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Preliminary Mine Closure and Reclamation Plan
Mirador Project
Ecuador

Submitted to:

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IMPORTANT NOTICE

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EXECUTIVE SUMMARY

This document presents a preliminary mine closure and reclamation plan for the Mirador Copper Project. The purposes of this plan are to lay out the closure measures and estimated closure costs as input to the project feasibility study, and also to form part of the Environmental Impact Assessment to indicate the post-mining reclamation activities that will mitigate potential environmental impacts. In general, site reclamation objectives will include the following:

- Protection of air, surface water, ground water, flora and fauna.
- Protection of public and worker health and safety.
- Restoration of wildlife habitat.
- Design and restoration of a post-mining topography that is comparable with pre-mining conditions.
- Restoration of the area in an aesthetically acceptable manner that generally blends within the surrounding habitat.
- Re-establishment of post closure revegetation that is suitable and comparable to pre-mining conditions.

The Mirador Copper Project is proposed as an open pit mining and conventional grinding and flotation plant processing a copper porphyry deposit to produce a copper concentrate containing minor amounts of gold and silver. The project is located in southeast Ecuador, approximately 400 km south of Quito and 300 km from the coast on the east side of the Andes Mountains. The elevation of the project site ranges from 800 to 1,400 m above sea level.

The Mirador Project will be permitted under Ecuadorian permitting procedures, which are described in Chapter 2 of the EIA. As well as being developed to conform to Ecuadorian environmental standards, the project is also being designed to meet the guidelines laid out in the Equator Principles. The Equator Principles are a framework for financial institutions to manage environmental and social issues in project financing. The Equator Principles have been endorsed by most of the significant international banks that are involved in mine financing, and in general reference the standards of the World Bank Group.

Corriente is committed to reducing residual environmental effects at the site upon closure. Reclamation work will form an integral part of the mine plan and will be carried out progressively during the life of the project. The mining and water management plans have been developed to facilitate progressive reclamation. All surface facilities have been designed to minimize reclamation requirements following mine closure and to enhance the natural recovery of the areas affected by mining. It is anticipated that a significant portion of the proposed reclamation will be carried out during the operational phase of the project. Progressive reclamation will provide an opportunity to reduce the extent of disturbed land over the life of the project.

This closure and reclamation plan is considered preliminary since some elements of the plan, such as post-closure monitoring requirements and associated cost estimates, may require revision upon project approval. Further, the specific details of the Mine Closure and

Reclamation Plan will evolve as mining progresses, and so the plan will be updated periodically during the mine life. The final plan will be generated several years before mine closure.

The closure plan will include both progressive and final reclamation measures. Progressive reclamation will include reclamation following the construction phase and during operation. All borrow pits, quarries, equipment and storage areas utilized during construction but not required during mine operations will be closed out and reclaimed at the end of the construction phase of the project. Prior to disturbing areas, all practically available soil will be salvaged and stockpiled for redistribution during ongoing reclamation and final closure of the mine.

As far as practical, disturbed areas will be revegetated incrementally during operation to reduce erosion and improve aesthetics. Areas will be regraded, revegetated and stabilized, as soon as possible.

The waste dump will have a cap of impervious material applied as soon as final surfaces are created, at which time they will also be vegetated. The waste dump will be constructed to its final slope angles where possible. Soil salvage will be incremental and concurrent with each phase of waste dump construction, pit development and waste rock dump development.

The tailings impoundment will not be reclaimed during operation as the dam will be raised by downstream construction so there will not be a final downstream slope on the dam until after the last dam raise. Tailings dam borrow pits will be resloped as necessary, covered with stockpiled topsoil, and vegetated as soon as they are depleted, provided they will not be required for subsequent stages of dam raising.

Major closure activities after the end of mine life will include removal of all facilities and infrastructure that is not planned to be left for other uses or is needed for post-closure maintenance, and reclamation of all disturbed areas. The key closure and reclamation issues for the project are as follows:

- The open pit mine will be allowed to fill with water when mining operations cease. There will be a height of exposed pit wall remaining above the final flooded surface. Some of the exposed wall materials could have the potential for acid generation. A pit lake study will be completed at Year 5 of the operation, when the ultimate mine life and pit configuration are better known and after more extensive geochemical characterization of the pit wall rocks has been carried out.
- Acid rock drainage (ARD) will be minimized by placing a cap of compacted overburden materials over the mine waste rock dump, and by maintaining runoff diversions around the waste dumps. The successful implementation of this strategy will minimize the volume of water that will require ongoing collection and treatment. Collection and treatment of acidic drainage from the waste dumps will continue for as many years as required, until the levels of acidity and metals abate to such that they will be acceptable for release or that can be adequately treated by passive systems.
- The tailings impoundment will be maintained with a water cover over most of its area to flood the tailing. This flooding will prevent oxidation of the tailings. Where a tailings beach exists above water, the beach will be covered by tailings that have had sulphide materials removed so the exposed materials will be non-acid generating.

- A secure, permanent spillway will be constructed in rock to safely discharge flow through the tailings pond.

Post operational reclamation will return the disturbed areas to the pre-mine conditions and habitat. Certain mine features may be left in place as permanent control measures to prevent environmental pollution, for long-term community use, or as a post-mining enhancement.

Environmental impacts remaining post-closure are expected to be moderate. Key expected impacts will be:

- Potential for acid drainage from exposed wall rocks above the outlet elevation of the open pit. It is expected that, with the significant streamflows in the region, the rate of oxidation of pit wall rocks will be such that water quality in the pit water discharge could be mitigated by dilution. In the worst case the pit lake discharge could necessitate collection and treatment. Even in this worst case, there would be no downstream impact to the receiving waters of the Quimi River as the discharge would be collected and treated if necessary.
- The waste dumps are expected to become acid generating and there will be discharges of acidic waters, containing dissolved metals, from the dump. The dump discharges will be monitored and collected and treated as necessary. The mitigation of this potential impact will depend on the mine operator having in place a viable financial model such that the ongoing treatment will be adequately funded.
- The waste dump will permanently alter the topography. The location of the dump in a side valley and the anticipated vegetation growth will effectively mask waste dump visibility.
- The plant site and all other mine infrastructure will be essentially returned to pre-mining conditions and revegetated. Thus, there will be little long-term impact of the plant site and infrastructure.
- The tailings impoundment will represent a significant change to the topography and habitat in the upper reaches of the Tundayme River. The tailings impoundment is to be closed as a shallow lake, where currently the site is a fast-flowing river through a dense rain forest.
- The tailings impoundment is expected to have no negative impact on water quality, as the lake will cover the tailings to prevent acid rock drainage and will serve as an effective sedimentation basin.
- The tailings dam will remain visible from a distance after closure, as the downstream face of the dam will be about 120 m high. Constructed of rockfill, the dam will vegetate naturally over a considerable period of years so that the visibility will remain for decades.
- A main impact of the Mirador Project will be the loss of forest habitat. The habitat loss will be the areas of the tailings impoundment (283 ha) and the open pit and waste dump (188 ha).
- In the Tundayme River, there will be some modification of the flow regime from pre-mining conditions. The total quantity of flow will remain unchanged, but the water will have less sediment and lower flood peaks, due to sedimentation in the closed tailings pond upstream and damping of flood flows. These changes are not expected to negatively impact the aquatic environment.

- The tailings impoundment will create a new aquatic habitat, a shallow lake with an area of about 250 ha. It is expected that this lake will become a healthy fish habitat that will be a positive impact of the project.
- Typically, mine closure will impact the economic condition of the closest community(ies). EcuaCorriente will work with the communities in the area to enable all stakeholders to have their interests considered during the mine closure process. A consultative process involving local communities, regulators and other interested stakeholders will be established during the operation to determine the long-term use for the mine and all associated lands.
- EcuaCorriente has begun implementing sustainable development activities in the local communities such as the establishment of the orchid nursery to provide alternate long-term economic activities in the active floral industry of Ecuador.

Corriente has developed a water quality monitoring plan that is already in place on the Mirador site. This existing water quality monitoring plan will form will the basis of an environmental management and environmental effects monitoring plan during the life of the operation. That plan will be continued as required post-closure.

Maintenance of critical components will also continue post-closure, including inspection and repair of diversion ditches, repairs to tailings dam spillway, repairs of any eroded reclaimed areas and repairs to any erosion noted on the waste dump cover, and operation of the water treatment plant and/or passive water treatment systems.

Final closure plans for Mirador will be implemented as soon as the mine reaches the end of its economically viable life.

The cost of final closure and reclamation for the Mirador Project has not been estimated in detail, as there are a number of significant unknowns with regard to the closure needs. Indicative costs have been estimated based on similar projects. The cost to carry out mine closure works are estimated at about $US15 million, and the cost to fund ongoing acid drainage collection and treatment will be in the order of $US 40 million.

Corriente is committed to providing suitable financial security and assurance to cover the full cost of closure and reclamation of the Mirador project, and any ongoing water treatment and site maintenance costs. It is Corriente's intention to enter into discussions with the responsible Ecuadorian authorities to reach agreement on an appropriate form and amount of security to be posted for the project.

1.0 INTRODUCTION

1.1 Closure Plan Objectives

This document presents a preliminary mine closure and reclamation plan for the Mirador Copper Project. The purposes of this plan are to lay out the closure measures and estimated closure costs as input to the project feasibility study, and also to form part of the Environmental Impact Assessment to indicate the post-mining reclamation activities that will mitigate potential environmental impacts. In general, site reclamation objectives will include the following:

- Protection of air, surface water, ground water, flora and fauna
- Protection of public and worker health and safety
- Restoration of wildlife habitat
- Design and restoration of a post-mining topography that is comparable with pre-mining conditions
- Restoration of the area in an aesthetically acceptable manner that generally blends within the surrounding habitat
- Reestablishment of post closure revegetation that is suitable and comparable to pre-mining conditions.

The Mirador Copper Project is proposed as an open pit mining and conventional grinding and flotation plant processing a copper porphyry deposit to produce a copper concentrate containing minor amounts of gold and silver. The project is located in southeast Ecuador, approximately 400 km south of Quito and 300 km from the coast on the east side of the Andes Mountains. The elevation of the project site ranges from 800 to 1,400 m above sea level.

The Mirador Project will be permitted under Ecuadorian permitting procedures. This closure plan will from part of the Environmental Impact Assessment documents being prepared in support of the permit application process.

The Mirador Project is being developed to conform to Ecuadorian environmental standards as well as to the guidelines laid out in the Equator Principles. The Equator Principles are a framework for financial institutions to manage environmental and social issues in project financing. The Equator Principles have been endorsed by most of the significant international banks that are involved in mine financing, and in general reference the standards of the World Bank Group.

1.2 World Bank Group Guidelines

From the World Bank Group Pollution Prevention and Abatement Handbook, Base Metal and Iron Ore Mining, following are the guidelines for mine reclamation and closure plans:

"The Mine Closure and Reclamation Plan should cover reclamation of tailings deposits, waste rock deposits, any open pit areas, sedimentation basins, and abandoned mine, mill and camp sites."

Mine reclamation plans should incorporate the following:

- *Return of the land to conditions supporting prior land use, equivalent land uses or other acceptable uses.*
- *Elimination of significant adverse effects on adjacent water resources.*
- *Use of waste rock for backfill and of topsoil (or other acceptable materials) for reclamation to the extent feasible.*
- *Contouring of slopes to minimise erosion and runoff.*
- *Planting of native species and of other species that are environmentally acceptable, to prevent erosion and to encourage self-sustaining development of a productive ecosystem on the reclaimed land.*
- *Post-closure management of AMD and tailings; reduction of AMD formation by sealing off pyrite-containing waste from oxidation and percolating water.*
- *Budget and schedule for pre- and post-closure reclamation activities.*
- *Sealing and securing of all shaft openings and mine adits on closure of the mine.*

"Money should be reserved over the life of the mine to cover the costs associated with mine closure. The amount of money and the type of financing required will depend on a number of factors such as the projected life of the mine, the nature of the operations, the complexity of environmental issues, the financial and environmental management capacity of the borrower or project sponsor, and the jurisdiction in which the mine is located. The mine reclamation and closure plan, the timing of its submission, and financing of activities under the plan, should be discussed and agreed on with the borrower or sponsor as early as possible."

1.3 Ecuador Guidelines

The Ecuadorian environmental regulations for mining activities state that all mining title holders must comply with their Environmental Management Plan and must present a financial guarantee to the Subsecretary of Environmental Protection of the Ministry of Energy and Mines which will hold the guarantee until the complete closure of the mine and for one year after. Details of Ecuadorian regulations are presented in Chapter 2 of the Mirador Project EIA.

Under Article 67 of the environmental regulations, mine closure plans must be presented for any phase of the operation and must include a description of the infrastructure that will be dismantled including all equipment, camps and others in accordance with the company's Environmental Management Plan and Environmental Audit. Every year a mining titleholder in Ecuador must complete an Environmental Audit until their mining title expires.

The regulation states that the disturbed areas will be rehabilitated in accordance with the environmental studies that were presented to the Ministry. Rehabilitation plans should take into account future uses for cultural and recreational activities. The mining titleholder is also responsible for damages to the natural environment and contamination to areas that occur after closure of the operations.

1.3.1 Corriente Commitment

Corriente is committed to reducing residual environmental effects at the site upon closure. Reclamation work will form an integral part of the mine plan and will be carried out progressively during the life of the project. The mining and water management plans have been developed to facilitate progressive reclamation. All surface facilities have been designed to minimize reclamation requirements following mine closure and to enhance the natural recovery of the areas affected by mining. It is anticipated that a significant portion of the proposed reclamation will be carried out during the operational phase of the project. Concurrent reclamation will be used to minimize the disturbed areas during the mining stages of the operation.

Corriente has, where applicable, incorporated in this Preliminary Mine Closure and Reclamation Plan the guidelines set out in the World Bank Pollution Prevention and Abatement Handbook. Accordingly, Corriente's plan will comply with the conditions of mining permits, regulations, and industry standards. The following principles have been established to guide the development of the overall plan:

- Plan and implement procedures in accordance with all applicable regulations.
- Apply cost-effective and appropriate closure and reclamation practices to reduce environmental risks and allow traditional use of the land.
- Conduct studies to predict post-closure environmental effects. Such studies will include:
    - Assessment of the rate of acid generation from the pit walls and waste rock dump, and the resulting pH and metal loadings.
    - Pit lake water quality study.
    - Studies of alternative (passive) treatment methods for acidic waters.
    - Reclamation trials on waste dump covers.
    - Potential for acid generation, and the rate of acid generation, from exposed tailings beaches.
    - Studies of aquatic impacts on the Tundayme River.
- Maintain a program of concurrent closure and reclamation as an integral part of project operations, as further detailed in later sections of this closure plan.
- Incorporate new reclamation and mine waste management methods and procedures.

1.4 Status of Closure Plan

This report provides a description of the anticipated closure and reclamation activities both during and on cessation of mine operations. It describes the areas of disturbance that will require reclamation, summarizes the proposed strategy and schedule for closure and reclamation of each area, and outlines the scope and cost of work to be carried out.

This report was prepared prior to Corriente receiving Ecuadorian environmental approvals for construction and operation of the project. Therefore, it is considered preliminary since some elements of the plan, such as post-closure monitoring requirements and associated cost estimates, may require revision upon project approval. Further, the specific details of the Mine Closure and Reclamation Plan will evolve as mining progresses, and so the plan will be updated periodically during the mine life. The final plan will be generated several years before mine closure. The key closure and reclamation issues for the project are as follows:

- Acid rock drainage (ARD) will be minimized by placing a cap of compacted overburden materials over the mine waste rock dump, revegetating the dump surface to aid in controlling erosion, and by maintaining runoff diversions around the waste dumps. The successful implementation of this strategy will minimize the volume of water that will require ongoing collection and treatment. Collection and treatment of acidic drainage from the waste dumps will continue for as many years as required, until the levels of acidity and metals abate to such that they will be acceptable for release or that can be adequately treated by passive systems.
- The tailings impoundment (AMEC 2004a) will be maintained with a water cover over most of its area to flood the tailing. This flooding will prevent oxidation of the tailings. Where a tailings beach exists above water, the beach will be covered by tailings that have had sulphide materials removed so the exposed materials will be non-acid generating.
- A secure, permanent spillway will be constructed in rock to safely Probable Maximum Flood flows through the tailings pond.

2.0 PROJECT DESCRIPTION

The project facilities will be in three locations:

- The administration offices, warehouses, concentrate filtration and handling, and water treatment facilities will be located near the confluence of the Rios Quimi and Wawayme.
- The open pit mine, mine maintenance, and crushing facilities will be located approximately 8 km east of the administration area above the Rio Wawayme.
- The processing plant and tailings impoundment facility will be located in the Rio Tundayme valley approximately 10 km upstream from the junction of the Rios Tundayme and Quimi.

2.1 Open Pit Mine

The open pit will have an ultimate depth of about 400 m from the top pf the highest wall to the south, to the currently planned pit floor. The floor elevation of the completed pit will be at about elevation 1040 m. The lowest point of the pit rim will be toward the south, at about elevation 1196 m. A total of about 110 million t of ore and 80 million t of waste material will be excavated from the pit.

Ore will be hauled eastward about 1.6 km along the Ore Haul Road to the crusher. The ore will be crushed and conveyed from this area to the plantsite. The crusher will be constructed on a cut-and-fill bench.

2.2 Waste Dumps

Approximately 80 million t of waste rock will be generated and disposed of over the life of the mine, currently estimated at about 13 years. The waste rock will be trucked and placed in the valley east of the pit.

The feasibility design has been developed to locate waste dumps on moderately sloping ground below and to the east of the open pit. Weathered overburden material will be mined first and will be placed at the upper end of the dump. In later stages, hard rock waste will be mined and will be placed downslope of the overburden to provide stability and drainage. Waste dump stability is referenced in the Feasibility Study and presented in a design memo by AMEC dated October 2004.

Two main diversions will be developed to divert runoff flows away from the waste dump. A gabion-lined channel will be constructed above the open pit, ore haul road and waste dump to divert major streamflows. As well, the main haul road upslope from the waste dumps will be developed with a large diversion ditch on its upslope side to intercept and the additional drainage area above the haul road that is not intercepted by the major diversion ditch. With this dual diversion concept in place, there will be essentially no upslope runoff onto the waste dump.

Drainage from the waste dump will include surface runoff and seepage discharge from within the dump. Surface runoff is expected to be uncontaminated, as it will have had only short-term contact with the waste materials. This surface runoff will be intercepted by perimeter toe

ditches, routed through sedimentation ponds and discharged to the environment. Seepage discharging from within the dump will also be routed through sedimentation ponds and will be regularly monitored for quality and as necessary will be treated prior to discharge.

Acid base accounting (ABA) work has been completed on 99 representative samples. The ABA results indicate that with only a few exceptions all of the bedrock materials tested met the criteria to be classified as having high acid generating potential. In other words the majority of the bedrock types likely to be disturbed by open pit mining of the Mirador deposit are expected to be net acid generating. Typically the primary mineralized material and the enriched zones are relatively high in sulphide sulphur concentrations (greater than 1.0 wt%), providing significant acid generating potential (AP). While typically the primary mineralized and enriched zones do contain appreciable amounts of neutralizing capacity, the amount is insufficient to buffer all of the potential acidity. Consequently the net neutralization potential (NNP) (NNP = neutralization potential (NP) – acid generating potential (AP)) is negative indicating that these materials are likely to be net acid generating over time. Kinetic testing work is underway but no meaningful results have been received to date. Based on the ABA testing it is concluded that the waste dump could be a significant acid generator.

For this waste dump that is expected to be a long-term acid generator, the most practical and best-understood approach is to make every effort to minimize influx of water and oxygen to minimize acid generation, but accept that the dump will continue to generate acid for a number of years after mine closure. The dump will be covered with impervious material, either soils or a combined soil and synthetic liner, to shed runoff, and secure diversions maintained around the dump. Therefore, long-term collection and treatment of acid drainage may be necessary and allowance will be made for this as the base case for handling acid drainage from the waste dumps. However, there may be other solutions that will be effective, and ongoing work will be carried out to assess potential solutions, that may include:

- Accelerated leaching of the dump to quickly remove acidity and reduce the time that ongoing treatment may be required.
- Use natural systems such as development of a wetland in which metal tolerant plants could uptake metals.
- Assess the dilution potential of the high flows in both the Wawayme River and the larger Quimi River into which dump drainage would discharge. It may be possible to show that there is such large dilution potential that the downstream impacts would be negligible.

2.3 Plant Site and Infrastructure

Ore will be delivered to the plantsite area by a 3.25 km long conveyor that will cross the prominent ridge to the south of the mine. The plantsite will be constructed on an excavated bench at about elevation 1450 m. The plantsite will be primarily on cut material, with a minor fill. A cut slope up to about 20 m in height will be formed behind the plantsite bench. Facilities within the plantsite will include a coarse ore stockpile, grinding mills, flotation circuits and concentrate thickening.

Concentrate will be transported as thickened slurry to the concentrate dewatering system, via a pipeline that will follow the conveyor route and the Mine Access Road to the Administration Area.

Tailings slurry will be carried from the concentrator via a 30-inch tailings pipeline to the tailings impoundment. A tailings pipeline road will be constructed to carry the tailings pipeline.

A number of site roads will be constructed as part of the project. These roads include:

- The Mine Access Road, an 8 m wide road from the Administration Area to the crusher site, about 4.3 km.
- The Mine Haul Road, a 24 m wide mine truck hail road from the open pit to the crusher area, about 1.6 km.
- The conveyor access road, a narrow, four-wheel drive construction access and maintenance road from the crusher to the plantsite, about 3.1 km.
- The Plantsite Access Road, an 8 m wide construction and operations access road from the Condor Road to the plantsite, about 11 km.

2.4 Tailings Impoundment

The tailings impoundment will be constructed across the Rio Tundayme at a location where the catchment upstream has an area of about 32 km^2, and will be formed by a rockfill dam with an impervious upstream zone separated from the rockfill by filter and transition zones. The initial impoundment will be formed by a starter dam constructed to a height of about 65 m, sufficient for storage of the first three years of tailings. The impoundment will have a net surplus water balance and will be operated as a flow-through impoundment. The dam will initially be allowed to fill with water prior to the commencement of tailings discharges, following which surplus water will then flow constantly over a spillway. Water will be reclaimed by a pump barge having three vertical turbine pumps and located near the right abutment of the dam through a 24-inch water line at a rate of ca. 42,450 m^3/day, and pumped to the process water reservoirs for subsequent use in the grinding mill.

Conventional practice is to construct diversions to minimize runoff entering a tailings impoundment and therefore reduce the net surplus. However, given the steep and marginally stable terrain, together with the large upstream catchment (and, hence, the large runoff flows) that would have to be diverted, reliable diversions are not feasible, and reliance on them would entail excessive risk to the TMF owing to the high probability of diversion failure. Because of this, the facility will therefore be operated as a flow-through system from which the excess water will be returned to the Tundayme River by way of a bypass spillway on the right (east) abutment of the dam. The bypass spillway will be raised with the tailings dam crest raises.

Conventional practice is to construct diversions to minimize runoff entering a tailings impoundment and therefore reduce the net surplus. However, given the steep and marginally stable terrain, together with the large upstream catchment (and, hence, the large runoff flows) that would have to be diverted, reliable diversions are not feasible, and reliance on them would entail excessive risk to the TMF owing to the high probability of diversion failure. Because of

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The tailings pond will be operated with a permanent water cover for dual purposes:

- To provide a large sedimentation basin for settling of tailings particles
- To provide a cover to prevent oxidation of sulphides in the tailings.

AMEC (2004b) carried out a study to assess potential water quality impacts of the flow-through tailings impoundment. The study indicates that the tailings impoundment will serve as an excellent sedimentation basin, so that suspended solids discharging from the tailings pond will be expected to be lower than background levels in the Rio Wawayme. The flow through the pond will also provide sufficient dilution that there will be no significant impacts of dissolved metals or process chemicals in the tailings pond discharge.

There will be some areas of exposed beaches in the tailings pond where single point discharges form deltas at the point of discharge into the pond, and also where a spigotted beach will be formed on the upstream side of the dam. These exposed beaches will be progressively covered by tailing and become submerged as the pond is raised in stages. At the final stage, however, there will be some tailings beaches permanently exposed. To prevent the potential for acid generation, the tailings will be separated into two streams in the latter years of operation. A small stream of sulphide-bearing Cleaner Flotation tailing will be carried in a separate, smaller tailings pipeline and discharged to a deep-water location in the pond where it will remain permanently submerged. The Rougher Tailings will have sulphides removed to form a non-acid generating stream. This main tailings stream will not be placed in any location where there will be permanent exposure to prevent acid generation.

3.0 CONCURRENT AND FINAL RECLAMATION MEASURES

3.1 Concurrent Reclamation

3.1.1 Construction Phase

All borrow pits, quarries, equipment and storage areas utilized during construction but not required during mine operations will be closed out and reclaimed at the end of the construction phase of the project. All cuts and fill created during construction, including roads, plantsite, tailings line, diversion ditches and sedimentation pond dikes will be vegetated to assist in erosion protection.

Prior to disturbing areas, all practically available and suitable soil will be salvaged and stockpiled for redistribution during ongoing reclamation and final closure of the mine.

3.1.2 Operations Phase

As practical, disturbed areas will be revegetated incrementally to reduce erosion and improve aesthetics. During operations, areas will be regraded, revegetated and stabilized, as soon as possible.

Waste dumps will have a cap of impervious material applied as soon as final surfaces are created, at which time they will also be vegetated. The waste dump will be constructed to its final slope angles where possible.

Soil salvage will be incremental and concurrent with each phase of waste dump construction, pit development and waste rock dump development. Soils will be tested for chemical and physical suitability to ensure suitability for reclamation. Soil stockpiles will be located as close as feasible to areas of reapplication. Stockpiles will be constructed with stable side slopes and access ramps. Stockpiles will be stabilized and seeded as soon as practical to prevent erosion and reduce leaching of soil nutrients. An annual inventory will be maintained of disturbed areas, volumes of topsoil accumulated, and volumes distributed.

A revegetation plan will be developed to determine species, planting schemes, seeding and planting rates, seedbed preparation, seeding and planting methodology, and treatments as necessary. The species selection and revegetation rates will be based on pre-mining vegetation types.

The tailings impoundment will not be reclaimed during operation as the dam will be raised by downstream construction so there will not be a final downstream slope on the dam until after the last dam raise. Tailings dam borrow pits will be resloped as necessary, covered with stockpiled topsoil, and vegetated as soon as they are depleted, provided they will not be required for subsequent stages of dam raising.

During operation, if there are any sewage treatment plants used, sludge from the operating sewage treatment plants will be used as soil amendment.

3.1.3 Closure and Reclamation Phase

Final reclamation measures will be carried out as soon as final surfaces are created. The final tailings dam slopes will be ready for reclamation after the last dam raise is completed about two years before the end of mine life.

Major closure activities after the end of mine life will include removal of all facilities and infrastructure that is not planned to be left for other uses or is needed for closure maintenance. Final waste dump capping will be applied. A permanent tailings dam spillway will be constructed.

Post operational reclamation will return the disturbed areas to the pre-mine conditions and habitat. Certain mine features may be left in place as permanent control measures to prevent environmental pollution, for long-term community use, or as a post-mining enhancement. Examples of facilities that may be left in place over the long term include:

- The medical clinic and buildings may be turned over to the local communities for their use and benefit
- Water treatment plant
- Waste dump diversions

3.2 Final Reclamation Measures

3.2.1 Open Pit Mine

The open pit mine will be allowed to fill with water when mining operations cease. The mine will have an ultimate depth of over 560 m on the high south wall, to about elevation 1040 m. The highest point exposed by the mine excavation will be about 1600 m. The lowest point of the pit wall will be on the north side of the pit, where the main haulage ramp will exiting at about elevation 1300 m. Thus, after the pit is flooded there will be a height of about 400 m of exposed wall. Some of the exposed wall materials could have the potential for acid generation.

At this stage of mine planning, it is not possible to develop precise models of the anticipated pit lake water quality that may result from oxidation or metal leaching of the exposed wall rock. A pit lake study will be completed at Year 5 of the operation, when the ultimate mine life and pit configuration are better known and after more extensive geochemical characterization of the pit wall rocks has been carried out. The objectives of the pit lake study would be to determine:

- Groundwater flows;
- Time for the pit to fill;
- Depth of pit lake;
- Pit wall stability;
- Anticipated water quality of the pit lake;

- Any potential environmental impacts;
- Develop mitigation measures as necessary.

Potential scenarios may include:

- There may be sufficient flow into and through the pit that there will be adequate dilution so there is no significant impact from the wall rocks and pit lake.
- A one-time treatment of the pit water may be required to adjust the pH before initial discharge begins, after which the models may indicate that long-term water quality will be adequate for discharge.
- Diversions may be left in place and maintained to reduce pit inflow and if desirable to reduce the rate of filling, and extend the time period before the pit would discharge.
- Should it be necessary, open pit discharges would be treated along with waste dump drainage, either by active or passive means.

3.2.2 Mine Waste Dump

The mine waste dump will be reclaimed as follows:

- Final dump slopes will be constructed to an angle of 2.5 horizontal to 1 vertical, both for overall stability and to provide stable slopes for establishment of vegetation.
- A cap of compacted overburden or composite soil/geomembrane liner will be placed over the final dump surface with the objective of shedding water to reduce infiltration.
- The dump surface will be planted with appropriate local varieties of plants and shrubs to provide erosion protection.
- The closure runoff system will be upgraded to separate clean, uncontaminated runoff from the dump surface from any seepage flowing from within the dump. Seepage flows will be isolated so they can be captured and monitored. If suitable for discharge, the seepage flows will be released, and if necessary treated prior to discharge.
- Major diversions upslope of the waste dump will be maintained over the long term, to avoid erosion of the dump by streamflow. Where possible, permanent, durable diversions will be put in place, but as necessary regular monitoring and maintenance will be continued.

The need for potential ongoing treatment of dump drainage waters following mine closure, and the potential options that will be assessed, are discussed in Section 3.2 above. If any discharges from the closed pit or waste dumps are below the regulatory pH, acidic, and passive treatment systems are not adequate, active chemical treatment will be used to mitigate impacts. Typical bases or alkalis used to treat acidic water are:

- Limestone (CaCo3),
- Quicklime (CaO),
- Hydrated lime (Ca(OH)2),

- Soda ash (Na2CO3),
- Caustic soda (NaOH),
- Sodium bicarbonate (NaHCO3),
- And ammonia (NH3).

Depending on the water chemistry, flocculants and coagulants may be used to reduce the metals concentration prior to neutralization. Aeration may be also used as a pretreatment to reduce iron and manganese.

The alkali treatment requirements will vary over the life of the mine dependent upon concentration of heavy metals (Al, Mn, Zn, Cu, Fe). The concentration of metals in the pit wall and waste rock will vary over the life of the mine requiring different dosage levels of alkalis to raise the pH and precipitate the heavy metals prior to discharge to the receiving waters.

The application processes may be relatively simple, flow through hoppers dissolving soda ash briquettes; drip or trickle systems discharging NaOH based on manual or automatic flow measuring systems; semi or fully automated water treatment plants.

3.2.3 Infrastructure

After mining and ore processing are complete, the crusher, mills, offices, conveyors, pipelines and support facilities will be dismantled. Inert materials such as steel, iron, concrete, plastic and wood will be disposed of, buried in on site disposal areas, or sold to scrap dealers for recycling.

Beneficial roads will be left in place to support community, military and public access. Non-beneficial roads and paving will be ripped and covered with an adequate depth of fill and topsoil to support revegetation.

Power lines may be left in place if there is a beneficial use. Otherwise, towers and lines will be removed and disposed of on site or sold as scrap.

Any hazardous materials or chemicals will be treated to render non-hazardous, or transported off site to an authorized treatment and disposal facility.

Surface pipelines will all be taken up and either sold as scrap or buried on site. Buried pipelines will be flushed with clean water and left in place, or removed and sold as scrap, or disposed of in an on site disposal area.

As the facilities are removed, the areas will be ripped as necessary, covered with an adequate depth of overburden, topsoiled and revegetated.

3.2.4 Tailings Impoundment

The tailings impoundment will be retained as a permanent facility following closure of the mine. An open channel spillway, capable of handling a probable maximum flood flow, will be constructed for closure. The closure spillway will be the same as the operating spillway for the last stage of raising the tailings dam. As it will have been in service for several years before closure, it will have been well tested by the time of final closure.

Retention of the tailing impoundment as a permanently flooded facility will provide several positive effects.

- A permanent water cover over the tailing will provide anoxic conditions that will prevent acidic water from forming keeping the lake at neutral conditions.
- The tailings impoundment will provide routing of flood flows and will therefore mitigate flooding downstream during large storm events.
- The head developed behind the dam could be routed into a penstock and be used to generate electricity, thereby providing a long-term asset for local communities and region.

To maintain stability and integrity of the tailings dam, the dam will not be topsoiled or revegetated, but will be allowed to revegetate naturally.

The diversion of the Namacuntza River will be taken out of service and allowed to flow back into the tailings basin, as it could not be expected to remain stable over the long term without ongoing inspection and maintenance, and will have no further function as there will be a constant flow of water over the spillway to maintain flow downstream in the Tundayme River.

3.2.5 Administration Area

The administration area will be dismantled except for facilities that may be required in the post closure period, or those that may be left as legacies for the local community. Facilities that would definitely be removed would include:

- Concentrate dewatering
- Accommodation camp

If there were a need to operate a water treatment plant beyond the end of mine life, certain facilities would be left in place to support its operation. These may include:

- Water treatment plant
- Power lines
- Repair shop
- Security gates and fencing

Any such operating facilities that remained after operation would remain under the control of the operating company with full safety, security and environmental protection measures in place.

Facilities that may be left as community legacies may include the office building or any other structure.

4.0 ENVIRONMENTAL IMPACT ASSESSMENT

4.1.1 Open Pit Mine

The open pit mine will be allowed to flood upon closure. This flooding will take about 5 to 10 years, depending on actual groundwater inflow rates. The flooding will maintain a cover over wall and floor rocks up to the level of the pit outlet, at about 1300 m. There will be potential for acid drainage from exposed wall rocks above the outlet elevation. The actual impact on water quality, and potential mitigating measures, will be assessed in a pit lake study to be performed in Year 5 of operation. It is expected that, with the significant streamflows in the region, the rate of oxidation of pit wall rocks will be such that water quality in the pit water discharge could be mitigated by dilution. However, in the worst case the pit lake discharge could necessitate collection and treatment. Even in this worst case, there would be no downstream impact to the receiving waters of the Quimi River as the discharge would be collected and treated if necessary.

The open pit will alter the local topography and will remain visible from a distance after closure, so there will be some visible impact. This impact will be lessened by vegetation growth over the longer term. The open pit will also result in loss of about 117 ha of natural ecosystem.

4.1.2 Waste Dump

The waste dump is expected to become acid generating and there will be discharges of acidic waters, containing dissolved metals, from the dump. The dump discharges will be monitored and collected and treated as necessary. Treated drainage waters (treated by either an active water treatment plant, passive biological treatment system or other means of treatment would be released to the receiving waters only after meeting agreed parameters for discharge. Thus, the acidic drainage will have no impact on the downstream waters provided the water quality monitoring systems and any required treatment systems are implemented and maintained for as long as necessary. Mirador will develop a financial mechanism for accruing funds over the life of the mine such that the ongoing treatment will be adequately funded.

The waste dump will have some visual impact. However, the location of the waste dump is on the lower slopes of the valley side in the mid-reaches of the Wawayme River valley and will only be visible from within the essentially unpopulated and remote Wawayme Valley. The waste dump is expected to support vegetation and to be covered in vegetation within a relatively short time period (5 to 10 years). The vegetation will effectively mask the waste dump visibility.

4.1.3 Plant Site and Infrastructure

The plant site and all other mine infrastructure will be essentially returned to pre-mining conditions and revegetated. This there will be little long-term impact of the plant site and infrastructure.

4.1.4 Tailings Impoundment

The tailings impoundment will represent a significant change to the topography and habitat in the upper reaches of the Tundaynme River. The tailings impoundment is to be closed as a shallow lake, where currently the site is a fast-flowing river through a dense rain forest.

The tailings impoundment is expected to have no negative impact on water quality, as the lake will cover the tailings to prevent acid rock drainage and will serve as an effective sedimentation basin. The lake will have the impact of removing essentially the entire sediment load that presently reports to the lower reaches of the Tundayme River. Normally, removal of sediment load may result in concerns over increased erosion downstream. However, in this case the impoundment will also serve to dampen flood flows, so that there will be lower peak flows downstream. It is expected that the lower flows will more than counter the loss of sediment in terms of potential erosion downstream.

The tailings dam will remain visible from a distance after closure, as the downstream face of the dam will be about 120 m high. Constructed of rockfill, the dam will vegetate naturally over a considerable period of years so that the visibility will remain for decades.

4.1.5 Biophysical Environment

4.1.5.1 Air Quality

There is not expected to be any significant air quality impacts of the mine upon closure. The tailings, which can be a dust concern in dry climates, will be covered with water. In this wet climate, it is unlikely that, even if uncovered, the tailings would be a source of dust.

4.1.5.2 Flora and Fauna

The main impact of the Mirador Project will be the loss of forest habitat. The habitat loss will be the areas of the tailings impoundment (283 ha) and the open pit and waste dump (188 ha). This habitat lost has typical diversity of the unspoiled rainforest of this region.

4.1.5.3 Water Quality and Aquatic Resources

Water quality is the largest potential impact of the Mirador Project. However, as stated above, provided that adequate measures are maintained to handle potential acid rock drainage, there should be no significant water quality impact.

In the Tundayme River, there will be some modification of the flow regime from pre-mining conditions. The total quantity of flow will remain unchanged, but the water will have less sediment and lower flood peaks, due to sedimentation in the closed tailings pond upstream and damping of flood flows. These changes are not expected to negatively impact the aquatic environment.

The tailings impoundment will create a new aquatic habitat, a shallow lake with an area of about 250 ha. It is expected that this lake will become a healthy fish habitat that will be a positive impact of the project.

4.1.6 Socio-Economic Impacts

EcuaCorriente will work with the communities in the area to enable all stakeholders to have their interests considered during the mine closure process. Typically, a closure of a mine will impact the economic condition of the closest community(ies). As part of their active Community Relations Plan, EcuaCorriente intends to work with the stakeholders to establish a targeted communication strategy that will reflect the needs of the stakeholders and interested parties. A consultative process involving local communities, regulators and other interested stakeholders will be established during the operation to determine the long-term use for the mine and all associated lands.

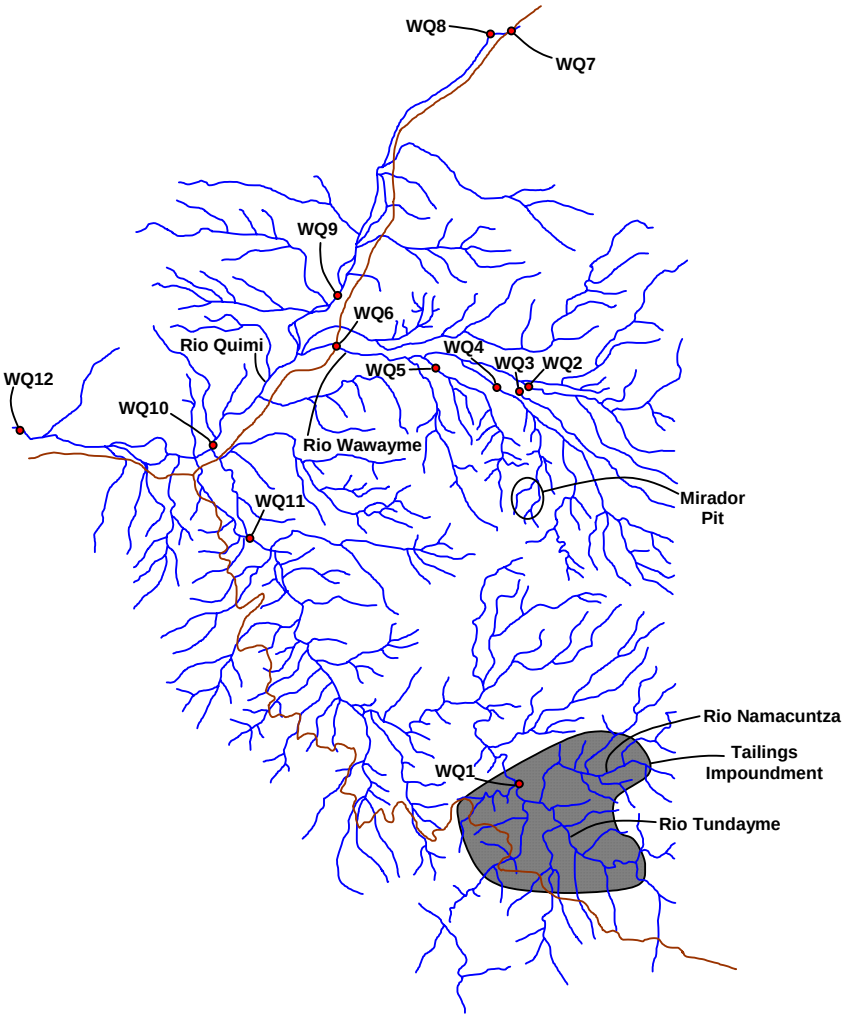
EcuaCorriente has begun implementing sustainable development activities in the local communities such as the establishment of the orchid nursery to provide alternate long-term economic activities in the active floral industry of Ecuador.

5.0 POST CLOSURE MONITORING AND MAINTENANCE

5.1 Environmental Management and Environmental Effects Monitoring

5.1.1 Current Water Quality Monitoring

A comprehensive water quality monitoring program has been developed as part of the environmental baseline study for the project. A total of 12 water quality locations are being sampled at monthly intervals to provide an accurate picture of pre-mining water quality.



	PROJECT:				
amec	TITLE: Water Quality Sampling Locations on the Rios Tundayme, Quimi, and Wawayme				
CLIENT:	DATE:	JOB No.:	SCALE: n/a	FIGURE:	REV. n/a

In addition to the water quality monitoring system, a climate monitoring station and a number of separate rain gauges at different elevations have been installed and are being used in the preproduction period to gather site specific data on precipitation, temperature, wind and evaporation. There is also a network of streamflow monitoring stations to develop a site-specific understanding of the correlation between rainfall and runoff. This data will be used to support detailed engineering of the project, and to provide baseline streamflow data to assess project impacts.

5.1.2 Environmental Monitoring During Operation Period

The water quality and streamflow monitoring programs established for pre-production will remain in place during the operating period. These will allow any impacts on water quality and flows to be detected at an early stage and any mitigation measures put in place. In addition to the monitoring already in place, additional monitoring will include:

- Streamflow measurements of the tailings dam spillway and Namacuntza River diversion.
- Seepage observation and measurement at the toe of the tailings dam.
- Regular inspection of diversions around the mine, waste dump and tailings area to assess any potential problems so that preventive maintenance can be performed.
- Tailings dam stability monitoring, including survey of fixed monuments to detect settlement or any horizontal movements.
- Water quality monitoring will be expanded as necessary to include sampling of open pit and waste dump drainages and tailings pond water quality.

Quarterly environmental reports will be prepared, presenting all data on a cumulative basis. Annual reports will be prepared highlighting any significant changes or problems encountered in each period, and reporting on mitigative measures taken to deal with any problems.

5.1.3 Environmental Monitoring During Closure and Reclamation Period

5.1.4 Post-Closure Monitoring

Post-closure monitoring will be essentially a continuation of the operational monitoring systems. All monitoring systems will be maintained for at least five years beyond the date of mine closure. At that time, the need for ongoing monitoring of each component of the mine will be assessed. Where there are ongoing water quality or other concerns, the systems will be maintained, and where the environmental systems are stable and have no negative impacts, monitoring will be discontinued or the frequency of monitoring will be reduced. The need for ongoing monitoring would then be reviewed at annual increments to assess further need.

In addition to the environmental monitoring of water flows and quality, the following regular inspection work will be continued in the long term:

- Waste dump diversion ditches that are designated as permanent will be inspected on at least a monthly basis.
- The tailings dam spillway will be inspected at least monthly.
- A qualified geotechnical engineer, preferably a representative of the Engineers of Record for the dam design and construction, will make an annual inspection of the tailings dam. The inspection will be annual for at least the first five years after closure, and the frequency will be reviewed and may be reduced if appropriate after that period.
- Tailings pond soundings will be made at intervals (3 to 5 years) to monitor the rate at which sediment accumulates in the pond in the post-closure period.
- The progress of plant growth in replanted areas will be inspected annually by a qualified agronomist responsible for the site reclamation work, until such time the plantings are judged to be stable and self-sustaining.
- The waste dump cover will be inspected on at least a quarterly basis for the first three years post closure, and on an adjusted lesser frequency as appropriate in later years.

5.2 Post-Closure Maintenance

Post-closure maintenance will consist primarily of:

- Timely repairs to diversion ditches when any slope stability or erosion are noted to be threatening ditch integrity.
- Repairs to tailings dam spillway.
- Any remedial works noted to be required to the tailings dam or other aspects of the tailings pond.
- Repairs of any eroded reclaimed areas and any additional works to maintain growth in reclaimed areas.
- Repairs to any erosion noted on the waste dump cover.
- Operation of the water treatment plant and/or passive water treatment systems.

6.0 IMPLEMENTATION SCHEDULE AND COST ESTIMATES

6.1 Implementation Schedule

Final closure plans for Mirador will be implemented as soon as the mine reaches the end of its economically viable life. The current mine plan calls for an operating period of about 13 years, after which final closure works would be started. It would of course be beneficial to Corriente to identify additional reserves that can be economically mined, in which case implementation of closure would be postponed through any additional operating period. Once closure work is initiated, it will be to Corriente's economic benefit to complete the work as quickly as possible. It is expected that the work will take about one year following the date of shutdown of operations to complete the closure works. Long-term post-closure programs (monitoring, maintenance and water treatment if necessary) will begin immediately upon mine shutdown.

6.2 Cost Estimates

The cost of final closure and reclamation for the Mirador Project has not been estimated in detail, as there are a number of significant unknowns with regard to the closure needs. In particular, the biggest unknown is the requirement for ongoing collection and treatment of acid drainage from the waste rock dump. Table 6.1 presents some indicative costs based on other detailed closure plans prepared for mines in later stages of operation where closure needs were better defined. Actual costs will also depend on other variables such as the demand for scrap metal at the time of closure.

Table 6.1 *– Mirador Project Indicative Closure Costs*

Area	Estimated Cost (US$)
Direct Closure Costs	
Process Facilities	5,000,000
Surface Infrastructure	2,000,000
Waste Dumps	3,000,000
Subtotal - Direct Costs	**10,000,000**
Indirect Closure Costs	
EPCM	1,500,000
Site Facilities Operation	500,000
Temporary Facilities & Equipment	500,000
Camp & Catering	500,000
Disposal Fees	500,000
Subtotal - Indirect Costs	**3,500,000**
Contingency @ 15% of Direct and Indirect Costs	2,025,000
Total Closure Costs (Rounded)	**15,500,000**
Post Closure Costs	
Acid drainage treatment plant - 30 years @ $1 million/yr	30,000,000
Environmental Monitoring – 30 years @ $100,000 K/yr	3,000,000
Maintenance – 30 yr @ $200,000/yr	6,000,000
Total Post Closure Costs	**$39,000,000**
Estimated Total Closure Funding Requirement (indicative cost only)	**$55,000,000**

7.0 FINANCIAL SECURITY AND ASSURANCE

Corriente is committed to providing suitable financial security and assurance to cover the full cost of closure and reclamation of the Mirador project. It is Corriente's intent to enter into discussions with the responsible Ecuadorian authorities to reach agreement on an appropriate form and amount of security to be posted for the project.

At this time Corriente has not developed or indicated any preference towards a specific format for the posting of security against reclamation liability. Corriente remains open to consideration of a wide range of options, including but not limited to the creation of a reclamation trust, cash, letter of credit, insurance bond or a combination of these mechanisms and others that may arise as a result of future discussions with the authorities.

Corriente is committed to a program of progressive reclamation at Mirador. Progressive reclamation has been built in as an integral part of the mine plan. Consequently, Corriente intends to manage its reclamation liability at Corriente by initiating reclamation work at an early point in the mine life, thereby limiting the expansion of overall liability over time.

Respectfully submitted,

AMEC Earth & Environmental,
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