4 The Mount Lyell Remediation Research and Development Program

4.1 Introduction

At the time of the Mount Lyell mine closure, DELM was aware that a major environmental problem existed and would continue to exist for hundreds of years unless substantial remediation action was taken. As a condition of closure, The Mount Lyell Mining and Railway Company left the State Government a trust fund containing $1.5 million to be used toward the environmental management and remediation of the lease site. The State Government recognised that this sum was insufficient to quantify, prioritise and remediate the environmental problems associated with Mount Lyell, and that a new mine operator would be unable to remediate the environmental problems resulting from historic mining practices and remain financially viable. As the Government searched for a new operator for the lease site, DELM (Tasmania) approached the Commonwealth for help in resolving the environmental 'legacies' legally left behind by The Mount Lyell Mining and Railway Company. After a site visit by the Commonwealth's Supervising Scientist, a co-operative program was agreed to which was jointly funded from the Mount Lyell Closure Trust Fund ($0.5m) and the Commonwealth ($1.5m). Additionally, it was agreed that the environmental mining expertise contained in the Office of the Supervising Scientist (***oss***) and the Environmental Research Institute of the Supervising Scientist (***eriss***) would join forces with DELM personnel in addressing the problem at hand.

At the same time as the MLRRDP was being developed, a new operator was found for the Mount Lyell lease site. Copper Mines of Tasmania, a wholly-owned subsidiary of Gold Mines of Australia, entered into a legal agreement with the State Government of Tasmania for resuming operations at the mine. Environmental conditions which CMT had to meet included the construction of a tailings pond. 'Historical' pollution which was the result of past mining practices, however, was declared to not be the responsibility of CMT. This included the 80 L/s of acid drainage which continues to be pumped from the underground workings in order to keep the mine dry, as well as the runoff from the waste rock dumps and hillsides. A figure of 3% of the acid drainage emanating from the underground workings was agreed to by the Tasmanian Government and CMT as being CMT's responsibility at the time of the resumption of mining, with incremental increases in CMT's responsibility as mining proceeds deeper underground (SDAC 1995).

4.2 Objectives of the MLRRDP

The principal purpose of the MLRRDP was to quantify and prioritise the sources of pollution, and to formulate options for a comprehensive remediation program for the Mount Lyell lease site, the King and Queen Rivers and Macquarie Harbour.

The general objectives of the Program were as follows:

1 To 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.

2 To develop a better understanding of the environmental impacts caused by past activities on the Mount Lyell mine site and tailings in the Queen and King Rivers and Macquarie Harbour, in order to enable the development of strategies to reduce or eliminate these impacts.

3 To demonstrate remediation methods to determine their practicality, cost and effectiveness in order to make recommendations as to the most cost-effective means of achieving the environmental quality objectives.

4 To identify and carry out any remediation works which can be implemented within the time frame and budget of the Program.

All projects in the MLRRDP adhered to at least one of these objectives. For example, the project that dealt with the rehabilitation of the Strahan foreshore (Johnston et al 1996) addressed objectives 1, 3 and 4 in the above list, while the project that examined the behaviour of copper in Macquarie Harbour (Teasdale et al 1996) addressed objective 2.

In addition to the general objectives, a set of specific objectives was also drawn up. These were related to the environmental quality objectives discussed below.

The MLRRDP aims to identify cost-effective options which:

- 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 individual projects examined methods and, in some cases, carried out trials which fulfilled one or more of these objectives.

4.3 Structure of the MLRRDP

4.3.1 Steering Committee

Members and function

The role of the Steering Committee was to approve operational plans for the Program as a whole, and, if necessary, offer comments. The committee also controlled finance to the Program by approving changes to expenditure. The committee periodically reviewed the progress of the individual projects, and approved and submitted the final Program report to governments.

The eight-member Steering Committee met at approximately six-month intervals and consisted of the following participants.

Mr Barry Carbon, Supervising Scientist (Co-Chair), Supervising Scientist (retired in December 1996)

Mr Hamish Bohannan, Resident Mine Manager, CMT

Dr Frank Cattell, Director of Environmental Management, DELM

Dr Arthur Johnston, Director, ***eriss*** (Acting Supervising Scientist from December 1996)

Mr Andrew Livingstone, Manager of Civil and Water Resource Engineering, HEC

Mr Greg McCrossen, Director, Corporate Services, DELM

Mr Stewart Needham, Assistant Secretary, ***oss***

Mr John Ramsay (Co-Chair), Secretary, DELM

4.3.2 Project Implementation Committee

Members and function

The Project Implementation Committee (PIC) was responsible for developing, coordinating and overseeing the implementation of the operational plan as approved by the Steering Committee. Specifically, the PIC administered the budget within the parameters set by the Steering Committee, defined the scope for individual projects, developed the budget for each project, and approved the consultancies awarded as part of the projects. In addition to reviewing the projects, the members of the PIC oversaw the individual projects, and maintained communication and cooperation with and between project leaders and the consultants.

The PIC met as required by the Program, at intervals of at least two months. Project leaders were invited to some meetings where their particular project was discussed. The members of the PIC were:

Dr Frank Cattell (Chair), Director of Environmental Management, DELM

Dr Arthur Johnson, Director, ***eriss***

Mr John Johnston, Senior Environmental Officer, DELM (left DELM in December1996)

Mr Warren Jones, Program Manager MLRRDP, Manager Policy and Programs, DELM

Dr Lois Koehnken, Water Specialist DELM, Scientific Adviser MLRRDP

Mr Stewart Needham, Assistant Secretary, ***oss***

4.3.3 Consultative Committee

Members and function

The purpose of the Consultative Committee was to involve the large number of different agencies and organisations that had reason to be interested in the Program. The organisations, many of whom had a stake in the work being done, were informed of the Program and its results, and offered their comments and criticisms of the Program.

The Consultative Committee consisted of the following representatives of their respective organisation:

Mr Wayne Bolton, Department of Tourism, Sport and Recreation

Dr Frank Cattell (Chair), Director of Environmental Management, DELM

Mr David Coleman, Department of Health and Community Services

Mr Darryl Gerrity, West Coast Council (Strahan)

Mr Stephen Godfrey, Parks and Wildlife Service

Mr Woijciech Grun, Industrial Safety—Mines, Tasmania Development and Resources

Mr John Johnston, Senior Environmental Officer, DELM

Mr Warren Jones, Program Manager MLRRDP, Manager Policy and Programs, DELM

Dr Andrew Sanger, Inland Fisheries Commission

Mr Andrew Scanlon, Hydro-Electric Commission

Mr Les Scott, Petuna Group (local aquaculture representative)

Mr Ray Shea, West Coast Council (Queenstown)

Mr Paul Smith, Forestry Tasmania

Ms Isobel Stanley, Environmental Manager, CMT

Dr Simon Stanley, Manager, Marine Environment Branch, Department of Primary Industry and Fisheries

The meetings of the Consultative Committee took place at the Queenstown Council Chambers at approximately 3-month intervals.

4.3.4 Project leaders

Function

Each project had one or two project leaders who were nominated for the projects early in the Program. The project leaders were experienced in the subject matter of the individual project. Often, a project leader was responsible for two or more projects. The role of the project leader was to prepare detailed project briefs, manage the consultant selection process and liaise with the consultants, answering any questions or queries. The project leaders also reported on the progress and findings of the projects to the various committees. Towards the end of the Program, all project leaders participated in a workshop where findings were presented, and the beginning of a remediation strategy was shaped.

4.4 Community participation in program

4.4.1 Consultation with community prior to project development

Prior to the initiation of the MLRRDP, DELM, and Supervising Scientist staff toured the Queenstown and Macquarie Harbour region and met with west coast residents. The concerns expressed by the residents augmented an already existing list of issues which had been compiled by DELM following a public seminar held in conjunction with the Macquarie Harbour – King River Study (Koehnken 1996).

4.4.2 Formulation of environmental quality objectives (EQOs)

In order to give the Program a clear focus, a set of environmental quality objectives (EQOs) was formulated. The objectives were compiled following discussions with the west coast community, and were circulated for comment around the Steering and Consultative Committees. It was emphasised that these objectives could not be achieved by the present Program, and were long-term aims for this and any subsequent remediation activities.

The objectives were divided into three groups, which coincided with the general grouping of the projects into those concerned with the Mount Lyell lease site, the Queen and King Rivers, and Macquarie Harbour.

Mount Lyell lease site

Subject to the requirements of ongoing and possible future mining operations on the Mount Lyell lease site, the rehabilitation of historic waste rock dumps and other historic environmental damage will proceed until the following conditions are met:

- emissions of acid drainage from the areas are reduced to the point that they do not compromise the environmental quality objectives for the Queen and King Rivers and Macquarie Harbour;
- the land is stabilised to minimise erosion and the effects on water quality;
- the 'bare hills' landscape should be maintained, although there are differing views on where the hills should remain bare. Most agree that the view field coming into Queenstown should be maintained.

In addition to the above objectives:

- infestation by exotic species will be minimised;
- culturally significant artefacts will be preserved;
- existing remediation works will be maintained.

The Queen and King Rivers

The remediation of water quality, sediments and the banks of the Queen and King Rivers will be undertaken such that:

- the rivers can support a healthy (although modified) aquatic ecosystem;
- erosion and transport of sediments and tailings deposited on the banks and beds of the rivers, or the leaching of metals from these, do not pose an ongoing threat to the environmental quality objectives for Macquarie Harbour;
- restoration of the visual appearance of the rivers and banks meet community requirements;
- navigability of the lower King River is improved;
- problems caused by the heightened water table in the lower reaches of the King River are reduced;
- undamaged areas are maintained as undamaged;
- existing heritage values are maintained.

Macquarie Harbour

The remediation of the water quality, sediments, the tailings delta and foreshore in Macquarie Harbour will be undertaken such that:

- the harbour will support a healthy (although not pristine) aquatic ecosystem;
- water quality throughout the harbour will be suitable for fish farming;
- fish and other aquatic life harvested from the harbour will be suitable for consumption;
- the harbour sediments and tailings delta will not pose an ongoing threat to the water quality required to meet the above objectives;
- the foreshore in the vicinity of Strahan modified or littered by mining related infrastructure should be safe and clean;
- dust from the delta will not pose a health risk;
- visual impact of the delta and the mine related wharf areas at Strahan will be reduced;
- environmental quality in that part of Macquarie Harbour which is in the World Heritage Area moves towards being in keeping with this designation.

4.4.3 Newsletter

The MLRRDP Newsletter was first distributed in July 1995, when it announced the launch of the Program the previous month. A total of seven newsletters were produced between July 1995 and September 1996. The content of the newsletters was aimed at a general readership, and included news of the reports and their findings. The newsletter also introduced the community to the scientists working on the Program and their activities and methods. A constant feature of the newsletter was the list of projects in the MLRRDP, which grew as the Program went on.

The newsletter was distributed to the public, government, all committee members, project leaders and some consultants.

4.4.4 Public meetings, consultative committee meetings, public events

Following the initial consultations, there were a series of public meetings at Strahan and Queenstown following major events in the Program, such as the public release of the first four reports, and the formulation of the final remediation strategy. The public meetings were open to all those who were interested, and those who attended included local residents, members of the west coast council and representatives of local organisations and businesses.

During the final stages of field work for the project entitled 'Remediation options for mine tailings in the King and Queen Rivers, western Tasmania', the public were invited to assist in the planting of native trees and shrubs on the tailings banks of the King River. This activity, which included many schoolchildren and was widely publicised, took place on April 13th, and ended with a barbecue at the local Drill Hall in Strahan.

4.5 Program development

4.5.1 Review of knowledge

Once the first round of community consultation was complete, DELM and Supervising Scientist personnel met in Canberra and reviewed the available technical information pertaining to the environmental status of the lease site, rivers, delta and harbour. This review led to the identification of knowledge gaps, which, combined with the overall program objectives, helped define the investigative projects to be initiated under the MLRRDP. At the same time, appropriate project leaders from DELM and the Supervising Scientist were identified for each project.

After the draft brief for each of the proposed MLRRDP projects had been completed, a second round of consultation was initiated to ensure that the projects identified were satisfactory to the community. During this process, a number of projects were modified, and additional projects were initiated reflecting the comments and input from the community. A full list of projects is given in Appendix A.

4.5.2 Project management

Each of the identified projects was managed by one or more of the scientists at DELM, ***eriss*** or ***oss***. Two projects, the one involving lease site remediation trials, and the one involving aquaculture toxicity testing, included co-project leaders from CMT and the Tasmanian Department of Primary Industry and Fisheries, respectively. The inclusion of these project leaders ensured that the specific projects were carried out to the satisfaction of these important stakeholders, and the results were complementary to existing industry related research.

Several projects were completed 'in house' by DELM, ***eriss*** and the ***oss***. These included: *Review of historical literature and data on the sources and quality of effluent from the Mount Lyell lease site* (McQuade et al 1996); *Estimation of water quality over time in the King and Queen Rivers, western Tasmania* (Klessa et al 1997); *Tailings and fluvial processes in the Queen and King Rivers* (Locher 1997); and *Copper toxicity trials in mine effluent affected waters, western Tasmania* (Humphrey et al 1997).

Most projects, as shown in Appendix A, were undertaken by leading Australian environmental consultants, selected on a competitive basis. A public advertisement was placed in national newspapers inviting 'expressions of interest' from relevant consultants for

each project. The project leaders evaluated the preliminary information, and invited the three or four most promising 'expressions of interest' to submit full tenders based on the detailed project briefs. Each project brief contained a set of selection criteria, and the tenders were evaluated by a selection panel consisting of the project leader and one or more appropriate qualified officers, against the criteria using a weighted matrix approach. The tenders were evaluated using the following criteria:

- relevant experience
- value for money
- technical skills
- management skills
- methodology

The top scorer was awarded the work.

Most projects had three major milestones: an initial literature review and detailed work plan, an interim report, and a final report. The project leaders were involved during all stages of the work, and frequently contributed to the field component of the investigations. Project leaders were responsible for verifying when the milestones had been successfully reached, and 'signing off' on the final report.

4.6 Development of remediation strategy

4.6.1 Project leader workshop

Over 31 July to 1 August 1996, a workshop was held for all project leaders of the MLRRDP at which findings from each of the investigative projects were presented. The workshop was attended by the project leaders, members of the Project Implementation Committee, and some members of the Steering Committee. The specific aims of the workshop were:

- the formation of an outline of the remediation strategy to be presented in the final report
- identification of information still required to finalise remediation strategy
- the preparation of a draft structure for the final report.

Project leaders working on related projects, some of whom had not previously met, were able to pool their knowledge and ideas to create the beginning of a remediation strategy for the Mount Lyell lease site, the Queen and King Rivers and Macquarie Harbour.

The two-day workshop began with each project leader presenting a summary of findings from their projects, in order that the leaders gained a good understanding of the complete range of projects and the bigger picture. In describing each project, the leaders stated the objectives, how they were addressed, the key results, the immediate implications for the final remediation strategy, whether additional work was required, and the need for additional research, including monitoring, to further expand our knowledge of the system.

While a range of possible remediation options emerged from the two-day think-tank, several small, yet vital, gaps in knowledge were identified, and several additional short-term work briefs were formulated, which were completed during the months following the workshop.

One of the areas requiring considerably more detailed information was the water flow regime, and associated copper and acidity loadings on the lease site. CMT, as part of its environmental management plan, had already initiated several investigations which would

provide the required information. As cooperative participants in the MLRRDP, CMT volunteered to share this information once obtained.

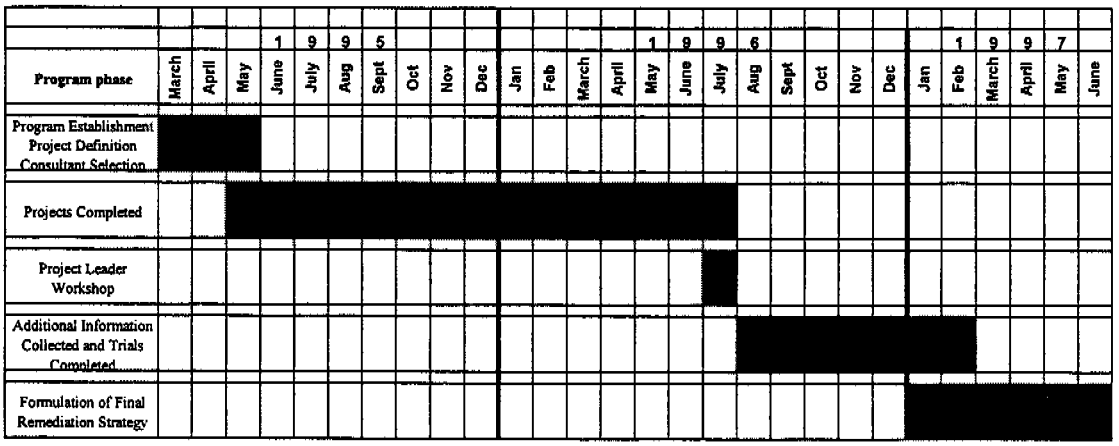
The final remediation strategy was developed based on all of the information gained by the MLRRDP, as well as a significant contribution from CMT, and previously collected DELM data.

4.6.2 Community consultation

Another round of community consultation was initiated once the range of remediation options was identified, but prior to the development of the final remediation strategy. This included public meetings in Queenstown and Strahan, and a Consultative Committee meeting. The aim of these meetings was to test the social acceptability of individual options, and to gauge the communities' views concerning remediation priorities based on the findings of the MLRRDP.

4.6.3 Timing of MLRRDP activities

As originally envisaged, the MLRRDP was to be an 18-month intensive effort to develop remediation plans for the Mount Lyell lease site. However, the complexities of the environmental issues, and the intricacies involved with developing remediation strategies, required that the program be extended an additional 10 months. Very generally, the timing of the program can be summarised as follows:



5 MLRRDP findings: State of the catchment

5.1 Introduction

The MLRRDP has completed a very wide range of investigations on the lease site, and in the rivers and harbour. Figures 5.1 to 5.3 depict the sampling sites and remediation trial sites associated with the MLRRDP's 15 investigative projects. Recent detailed biological, chemical and physical information obtained from the sampling sites combined with available historical information has allowed the MLRRDP to compile an accurate and meaningful picture of the present state of the King River catchment below Queenstown.

The findings of the MLRRDP are presented in two parts. Firstly, descriptions of the state of the lease site, rivers, delta and harbour are presented which summarise many of the findings of the MLRRDP as well as other available information. Secondly, the remediation options available for each of these catchment sections (lease site, rivers, delta, harbour) are presented and discussed.