GOLDEN CROSS MINING PROJECT

ENVIRONMENTAL IMPACT

AUDIT

SUMMARY

EMBARGOED

Until

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Office of
PARLIAMENTARY COMMISSIONER FOR THE ENVIRONMENT

PO Box 10241
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PREFACE

The Golden Cross Project is the third of three "modern generation" hard rock gold mines to be subject to the EIR/ Audit process - the others being Spectrum Resources' Monowai-Maratoto Proposal and the Waihi Gold Company's Martha Hill Project. These projects have put local and regional government agencies in the Thames-Coromandel area, central government control agencies, and ourselves (the auditors) through a very steep learning curve. The substantial documentation surrounding the projects is a valuable resource. It is apparent, from this Audit, that Cyprus Minerals Limited and its consultants have applied knowledge gained from the Martha Hill and Monowai experiences to good effect. I am particularly pleased to note that the environmental investigations have had a major influence on the planning and design of the project.

The approach adopted for this Audit has been to focus on the critical issues of environmental concern, particularly the Company's proposal to site a tailings dam and waste rock stacks in the headwaters of a valley subject to active faulting and high and intense rainfall. The issues are complex. I am conscious that the public relies on my office to check the technical detail for them. This has, inevitably, resulted in a technically complex Audit.

There is an environmental risk in relation to the stability of the site with the potential for downslope displacement of the dam (or parts of it) during a major earthquake and/or the rupture of the encapsulating layer around the waste rock, leading to acid leachate generation and release of acid and toxic metals to the river. Clearly, the overall risk can be reduced by the adoption of conservative engineering standards and appropriate rehabilitation techniques. This risk management approach places a major responsibility on the Company and on those consent agencies setting and enforcing conditions. The risk during the life of the project can be 'covered' by the conditions on the mining licence and water rights, including bond provisions. The medium term risk, from project closure until expiry of a possible 50 year water right, is to some extent covered by the conditions on the water right and the water right bond. Responsibility for long term maintenance and damage repair, following expiry of water rights, is not prescribed by law. A long term risk remains, however, which could increase through time as natural erosion takes place and if inappropriate land use occurs on the waste rock stacks. This environmental cost, and the significant financial cost of long term special treatment of the site, will be handed to future generations. I believe that the Minister of Energy must have full regard to these costs when addressing the economic effects of the proposal.

The Company has already shown a responsible attitude by making a number of commitments to minimise adverse environmental impacts. These might be lost were another company to take control. I consider these commitments should remain for the life of the project and should be formalised in conditions on the mining licence.

In considering the environmental risk I am convinced of the need for dam safety legislation and consider that the long term legal responsibilities formaintenance and the repair of any damage require clarification. The responsibility for such areas has previously been addressed in environmental impact audits of Spectrum Resources Limited proposals and the Waihi Gold Company proposal for Martha Hill. Bonds have been suggested to cover the possibility of premature mine closures, and medium term management of mining wastes. So far all that has eventuated is a $1. 25M mining licence bond and a $1M bond set by the Hauraki Catchment Board, convertible after five years to a trust fund to cover repairs for any damage during a 50-year water right held by the Waihi Gold Company. The trust fund can then revert to the Company.

Arrangements for long-term responsibility for such areas are unsatisfactory. Tailings and some waste rock stacks will require careful management into the 21st century and beyond. Both the tangata whenua and the local community require assurance that their environment will be protected from damage by mining wastes.

I consider there is an urgent need to establish, in law, responsibility for dam safety, bonding/trust fund arrangements beyond the life of a project, and a special fund to cover management of environmental hazards in perpetuity. In addition, consideration needs to be given to whether or not mine tailings should be legally defined as a hazardous waste. In the absence of adequate assurances for long term environmental protection, reversion of land to the Crown at the end of mining operations is the only satisfactory solution.

In my view, the Crown as licensor has a responsibility to ensure the environment is, and remains, for all time, protected from the actions of the licensee.

Helen R. Hughes

Helen R Hughes
Parliamentary Commissioner for the Environment

March 1988

EXECUTIVE SUMMARY AND RECOMMENDATIONS

SUMMARY

The proposed Golden Cross mine site presents challenges from an environmental perspective. It is in a high rainfall, moderately steep, seismically active area. The site is immediately adjacent to a Conservation Park containing rare and endangered species. Access to the mine site would involve passage through a small rural community whose residents value their tranquil lifestyle. Site options for tailings disposal are limited. Summer flows in the Waitekauri River may be marginal in terms of providing adequate dilution for treated wastewater.

The Audit Team's overwhelming impression is that, to date, the Company has handled environmental aspects of project design very sensitively. Notwithstanding this, the Team has identified some significant concerns which will need to be adequately addressed by the Company and/or by consent granting authorities before the project could be considered environmentally acceptable.

Of the three "nationally significant" issues identified, one - the urgent need for dam safety legislation in New Zealand - has been alluded to in the Preface of the Audit.

A second issue of national significance, arising during the Audit, is the need for agreement on what constitutes 'acceptable' receiving water standards for heavy metals. New Zealand has relied upon United States Environmental Protection Agency (USEPA) "national" numerical criteria for guidance but the mining industry and some water scientists consider these to be inflexible and unnecessarily conservative. It is doubtful whether the dilution available in the Waitekauri River during dry summer months would be adequate to enable the Company to meet receiving water standards based on EPA national criteria, even if it used best available technology. The Company's response to this problem has been to design its own "site specific" criteria. However, the approach adopted is open to criticism on a number of grounds, not the least of which is that little, if anything, is known about the toxicology of the 80 invertebrate species and eight native fish species found in the Waitekauri River system. The Company's criteria are based essentially on rainbow trout which occur in the river, downstream from the proposed discharge point. Since the requisite information to design truly site specific criteria is unlikely to be forthcoming (there isn't a laboratory in New Zealand properly set up or funded to do the necessary research), the choice before the Hauraki Catchment Board is either to accept the "rainbow trout" criteria as reasonable or to opt for (continued) use of the USEPA national criteria with its greater margin of safety.

The third significant feature of the project, from a national perspective, is the Company's proposal to use a biological effluent treatment system. The method relies on bacteria to break down the cyanide and remove heavy metals. It is based on a system in use at the Homestake Mine in Dakota, USA. The method minimises the use of chemicals and therefore has potential environmental as well as economic advantages. If used, the method will be a first for New Zealand mine effluents and its performance would therefore be watched with considerable interest.

Another very important issue is whether or not the Company is able to devise a water management system capable of collecting, treating and discharging all the contaminated water from the licence area without adversely affecting existing uses of the Waitekauri River or water further downstream. The Company appears to have done a good job in relation to the assessment of water collection and treatment needs. However, the Audit Team has drawn the Hauraki Catchment Board's attention to some problems in relation to the Company's proposals for receiving water standards.

The main social issues include the threats that an industrial development of this nature poses to the lifestyle of a small rural community (eg noise/road safety), the potential impact of incoming workers on the housing market, the extent to which the project would provide employment for locals, the adequacy of existing pre-school facilities and the ability of the area's community support and social welfare services to cope with an influx of people.

A matter of importance to the people living in the Waitekauri Valley and in Waikino, is how the Company proposes

to minimise the impact of mine-generated traffic. The Audit Team is confident that this is an issue which can be satisfactorily resolved. The Company has recently commissioned a feasibility study into the upgrading and extension of Samson Road to service the mine. This route, in combination with appropriate traffic management techniques, would appear to have the potential to meet most, if not all, of the concerns that have been raised.

Waihi and Paeroa, like many small rural servicing towns in New Zealand, are currently experiencing depressed economic conditions with high unemployment. There is evidence to suggest that Waihi, in particular, is a socially disadvantaged area with unemployment running at about 25% of the workforce, a severe shortage of rental housing and a significantly higher percentage of elderly people, beneficiaries and low income earners than the national average. The Audit examines what steps could be taken by the mining companies, local authorities and the Government to assist the community to cope with any additional social pressures that may arise from the resurgence of the mining industry. It also addresses the need for monitoring the social impacts of the mining developments.

Perhaps the principal issue which the Audit Team has had to deal with is whether or not the Company has selected a satisfactory site for the disposal of the waste rock and tailings generated by the mining operations. What must be recognised is that whatever the site chosen, the structures, tailings and waste rock are going to be there in perpetuity. Environmental costs could well fall upon future generations. There is also a need to address the concern of the tangata whenua over the permanent placement of toxic waste on the surface of the land.

Although the Audit Team has reservations about the site selection process as presented in Technical Report 2 (see section 5. 2 of the Audit), it is accepted that the choice of the Union Stream site was probably a reasonable one given the environmental and economic constraints applying to other options. The Union Stream site is a natural amphitheatre, in close proximity to the mine site, and about two kilometres from the nearest valley residence.

The Company proposes to build a large earth dam, approximately 70 m high, to contain the tailings. The downstream face of the dam would be constructed of potentially acid producing waste rock 'encapsulated' by a compacted layer of non acid producing andesitic material. Given the nature of the terrain, the presence of four active faults and a high rainfall climate, the Team's attention was focused initially on the likely stability of the structure. Would there be a chance of the structure, or part of it collapsing in the event of a major earthquake? What would the likelihood be, in such an event, of the encapsulating layer being ruptured exposing the potentially acid producing rock to air and water? A specially commissioned report from the New Zealand Geological Survey has to some extent allayed the concerns of the Audit Team with respect to site stability. The Team now considers that, providing the Company adopts conservative (final) design criteria (eg oversizing of under drains, adequate internal drainage, allowance for 2 - 4 m fault displacement) it would be possible to build a safe structure capable of withstanding strong earthquakes, for a considerable period of time. However, concerns about the future remain. Tailings dams, like hydro-electric power dams, have a finite design life but, unlike the situation with the latter, "decommissioning" of a tailings dam would probably involve removing the entire structure.

The likely success of the Company's proposal to "encapsulate" the potentially acid forming waste rock hinges upon a number of considerations, including the applicability of laboratory-based permeability tests to the field situation, careful design and rigorous adherence to design specifications during the construction process. Again, the Audit Team accepts that it is possible to engineer such a structure but has reservations about the long term situation. In order to prevent the generation of acid leachate, and a contaminated Waitekauri River, the integrity of the sealing layers would need to be maintained in perpetuity. This rehabilitation goal would, in effect, restrict the range of uses to which the land could be put. For example, tree crops or reversion to native bush may not be advisable because of the possibility of tree roots or windthrow breaching the seal. Apart from restricting land use options, there would be a requirement for ongoing maintenance and the need for damage repair in the event of slumping or fault displacement. The propensity of the area to receive high intensity rainfall suggests that, with time, soil erosion could (by itself) present a problem with respect to maintenance of the sealing layer.

There are significant risks associated with the construction of this type of structure, with this type of composition, in this type of locality. The risks are not quantifiable but it seems reasonable to suggest that they would be very small initially, gradually increasing with time. This risk, together with the constraints and requirements of future management are all hidden costs, not borne by the Company or the mining industry under current arrangements. In an ideal world, such costs or externalities would be taken into account in a cost-benefit analysis, but in practise this seldom occurs. One way of putting a tangible figure on the cost might be to assess the cost of removing the

entire structure if the need arose.

The Audit Team appreciates that many of the above considerations could equally well apply to any proposal to establish a large tailings/waste rock dump in New Zealand. Gold ores typically have sulphide minerals associated with them, and consequently have acid generating potential. There is clearly a wide spectrum of risk associated with the disposal of this type of material. In parts of Australia, on a flat site with a dry arid environment and a very slow rate of chemical weathering the risks would be minimal. However, in temperate, subtropical or tropical climates, on steeper terrain, the risks are much greater. In this respect, the Golden Cross disposal site is clearly less suitable than the Martha Hill one because the latter experiences approximately half the rainfall, the terrain is more or less flat and the adjacent receiving water has a higher assimilative capacity. (It should be noted, however, that any comparison would need to take into account the substantially lower volume of waste rock that would be produced by the Golden Cross mine).

A number of questions arise from the Audit Team's deliberations. Are the risks acceptable? Who presents the case for future generations? Can the concerns of the tangata whenua be met? Do the (short term) benefits of large scale gold mining outweigh the long term costs? Who meets long term costs? What are the implications for long term management and ownership of the land? There is a need for these questions to be addressed by Government. A number of suggestions have been made in this Audit. There is a need for Government, if it considers it appropriate to continue licensing large scale gold mining operations in New Zealand, to establish some kind of "maintenance and damage repair" trust fund, by imposing an appropriate levy on mining Companies. Management constraints may need to be imposed on future landowners by way of covenant attached to title or it may be necessary for the Crown, as licensor, to become the long term owner of the land to ensure that it is maintained and managed appropriately, in perpetuity.

RECOMMENDATIONS

Planning and Administrative Framework

section 4. 3. 3

The Mining Act 1971, explicitly provides that the Town and Country Planning Act 1977 does not apply to prospecting and mining activity. The Audit Team has obtained advice from the Chief Inspector of Mines that he would be reluctant to place social conditions on a mining licence.

RECOMMENDATION (1)

> That the Resource Management Statutes Review Team, convened by the Ministry for the Environment, note the difficulty of setting appropriate social conditions on mining under the current mining legislation.

The Mining Act provides an opportunity for a territorial local authority to give its view on a mining licence application. It must advertise the application and may advise the District Maori Council and Local Maori Land Advisory Council if it considers there is significant Maori interest. The latter was confirmed during the Audit Team's visit to the Pai O Hauraki Marae.

RECOMMENDATION (2)

> That the Ohinemuri County Council advise the Hauraki District Maori Council and the Local Maori Land Advisory Council of the Golden Cross mining licence application and arrange a meeting to discuss the project with these bodies.

Tailings Dam and Waste Rock Stacks

sections 5. 3, 5. 4

he Company proposes to build a large tailings dam in the upper catchment of the Union Stream. Four active faults have been identified in the vicinity of the site. Concerns have been expressed by both the NZ Geological Survey

(DSIR)and the Physics and Engineering Laboratory (DSIR) that seismic risk may have been inadequately addressed in the EIR, in terms of potential ground accelerations.

RECOMMENDATION (3)

That the Company re-evalutates the seismic parameters used in the tailings embankment design in the light of submissions from the Department of Scientific and Industrial Research.

With the exception of the Omahia Andesite, all of the waste rock available for embankment construction has some potential for acid leachate generation. It is essential that only material with low acid producing potential be used in potential seepage zones. There are sound geotechnical and geochemical reasons for including a blanket drain above the basal sealing layer in Zone 2. It is important that the integrity of the sealing layers be maintained in the event of a major earth movement.

RECOMMENDATION (4)

That the Hauraki Catchment Board set the following conditions for the design and construction of the tailings retention embankment and the Union Stack:

1)that materials used throughout Zone 1 and in any potential seepage zones in Zone 2 be specifically selected (after appropriate testing) to be of only low acid producing potential;

2)that a blanket drain be sited immediately above the basal (compacted) argillic andesite sealing layer in Zone 2 of the embankment, discharging to an appropriate collection point;

3)that maintenance of the integrity of the argillic/Omahia sealing layers in the embankment and the Union Stack, in the event of major movements occurring during an earthquake, be considered as part of the embankment design.

The Stockyard Stack also overlies two of the active fault traces that need further consideration with respect to embankment design (above).

RECOMMENDATION (5)

That the Hauraki Catchment Board, as a condition of the Water Rights relating to the Stockyard Stack, stipulate that the Company, in its engineering design of this Stack, takes appropriate measures to ensure the integrity of encapsulation should a major displacement occur in either of the two active faults known to underlie the Stack.

There is potential in a high rainfall area, such as the Waitekauri Valley, for the trapping of significant quantities of water during construction of the rock stacks. The possibility of some breach of the upper sealing layers, allowing the entry of water to the waste rock stacks also has to be acknowledged. Provision of a drain at the downstream end of the sealed layers could provide a safety mechanism if any problem occurred.

RECOMMENDATION (6)

That the Hauraki Catchment Board request the Company to site a drain, at the downstream end of the sealed waste rock layers, that would be capable of collecting leachate from these layers.

It is becoming increasingly accepted, internationally, that technical review panels should be appointed for all dams, particularly where public safety is concerned.

RECOMMENDATION (7)

That the Hauraki Catchment Board appoint a Technical Review Panel (as a condition on the issue of the Placement Water Right) to review all stages of the proposed tailings and waste rock disposal including the siting, design, construction, operation, maintenance, closure or abandonment, and afterwards.

Dam Safety Legislation

section 5. 3. 5

New Zealand has inadequate legislation to regulate the safety of dams whether impounding water, tailings or other hazardous material. The recent 1987 Rotorua Conference on Dam Safety, organised by the New Zealand Society of Large Dams, called for legislation to ensure that dams are built, operated, and maintained safely in New Zealand.

RECOMMENDATION (8)

That the Ministry for the Environment pursue the development of suitable legislation to regulate impoundments of water, tailings or other hazardous materials.

RECOMMENDATION (9)

That the Institution of Professional Engineers of NZ strongly support efforts by the NZ Society of Large Dams to have dam safety legislation adopted in New Zealand to control the impoundment of water, tailings or other hazardous materials.

Monitoring of Discharges

section 5. 3. 5

It is important from a management perspective, that the Company and the Catchment Board know what is going on in the tailings, the embankment and the waste rock stacks in terms of geochemical changes and water level changes.

RECOMMENDATION (10)

That the Hauraki Catchment Board stipulate, as part of the Water Rights conditions, that:

1) appropriate screened pipes and fittings be installed to enable monitoring of water levels and the collection of water samples for chemical analysis at specified locations and levels in the tailings, in Zone 2 of the embankment and in the waste rock stacks;

2) there is a regular programme of monitoring at all these sites (for water chemistry and water levels) until cessation of the water right.

RECOMMENDATION (11)

That on cessation of mining and the closedown of operations (that is, the termination of the Company's direct responsibility), the Hauraki Catchment Board continues such monitoring as necessary, both within these structures and in external waters (springs, etc).

Low Flow Maintenance

section 6. 2. 1

The likely effect of the mining operation on flows in the Maratoto Stream, during the dewatering and rewatering, has received little attention in the EIR.

RECOMMENDATION (12)

That the Hauraki Catchment Board ensure that the impacts of dewatering (and the initial rewatering stage) on the Maratoto Stream and catchment be fully assessed and that conditions be set on the dewatering Water Right to ensure that satisfactory minimum flows are maintained in the upper section of this stream at all times.

The Company acknowledges that for a short period (possibly 2-3 years) after dewatering has stopped, there will be a reduction in the annual one day low flows in the Waitekauri River immediately above the Union Stream confluence by as much as 40%. However, the consequences of this in a particularly dry summer do not appear to have been considered.

RECOMMENDATION (13)

That the Hauraki Catchment Board ensure that contingency plans are provided by the Company to ensure that the Waitekauri River is protected during any very dry summer low flow period. Both the maintenance of adequate flows in the upper reaches of the river and the maintenance of water quality standards (if necessary by the cessation of discharges from the treatment plant, etc) need to be addressed.

Site Works/Erosion Control

section 6. 3

The proposal involves the disturbance of a large area of ground in a locality which is steep and subject to high intensity rainfall. It is important that everything possible be done to minimise erosion at source. All disturbed ground should be topsoiled and grassed as soon as practicable once earthworks are completed.

RECOMMENDATION (14)

That the Hauraki Catchment Board, as conditions to the appropriate Water Rights, stipulate that the Company prepare a Management Plan for the control of stormwater and suspended solids.

Underground Mine Sealing

section 5. 5

The Company proposes to back-fill about 80% of the underground mine voids with the coarser fraction of the tailings. It anticipates that, following closure, groundwater levels will return to pre-mining levels and the entire mine would be fully saturated. However, there is potential for flow paths to be intersected, created or enhanced during the mining operation. If the mine workings are <u>not</u> completely flooded, allowing ingress of oxygenated water, there is potential for acid leachates to develop. Given the existence of a downward vertical hydraulic gradient within the area, there is potential for a permanent environmental problem to be created if the mines are not adequately sealed.

RECOMMENDATION (15)

That the Ministry of Energy stipulate, as a condition of the mining licence, that all subsurface geological structures be mapped and that sealing be carried out, prior to backfilling, in all areas where there are indications of leakage channels.

Sewage Disposal

section 6. 4

The Company proposes to combine domestic sewage with the tailings and, after sedimentation, sewage effluent would be a very small component of the total flow reporting to the treatment plant. This seems to be a satisfactory arrangement. However, there is a need to clarify the fate of sewage, prior to the commissioning of the treatment plant.

RECOMMENDATION (16)

That the Hauraki Catchment Board clarify with the Company how sewage would be disposed of during the period prior to the commissioning of the process water treatment plant.

Receiving Water Criteria

section 6. 6. 2

The Audit Team has strong reservations about the methods the Company has employed to arrive at its proposed receiving water criteria. The assumptions underlying the method are not explicitly stated and the validity of the implied assumptions is questionable. The resulting toxicity data base does not comply with the minimum data set requirements of the United States Environmental Protection Agency for the derivation of either national or site specific criteria.

RECOMMENDATION (17)

That the Hauraki Catchment Board obtain an independent review of the toxicity data base compiled for the calculation of water quality criteria.

The Audit Team has identified a number of differences between the methods used by the Company to calculate acute and chronic toxicity criteria and those advocated by the US Environmental Protection Agency.

RECOMMENDATION (18)

That the Hauraki Catchment Board critically evaluate the Company's calculation procedures for deriving numerical water quality criteria.

The Company proposes that its acute and chronic criteria be applied as a short term maximum and 28 day average respectively. The Audit Team has reservations about this approach. The EPA recommend a one hour average for acute criteria although it acknowledges that a one day average may be more practical for monitoring purposes. For the chronic criteria, 20 to 30 days is regarded as acceptable, and an averaging period of four days is considered to be appropriate (US EPA 1985).

RECOMMENDATION (19)

That the Hauraki Catchment Board define the averaging periods for acute and chronic criteria as one to 24 hours and four days respectively.

There is a natural correlation between hardness and toxicity. Hardness therefore tends to be used as a "surrogate" for those ions which affect metal toxicity, but this approach can be invalid where total hardness and alkalinity are not equivalent.

RECOMMENDATION (20)

That the Hauraki Catchment Board calculate numerical water quality criteria on the basis of receiving water alkalinity when the alkalinity is significantly less than the hardness (hardness and alkalinity should be expressed in the same units, usually $g/m^3.CaCO_3$).

Given the uncertainties relating to the numerical water quality criteria proposed by the Company, the Audit Team considers it to be essential that if they, or similar, are to be adopted for the Waitekauri river, narrative criteria are also imposed for the protection of aquatic life.

RECOMMENDATION (21)

That the Hauraki Catchment Board impose narrative criteria, for the protection of aquatic life, as conditions of the Water Right for the major discharge from the treatment plant to the Waitekauri River.

The Audit Team draws the Hauraki Catchment Board's attention to concerns which have been expressed by the Water Quality Centre, Ministry of Works and Development about the Company's proposals for "acceptable" suspended solids and turbidity levels in the Waitekauri River.

RECOMMENDATION (22)

That the Hauraki Catchment Board critically evaluate the Company's proposals for receiving water criteria for suspended solids and that it consider setting limitations on the increase in turbidity (or decrease in clarity) as well as on the total suspended solids in the discharges.

Regional Water Quality and Cumulative Effects

section 6. 6. 1

The long term issue of the cumulative effects of a large number of mining operations on the levels of metals in waters and sediments of estuarine areas of the Firth of Thames needs to be addressed.

RECOMMENDATION (23)

That the Hauraki Catchment Board give priority to a monitoring programme to determine natural and anthropogenic inputs of toxicologically significant metals to the Firth of Thames.

Water Quality Monitoring

section 6. 7

There are a number of "clean" and "turbid" water discharges which may contain only very small quantities of metals but which, in combination, could be significant in reducing the assimilative capacity of the Waitekauri River with respect to the main treatment plant discharge. It would therefore be desirable for receiving water standards to be established and monitored, in addition to the conditions on the main discharge.

RECOMMENDATION (24)

That the Hauraki Catchment Board considers the possible reduction in assimilative capacity of the Waitekauri River when setting the Water Right conditions for the discharge from the water treatment plant. These conditions should include a programme of receiving water monitoring.

The Audit Team supports the Company's proposal to establish a biological monitoring programme for receiving waters. The results should be used to demonstrate compliance with the proposed narrative criterion. The Hauraki Catchment Board needs to address the question of what constitutes a "significant" effect on aquatic life.

RECOMMENDATION (25)

That the Hauraki Catchment Board and the Company agree on a biological monitoring programme.

Landscape

section 7. 2

The EIR and technical reports contain little or no reference to visual impacts or potential means of amelioration. Measures to protect or improve landscape values need to be related to an overall rehabilitation plan.

RECOMMENDATION (26)

That the Company ensure that landscape considerations are an integral part of project design and rehabilitation planning.

Some tree or shrub plantings may be beneficial for visual screening, noise amelioration or soil conservation purposes. It would be important that appropriate technical advice be sought on the location of plantings and the species used.

RECOMMENDATION (27)

That the Company give early consideration to the development of a tree planting programme in consultation with the Hauraki Catchment Board, Department of Conservation, landscape architects and other sources of expertise.

Vegetation

section 7. 3

The Company has identified a botanically interesting plant association, with swamp maire Syzgium maire, to the north of the Union Stream.

RECOMMENDATION (28)

That the Company fence off the swamp maire and buffer area shown in Figure 7. 2. 2 of the EIR.

Wildlife

section 7. 4

The area covered by the mining licence application, being mainly pastoral, presents relatively impoverished wildlife habitats. Although the wildlife values of the surrounding area are high, the project is unlikely to have a significant adverse effect on these values. The "endangered" North Island Kokako Callеas cinerea is present in the adjacent forest and the Company proposes to undertake a monitoring programme to determine the kokako's response to project-generated noise and an annual survey of the population. It is also considering funding a programme of activehabitat enhancement or making a monetary contribution to more general research or management.

RECOMMENDATION (29)

That the results of the monitoring programme and annual survey of kokako be conveyed to the Department of Conservation on a regular basis.

RECOMMENDATION (30)

That the Company finalise its proposals for funding of kokako management/research in consultation with the Department of Conservation.

The Company's surveys have revealed the presence of large numbers of the rare native frogs Leiopelma archeyi (Archey's frog) and Leiopelma hochstetterri (Hochstetter's frog) in the Coromandel Conservation Park adjacent to the proposed mine site. A small number of Archey's frogs were found in the proposed tailings disposal area. The Company proposes a relocation programme to prevent the destruction of these animals.

RECOMMENDATION (31)

That the Company further refine its frog relocation programme, in consultation with staff of the Protected Ecosystems and Species Directorate, Department of Conservation.

Hazard Evaluation and Contingency

section 8.2, 8.3

The Company has not, in the EIR, presented contingency plans for dealing with the "worst case" scenario of major earthquake or storm damage to the tailings dam or waste rock stacks. One of the consequences of such damage could be the acidification of the Waitekauri River.

RECOMMENDATION (32)

That the Hauraki Catchment Board require details of contingency plans for dealing with the event of serious damage to the tailings/waste rock disposal areas.

A long term environmental hazard would be created by the disposal of tailings and waste rock from the Golden Cross Mine just as it would be by the disposal of large quantities of sulphide bearing rock from any hard rock mining venture in a non-arid area. The waste rock stacks will require ongoing maintenance and damage repair.

RECOMMENDATION (33)

That the Ministry of Energy prepare an amendment to the Mining Act 1971, to allow for the imposition of a special maintenance and damage repair levy for managing the long term hazards associated with hard-rock mining.

RECOMMENDATION (34)

That the Resource Management Statutes Review Team devise appropriate mechanisms for dealing with the management of long term environmental hazards resulting from resource use industries such as mining.

Rehabilitation Plan

section 9. 3

Planning for rehabilitation must be well advanced before mining commences if a satisfactory standard of restoration is to be achieved. A comprehensive rehabilitation plan should be identified at the time of granting of the mining licence.

The Audit Team considers that the tailings and waste rock structures present a long term environmental hazard for reasons explained in the Audit.

RECOMMENDATION (35)

That the long term stability of the mining site be the primary goal of the Golden Cross Rehabilitation Plan.

The need for ongoing maintenance and monitoring of the site, after mining, is one of the costs of the project.

RECOMMENDATION (36)

That a secondary goal of the rehabilitation plan be the minimising of future monitoring and maintenance requirements.

There is a need for a Rehabilitation Peer Review Panel (RePRP) to vet rehabilitation proposals and to advise on the standard of the works carried out.

RECOMMENDATION (37)

That the Hauraki Catchment Board and Ministry of Energy establish a Rehabilitation Peer Review Panel to advise the Company, the Board and the Mining Inspector of the adequacy of proposed and final rehabilitation.

There are public amenity, water quality and wildlife (habitat) advantages in establishing a beach and littoral zone around the margin of the pit lake.

RECOMMENDATION (38)

That the Company, after consultation with appropriate agencies (Department of Conservation, Hauraki Catchment Board) and other experts design a beach and littoral zone at the final lake level in the opencast pit.

The placement of Omahia Andesite or ash subsoils at and above future pit lake level would aid the establishment of wetland vegetation with consequent water quality and wildlife benefits.

RECOMMENDATION (39)

That the Company cover the potentially acid-producing lower benches (at and above lake level) with a layer of ash subsoil or Omahia Andesite to aid their revegetation.

It is important that slumping of batter slopes be minimised to reduce visual impact and maintenance costs and to ensure rapid rehabilitation of the batter faces of the final pit outline.

RECOMMENDATION (40)

That the Company, in consultation with the Hauraki Catchment Board and the Department of Conservation, consider special stabilisation measures to promote rapid rehabilitation of the batter faces of the final pit outline.

Rehabilitation trials could be carried out on faces of argillic andesite exposed during the construction of the portal and road for the prospecting decline or during site construction activities.

RECOMMENDATION (41)

That the Company conduct rehabilitation trials on faces of argillic andesite exposed early in prospecting or mining activities.

There is potential for groundwater inputs to the mine lake to have a detrimental influence on lake water quality.

RECOMMENDATION (42)

That the Company, in consultation with the Hauraki Catchment Board, monitor groundwater flows and quality as the pit nears completion and, if necessary, provide for the collection and diversion of flows to ensure the improvement of lake water quality.

The high north-eastern face of the final pit will be the major visual impact of the site.

RECOMMENDATION (43)

That the Company investigate the feasibility of lessening the visual impact of the high north-east pit face by altering pit slopes and re-scheduling mining operations to allow for its early revegetation.

The proposal to rehabilitate the surface of the tailings disposal area as a wetland is supported. The rate of establishment of (beneficial) vegetation could be accelerated by the provision of a layer of organic matter.

RECOMMENDATION (44)

That the Company investigate the feasibility of providing an organic layer over the final tailings surface prior to planting and final water level control.

The Company's proposals for soil and subsoil depths on top of the waste rock stacks appear adequate but the Audit Team suggests that the Company should obtain further advice on this matter. The Team considers that trees should not be planted, or permitted to grow, on top of the waste stacks.

RECOMMENDATION (45)

That the Company provide adequate soil depth over the waste rock stack sealing layers, and ensure that rehabilitation plans provide for the grassing of the final surface.

Early planting of bare or erosion prone ground and riparian areas could have medium and long term soil conservation, water quality, visual, noise control and wildlife habitat advantages.

RECOMMENDATION (46)

That the Company plant erosion-prone areas in appropriate native species, as soon as practicable.

Bonding and Insurances

section 9. 4

The mining bond is the prime means of ensuring that the terms and conditions of the mining licence are met if the mine closes prematurely. However, under current legislation, the Planning Tribunal has no jurisdiction over the size of the bond.

RECOMMENDATION (47)

That the Resource Management Statutes Review Team ensure that any proposed new legislation allows examination of the level of the mining licence bond by the Planning Tribunal.

Expert scrutiny could still be provided in the absence of the above provision.

RECOMMENDATION (48)

That the Chief Inspector of Mines discuss the Company's projected annual bond liability with appropriate agencies, or experts, prior to proposing the bond level.

No provision is made in the Mining Act 1971 for the inflation-indexing of the bond. Greater knowledge of the cost of rehabilitation will be gained as the project proceeds.

RECOMMENDATION (49)

That the Minister of Energy, in consultation with the RePRP, review the bond at three-yearly intervals, taking into account inflation and the results of rehabilitation investigations to ensure that the bond is capable of allowing adequate rehabilitation at all stages of the project.

If some identifiable risk(s) remain, at the time of licence termination, some of the bond could be retained to cover future corrective measures.

RECOMMENDATION (50)

That the Minister of Energy attach a condition to the mining licence that requires the Company to make an assessment of residual risk before licence termination.

RECOMMENDATION (51)

That the Minister of Energy examine the possibility of providing for the retention of some of the bond for future corrective measures beyond the term of the mining licence.

The Hauraki Catchment Board has addressed medium term environmental control considerations, in the case of Martha Hill, by requiring that the development has water rights for a period of 50 years with a bond attached for necessary maintenance and treatment plant operation should the Company's involvement in the project cease.

RECOMMENDATION (52)

That the Company accept the Hauraki Catchment Board's water right and bond approach for protecting water values during the medium term life of the waste retaining structures.

If the Planning tribunal reports that this approach has no base in law, there is an urgent need for improvements to the legislation.

RECOMMENDATION (53)

That the Resource Management Statutes Review Team address the adequacy of the legislative provisions covering rehabilitation of potentially hazardous waste material storage areas.

Final Land Use

section 9. 5

The presence of historical and modern-day mining remnants, improved access, car parking, the retention of buildings and the proximity of the Conservation Park could provide the basis for a Mining Park.

RECOMMENDATION (54)

That the Company and the Department of Conservation give careful consideration to the option of rehabilitating the land currently owned by the Company as a Mining Park.

The Audit Team considers that the Crown as licensor, must be prepared to accept responsibility for the special attention that the site requires in perpetuity. The early identification of the Department of Conservation as the future owner would enable it to ensure that rehabilitation was carried out to a standard consistent with the adjacent Park.

RECOMMENDATION (55)

That the land owned by the Company be purchased by, or surrendered to, the Crown at the end of the mining licence.

RECOMMENDATION (56)

That the Department of Conservation accept responsibility for managing the land.

The Department of Conservation may need to be prepared to maintain and operate the treatment plant as part of its site management responsibilities.

RECOMMENDATION (57)

That the Hauraki Catchment Board note that there may be a need for continuity in the exercise of water rights for discharge of treated effluent after the Company's water right expires.

Although the Audit Team has recommended that the land be surrendered to the Crown, there should still be a mechanism for ensuring that the nature of the land and the management constraints which should apply is known to future landowners.

RECOMMENDATION (58)

That the Resource Management Statutes Review Team include provision in the new mining legislation to register a notice against the certificate of title which shows an area that has been used for tailings or waste rock disposal and the management constraints which apply.

Monitoring of the tailings impoundment and waste rock stacks will be required, past the life of the project, to identify damage that needs to be required and to provide early warning of any environmental problems.

RECOMMENDATION (59)

That the Hauraki Catchment Board assume responsibility for monitoring when the Company's involvement at the site ends.

Concerns of the Tangata Whenua

section 10.3

The concerns of the tangata whenua have been addressed in section 10 of the Audit. Consultation with the tangata whenua should be carried out in accordance with Maori custom. The retention of a kaumatua, in a consulting capacity, would assist the Company to address some of the concerns of the Maori people.

RECOMMENDATION (60)

That the Company negotiate with the Hauraki District Maori Council on the retention of a kaumatua; notify tangata whenua in accord with Maori custom; and hold consultative meetings on local marae.

Roads and Traffic

section 11. 2

Residents of Waikino and the Waitekauri Valley are concerned at the risk to children walking to and from school, arising from mine-generated traffic. Road upgrading (including widening) and the provision of adequate footpaths in Waikino would increase pedestrian safety.

RECOMMENDATION (61)

That the Company contribute to the cost of providing footpaths and traffic restraint measures in Waikino.

The Company is currently investigating the feasibility of establishing a new private road from Samsons Road to Twin Bridges. This route, replacing Campbell Road, would be shorter and would give greater safety and less noise to the residents of Waikino and the Waitekauri Valley. There should be strong disincentives for drivers who might be tempted to take the shortcut through Waikino.

RECOMMENDATION (62)

That the Company pursue a new designated route away from the lower Waitekauri Valley and the Waikino settlement.

RECOMMENDATION (63)

That the Company consult with the Ohinemuri County Council on the provision of traffic restraint measures on Waitekauri Road as well as appropriate signposts for Samson Road or any other alternative route.

Noise, Dust and Air Quality

section 11. 3

With the exception of traffic noise, the noise, dust and air quality impacts on residents of the Waitekauri Valley, and the local environment outside the mining licence boundary, are likely to be minimal if the commitments made by the Company are upheld throughout the life of the project.

Occupational Health and Safety

section 11. 4

The Golden Cross project would include the first significant underground hard (quartz) rock mining operation in New Zealand for over a decade. It would be prudent to update relevant regulations, taking into account overseas advances, with the aim of providing the safest possible work environment.

RECOMMENDATION (64)

That the Chief Inspector of Mines, in consultation with the Departments of Health and Labour, review the adequacy of the Mining (Safety) Regulations relevant to underground hard rock mining.

The Department of Health has provided some useful suggestions in relation to noise, dust and hydrogen cyanide control.

RECOMMENDATION (65)

That the Chief Inspector of Mines examine the Department of Health's suggestions for noise, dust and hydrogen cyanide control and take them into account when establishing draft conditions for the mining licence.

Employment and Training

section 11. 4

The Company has a policy of employing local people whenever practical. It has also indicated that it will place a heavy emphasis on "on-the-job" training and that, to this end, it will consult and co-operate with the Regional Employment Advisory Council (REAC) and the Maori ACCESS Committee. The Department of Labour has stressed the importance of advanced planning and timing so that efforts are made to identify shortages in specific skills and to put in place appropriate training programmes prior to the demand arising.

RECOMMENDATION (66)

That the Company undertake an early survey of the local availability of requisite mine-related skills, in consultation with the Department of Labour.

RECOMMENDATION (67)

That the Company consider making a public request for expressions of interest in future mine-related employment with the aim of compiling a "register of aspirants" from which people could be selected for training and that this request be extended to the tangata whenua on marae.

RECOMMENDATION (68)

That the Company, in consultation with the Waihi Gold Company, REAC, Maori ACCESS, the Polytechnics and training scheme organisers, foster the establishment of appropriately timed training programmes in mine-related skills.

RECOMMENDATION (69)

That the Company does everything possible to encourage contractors to give preference to the employment of local people.

Housing and Accommodation

section 11. 6

The Company has acknowledged that the Golden Cross construction phase is likely to compound the existing shortage of rental accommodation in the area and has stated that it will commit resources to monitor and minimise the project's impact on housing.

RECOMMENDATION (70)

That the Company investigate the influence of the Martha Hill project on the local housing market and discuss the options for minimising the Golden Cross project's impact on housing (outlined on p 266 of the EIR), with local authorities, contractors, union representatives and the Waihi Gold Company.

The Company has recognised the potential social advantages of adopting a worker travel assistance policy which encourages people to commute from a number of settlements in the region.

RECOMMENDATION (71)

That the Company give favourable consideration to the implementation of a worker travel assistance policy.

Local authorities in the project area may be able to ease accommodation pressures by such measures as permitting industrial or rural zoned land to be used for temporary housing, or by adopting a more flexible approach to temporary housing options, particularly over the duration of the construction period.

RECOMMENDATION (72)

That local authorities review controls over building and temporary housing with a view to easing accommodation pressures.

Central Government has a role to play through the efforts of the Housing Corporation.

RECOMMENDATION (73)

That the Housing Corporation note the potential effects of mining industry expansion on the availability of accommodation in the Waihi/Paeroa area and give favourable consideration to the allocation of additional resources to this area.

Pre-School Services

section 11. 7. 2

There is a severe shortage of pre-school accommodation (kindergartens, playcentres and playgroups) in the area. The Waikino Playgroup has indicated that its present facilities will not be able to accommodate any significant increases. The Company has indicated that it would consider providing financial support for pre-school services.

RECOMMENDATION (74)

That the Education Department and the Hamilton Education Board note the likely significant increase in demand for pre-school facilities in the Waihi/Waikino/Paeroa area, occasioned by the expansion of the mining industry and, accordingly, give favourable consideration to the commitment of additional resources to this area.

RECOMMENDATION (75)

That the Company provide financial support to the Waikino Playgroup if there is a need to improve resources to accommodate the children of incoming mine workers.

RECOMMENDATION (76)

That local authorities consider channelling a portion of any development levy or grant into the improvement of pre-school education facilities in the area.

Waikino Water Supply

section 11. 7. 3

There are plans to upgrade the existing water supply at Waikino. A Company contribution would help to keep the ratepayer contribution down, increasing the likelihood of the scheme proceeding.

RECOMMENDATION (77)

That the Thames Valley United Council or the Ohinemuri County Council channel a portion of any development levy monies towards the upgrading of the Waikino water supply.

Funding Arrangements

section 11. 8. 2

The legal position with respect to the payment of a development levy in terms of the Local Government Act 1974 is not clear at present.

RECOMMENDATION (78)

That the Thames Valley United Council and the Ohinemuri County Council take immediate steps to clarify the legal situation with respect to the provision of a development levy.

RECOMMENDATION (79)

That the Ministry for the Environment refer to the Resource Management Statutes Review Team the problems being experienced with the application of the Local Government Act 1974 to mining developments.

The Company has initiated discussions with the Ohinemuri County Council on a potential donation in lieu of a development levy. In response to questions from the Audit Team, it has implied that there is a trade-off between the cost of physical works and the Company's contribution to social impact management.

RECOMMENDATION (80)

That the Company ensures that the size of any donation or grant is adequate to meet the cost of social mitigation measures as well as the cost of physical works.

The Waikino and Waitekauri people have indicated a wish to be involved in deciding how any Company contributions to community development are allocated.

RECOMMENDATION (81)

That the Thames Valley United Council or the Ohinemuri County Council involve the people of Waikino and Waitekauri Valley in decisions on the allocation of any development levy funds.

Any deed of agreement between Cyprus Minerals and local authorities is of considerable public interest and should only be decided after the public has had an opportunity to comment.

RECOMMENDATION (82)

That in the event of any deed of agreement being signed between Cyprus Minerals and any local authority(ies), draft proposals be made public and there be a process of public consultation prior to signing.

Community Liaison

section 11. 8. 3

The Company's "open door" policy has been very favourably received. The Company intends appointing a senior Community Liaison Officer and is considering a number of other options for ongoing community contact.

RECOMMENDATION (83)

That the Company establish a Community Liaison Committee or forum.

RECOMMENDATION (84)

That the Company give favourable consideration to periodic newsletters, workshops, open days and public meetings to keep people informed of project development and Company proposals.

Social Impact Monitoring

section 11. 8. 4

Monitoring of social impacts is needed to provide a factual data base on which to make decisions. The information collected would also provide a very useful record of the (actual) impact of mining industry development. The Martha Hill experience suggests that the socio-economic impacts of mine development are regional and cut across local authority boundaries. This is likely to be increasingly so if the Golden Cross project proceeds.

RECOMMENDATION (85)

That, subject to the receipt of appropriate funding (below), the Thames Valley United Council take responsibility for the implementation and budgeting of a monitoring programme and the employment of a person to undertake the monitoring work.

The Company has acknowledged the importance of monitoring community change systematically and continuously from the outset of the project. The Waihi Gold Company has indicated that it would be prepared to provide 25% of the cost of employing a person to undertake monitoring work. There is also a possibility of retaining the grant from the New Zealand Lotteries Board.

RECOMMENDATION (86)

That Cyprus Minerals NZ Ltd and the Waihi Gold Company take responsibility for jointly providing 50% of the salary of a full time monitoring worker and that the money be made available as soon as the Thames Valley United Council confirms the appointment of a suitable person.

RECOMMENDATION (87)

That the Thames Valley United Council make immediate application to the NZ Lotteries Board, Department of Internal Affairs, for reinstatement of the $15,000 grant towards the cost of employing a monitoring worker.

The position should be a full time one at least until the end of the Golden Cross construction phase and it should be properly resourced in terms of travel and other costs. Local authorities are a potential source of any additional funding that is needed.

RECOMMENDATION (88)

That the Thames Valley United Council, the Waihi Borough Council and the Ohinemuri County Council together contribute 50% of the salary of a full time monitoring person and that the money be made available as soon as the Thames Valley United Council confirms the appointment of a suitable person.

Co-ordination

section 11. 8. 5

The Waihi Borough Council has established a Social Impact Mitigation Committee (SIMC). The Ohinemuri County Council has indicated that, if necessary, it too would consider the establishment of a SIMC. However, given the regional implications of mining industry development and accepting that impacts will continue to be centred on Waihi, it would seem logical to expand the existing committee.

RECOMMENDATION (89)

That the (Waihi based) Social Impact Mitigation Committee be expanded to include representation from the Ohinemuri County Council, Paeroa Borough Council, appropriate regional organisations and that it be convened by the Thames Valley United Council.

RECOMMENDATION (90)

That Cyprus Minerals and the Waihi Gold Company liaison officers be invited to attend all meetings.

RECOMMENDATION (91)

That the worker monitoring social impacts report to the Social Impact Mitigation Committee on a regular basis.

At a national level, there is a need for an integrated long term approach towards the provision of regional social support services. This is the role of the so called "HEW Committee" referred to in section 14. 3 of the EIR.

RECOMMENDATION (92)

That the Thames Valley United Council keeps the Health, Education, and Welfare (HEW) Inter-departmental Committee informed of mining industry development and monitoring results so as to facilitate the planning and provision of social services.

Another means of achieving some co-ordination of community and central government responses at a regional level is via the new District Executive Committee (DEC), which, through its membership, is intended to provide community input to the provision of social welfare services.

RECOMMENDATION (93)

That the Department of Social Welfare issue an invitation for the monitoring worker to attend DEC meetings as an observer and information provider.

It would also be important that the monitoring worker attend the Community Liaison Committee meetings planned by the Company.

RECOMMENDATION (94)

That the Company issue an invitation for the monitoring worker to attend Community Liaison Committee meetings.

Further co-ordination could be achieved by locating the monitoring worker in the same building as the Waihi Community Resources Centre which was established to function primarily as a community information service.

RECOMMENDATION (95)

That the social impact monitoring worker be based at the Waihi Community Resources Centre.

The Waihi Community Resources Centre provides a focus for community support in the Waihi area. The EIR notes the likelihood of additional social problems arising from the Martha Hill and Golden Cross projects and Cyprus Minerals NZ Ltd has indicated that it will consider funding support for the Centre.

RECOMMENDATION (96)

That both Cyprus Minerals NZ Ltd and the Waihi Gold Company give favourable consideration to providing funding assistance for the Waihi Community Resources Centre.

Community Support

section 11. 8. 6

The primary responsibility for providing additional community support services for the area, lies with Government.

RECOMMENDATION (97)

That the Minister of Social Welfare, the HEW Committee and the Director of Social Welfare, Paeroa, give favourable consideration to funding support for the Waihi Community Resources Centre and/or the employment of an additional community development worker(s) in the Waihi/ Paeroa area.

RECOMMENDATION (98)

That the efforts of any additional community development worker(s), provided by government funding, be targetted at the community as a whole, not just those affected by mining.

Project Wind-Down

section 11. 8. 7

Completion of the Golden Cross project would involve the loss of 155 jobs. If closure of the Golden Cross and Martha Mines occurred at about the same time, nearly 600 people could be directly affected, with many more likely to be indirectly affected. The precise closure date of the two mines is not known at this stage.

RECOMMENDATION (99)

That the Thames Valley United Council and the Social Impact Mitigation Committee work closely with the mining companies to determine what strategies would be appropriate to minimise the adverse effects of project closure on the host community.

RECOMMENDATION (100)

That the monitoring programme be continued through the closure period(s) and for at least a year after the last closure.