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MOUNT LYELL REMEDIATION

Final report

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A joint program between the Supervising Scientist and the Department of Environment and Land Management, Tasmania.

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Executive summary

Background

Copper has been mined and processed at the Mount Lyell mine at Queenstown in western Tasmania for a century but it was not until Copper Mines of Tasmania (CMT) took the Mount Lyell mine over in 1994 that more than scant regard was paid to protecting the environment.

Historically the mine was an economic focal point for western Tasmanian development, with towns, railways and governments all dependent on its fate. But the environmental impact and costs of this prosperity were high. With 'new' industries on the west coast such as ecotourism and aquaculture, which depend on a 'clean' environment, the existing and continuing pollution from historic mining practices does not meet the present expectations of society and remediation solutions are needed.

The environmental impacts include:

- tailings, slag and acid drainage into rivers and a delta of tailings the size of a city suburb in Macquarie Harbour;
- all aquatic life in the Queen River and lower King River has been killed;
- waterways contaminated with toxic metals, particularly copper, representing a potential hazard to the fishing industry and other harbour uses;
- vegetation on Queenstown hills destroyed by felling, fire, erosion and toxic fumes from smelting.

Smelting ended in the 1960s and CMT has built a dam to contain tailings. CMT's modern environmental management plan is based on 'Best Practice Environmental Management' principles.

Remedial action and the MLRRDP

The Mount Lyell Remediation Research and Demonstration Program (MLRRDP) has collected technical information and designed a remediation plan to redress environmental damage relating to Mount Lyell activities. The MLRRDP is one of Australia's most comprehensive responses to large-scale environmental damage. The Program's field trials have studied cost-effective ways to reverse the environmental damage affecting Mount Lyell, Macquarie Harbour and the King and Queen Rivers.

The Program is of national and international significance as an example of responsible environmental management and it also has strong local significance to the economy and quality of life for the west coast of Tasmania.

The Commonwealth (through the Supervising Scientist, part of Environment Australia) and Tasmanian Governments (Department of Environment and Land Management [DELM]) jointly managed the MLRRDP and have provided a total $2 million for research, field trials/reports, as well as community consultation/education and administration for two and a half years.

This report summarises MLRRDP outcomes. The findings will help Government and CMT redress environmental damage in the region.

The program had extensive community participation in all phases through its Consultative Committee (consisting of all stakeholders in the region) plus public meetings and newsletters.

Early on, public input was grafted onto the technical expertise of the Supervising Scientist and DELM to create the Environmental Quality Objectives of the MLRRDP and design 16 investigative projects for environmental information about the affected areas. This enabled an accurate assessment of the state of these regions and the basis of a cost-effective remediation plan targeting primary pollution sources.

General objectives of the MLRRDP

- Involve the west coast community and other stakeholders in determining the long-term environmental quality objectives for the Mount Lyell lease site, the King and Queen Rivers and Macquarie Harbour.
- Develop better understanding of historical environmental impacts from the Mount Lyell mine site and tailings, in order to implement strategies to reduce or eliminate these impacts.
- Demonstrate remediation methods to assess practicality, cost and effectiveness and recommend the most cost-effective means of achieving the environmental quality objectives.
- Identify and carry out any remediation works possible within the life and budget of the Program.

Specific objectives of remediation strategy

- Minimise acid drainage from the lease site and tailings deposits in the rivers;
- Improve the visual appearance of the tailings banks and the delta;
- Improve water quality in the King and Queen Rivers enough to sustain a modified ecosystem;
- Maintain culturally significant artefacts;
- Protect marine farming in Macquarie Harbour.

The findings

The projects overwhelmingly identified the lease site as the major source of acid drainage related pollutants affecting the rivers and harbour, with metals contamination from tailing and slag deposits being very minor in comparison.

Within the lease site, the North Lyell Tunnel has water derived in part from underground workings and has approximately 78% of the lease site copper loading. Discharge from other tunnels and waste rock dumps accounts for 21%. The remaining 1% is from smaller sources.

Downstream, chemical modelling and toxicological testing indicates that 95% to 99% of the acid drainage from the site must be neutralised or stemmed for the resultant water quality to meet downstream environmental quality objectives. Contaminated sediments in the King River and Macquarie Harbour contribute relatively little of the total pollutant load entering the harbour, and it is clear the priority for remediation should be the lease site. The Queen and lower King Rivers (but not their tributaries) are essentially lifeless due to acidity and high metal concentrations. The biological communities in Macquarie Harbour are impoverished compared with coastal embayments elsewhere in south-eastern Australia. However, Macquarie Harbour waters are less toxic than would be expected from the concentrations of copper present. This is because other constituents of the water chemistry hold a proportion of the copper in inactive forms.

Recommended remediation strategy

Two principal lease site remediation alternatives have been identified which would achieve the downstream Environmental Quality Objectives:

- long-term acid drainage neutralisation and copper removal; release of clean water to the river; or
- removing acid drainage from the catchment, through collection and discharge, to the ocean using a pipeline.

The options were assessed for: effectiveness, feasibility, cost, social acceptability, flexibility and impact of mine closure/development. Neutralising all acid drainage sources is recommended in conjunction with water diversion works which minimise the production of acid drainage. Neutralisation is a flexible system with options for staged implementation, using mine tailings in the neutralising process. A copper recovery system, such as solvent extraction/electro winning (SX/EW) is also recommended as it has potential cost offsets.

The MLRRDP has also identified and trialed remediation options suitable for small acid drainage sources, particularly those not easily diverted to a central collection point, or those not linking with the Queen River. Covering the Magazine Creek waste rock dump and the installing a successive alkalinity producing system (SAPS) have both been very effective in reducing acid drainage, and could be incorporated as supplementary measures to the large-scale lease site water management plan is developed.

While remediation must focus on the lease site, downstream revegetation trials (established to determine the most successful riverbank revegetation methods) need monitoring. Community-based groups should be encouraged to help implement revegetation works.

Summary of MLRRDP recommendations

1 Any remediation strategy should focus particularly on the Mt Lyell lease site.

2 Remediation must ultimately eliminate virtually all acid drainage from the lease site. Interim measures which achieve short-term progress are not substitutes for the long-term remediation required for downstream recovery.

3 Lease site water management is a key to successful remediation, and reducing acid drainage sources through the diversion of clean water should be a top priority. Remediation must include containing and treating acid drainage contaminated storm waters as well as 'normal' flows. As mining evolves, the quantity and quality of acid drainage from the lease site will change, and today's remediation effort must be flexible enough to respond cost-effectively to tomorrow's development.

4 Remediation work implementation and management needs a negotiated agreement, between Governments and the lease occupant, recognising the present legal framework affecting mining. The agreement must provide a legal, logistical and financial framework within which remediation can proceed.

5 The preferred remediation strategy is neutralising 100% of the acid drainage to pH 6.5, implemented progressively.

6 Copper recovery technology (selected after feasibility studies) should be implemented in conjunction with the neutralisation system, as this offers the potential to offset some neutralisation costs (depending on negotiations with the present mine operators).

7 Improving water quality in the lower King River so fish use its tributaries is an early target, even if the mainstream King remains uninhabitable.

8 Remediation of the King River banks, bed and delta through revegetation should be encouraged by involving community-based groups, improving the visual amenity and reducing dust emissions. The best remediation option for the King River is to clean the water leaving the lease site.

9 No specific remediation works are recommended in Macquarie Harbour at this time, though long-term monitoring is warranted. Remediating the site and reducing/eliminating the discharge of acid drainage is also the best remediation strategy for the harbour.

Costs associated with remediation

The cost of remediating the lease site may appear substantial at first: neutralising all acid drainage sources requires capital expenditure exceeding $10 million, with yearly operating costs around $2 million. However, if full remediation proceeds, the growing Macquarie Harbour-based aquaculture industry may contribute an extra $8 million a year to the local economy. If even half the tourists visiting Strahan stay one additional day it will generate another $9 million yearly through tourism. Importantly, site remediation would enhance Tasmania's 'clean green' image and send a message to local, national and international mining and environmental communities that Tasmania is serious about the environmental impacts of mining. Implementing remediation plans is a major step in fulfilling Australia's international responsibility to protect, conserve and preserve World Heritage Areas for future generations.

Where to now?

In implementing the recommended remediation strategy, the Tasmanian Government and CMT must negotiate an agreement which will promote remediation, recognise CMT's right to mineral access and permit third party involvement if required. It must provide a legal, logistical and financial framework so remediation proceeds and funding options at the Commonwealth, State and local level should not be limited to government sources. Given the longevity and severity of the acid drainage-related environmental issues and the effort and money invested in the MLRRDP and other studies, the community has a strong expectation from that effective action will occur. There is no putting Mt Lyell back in the 'too hard basket'.

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