overall project layout. The requirement for a temporary strip, as presented in the PER is no longer necessary.

- The road from Kitty's Gap is now proposed to go straight north to the Processing Plant access road instead of across Kookenyia Creek. As well as eliminating the requirement for a substantial creek crossing, the overall road distance is less.
- Annual approximate water requirements have reduced from 10.5 GL/yr.

The potential impacts of the proposal initially predicted by the proponent in the PER document (Moly Mines, 2007) and their proposed management are summarised in the Executive Summary of the proponent's document.

3. Key environmental factors and principles

Section 44 of the *Environmental Protection Act 1986* 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. In addition, the EPA may make recommendations as it sees fit.

The identification process for the key factors selected for detailed evaluation in this report is summarised in Appendix 3. The reader is referred to Appendix 3 for the evaluation of factors not discussed below. A number of these factors, such as flora and vegetation, geochemistry, greenhouse gases, weeds, aquatic ecology and landforms, are very relevant to the proposal, but the EPA is of the view that the information set out in Appendix 3 provides sufficient evaluation.

It is the EPA's opinion that the following key environmental factors for the proposal require detailed evaluation in this report:

- (a) Groundwater and subterranean fauna;
- (b) Surface Water and Drainage;
- (c) Terrestrial Fauna Management;
- (d) Closure and Rehabilitation; and
- (e) Amenity Values.

The above key factors were identified from the EPA's consideration and review of all environmental factors generated from the PER document and the submissions received, in conjunction with the proposal characteristics.

Details on the key environmental factors and their assessment are contained in Sections 3.1 - 3.5. The description of each factor shows why it is relevant to the proposal and how it will be affected by the proposal. The assessment of each factor is where the EPA decides whether or not a proposal meets the environmental objective set for that factor.

The following principles were considered by the EPA in relation to the proposal:

- (a) The precautionary principle;

- (b) Inter-generational equity;
- (c) Conservation of biological diversity and ecological integrity; and
- (d) Waste hierarchy.

3.1 Groundwater and subterranean fauna

Description

Water Supply

The groundwater system within the project area is defined by three surface water catchments. Of these three, the two catchments that drain through Coppin Gap also directly influence the groundwater system of the proposed open-cut mine. Groundwater flow into Coppin Gap is not considered as significant as the surface water flow into it. Analyses of monthly water levels indicate that the groundwater profile broadly follows the overall trend of the surface water drainage system, converging at Coppin Gap. The groundwater system at Coppin Gap is a dynamic system with large seasonal fluctuations.

Groundwater is fresh to slightly brackish with total dissolved solids (TDS) values ranging from 800 – 1300 milligram per litre (mg/L). Depth to groundwater ranges from 20 – 35m south of the Talga Range. Within the tailings storage facility site, which is north of the Talga Range, depth to groundwater ranges from 4 – 10m.

Groundwater from the De Grey River and Canning Basin will be used for water supply for mine operations.

The De Grey River Borefield is proposed to provide the initial water source for the project and peak demand water. Investigations have indicated a suitable water source capable of providing 8 GL/yr for an initial period, dropping to 4 GL/yr for the later stages of the project. The maximum requirement from this borefield is 4 GL/yr during construction and peak demand. The De Grey Borefield is designed to draw water from a semi-confined aquifer. To manage water level drawdown across the borefield, cycling of production and standby bores would be required to ensure an even drawdown cone across the borefield.

The Canning Borefield is located in the western margin of the Canning Basin approximately 70km north of the project site and would be the primary water source once the water demand increases above that available from the De Grey system. No phreatophytic (groundwater dependent) or vadophytic (water sourced from the unsaturated zone above water table) vegetation has been found in the area of the proposed borefield. The average annual requirement of water from the Canning borefield would be approximately 8 GL/yr. The total water requirement from both borefields is approximately 10.5 GL/yr.

The Woodie Woodie Borefield was a contingency water source to be used if the Canning Borefield was deemed environmentally unacceptable or inadequate for

project requirements. Moly Mines no longer intends to pursue the Woodie Woodie Borefield option.

Groundwater abstraction, particularly from the De Grey Borefield, has the potential to lower the water table and subsequently impact subterranean fauna and vegetation. Mining below the water table also has the potential to impact both subterranean fauna and vegetation within the area of drawdown due to changes in groundwater level.

Subterranean Fauna

Subterranean fauna surveys of the De Grey River borefield area show that one of eight groundwater wells sampled within the survey area contained stygofauna. The majority of these species are considered to be common within the Pilbara. One potential new species (*Mesocyclops* cf. *kieferi* n. sp.?) was identified from a pastoral control bore within the De Grey Borefield area. Currently, there are three known species of *Mesocyclops* in the Pilbara.

Subterranean fauna were recorded from 14 of 22 groundwater wells sampled within the project area. These were a mixture of non-stygol surface water invertebrates and common stygofauna taxa. The majority of the taxa are considered common within the Pilbara aside from one species of limited known distribution, *Leicandona quasihalsei* which this species has only recently been described from the type locality at Skull Spring on the Davis River, in the upper De Grey catchment, and was collected on the most recent survey of the project area.

All families of stygofauna recorded during surveys, including taxa only known to family and genus level at present, have a known distribution outside of the project area.

No stygofauna were identified from the three samples collected from the preliminary survey of the Canning borefield in September 2007. Sampling undertaken in February 2008 identified specimens of the Phylum Rotifera from three bores. There are 40 known records of Rotifera in the Pilbara.

Mine Dewatering

The proponent predicts that drawdown impact due to mine dewatering will be relatively localised, with the development of a steep hydraulic gradient surrounding the mine void due to the low permeability of the surrounding fresh rock mass. However, there is the potential for groundwater drawdown in excess of the natural variation to occur, particularly in the vicinity of drainage lines between the mine and Coppin Gap.

Within the localised cone of depression, phreatophytic and vadophytic species along Coppin Creek may be impacted as a result of the drawdown. The occurrence of *Melaleuca argentea* along areas of Coppin Creek indicates that, in its natural state, the depth to groundwater is unlikely to exceed 2 to 3m. This species may be impacted within the cone of depression due to its relatively shallow root system.

Vadophytic species *Eucalyptus camaldulensis* var *obtuse* (River Red Gum) and *E. victrix* (Coolibah) are prevalent along Coppin Creek. Dewatering could cause the species to exhibit signs of stress in correlation to decreased access to groundwater.

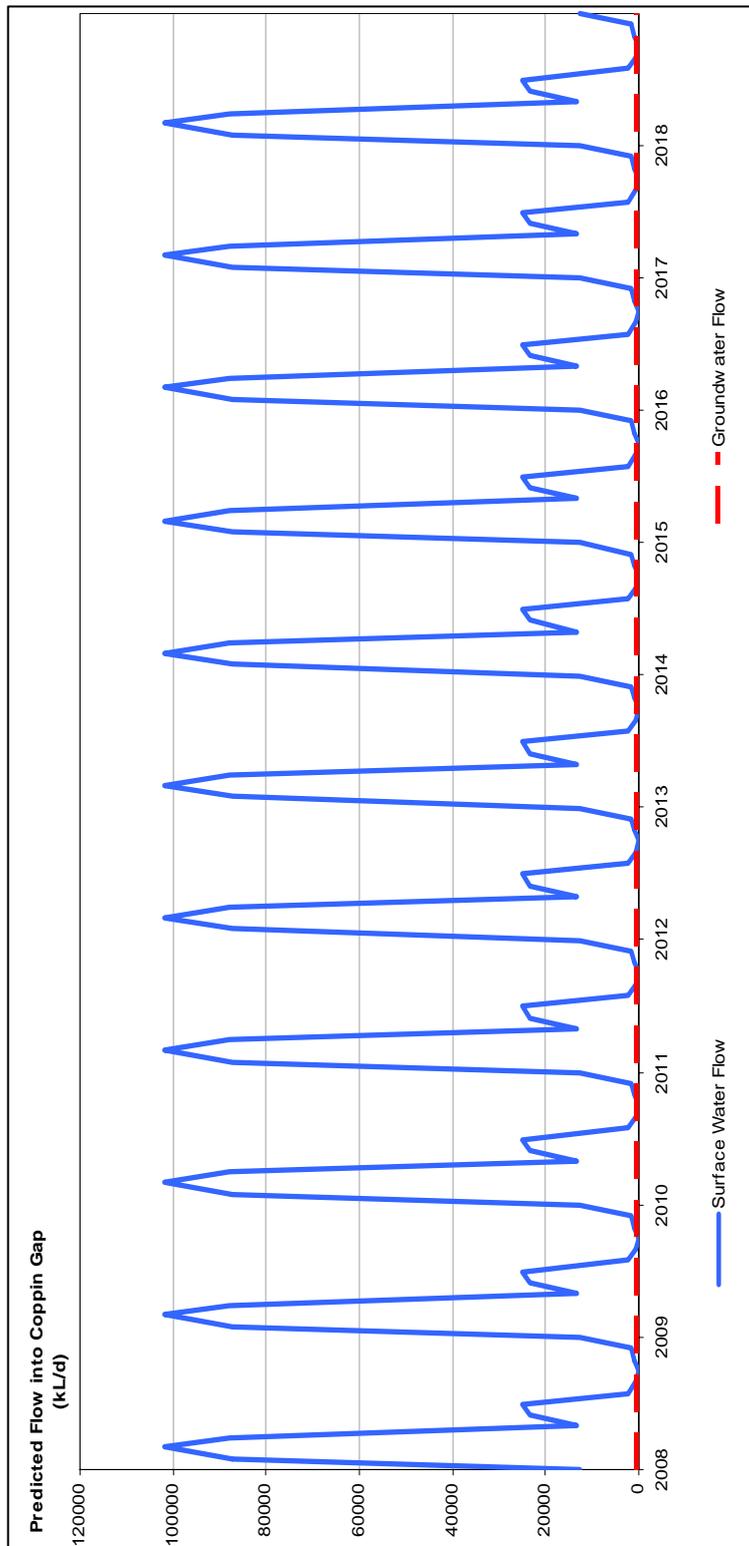


Figure 4: Predicted ground and surface water flows into Coppin Gap

Predicted groundwater flows into Coppin Gap are significantly less than the contribution from surface water. For average recharge conditions, modelling undertaken predicts a decrease in groundwater flows at Coppin Gap from around 110 kilolitres per day (kL/d) to around 95 kL/d over the life of the mine.

Tailings Storage Facility

Process plant tailings will be managed using a Tailings Storage Facility (TSF). The TSF involves the filtration and stacking of the filtered tailings instead of the pumping and sub aerial disposal of slurried tailings. The use of the tailings stacking system will allow storage to be built to a maximum height of 25m. The new design would enable progressive rehabilitation during the operational phase of the project at a rate of approximately 50ha per year (Moly Mines, letter 21 February 2008).

The proponent has proposed to manage groundwater using the following measures:

- Implementation of a phreatophytic vegetation monitoring program that detect and minimise impacts associated with dewatering operations;
- If water levels at Coppin Gap are affected or riparian vegetation is being impacted, appropriate strategies to minimise the impacts of drawdown will be adopted, such as:
 - implementation of an artificial aquifer recharge system;
 - artificially maintaining the water levels at the Coppin Gap; and
 - an engineering solution that confines or separates the aquifer around the vicinity of the pit from Coppin Gap so that drawdown does not occur.
- Monitor groundwater downstream of the TSF; and
- Treat groundwater if contaminated.

The proponent has proposed to undertake further studies to further understand the identity and distribution of subterranean fauna species found in earlier surveys. This work will be carried out in accordance with EPA Guidance Statement No. 54 - *Sampling methods and survey considerations for subterranean fauna in Western Australia*;

Submissions

A number of Government and public submitters expressed concern over the possibility of permanent impacts on Coppin Gap Pool due to the alteration in the local groundwater flow.

Other points raised in submissions included accuracy of modelling, monitoring requirements and impacts on vadophytic or phreatophytic vegetation.

Assessment

The EPA's environmental objective for this factor is to:

- maintain the quality of groundwater so that existing and potential uses, including ecosystem maintenance are protected.

- maintain the abundance, diversity, geographic distribution and productivity of subterranean fauna at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge;
- ensure adequate protection of important habitats for these species;
- protect Specially Protected (Threatened) and Priority Fauna and their habitats, consistent with the provisions of the Wildlife Conservation Act 1950; and
- protect fauna listed on the relevant schedules of the EPBC Act.

The EPA notes that groundwater from the De Grey River and Canning Basin will be used for water supply for mine operations. This has the potential to lower the water table and impact on subterranean fauna and vegetation.

Subterranean fauna surveys were carried out within the project and borefield areas. A potentially new species *Mesocyclops cf. kieferi* n sp from a control pastoral bore within the De Grey Borefield area was identified. The EPA notes however that hydrological modelling indicates that drawdown is unlikely to impact this potentially new subterranean fauna species. The proponent has proposed to carry out further subterranean fauna surveys to ensure that groundwater abstraction is managed so as to avoid any significant impacts on this fauna. The EPA supports this initiative and believes that this would add to the knowledge base of subterranean fauna within the project and borefield areas.

The EPA notes that hydrological studies indicate that over a 10 year period, an extraction rate of 4 GL/yr of groundwater from the De Grey Borefield is sustainable with no detrimental effects on riparian and phreatophytic vegetation.

The rate of groundwater flow into Coppin Gap is small compared to surface water flow. Modeling undertaken by the proponent indicates that although drawdown will occur within the immediate vicinity of the pit, drawdown levels at Coppin Gap would be minimal and is not likely to cause detrimental impacts to vegetation. The EPA notes the contingency measures to artificially maintain water levels at Coppin Gap by the addition of appropriate high quality water or artificial recharge of the aquifer.

The dry stack Tailing Storage Facility is particularly suitable for use in arid climate where water is not readily available. The method has been implemented in North and South America in industrial operations. Two facilities in Alaska have been implemented using the dry stack tailings method. The EPA is aware that these two facilities operate under significantly different climatic conditions to that of the proposed project area in the Pilbara. The EPA considers that dry stack TSF if implemented in the Pilbara would need to be managed in a manner to ensure that high intensity rainfall events do not affect the integrity of the facility and impact groundwater and surface water.

With appropriate engineering design of the TSF and the implementation of the recommended condition 6, which requires the management of discharges and runoff, the dry stack TSF method could be environmentally acceptable.

Summary

Having particular regard to:

- (a) the implementation of the recommended condition 6 to ensure that the quality of discharge meets ANZECC requirements for ecosystem maintenance,

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

3.2 Surface Water and Drainage

Description

Coppin Gap Pool is a unique, semi-permanent water body that has minimal fringing riparian vegetation due to steep rocky inclines, with only a small section of creek bank supporting Eucalypt and Melaleuca species. It is located where Coppin Creek intersects the Talga Range.

Coppin Creek is a tributary of Kookenyia Creek, and drains the Coppin Gap Catchment. Coppin Creek is a temporary, inland, dryland creek, similar to other creeks in the region. During heavy rainfall events water flows northward through Coppin Gap to Kookenyia Creek and continues into the De Grey River which is approximately 25km north of the project site. The De Grey River is a significant water resource in the Pilbara region and related aquifers supply drinking water to the town of Port Hedland.

Water Quality Impact to Coppin Gap Pool

Diversion Channel

Water quality of Coppin Gap can be potentially impacted by mining activities such as the construction of the diversion channel and waste dumps.

Eroded material from the diversion channel is likely to be transported and deposited upstream and downstream of Coppin Gap. The diversion channel is proposed to redirect surface water from Coppin Creek around the pit area. The channel route will be approximately 900m shorter than the existing Coppin Creek route through the pit area.

The diversion channel would potentially impact flow volumes and peak discharge downstream. Immediately upstream of Coppin Gap, flow volumes and peak discharges may potentially decrease due to a reduction in the size of the catchment area. Other impacts of the diversion channel include erosion within the creek diversion and sedimentation in Coppin Gap Pool.

The majority of the diversion channel would be cut into competent rock material with a low potential for additional sediment generation. The creek bed and creek bank surfaces would be designed with low potential erodibility. Vegetation would be established along the diversion channel soon after it is constructed using material from the original creek that overlies the pit. The channel would incorporate a

constructed floodplain that would allow for vegetation establishment in the area adjacent to the main channel flow.

The proponent proposes to minimise the production of sediment through the use of a diversion structure, vegetation and sediment traps. Accumulation of sediments from these traps would be removed prior to each wet season.

Waste Dumps

Waste dumps have the potential to release sediments and potentially impact water quality of Coppin Gap Pool. Waste dumps 1 and 2 will contain potential acid forming material which has the potential to produce acidic runoff or runoff that may contain elevated concentrations of heavy metals.

Waste rock (overburden) from the mine will be placed in three waste dumps. These dumps will be located to the west (Landform 1), south-west (Landform 2) and south-east (landform 3) of the mine pit. The waste dump footprint has been modified since the release of the proponent's environmental review document and after consideration of public submissions.

The northern extent of waste dump has been altered to ensure that the landform does not encroach on the minor creek line that flows into Coppin Creek. The western boundary of this waste dump has been adjusted away from the diversion channel to ensure that flood waters do not enter the waste landform areas.

The waste rock to be generated during mining would be classified and managed according to the potential for acid formation (PAF). The PAF material contains molybdenum, copper and sulphur. Waste will be classified as PAF or non-acid forming material. PAF material placed in dumps 1 and 2 will be placed above at least 15m of NAF material and capped with at least 10m of NAF material. The final design of the cap will be adjusted if necessary to minimise infiltration of water into the PAF material.

Tailing Storage Facility

Potential seepage from the tailings storage facility (TSF) due to extreme rainfall events would initially flow into Kookenyia Creek and potentially impact the De Grey River water quality.

Geotechnical studies of the TSF design indicate that seepage after extreme rainfall events is unlikely due to the high void ratio and low moisture content of the tailings. It is predicted that void space within the upper few metres of the tailings will contain any incident rainfall, reducing the possibility of the tailings becoming saturated. Extreme rainfall events are not expected to impact the stability of the TSF (Moly Mines, letter 21 February 2008, Attachment 1).

The proponent proposes to monitor surface water quality downstream from the TSF before it enters Kookenyia Creek and 25km north of the project site where Kookenyia Creek flows into the De Grey River.

Submissions

The main points raised in the submissions were the impact on Coppin Gap pool, the uncertainties in the modelling of impacts, contingencies and long term management of surface water.

Assessment

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

- maintain the integrity, ecological functions and environmental values of watercourses, and to ensure that alterations to surface drainage do not adversely impact native vegetation or flow regimes.
- ensure surface water does not adversely affect environmental values or the health, welfare or amenity of people and land uses.

Water Quality Impact to Coppin Gap Pool

Water quality of Coppin Gap can potentially be impacted by mining activities such as the construction of the diversion channel and waste dumps.

Eroded material from the diversion channel could potentially impact water quality in Coppin Gap Pool. The EPA notes however that construction of the majority of the diversion channel would be cut into competent rock material with a low potential for additional sediment generation and vegetation to further reduce erosion.

The use of a diversion structure, vegetation and sediment traps should ensure that the potential impact of sediment transport to Coppin Gap Pool is managed in an environmentally acceptable manner.

Waste Dumps

Waste dumps have the potential to release sediments and impact water quality of Coppin Gap Pool. Waste dumps 1 and 2, in particular, will contain PAF material which has the potential to produce acidic runoff or runoff that may contain elevated concentrations of heavy metals. The footprint of the waste dump 3, located south-east of the mine pit, has been modified to avoid minor creek lines that flow into Coppin Creek. The western boundary of the dump has also been modified away from the diversion channel to prevent flood water entering the waste dump area.

Waste rock (overburden) generated during mining may contain PAF material containing molybdenum, copper and sulphur. These material will be placed within dumps 1 and 2 to avoid the formation of acidic leachate.

The EPA considers that the diversion of watercourses and waste dumps are unlikely to have a detrimental impact on surface water quality.

Potential seepage from the TSF could also impact water quality in Kookenyia Creek. Information provided by the proponent indicates that due to the dry stack tailings design means that seepage is highly unlikely, even in extreme rainfall events.

The EPA expects that there will be no routine discharge of water in the form of leachate or run-off from the TSF. The EPA however, is aware that there is potential for loss of discharge water to the environment, particular during extreme rainfall events. The EPA considers therefore that any potential discharge of water from the TSF should be managed and treated if necessary to ensure that the ecological functions and environmental values of water courses are maintained. The EPA also considers that any potential discharge of water from the TSF should ensure that surface water does not adversely affect environmental values of the De Grey River.

The EPA considers that, with implementation of condition 6 which addresses water quality criteria and monitoring of surface water quality to ensure that water quality meets Australian Water Quality Guidelines for Fresh and Marine Waters (ANZECC, 1992), the impact to Kookenyia Creek and De Grey River should be environmentally acceptable.

Summary

Having particular regard to:

- a) the implementation of the recommended condition 6 to ensure that the quality of discharge meets ANZECC requirements for ecosystem maintenance,

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

3.3 Terrestrial Fauna

Description

The proposal has the potential to impact terrestrial fauna by direct loss or disturbance of habitat, alteration to hydrology, reduced hydraulic connectivity and vehicle impacts.

The proponent undertook two vertebrate fauna surveys over the project area during August 2005 and April 2006. A reconnaissance survey and assessment of vertebrate fauna and fauna habitats was conducted over water supply areas and associated service corridors during April and May 2007. An additional survey for short range endemic invertebrate fauna (SRE) was undertaken during August-September 2006.

Species of conservation significance recorded in the project area are described below.

The Northern Quoll *Dasyurus hallucatus* (Endangered) was captured on six occasions during the surveys. All captures were close to rocky substrates adjacent to the Talga Range. The Northern Quoll is listed under the EPBC Act and listed as Schedule 1

under the *Wildlife Conservation Act 1950*. The preferred habitat for the Quoll is rocky escarpments, open forest and woodland.

The Orange Leaf-nosed Bat *Rhynonictoris aurantius* (Vulnerable, Schedule 1) is likely to be present. Roosts of the Orange Leaf-nosed Bat have been confirmed within 15km of the site, and it is likely that the species would at least traverse the area during foraging, or possibly use caves within the Talga Range for temporary or seasonal roosting. The lack of suitable deep caves low in the landscape suggests that there are no breeding sites present.

The Ghost Bat *Macroderma gigas* (Priority 4) was identified from calls recorded at Coppin Gap during August 2006. The species is widespread in the region and natural roost sites suitable for this species are likely to occur over the project area within the Talga Range.

The proponent proposes to mitigate noise impacts on the Orange Leaf-nosed and Ghost bats by restricting blasting to daylight hours. Light impacts would be mitigated by directing light away from sensitive areas such as the Talga Range and riparian zones.

The Western Pebble-mound Mouse *Pseudomys chapmani* (Priority 4) was captured during fauna surveys over the project area. Both active and inactive mounds were also identified. The species habitat is considered to be widespread in the region. The proponent states that before land clearance, all active mounds within potential habitat areas would be identified, mapped by GPS and managed to avoid impact to habitat.

The Rainbow Bee-eater *Merops ornatus* (Migratory species) was observed over the majority of the project area during both surveys. Possible habitats within the project area include open woodlands, riverbanks and cliffs.

The Pilbara Olive Python *Liasis olivaceus barron* may be present but was not recorded during the surveys within the project area.

A SRE survey was completed during August – September 2006. The survey identified an undescribed species of terrestrial snail, “*Quistrachia sp.*” (Camaenidae), which was collected from five sites at Spinifex Ridge. This unknown species is representative of a group that is typified by short-range endemism. Although the species was found in three habitats, based on the condition of specimens collected it appears that rocky slopes and ranges associated with the Talga Range is typical habitat that may offer the local refugial conditions required to support this species. The proponent proposes to conduct an autumn 2008 SRE survey to confirm results of the August–September 2006 survey.

Submissions

The main point raised in the submissions was the inadequacy of surveys.

Assessment

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

- maintain the abundance, diversity, geographic distribution and productivity of fauna at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge;
- protect Specially Protected (Threatened) and Priority Fauna and their habitats, consistent with the provisions of the *Wildlife Conservation Act 1950*; and
- protect fauna listed on the relevant schedules of the EPBC Act.

A small part of the Northern Quoll's habitat would be cleared within the project area. Clearing of 1600ha would not significantly affect the local habitats of the Northern Quoll due to preservation of the riparian linkage from the project area downstream to the De Grey River. The EPA considers that the Northern Quoll is unlikely to be substantially affected by the project.

The Orange Leaf-nosed Bat may forage within the project area but no suitable roost and breeding sites were discovered within the project area. Suitable rocky gully habitat along the Talga Range would not be disturbed, however, rocky slope habitats would be disturbed. The EPA notes that the proposed area of disturbance does not provide extensive caves or overhangs required for Ghost Bat habitat and that mining related impacts on the Orange Leaf-nosed and Ghost bats would be mitigated by managing blasting and light impacts.

Ground disturbing activities may impact Western Pebble-Mound Mouse habitat which is widespread in the region. The EPA considers that it is unlikely that the Western Pebble-Mound Mouse will be significantly affected by the project, although areas of habitat and mounds are likely to be disturbed or lost.

Mitigation of fauna impacts associated with the creek diversion has largely been addressed through design criteria. The success and timing of vegetation of the diversion channel, designed to replicate the ecological functioning of the existing creekline, will be important to ensure impacts are minimised.

An undescribed species of terrestrial snail, "*Quistrachia sp.*" (Camaenidae) was identified in the project and surrounding area. The proponent has committed to undertake an autumn 2008 SRE survey to ensure that impacts to SRE are avoided. The EPA recommends that condition 7 requiring the proponent to report the findings of the autumn 2008 SRE survey to the DEC, be implemented to inform project design so that adequate protection of SRE can be achieved.

Summary

Having particular regard to:

- (a) the implementation of the recommended condition 7 requiring protection of fauna of conservation significance, maintenance of the diversity of fauna populations and fauna habitats; and

- (b) the implementation of the recommended condition 7 requiring an autumn short range-endemic survey, reporting of survey data and contingency measures,

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

3.4 Closure and Rehabilitation

Description

Approximately 1600ha of land would be disturbed and there is potential for unstable landforms, erosion, contamination, impacts to native fauna, altered ground and surface water regimes and loss of landscape values.

At the conclusion of mining, the total disturbance footprint of the pit would be approximately 120ha. The final dimensions will be approximately 430m deep with a crest width of 1100m in an east - west direction and 1170m in a north – south direction. Once mining has ceased, the groundwater levels in and surrounding the pit void are expected to recover very slowly and remain at levels about 200m below the pre-mining water table level. The majority of rock exposed in the pit wall at the completion of mining is likely to comprise unmineralised material or low-grade mineralized material, neither of which is considered to have significant acid generating potential.

The area required for the deposition of tailings is approximately 50ha per annum, with an ultimate footprint at cessation of mining of about 600ha. Tailings would be deposited to a full height of 25m. The tailings comprise particulate materials, similar in texture to fine sand. This material is expected to be relatively permeable with an estimated hydraulic conductivity of 4×10^{-5} m/s. The conceptual design for the TSF landform is a structure without any active, engineered drainage features. Geotechnical studies indicate that cyclonic rainfall events should not generate runoff due to the permeable nature of the tailings. Following the second year of operations, the TSF would be progressively rehabilitated at a rate greater than 45ha per year on a three year rolling average. Unrehabilitated areas of the TSF would not exceed 150ha at any time during operation and decommissioning.

Approximately 330 Mt of waste rock would be generated during the 10 year mine life. The waste would be placed in three waste dumps to the west, southwest and southeast of the mine pit with a combined footprint of approximately 400ha. Geochemical studies (Graeme Campbell & Assoc, 2006) carried out on waste rock indicate that it should typically be classified as non-acid forming due to the low levels of sulphides. Waste rock with acid generating potential is proposed to be encapsulated within material with no acid generating potential. The thickness of non-acid generating material would be greatest along drainage channels, where the thickness would be approximately 15m. The maximum height of the landforms will be less than 60m above the ground. The waste dumps would be progressively rehabilitated starting in about the third year following the commencement of mining.

The diversion channel would remain as a permanent feature, designed to resemble as closely as possible the section of Coppin Creek intersected by the pit. The proponent proposes to revegetate the diversion channel and ensure it functions well before closure.

Submissions

The main points raised in submissions related to progressive rehabilitation, closure criteria and the pit lake.

Assessment

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

- ensure that closure and rehabilitation achieves stable, non-polluting and functioning landforms which are consistent with the surrounding landscape and other environmental values;
- ensure that self-sustaining native vegetation communities are returned after mining, which, in species composition and ecological function are close as possible to naturally occurring analogue sites;
- protect landforms or geological features of heritage significance or of outstanding scenic or scientific value; and
- ensure that final mine pit lakes do not cause significant environmental impacts through groundwater pollution or by attracting native or introduced fauna.

The EPA notes that the pit will not be backfilled at closure and that it will become a groundwater sink. The EPA considers that with the low potential for acid generation within the pit, it is unlikely that groundwater quality would be affected.

TSF is proposed to be progressively rehabilitated at a rate greater than 45ha per year and the unrehabilitated area of the TSF would not exceed 150ha at any time during operation and decommissioning, and the height of the TSF would not exceed 25m. The EPA supports the progressive rehabilitation of the TSF.

At closure of mining, the three waste dumps would have a combined footprint of 400ha and a maximum height of 60m. On the basis geochemical studies (Graeme Campbell & Assoc, 2006) carried out on waste rock, there is a limited potential for acid formation and that any potentially acid forming material would be encapsulated within the waste dumps.

The diversion channel would be a permanent feature of the landscape. The EPA notes that proponent would revegetate the diversion channel and ensure it functions before closure.

The EPA considers that, with the implementation of the recommended condition 8, that this environmental factor could be considered environmentally acceptable.

Summary

Having particular regard to:

- (a) the implementation of the recommended condition 8 which addresses landforms, native vegetation, geological features and mine pit lakes,

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

3.5 Amenity Values

Description

Coppin Gap is a popular local tourist area. It is estimated that between 60 - 100 vehicles visit Coppin Gap every year. The proposal has the potential to restrict public access, reduce visual amenity and affect public safety.

Coppin Gap is located in a Class A Nature Reserve approximately 500m to the east of the project area. It is a semi-permanent water body located where Coppin Creek intersects the Talga Range. Coppin Gap is one of two breaks in Spinifex Ridge located within the project area. The other, Kitty's Gap, is used as an access point through the range. These gaps concentrate flow from the upstream catchment and allow it to pass through the ridge to Kookenyia Creek.

Vegetation at Coppin Gap is minimal with fringing riparian vegetation consisting of Eucalypt and Melaleuca species. This vegetation provides habitat for algae and macroinvertebrates that are transient due to the ephemeral nature of Coppin Gap Pool.

The proponent proposes to construct a new access track to ensure seasonal access to Coppin Gap. The new access track would be aligned to minimise any visual impact from mining operations. Procedures for blasting would be implemented to ensure safety of visitors to Coppin Gap and fencing would prevent public access to active mining areas.

During construction and operation, public access to Kitty's Gap would be prohibited since the track is required as a key access point throughout the life of the operation. Public access would be allowed once the project has been decommissioned.

Submissions

The issue of visual amenity of the project on Coppin Gap was raised by the public and government departments. Submitters believed that the natural scenic value of the area would be severely compromised if the project was to proceed.

Public submissions indicated concern over the impact on tourism and environmental values.

Other submitters were concerned about public safety and restriction on access during blasting.

Assessment

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

- protect landforms or geological features of heritage significance or of outstanding scenic or scientific value; and
- maintain landscape and landform integrity, ecological functions and environmental values.

The EPA notes that the project area is approximately 500m from Coppin Gap reserve and for the proponent intends to minimise potential impacts.

Submissions regarding visual amenity and impact on tourism to Coppin Gap highlighted the public concern over the possibility of the proposal significantly degrading the area's scenic and heritage value. The EPA considers that Coppin Gap Pool is the focus of tourist activities and to protect its scenic values, there should be no visual intrusion within Coppin Gap of project activities.

The EPA notes that the proponent has committed to preparing blasting procedures to ensure public safety.

The EPA considers that implementation of condition 9, which requires that infrastructure and facilities be designed and managed so that they are not visible from Coppin Gap Pool, will ensure that amenity values are not impacted.

Summary

Having particular regard to the:

- (a) recommended condition 9 to ensure no project infrastructure is visible from Coppin Gap Pool,

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

3.6 Environmental principles

In preparing this report and recommendations, the EPA has had regard for the object and principles contained in s4A of the *Environmental Protection Act (1986)*. Appendix 3 contains a summary of the EPA's consideration of the principles.

4. Conditions

Section 44 of the *Environmental Protection Act 1986* 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.

4.1 Recommended conditions

The EPA has developed a set of conditions that the EPA recommends be imposed if the proposal by Moly Mines to develop an open pit mine and process 20 Mtpa of ore to produce 23,000 tpa of molybdenum concentrate and 48,000 tpa of copper concentrate, is approved for implementation.

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

- (a) Groundwater
- (b) Surface Water and Drainage
- (c) Terrestrial Fauna
- (d) Closure and Rehabilitation
- (e) Amenity Values

It should be noted that other regulatory mechanisms relevant to the proposal are:

- Part V of the *Environmental Protection Act 1986* – various Works Approvals and an operating licence would be required for construction and operation of the project;
- *Right in Water and Irrigation Act 1914* – water licenses and bed and banks permits will be required from the Department of Water for the project area and borefields; and
- *Mining Act 1978* – a mining proposal will be required to be approved by the Department of Industry and Resources.

5. Other Advice

The proposal currently before the EPA is for a mining operation of 10 years. The EPA notes that the proponent may extend the mine life to 20 years if market conditions are favorable. An extension of the mine life would result in an increase in the footprint of the waste dumps, tailings storage facility and pit. This could affect the visual amenity from Coppin Gap and public roads. Additional water would need to be drawn from the borefields and project area creating further stress on groundwater resources. Any such proposal for an extension of mine life beyond that considered in this assessment would require referral to the EPA.

6. Conclusions

The EPA has considered the proposal by Moly Mines to develop an open pit mine and process 20 Mtpa of ore to produce 23,000 tpa of molybdenum concentrate and 48,000 tpa of copper concentrate.

Water

Groundwater and surface water are both present in the area of the mine and processing plant.

Surface water is the primary component of water, and groundwater and surface flow to the north from both areas. Mining, waste dumps and processing (including the tailings storage facility) have potential to adversely affect surface water quality.

Environmental objectives for surface and groundwater are largely the same, with subterranean fauna being the difference.

Groundwater and Stygofauna

Groundwater from the De Grey River and Canning Basin will be used for water supply for mine operations. Groundwater abstraction has the potential to lower the water table, which potentially can impact on both subterranean fauna and vegetation. Hydraulic modeling indicates that drawdown is unlikely to impact subterranean fauna in the proximity of the De Grey Borefield.

Surface water

Water quality of Coppin Gap could be impacted by mining activities such as the construction of the diversion channel and waste dumps.

Eroded sediment material from the diversion channel could potentially impact water quality in Coppin Gap Pool. The EPA notes, however, that construction of the majority of the diversion channel would be cut into competent rock material with a low potential for additional sediment generation. The creek bed and creek bank surfaces would be designed with low potential erodibility. Vegetation would be established along the diversion channel soon after it is constructed using material from the original creek that overlies the pit. The channel would incorporate a constructed floodplain that would allow for vegetation establishment in the area adjacent to the main channel flow.

Waste dumps have the potential to release sediments and impact water quality of Coppin Gap Pool. Waste dumps 1 and 2, in particular, will contain potential acid forming (PAF) material which has the potential to produce acidic runoff or runoff that may contain elevated concentrations of heavy metals.

Waste rock (overburden) generated during mining may contain PAF material. This material may contain molybdenum, copper and sulphur. PAF material will be placed in dumps 1 and 2 on at least 15m base of non-acid forming (NAF) material and capped with at least 10m of NAF material. The final design of the cap will be adjusted to minimise infiltration of water into the PAF material and to reduce the potential of leachate into groundwater.

Waste dump 3, located south-east of the mine pit, has been redesigned. The northern extent of waste dump 3 has been altered to ensure that the landform does not encroach on minor creek lines that flow into Coppin Creek. The western boundary of the

landform has also been modified away from the diversion channel to prevent flood water entering the waste landform area.

The EPA considers that the construction of the diversion channel and waste landforms are unlikely to have a detrimental impact on water quality of Coppin Gap.

Dry stack tailings management

A dry stack tailings storage facility (TSF) is proposed for use at the site. This form of tailings management has been implemented in North and South America in industrial operations, however these facilities operate under significantly different climatic conditions to that of the project area within the Pilbara.

The EPA notes that dry stack tailings in the Pilbara would need to be managed in a manner which ensures that high intensity rainfall events do not cause overflow and impact to surface or groundwater. Provided appropriate engineering design ensures that potential leachate and surface run-off do not impact groundwater, the EPA considers the dry stack TSF could be managed in an environmentally acceptable manner. The EPA has recommended conditions which requires appropriate design, water quality management to ensure that surface and groundwater quality is not significantly impacted.

The TSF would be progressively rehabilitated at a rate greater than 45ha per year and the unrehabilitated area of the TSF would not exceed 150ha at any time during operation and decommissioning. The EPA supports the progressive rehabilitation of the TSF.

In terms of water quality and quantity the EPA expects that management of surface and groundwater will ensure that:

- Australian water quality criteria are met for protection of potable water supply and ecosystem maintenance;
- Recreational and environmental values are protected;
- Water quality is monitored; and
- Department of Environment and Conservation regulate discharges under Part V of the *EP Act 1986*.

Terrestrial Fauna

The EPA notes that while a small area of potential Northern Quoll habitat would be cleared within the project area, it is unlikely to affect the conservation status of the Northern Quoll. The other listed species may forage or traverse the project area but are unlikely to be impacted.

An undescribed species of terrestrial snail, "*Quistrachia sp.*" (Camaenidae) was identified within the project area and the EPA has recommended a condition which requires an autumn 2008 short range endemic (SRE) survey and with the development and implementation of appropriate management actions to protect significant species.

Amenity

Coppin Gap Pool is the focus of local tourist activities. To protect its scenic values, the EPA considers that there should be no visual intrusion within Coppin Gap of project activities. The EPA has thus recommended a condition that requires

infrastructure and facilities to be designed and managed so that they are not visible from Coppin Gap Pool.

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 recommended conditions set out in Appendix 4, and summarized in Section 4.

7. Recommendations

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

1. That the Minister notes that the proposal being assessed is for the development an open pit mine that would process 20 Mtpa of ore to produce 23,000 tpa of molybdenum concentrate and 48,000 tpa of copper concentrate;
2. That the Minister considers the report on the key environmental factors and principles 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; and
4. That the Minister imposes the conditions and procedures recommended in Appendix 4 of this report.

Appendix 1

List of submitters

Organisations:

Conservation Council of Western Australia
Department of Environment and Conservation
Department of Health
Department of Industry and Resources
Department of Water
The Wildflower Society of Western Australia

Individuals:

Dr Graham Thompson

Appendix 2

References

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EPA (2007), *Sampling methods and survey considerations for subterranean fauna in Western Australia*, Guidance Statement No 54a, Environmental Protection Authority, Government of Western Australia, August 2007.

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Moly Mines (2008), *Attachment 1 – Filtered Tailings Stacking Stability*, Letter to EPA Chairman from Moly Mines, received 21 February 2008.

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Appendix 3

Summary of identification of key environmental factors and principles

Preliminary Environmental Factors	Proposal Characteristics	Summary of Government Agency and Public Comments	Identification of Key Environmental Factors
BIOPHYSICAL			
Groundwater	<p>Total water requirement would be approximately 10.5 GL/a with a maximum of 12 GL/a, of which the majority is for process water. Four water supply options have been investigated for the project. The bulk of the project water requirements would be met by abstracting water from a borefield tapping into the western margin of the Canning aquifer, located approximately 80 km NNE of the project site. A smaller borefield would be established in the De Grey alluvium to supply up to 4 GL/year. This would be used as the initial water source during construction and while the main borefield is commissioned. Water from the De Grey borefield would also provide water to supplement the Canning water supply during periods of peak water demand. Water from the dewatering of the mine pit at Spinifex Ridge and water reclaimed from filtration of tailings would also contribute to the process water supply.</p>	<p><u>DEC</u></p> <ul style="list-style-type: none"> • Feasibility of grouting as a strategy to avoid or manage impacts on groundwater dependent systems. • Demonstrate that drawdown of the deeper semi-confined aquifer in the De Grey borefield will not affect the shallow aquifer and therefore not impact on the vadophytic or phreatophytic vegetation. • Address the cumulative impacts of the drawdown at the proposed borefield at De Grey, with the existing borefields at De Grey on river ecosystem and the Port Hedland town water supply. • Potential impacts of the mining and dewatering activities on the groundwater and surface water (and associated ecosystems) within all the impact areas. • Impact of not backfilling the pit on water quality within the pit and how this will affect the surrounding aquifer, including the De Grey River aquifer. • Impacts of groundwater seepage, particularly at the southern end of the gorge. <p><u>DOW</u></p> <ul style="list-style-type: none"> • Water requirements associated with product handling at loading facilities in Port Hedland given limited water availability. • Environmental risks of developing the De Grey borefield and the need to determine Environmental Water Requirements of local ecosystems in order to minimise impacts on vegetation. • Uncertainties in water management planning at the mine site due to the complex nature of local hydrology and hydrogeology. • Competing uses for the water resources in the Canning Basin. • Groundwater monitoring will be required at a very high intensity to allow careful management of the Coppin Gap water pool. • A groundwater licence would not be issued unless the Groundwater Licence Operating Strategy identified clear triggers and responses as agreed between DoW and the proponent. 	<p>Considered to be a key environmental factor. See section 3.1 Groundwater.</p>

Preliminary Environmental Factors	Proposal Characteristics	Summary of Government Agency and Public Comments	Identification of Key Environmental Factors
		<ul style="list-style-type: none"> • Need to demonstrate that there are no environmental impacts as a result of transferring the between groundwater management areas and no social or cultural impacts. • Impact on water levels and ground water dependent ecosystems (GDE) in Coppin Gap Pool. <p><u>DOIR</u></p> <ul style="list-style-type: none"> • Impacts on public water supply in the area • Monitoring of groundwater chemistry in TSF monitoring bores should be conducted quarterly at a minimum. • Groundwater monitoring bores should be placed around WRD1 and WRD2 with consideration given to direction of groundwater flow to detect any acidic or metalliferous drainage <p><u>Conservation Council</u></p> <ul style="list-style-type: none"> • Use of existing dewater fields should be used wherever possible both for environmental and sustainability reasons. • Cumulative impacts of mine site dewatering and water abstraction for mining in the Pilbara. • The interchange between the aquifer and the pools may be what keeps the pools semi-permanent after rains and grouting the aquifer may permanently destroy this system. • Concerns regarding the reliability of computer modelling claiming that there is little risk that the significant modifications to this system will result in negative impacts • Infiltration of metallic contaminants to groundwater systems could occur through the pit. • Infiltration of metallic contaminants to groundwater systems could occur through leaching from the base of the tailings dam or waste dumps • Commitments made to the De Grey River monitoring program. • The management plan should include collection of climatic and flow data and be coordinated with other users of the water resource. • The management plan must include enforceable stop pumping 	

Preliminary Environmental Factors	Proposal Characteristics	Summary of Government Agency and Public Comments	Identification of Key Environmental Factors
		triggers.	
Surface Water	<p>The project is located within the De Grey River catchment, which is the main drainage system in the northeast Pilbara area. In the study area, a ridge 100 to 150m high, known as Spinifex Ridge, is the dominant feature in the landscape. Two breaks in Spinifex Ridge, known as Coppin Gap and Kitty's Gap, concentrate flow from the upstream catchment and allow it to pass through the ridge. Floodwaters downstream from these two gaps then flow approximately 25km northwards before discharging via Kookenyia Creek into the De Grey River. A diversion of Coppin Creek, a tributary of Kookenyia Creek is required to access the orebody at Spinifex Ridge. Baseline studies to characterise biotic and abiotic aspects of the Coppin Creek catchment, were completed in 2006 and 2007 and summarised in the PER.</p>	<p><u>DEC</u></p> <ul style="list-style-type: none"> • Actions to be taken to avoid significant permanent damage to ecosystems (particularly Coppin Gap) should be clearly documented and the timing of implementing these actions discussed. <p><u>DOW</u></p> <ul style="list-style-type: none"> • Monitoring of impacts on the Gap pools from altered surface water regimes, particularly relating to any increased sediment loading and changes to water quality, • Uncertainties in water management planning at the mine site due to the complex nature of local hydrology and hydrogeology, • Water to maintain Coppin Gap pool levels should be sourced from the pit dewatering as a preference. Recirculation needs to be considered in maintaining pool levels • A number of water volume and quality criteria additional to those included in the draft Management Plans are required to tightly conserve the environment of this pool. • Upstream and downstream bunds required for diversion of Coppin Creek will require a permit to modify bed and banks. <p><u>DOIR</u></p> <ul style="list-style-type: none"> • The extent of flooding caused by a 1 in 100 year, 72 hour rainfall event. • All permanent infrastructure should be outside the area flooded by 1 in 100, 72 hr rainfall event, and armoured to withstand a potential maximum flood event. • Topsoil stockpiles should be located outside the area flooded by 1 in 100, 72 hr rainfall event, or appropriate bunding installed. <p><u>Cons Council</u></p> <ul style="list-style-type: none"> • Reliance on theoretical model that includes a made up scenario 	<p>Considered to be a key environmental factor. See section 3.2 Surface Water and Drainage</p>

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		<p>where the catchment experiences a number of drought years.</p> <ul style="list-style-type: none"> • How much drawdown is ecologically acceptable? If the mine will dry out the semi-permanent pools in Coppins Gap, this is not an ecologically and socially acceptable scenario. • Proposed management interventions are largely theoretical and hence a distraction from the fact that the mine will permanently alter the water balance in Coppins Gap • Creek diversion is unlikely to provide the same flows into Coppin Gap as existing creek • Revegetate diversion channel rather than wait for this to occur naturally • The proposed mine will permanently alter Coppins Gap so that long term management after the mine life will likely be required. 	
Terrestrial Fauna (inc SRE)	<p>Moly Mines would implement the specific management measures to ensure that impacts are minimised. Although these measures consider all fauna, species of conservation significance would be the primary focus. Fauna of conservation significance include the recorded State and Federally -listed species: Northern Quoll, Orange Leaf-nosed Bat (Pilbara), Ghost Bat, Western Pebble-mound Mouse, Australian Bustard, Bush Stonecurlew and Rainbow Bee-eater.</p> <p>Spinifex Ridge operations would be undertaken in accordance with the Moly Mines' Management System, which is consistent with the</p>	<p><u>DEC</u></p> <ul style="list-style-type: none"> • Further address the issue of road kill of fauna in the PER. • Provide appropriately detailed information on the risk to fauna associated with molybdenum in groundwater. • Address issues of managing light spill and commit to not using barbed wire fencing within the project area or associated borefields and corridors. • Unclear exactly where the SRE surveying was undertaken in relation to the Project area and surrounds. • No trapdoor spiders were recorded in the current survey. Trapdoor spiders are likely to be SRE and are best trapped after a significant rain event. • Further surveys for SRE need to be conducted within and outside the project area at the correct time of year in order to allow assessment of the impact of the mining development on these SRE in the local and regional context. <p><u>DOIR</u></p> <ul style="list-style-type: none"> • Studies of potential hazard of elevated Molybdenum levels in the 	<p>Considered to be a key environmental factor. See section 3.3 Terrestrial Fauna</p>

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	<p>requirements of ISO 14001:2006, the international standard for environmental management systems.</p> <p>Existing threatening processes - particularly in respect to fire management -- may be reduced by an enhanced capacity for fire control in the region due to the presence of fire-fighting equipment and trained personnel.</p> <p>An undescribed species of terrestrial snail, "Quistrachia sp." (Camaenidae), was collected from five sites at Spinifex Ridge. This unknown species is representative of a group that is typified by short-range endemism. Although the species was found in three habitats, based on the condition of specimens collected it appears that rocky slopes and ranges associated with the Talga Range is typical habitat that may offer the local refugial conditions required to support this species.</p>	<p>TSF, should be provided in Appendices, to support statements made in the PER relating to this issue.</p> <p><u>Cons Council</u></p> <ul style="list-style-type: none"> • Fauna habitats need to be given adequate weight in the EPA's determinations. <p><u>Public</u></p> <ul style="list-style-type: none"> • The fauna survey program would have benefited significantly from a review of the intended fauna survey protocols before the survey was undertaken. • Insufficient data collected per habitat type to record or even estimate the terrestrial fauna species richness, assemblage structure or ecosystem function. • At least one of the surveys should have been undertaken in summer (or spring) resulting in a significant bias and reduced catch rates; • Inadequate number of traps and trapping effort in each habitat to adequately sample the fauna; and • Inadequate survey duration in any habitat to adequately sample the fauna. • Appropriate areas should have been grid searched for Mulgara and Bilbies, as both are potentially in the area. • With recently burnt areas mounds (presumably no longer occupied) could be viewed from some distance' (p. 29) – this is not true as we have regularly found active Pebble-mound Mouse mounds in burnt areas. Each of the mounds referred to should have been inspected. • Species accumulation curves should have been prepared for each habitat type. • A map of the site indicating the spatial distribution of the major fauna habitat types was required. • Advice from aboriginals in the area is that Golden Bandicoots were present in the area until recently. This species is not mentioned. 	

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		<ul style="list-style-type: none"> • The recording of <i>Dasykaluta rosamondae</i> at this site probably represents a range extension that perhaps should have been discussed. • Spring and summer surveys are generally much better survey periods in all areas of WA including the Pilbara except in the Kimberley. • The rainfall in July 2005 and April 2006 potentially influenced the sampling yet in the limitations this was not considered a constraint. • Based on the available data there is no way that the knowledge of the vertebrate fauna in the vicinity of Spinifex Ridge could be assessed as 'high'. • Because of the low survey effort, the authors are unable to describe the terrestrial vertebrate assemblage in any of the major fauna habitat. • More surveys should be conducted to assess the likely impact on biodiversity and in particular species of conservation significance. 	
Subterranean Fauna	<p>Within the project area, subterranean fauna were recorded from 14 of 22 groundwater wells sampled within the project area. These were a mixture of non-stygial surface water invertebrates and common stygofauna taxa. The majority of the taxa are considered common within the Pilbara aside from one species of limited known distribution. Due to current taxonomic limitation, some incomplete or damaged specimens and some fauna being immature, not all could be identified to species level.</p>	<p><u>DEC</u></p> <ul style="list-style-type: none"> • Boundaries of the project area are not well defined within the Subterranean Fauna Survey report which makes it difficult for the reader to determine the actual area surveyed. • The sampling that has been undertaken to date appears to be insufficient to fully characterise the stygofauna present. • The results of the Canning Borefields stygofauna surveys should have been included in the PER. • The aquifers to be impacted upon through processes of dewatering should be identified and related to the aquifers in which the stygofauna have been recorded. • The proponent needs to address the potential impact of the >5m drawdown on the two stygofauna species of identified conservation significance • Further detailed surveys are required both within and outside the various impact areas. 	<p>Considered to be a key environmental factor. See section 3.1 Groundwater</p>

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	<p>The potential new species <i>Mesocyclops cf. kieferi</i> n. sp.? (Karanovic) was identified from a pastoral control bore within the De Grey borefield survey area. This could be a new species, but requires more study to verify its identity and distribution. If it is a new species then it would be very close to <i>M. kieferi</i>. Currently, there are three known species of <i>Mesocyclops</i> in the Pilbara. Chinablin well is a shallow pastoral bore in poor condition with collapsing sides, and is susceptible to overland flow.</p> <p>No stygofauna were identified from the three samples collected from the preliminary survey of the Canning borefield in September 2007. A fourth bore was dry or blocked at the time of sampling and could not be sampled.</p>	<ul style="list-style-type: none"> • The portion of each stygofauna habitat unit in the aquifer that will be disturbed by groundwater extraction and any changes in chemical parameters should be provided. • Taxa identification should be to species level where possible. • Future sampling for troglofauna required and should include areas inside and outside the pit as well as associated borefields • Insufficient evidence is presented within Appendix E to indicate that the habitats present within the mine area and borefields are not suitable to support troglofauna. <p><u>Cons Council</u></p> <ul style="list-style-type: none"> • If new species of stygofauna are discovered in surveys then this project must go through a second public review. 	
Flora and vegetation	The project area lies in the Chichester subregion of the Pilbara biogeographic region of Australia. There are no Environmentally Sensitive Areas or Threatened Ecological Communities within the project area. Twenty four vegetation associations were identified over the project area and 86 within the	<p><u>DEC</u></p> <ul style="list-style-type: none"> • The PER does not address the limitations of the flora and vegetation surveys as outlined in EPA guidance statement No 51 (EPA, 2004). Surveys to date have not provided sufficient information to assess the impact of the development on vegetation and flora. • No priority taxa were sighted. This may be due to inadequate survey effort, timing or ID. • Survey did not detect the weed species Parkinsonia at the Muccan Crossing. 	The overall management of vegetation and flora would be addressed by Moly Mines in a specific Vegetation and Flora Management Plan A management plan for Coppin Gap that would incorporate flora management would also be developed by Moly Mines in close consultation with

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	<p>proposed pipeline corridor. Vegetation occurring over the orebody itself has been cleared or severely degraded during ongoing drilling programmes over the past 23 years.</p> <p>At the local scale it is recognised that Coppin Gap possesses a particular microclimate with a dependable supply of moisture and nutrients, and that the related vegetation association (D2) has a discontinuous and patchy local distribution. No Declared Rare Flora or Priority Flora species were identified within the project area, service corridor or borefields.</p>	<ul style="list-style-type: none"> • A much more extensive list of species for the Woodie Woodie corridor would be expected. • The flora survey report places too great an emphasis on land systems as a surrogate for vegetation communities. • Provide a risk assessment of the impact of mining activities on flora and vegetation at the local and regional scales, in the context of the limitations of the surveys based on species detected in other surveys. • More detailed surveys of infrastructure corridors should be undertaken. 	<p>the Shire of East Pilbara and DEC. The Environmental Management Plans (EMPs) would specify management measures to ensure that impacts to vegetation and flora are minimised over the project area. These measures are described below.</p> <p>Clearing of vegetation would be kept to a minimum necessary for safe construction and operation of the project. The discrete positioning of waste landforms would enable vegetation communities surrounding Coppin Gap to be avoided completely, and the impacts on H3 Vegetation Association of the more mesic areas of the southern flank of the Talga Range (supporting <i>Ficus brachypoda</i>) to be minimised.</p> <p>Riparian vegetation would be avoided wherever possible. Design criteria would position waste landforms and the TSF at least 750 m from riverine sections of the project area (that is, Vegetation Associations D2, D3, and D6). Where disturbance is unavoidable to minor drainage lines, other than</p>

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			<p>that impacted by direct clearing, sufficient culverting would be installed to maintain surface water flows.</p> <p>Topsoil management and rehabilitation would be included in the Conceptual Closure Management Plan. Progressive rehabilitation of disturbed areas would be implemented with the aim of reflecting the pre-disturbance state as closely as possible</p> <p>Not considered to be a key environmental factor.</p>
Weeds	<p>Buffel Grass along with seven other weed species have been recorded from the project area, the majority of which are restricted to Coppin Creek upstream of Coppin Gap. An increased road network and importing of earthmoving machinery onto site during construction and operation have the potential to introduce new weed species, and/or facilitate the spread of those already present, into new areas of the project area. Ruby Dock (<i>Acetosa vesicaria</i>) and Kapok Bush (<i>Aerva javanica</i>) are common weed species in the Pilbara that often</p>	<p><u>DEC</u></p> <ul style="list-style-type: none"> • A weed survey should be undertaken encompassing the full extent of the project area, borefields and service corridors. • The proponent should consider weed management as an integral part of the management commitments for the project. • The PER should include details on appropriate weed hygiene procedures which are required when moving from a weed infested into a weed free area within the project area. • Weed invasion is listed throughout the PER as a factor which may have a potential impact on flora, vegetation and fauna, however, there is no indication of the weed species which are likely to cause an impact on these environmental factors. 	<p>Moly Mines aims to control the spread of existing weeds, and prevent the introduction of new weed species over the project area. Weed hygiene measures would include:</p> <ul style="list-style-type: none"> • Minimising the creation of disturbed areas and progressively rehabilitating areas of disturbance to avoid colonisation by weed species; • Implementation of vehicle hygiene procedures for vehicles arriving and/or departing the project area;

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	<p>invade disturbed areas. The latter is present along the creekline south of Coppin Gap and around the current exploration camp while Ruby Dock is currently absent. At present there appear to be no introduced aquatic weeds in the system.</p>		<ul style="list-style-type: none"> • Off-road vehicle use would be strictly controlled over the project area with no driving permitted off designated routes; • Topsoil and mulch sourced from areas of weed infestation would be stored and utilised separately; • The use of provenanced seed in the rehabilitation programme, preferably sourced from the immediate area; and • An induction and ongoing education program for Moly Mines staff would reinforce awareness of procedures to prevent and control the spread of weeds. <p>Not considered to be a key environmental factor.</p>
Aquatic Ecology	<p>Three key aquatic habitats were defined in Coppin Creek:</p> <ul style="list-style-type: none"> ▪ semi-permanent water bodies with minimal emergent vegetation and littoral zone, and a mostly rocky base (i.e. Coppin Gap, Kitty's Gap); ▪ temporary creekline habitats with emergent vegetation, slightly sloping banks, sandy base, connected during high flow events; and 	<p><u>DEC</u></p> <ul style="list-style-type: none"> • The PER and/or Attachment K do not contain any information regarding surveying and collecting vascular aquatic plants. While species diversity may be very low for ephemeral creeklines, the omission of vascular aquatics is significant. • Both the sampling adequacy and quality of identifications are highly questionable for charophytes. • The data in Appendix K is only presented at the genus level. Species level identifications should be made where possible in order to assess the significance of the flora on a local and regional scale. • Further information needs to be provided on the management and construction of the Coppin Creek diversion channel, especially the 	<p>Erosion, sedimentation, altered water levels or hydrological regimes and diminished water quality may contribute to the following:</p> <ul style="list-style-type: none"> • Change in community structure and habitat. • Loss of riparian vegetation. <p>Management strategies would include, but not be limited to:</p> <ul style="list-style-type: none"> • the incorporation of water

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	<ul style="list-style-type: none"> ▪ temporary creekline comprised of isolated pools, little to no emergent vegetation or submerged macrophytes and minimal retention of surface water. <p>The aquatic environment of Coppin Creek includes a transient community comprising algae and macroinvertebrates. Emergent riparian vegetation provides habitat for these organisms. Other groups that inhabit the aquatic environment, including fish, reptiles and amphibians</p>	<p>revegetation of the channel.</p> <ul style="list-style-type: none"> • Hydrological modelling indicates that dewatering will have an impact on Coppin Gap water levels, particularly when coinciding with drought. • The potential environmental impacts of grouting on subterranean fauna and other local biota such as vegetation should also be addressed. 	<p>management features that replicate natural conditions, including floodplain zones and diversion structures;</p> <ul style="list-style-type: none"> • appropriate design in terms of cross section and path, flow profile, drainage, and disturbance footprint; • containment of water from operational areas including waste landforms with the water re-used in the mine water circuit; • the installation of sediment traps and basins; • the installation of diversion structures around mine infrastructure and pit bunds to minimise erosion; and • appropriate waste landform design to incorporate water management features that minimise the potential for sediment-laden surface water runoff. <p>Not considered to be a key environmental factor.</p>
Geochemistry	<p>The tailings composition reflects the mineralisation associated with the orebody. It is composed of mainly quartz and actinolite with a number of accessory minerals including</p>	<p><u>DOIR</u></p> <ul style="list-style-type: none"> • The concentrations of metals within the tailings and tailings slurry should be presented as a table within the PER and comparison made to DEC guidelines. • An acid rock drainage management plan, or a section on acid rock 	<p>Tailings would be stored by filtered stack method which would result in tailings with approximately 15 – 17% moisture content compared to 70% in the</p>

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	<p>calcite, chlorite, plagioclase, muscovite and potassium feldspar. The trace components include pyrite, pyrrhotite, molybdenite, arsenopyrite and chalcopyrite.</p> <p>Elemental analysis indicates that the tailings are enriched in the minor elements silver (Ag), copper (Cu), cadmium (Cd), arsenic (As), bismuth (Bi), antimony (Sb), selenium (Se) and molybdenum (Mo) compared to un-mineralised soils and bedrocks. However, the degree of enrichment was not marked. Pilot plant testing of the process plant has indicated that the molybdenum content of the tailings is expected to be approximately 60 - 80 mg/kg.</p> <p>Decant water was mildly alkaline (pH 8 - 9) and fresh to slightly brackish (460 - 600 mg/L total dissolved solids which are mainly sodium chloride). Concentrations of minor elements were generally low and close to or below their detection limits. The one exception was molybdenum which had a solubility in the order of 1 mg/L (compared to a natural soil Mo level in Coppin Gap pool of ~0.1mg/L). Soluble molybdenum</p>	<p>drainage management within the progressive rehabilitation and closure plan, should be prepared, in consultation with an appropriately qualified specialist.</p> <ul style="list-style-type: none"> • Concentrations of molybdenum causing toxic effects on vegetation should be provided, and referenced. • The potential for uptake of metals by vegetation established on the TSF at closure should be considered, in relation to both toxic effects on vegetation, and toxic effects or bioaccumulation in fauna/stock grazing on TSF vegetation. <p><u>Cons Council</u></p> <ul style="list-style-type: none"> • The PER does not mention the expected molybdenum levels or their health effects due to an assumption that this need not be addressed because molybdenum is less toxic than arsenic. • Large quantities of PAF material in the ore exacerbate the potential for releases of toxic metals which in turn has the potential to cause numerous detrimental impacts to the environment. • Recommendations of best practice guidelines such as the Australian Government DoTARs Leading Practice guidelines for Managing Acid and Metalliferous Drainage should be followed. • Technology for store release cover designs and encapsulation of PAF remains unproven. There is a large amount of uncertainty, and hence risk, in geological modelling which needs to be taken into account. • Risk associated with heavy metals cannot be completely discounted by modelling that is by its nature imperfect. 	<p>original slurried tailings proposal</p> <p>The construction of the TSF at Spinifex Ridge Project would comply with all relevant Australian Standards. The TSF would be constructed to minimise seepage and potential groundwater quality impacts. A collection sump would be established at the upstream toe of the embankment, where the embankment crosses a stream bed. This would control any seepage before it enters fractured basement rock likely to occur in the creek bed. A sediment trench would be constructed downstream of the peripheral embankment, which serves to collect any tailings in the event of an accidental discharge.</p> <p>Not considered to be a key environmental factor.</p>

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	would be present as the molybdate anion.		
<ul style="list-style-type: none"> POLLUTION 			
Greenhouse Gases	<p>Activities on site result in estimated annual operational GHG emissions of approximately 631,614 t CO₂-e. Given the operation would process 20 Mtpa of ore and produce a total of 71,000 tpa (23,000 tpa of molybdenum and 48,000 tpa of copper) of concentrate the GHG efficiency of the operation would be approximately 31.6 kg CO₂-e/t of ore processed, or approximately 8.9 t CO₂-e/t concentrate produced. Over 99% of these emissions are generated from the combustion of fuel and the generation of electricity for the project.</p>	<p><u>DOIR</u></p> <ul style="list-style-type: none"> Consider other options such as biodiesel, the carbon neutral program, and carbon offsets. Develop management plans for these and considers the Premier's Climate Change Action Statement and the National Pollutant Inventory. <p><u>Cons Council</u></p> <ul style="list-style-type: none"> Greenhouse gas emissions of 631,614 tpa represent a 0.9% increase to WA's rising GHG emissions (based on 70 Mtpa for WA in the SoE Report). This is a significant contribution from one project. Standard proponent actions such as minimizing haul route distances are not legitimate claims to energy efficiency innovation or GHG mitigation. Real mitigation measures and offsets need to be applied Claiming that no GHG emissions will come from land clearing because the height of the vegetation is below an arbitrary limit is not scientifically defensible given knowledge that these plants, their root systems and the soil will hold GHG's. 	<p>The management objectives for greenhouse gas (GHG) emissions are to minimise emissions to levels as low as practicable on an on-going basis and consider offsets to further reduce cumulative emissions. Applicable guidelines and standards include:</p> <ul style="list-style-type: none"> EPA Guidance Statement No. 12 <i>Minimising Greenhouse Gas Emissions</i> (EPA, 2002). <p>Emissions would be minimised on site by optimal positioning of site infrastructure to minimise haul distances. Greenhouse gas emissions have been minimised from the design phase of the project with the selection of a reciprocating engine gas fired power plant for electricity generation. This option was chosen based on its relatively low greenhouse gas emissions when compared with other power supply options.</p> <p>Not considered to be a key environmental factor.</p>

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<ul style="list-style-type: none"> SOCIAL SURROUNDINGS 			
<p>Visual Amenity</p>	<p>Coppin Gap is located in a Class A Nature Reserve approximately 500m to the east of the project area. It is a semi-permanent water body located where Coppin Creek intersects the Talga Range. Coppin Gap is one of two breaks in Spinifex Ridge located within the project area. The other, Kitty's Gap, is used as an access point through the range. These gaps concentrate flow from the upstream catchment and allow it to pass through the ridge to Kookenyia Creek.</p> <p>Surface water in Coppin Creek is typically fresh and alkaline, with an electrical conductivity of approximately 3,540 µS/cm and a pH of 8.1 – 8.9. Coppin Gap pool is a fresh, semi-permanent water body with an electrical conductivity less than 4,800 µS/cm and a pH of 8.2 - 8.3. Concentrations of nutrients such as total nitrogen and total phosphorus are below 1mg/L.</p>	<p><u>DOIR</u></p> <ul style="list-style-type: none"> To reduce the visual impact of the pit face cut into the Talga Range, the progressive revegetation of pit benches on the range face should be considered. Two of the main public viewing points of the project following closure will be from the access road to Coppin Gap, and from Coppin Gap itself. Simulated views of the project area from the access road, and from the northern and southern end of Coppin Gap, should be provided. <p><u>Wildflower Society</u></p> <ul style="list-style-type: none"> Views from Coppin Gap will be significantly impacted by both waste dumps, tailings storage facilities and probably the bund for the diverted creek and also a massive pit will also be left. Project will infringe on Coppin Gap as there will be restricted access from the danger of fly rock during blasting. A Community Reference Group should be set up to liaise with interested groups to see that community expectations are met. Management plans be made publicly available and also that each one is covered by a legally enforceable condition. Concern regarding the location of the project in relation to Coppin Creek and Coppin Gap; Proposed impact on Coppin Creek; Proposed size and location of the waste dumps; Proposed size and location of the pit; Proposed size and location of the tailings dam. <p><u>Cons Council</u></p> <ul style="list-style-type: none"> Scenic value of Coppin Gap will be significantly reduced. Large manmade landforms (the pit and waste dumps) will become dominant landscape features in the area immediately adjacent to Coppin Gap. It is highly unlikely that the aesthetic and indirect impacts on 	<p>Considered to be a key environmental factor. See section 3.5 Impacts to Amenity Values</p>

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		<p>Coppin Gap will be viewed as acceptable by a majority of stakeholders following mine construction.</p> <ul style="list-style-type: none"> • Tourism would be severely compromised by this proposed mine that dwarfs the natural features and will impose restrictions on activities such as walking and swimming. Safety signs will be required that will reduce the aesthetic values; • Tourism amenity of Coppin Gap, Kitty Gap and the ranges will be permanently deteriorated by the loss of scenic amenity and the loss of the road to Kitty Gap between the ranges. 	
Closure	<p>The overall objectives of this conceptual rehabilitation and closure plan are:</p> <ol style="list-style-type: none"> 1. During the construction and operation of the mine: to ensure that public safety and key environmental values would be protected, and 2. After cessation of mining: to ensure that the use of environmental resources by Moly Mines would not result in public cost or liability or significantly constrain the agreed future uses of the land. This would be effectively achieved through creation of stable and functioning landforms, consistent with surrounding landscape and other environmental values of the region. <p>A further general aim of the rehabilitation and closure plan is to support the efficient and prudent use of resources and to allocate resources</p>	<p><u>DOW</u></p> <ul style="list-style-type: none"> • Acceptability of leaving a saline open void a short distance from a significant natural water feature. <p><u>DOIR</u></p> <ul style="list-style-type: none"> • Information on progressive rehabilitation and closure is limited, and should be expanded. • Closure plan could potentially be renamed the ‘Progressive Rehabilitation and Closure Plan’, and incorporate planning for progressive rehabilitation of the site. • The ‘Closure Plan’ should include a section for each project component or domain at the site and state the closure objectives, preliminary completion criteria, management actions, rehabilitation specifications and planned monitoring for each domain. • If there is likely to be a shortage of growth medium a commitment to investigating alternative sources of “growth medium” (such as regolith, or crushed waste rock), and trials to establish the suitability of this material for this purpose, should be made. • Material required to construct the TSF cover system should be stockpiled adjacent to the TSF, prior to discharge of tailings to this facility. • Issues associated with a pit lake following closure do not appear to have been considered, or are not clearly stated. 	<p>Considered to be a key environmental factor. See section 3,4 Closure and Rehabilitation</p>

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	<p>in a way that reflects the environmental priorities of stakeholders. Whole-of-project costs and environmental risks would be taken into account when making decisions on the scheduling and allocation of resources for rehabilitation and closure works. Planning for rehabilitation and closure would be linked to mine planning to ensure that closure and rehabilitation works are as cost-effective as possible and implemented in a timely manner.</p> <p>The rehabilitation and closure plan for the Spinifex Ridge project has been prepared to include strategies that can reasonably and practically be conducted, before and during mining, to optimise the establishment of ecosystems that mirror the attributes and functions of the pre-mining environment. The strategies that would be adopted in support of rehabilitation and closure objectives are still being developed and would evolve through consultation with regulators and other stakeholders.</p>		
Landforms	The project area is located across four land systems, namely Capricorn,	<u>DOIR</u> <ul style="list-style-type: none"> • Zone of potential instability around the pit is not included in 	Potential impacts to landforms and soils include the modification of

Preliminary Environmental Factors	Proposal Characteristics	Summary of Government Agency and Public Comments	Identification of Key Environmental Factors
	<p>Macroy, Rocklea and Talga. These land systems vary in regard to landform, geology, and vegetation, and in their proportions within the Pilbara region and the project area.</p> <p>While the greatest proportion of the project area is comprised of the lower footslopes, stony and sandy plains, the area is visually dominated by the major ridge of the Talga Range. The Range extends in an east-west direction across the project area with a maximum height of 324 mASL.</p> <p>Three main lithotypes are associated with the orebody at Spinifex Ridge; granodiorite, mafic volcanics and felsic volcanics. It is expected that all of the granodiorite would be processed as ore, while much of the felsic and mafic units would be taken as waste to the waste landform or stockpiled as mineralised waste or low-grade. Modelling of the likely distribution and volume of potentially acid forming waste rock indicates that the majority of the waste rock is non acid-forming</p>	<p>constraints for placement of waste rock dumps (WRDs).</p> <ul style="list-style-type: none"> • There is no bund around the top surface of the dump, to prevent run-off discharging over the batters. • There is no commitment to progressive rehabilitate. • PAF material should be placed only under horizontal surfaces of the WRD dump, and not extend under the batters, to reduce the potential for water infiltration to the PAF material. • Details of management of water on the surface of the WRDs should be provided, including measures to manage run-off from adjacent ridges. <p><u>Cons Council</u></p> <ul style="list-style-type: none"> • High risk of topsoil or loose material washing off Waste Dump 3 into diversion channel and Coppin's Gap. • There is little point in preserving most significant geological features without their aesthetic context. 	<p>existing landforms through the development of the pit, waste dump and tailings storage facility, and soil erosion and sediment mobilisation across the project area. Key management strategies to minimise impacts pertaining to soils and landforms in the project area would include:</p> <ul style="list-style-type: none"> • construction of landforms the blend in with existing landforms, are suitable for closure, stable and resistant to erosion, • collection, stockpiling and management of soil resources in ways as to maximise rehabilitation potential and minimise erosion potential, • development, implementation and ongoing review of Rehabilitation Plans incorporating applicable design criteria for the reconstruction and rehabilitation of surface soil profiles, and • progressive rehabilitation of disturbed areas. <p>Not considered to be a key environmental factor.</p>

PRINCIPLES		
Principle	Relevant Yes/No	If yes, Consideration
<p>1. The precautionary principle <i>Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.</i> <i>In application of this precautionary principle, decisions should be guided by –</i> (a) <i>careful evaluation to avoid, where practicable, serious or irreversible damage to the environment; and</i> (b) <i>an assessment of the risk-weighted consequences of various options.</i></p>	Yes	The proposal has the potential to impact fauna, groundwater and surface water. Therefore, monitoring and management measures should be implemented to detect and avoid impact.
<p>2. The principle of intergenerational equity <i>The present generation should ensure that the health, diversity and productivity of the environment is maintained and enhanced for the benefit of future generations.</i></p>	Yes	Resource would be permanently reduced in this area. Resource can be used for infrastructure which could benefit future generations and may be recycled in the future.
<p>3. The principle of the conservation of biological diversity and ecological integrity <i>Conservation of biological diversity and ecological integrity should be a fundamental consideration.</i></p>	Yes	The proposal would result in the loss of approximately 1600ha of vegetation and has the potential to affect diversity integrity. Fauna is a relevant environmental factor addressed in this report.
<p>4. Principles relating to improved valuation, pricing and incentive mechanisms (1) <i>Environmental factors should be included in the valuation of assets and services.</i> (2) <i>The polluter pays principles – those who generate pollution and waste should bear the cost of containment, avoidance and abatement.</i> (3) <i>The users of goods and services should pay prices based on the full life-cycle costs of providing goods and services, including the use of natural resources and assets</i></p>	Yes	The proposal would require waste (tailings) storage, environmental monitoring, rehabilitation and ongoing management until a stable self sustaining landform is established. The proponent should bear these costs.

PRINCIPLES		
Principle	Relevant Yes/No	If yes, Consideration
<p><i>and the ultimate disposal of any waste.</i></p> <p><i>(4) Environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structure, including market mechanisms, which enable those best placed to maximize benefits and/or minimize costs to develop their own solution and responses to environmental problems.</i></p>		
<p>5. The principle of waste minimisation</p> <p><i>All reasonable and practicable measures should be taken to minimize the generation of waste and its discharge into the environment.</i></p>	Yes	The proposal would generate waste (tailings), hence the proponent should address the waste hierarchy and minimise the generation of unavoidable wastes.

Appendix 4

Recommended Environmental Conditions

RECOMMENDED ENVIRONMENTAL CONDITIONS

Statement No.

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

SPINIFEX RIDGE PROJECT, 50 KILOMETRES NORTH-EAST OF MARBLE
BAR, SHIRE OF EAST PILBARA.

Proposal: To develop an open pit mine and process 20 million tonnes per annum (Mtpa) of ore to produce 23,000 tonnes per annum (tpa) of molybdenum concentrate and 48,000 tpa of copper concentrate.

Proponent: Moly Metals Australia Pty Ltd

Proponent Address: 46–50 King’s Park Road, West Perth, Western Australia, 6005.

Assessment Number: 1657

Report of the Environmental Protection Authority: Bulletin 1285

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

1 Proposal Implementation

1-1 The proponent shall implement the proposal as documented and described in schedule 1 of this statement subject to the condition and procedures of this statement.

2 Proponent Nomination and Contact Details

2-1 The proponent for the time being nominated by the Minister for the Environment under sections 38(6) or 38(7) of the *Environmental Protection Act 1986* is responsible for the implementation of the proposal.

2-2 The proponent shall notify the Chief Executive Officer of the Department of Environment and Conservation (CEO) of any change of the name and address of the proponent for the serving of notices or other correspondence within 30 days of such change.

3 Time Limit of Authorisation

3-1 The authorisation to implement the proposal provided for in this statement shall lapse and be void within five years after the date of this statement if the proposal to which this statement relates is not substantially commenced.

3-1 The proponent shall provide the CEO with written evidence which demonstrates that the proposal has substantially commenced on or before the expiration of five years from the date of this statement.

4 Compliance Reporting

4-1 The proponent shall submit to the CEO environmental compliance reports annually reporting on the previous twelve-month period, unless required by the CEO to report more frequently.

4-2 The environmental compliance reports shall address each element of an audit program approved by the CEO and shall be prepared and submitted in a format acceptable to the CEO.

4-3 The environmental compliance reports shall:

1. be endorsed by signature of the proponent's Executive Chairman or a person, approved in writing by the CEO, delegated to sign on behalf of the proponent's Executive Chairman;
2. state whether the proponent has complied with each condition and procedure contained in this statement;
3. provide verifiable evidence of compliance with each condition and procedure contained in this statement;
4. state whether the proponent has complied with each key action contained in any environmental management plan or program required by this statement;
5. provide verifiable evidence of conformance with each key action contained in any environmental management plan or program required by this statement;
6. identify all non-compliances and non-conformances and describe the corrective and preventative actions taken in relation to each non-compliance or non-conformance;

7. review the effectiveness of all corrective and preventative actions taken; and

8. describe the state of implementation of the proposal.

4-4 The proponent shall make the environmental compliance reports required by condition 4-1 publicly available in a manner approved by the CEO.

5 Performance Review and Reporting

5-1 The proponent shall submit to the CEO a Performance Review Report at the conclusion of the first, second, fourth, sixth, eighth and tenth years after the start of implementation and then, at such intervals as the CEO may regard as reasonable, which addresses:

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

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

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

6 Surface Water / Drainage and Groundwater

6-1 The proponent shall ensure that the run-off or seepage from the waste dumps and the tailings storage facility do not cause the quality of surface or ground water in or leaving the proposal area to exceed ANZECC* requirements, taking into consideration natural background water quality, so that existing and potential uses, including ecosystem maintenance, are protected.

* - *Australian Water Quality Guidelines for Fresh and Marine Waters*, ANZECC (November 1992, and its updates).

6-2 The proponent shall monitor the quality of any run-off or seepage from the tailings storage facility and waste dumps to surface and ground water on and in proximity to the project area shown in the figure in Schedule 1 to the Minister's Statement. This monitoring is to be done to the satisfaction of the CEO of the Department of Environment and Conservation.

6-3 The proponent shall submit a monitoring program to the CEO of the Department of Environment and Conservation prior to construction.

- 6-4 The proponent shall submit the results of the monitoring program to the CEO of the Department of Environment and Conservation.
- 6-5 The proponent shall provide proposed management measures to the CEO of the Department of Environment and Conservation if the requirements of condition 6-1 are not met.

7 Terrestrial Fauna

- 7-1 The proponent shall report the results of the autumn 2008 Short Range Endemic Survey (described on page 45 in Appendix F (Environmental Management Programme) of the Public Environmental Review) to the CEO of the Department of Environment and Conservation, prior to any ground-disturbing activities associated with the proposal.
- 7-2 The proponent shall submit with the report required by condition 7-1, practicable management measures that may be required to facilitate protection of the conservation status of any short range endemics located in the proposal area, to the CEO of the Department of Environment and Conservation.

8 Closure and Rehabilitation

- 8-1 Immediately following the second year of operations, the proponent shall carry out progressive rehabilitation of the minesite and its environs, including waste dumps and the tailings storage facility, to achieve rehabilitation at a rate of not less than 45 hectares per year on a three-year rolling average.
- 8-2 During operations and decommissioning, the proponent shall not allow unrehabilitated areas of the tailings storage facility to exceed 150 hectares at any time.
- 8-3 Within two years following the cessation of productive mining, the proponent shall have substantially achieved stable, self-sustaining and functioning landforms which are compatible with the surrounding landscape, with the exception of the pit lakes (see condition 8-4), and which contribute to the maintenance of the biodiversity observed at the outset of mining and the key environmental values over the long-term.
- 8-4 The proponent shall ensure that the final pit lakes do not cause significant environmental impacts arising from groundwater pollution or through attracting native fauna that may subsequently be harmed.

9 Visual Amenity

- 9-1 The proponent shall ensure that no project area infrastructure such as waste rock landforms, tailings storage facility, pit, topsoil stockpiles, processing plant, communication tower or evaporation ponds are visible from Coppin Gap Pool.

Notes

1. Where a condition states “on advice of the Environmental Protection Authority”, the Environmental Protection Authority will provide that advice to the Department of Environment and Conservation for the preparation of written notice to the proponent.
2. The Environmental Protection Authority may seek advice from other agencies or organisations, as required, in order to provide its advice to the Department of Environment and Conservation.
3. The Minister for the Environment will determine any dispute between the proponent and the Environmental Protection Authority or the Department of Environment and Conservation over the fulfilment of the requirements of the conditions.
4. 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 1986*.

Schedule 1

The Proposal (Assessment No. 1657)

General Description

The proposal is to develop an open pit mine that will process 20 million tonnes per annum (Mtpa) of ore to produce 23,000 tonnes per annum (tpa) of molybdenum concentrate and 48,000 tpa of copper concentrate.

The proposal is described in the following document – Moly Metals Australia Pty Ltd: Public Environmental Review (August 2007).

Summary Description

A summary of the key proposal characteristics is presented in Table 1.

Table 1 – Summary of Key Proposal Characteristics

Element	Description
General	
Life of Mine	10 years
Total Area of Disturbance	Approximately 1600 hectares
Total Area of Rehabilitation	All disturbed areas excluding final pit area
Final Depth of Pit	Approximately 430 metres below creek level
Treatment Rate	20 million tonnes per annum
Molybdenum concentrate production	Approximately 23 000 tonnes per annum (max ~ 25 000 tonnes per annum)
Copper concentrate production	Approximately 48 000 tonnes per annum
Power Requirements	600 Gigawatt hours per annum
Power Generation	Gas fired power plant
Water Requirements	Approximately 10 Gigalitres per year
Water Source	Groundwater bores within the De Grey and Canning borefields
Annual Greenhouse Gas Emissions	Approximately 640 000 tonnes of carbon dioxide equivalent
Processing Plant	Secondary and tertiary crushing, grinding and milling circuit, float and leach circuits.
Tailings Storage Facility	Approximately 600 hectare filtered dry stacked tailings design.

Figures (attached)

Figure 1 – Regional Location Plan

Figure 2 – Project Layout

Appendix 5

Summary of Submissions and Proponent's Response to Submissions