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## TABLES



## ILLUSTRATIONS

# 11 MINE CLOSURE PLAN

It is proposed the closure and abandonment plan of the mining operation for the Mining concession 5969 contract of Touchstone Colombia, in accordance with the terms of reference from Environment and Sustainable Development Ministry for open-pit gold deposits exploitation, and to company values, principles and policies. This in order to leave the intervened places in a security and stability state which minimizes the adverse effects on people and the environment.

The closure plan will be subject to periodic updates with the purpose of adjusting aspects that are identified during the operation implementation. In the same way, the mining planning will focus on creating acceptable environmental conditions, besides a constant communication and commitment with the authorities as well as communities, with the aim of establishing realistic objectives articulated through plans that allow enhancing the desired changes and avoiding or minimizing the unwanted ones.

## 11.1 OBJECTIVES

### 11.1.1 General

To establish technical, environmental and social guidelines that Touchstone Colombia will take into account for the closure stage, the components and facilities that are part of the project. In order to return the territory in adequate conditions to protect the environment, communities and collective rights once the mining operations are finished.

### 11.1.2 Specific

To define the initial closure plan based on the current knowledge of the mine and the interrelation of the project stages that were defined in the Works Program.

To specify the criteria from which the closure plan update will be carried out.

To define the activities that will be part of the progressive closure during the useful life of the project.

To establish the temporary closure plan in case of adverse conditions occur and which require temporary suspension for technical, environmental, economic, political or financial reasons.

To establish activities that will be conducted in order to achieve the final closure of every single component of the project.

To define the post-closure activities of the mine for the monitoring of: slope stability, water quality, fauna and flora and maintenance tasks.

## 11.2 LEGAL FRAMEWORK

The legal guidelines related to the closure of mines are briefly defined below, those which were the basis for the development of this plan.

### 11.2.1 Environmental Legislation

Law 99 from 1993, Article 60

It establishes for the open pit mining the obligation to perform: "The restoration or substitution morphological and environmental of whole land that were intervened with the exploitation, on behalf of the concessionaire or beneficiary of the mining title, who will warrant it with a compliance policy or bank guarantee. The Government will regulate the procedure to extend the compliance policy or the bank guarantee ".

Decree 2820 from 2010, Article 40

It defines for the projects the dismantling and abandonment plan, which will include the management measures of the area, the final restoration activities and other pending actions.
Under the environmental legal framework for closure, other guidelines provided in the reference terms are taken into consideration: "The General Methodology for the Presentation of Environmental Studies" and in the "Evaluation Manual of Environmental Studies", that describes the content and scope of activities for mine closure phase and abandonment of infrastructure.

Likewise, it will be considered: the restrictions derived from the territorial ordering, the guidelines regarding to the priority in the destination of natural resources, the strategies of protection and conservation of ecosystems; as well as the articulation in the design and execution of the closure aspects that ensure the exercise of the rights which communities have towards the participation in the planning of their territories.

### 11.2.2 Mining Legislation

Law 685 from 2001 (Mine Code)

The Mining Code contemplates the free reversion in favor of the State (Article 113) which is stipulated for property also fixed and permanent installations, transport goods and shipping of the minerals that are incorporated to the deposits and accesses but cannot be removed without detriment. The free reversion occurs only in those cases in which the characteristics and dimensions of the aforementioned goods, in the opinion of the mining authority, make them suitable as an infrastructure destined for a public transport, boarding service or that could be used by the community.

It contemplates the closure as a planned activity, which must begin to be executed in compliance with the mining concession and that is supervised not only by the environmental authority but also by the mining company (Article 84, Works Program). In like manner, the Mine Code establishes that the closing activities constitute contractual obligations covered by the mining-environmental policy (Articles 45 and 280).

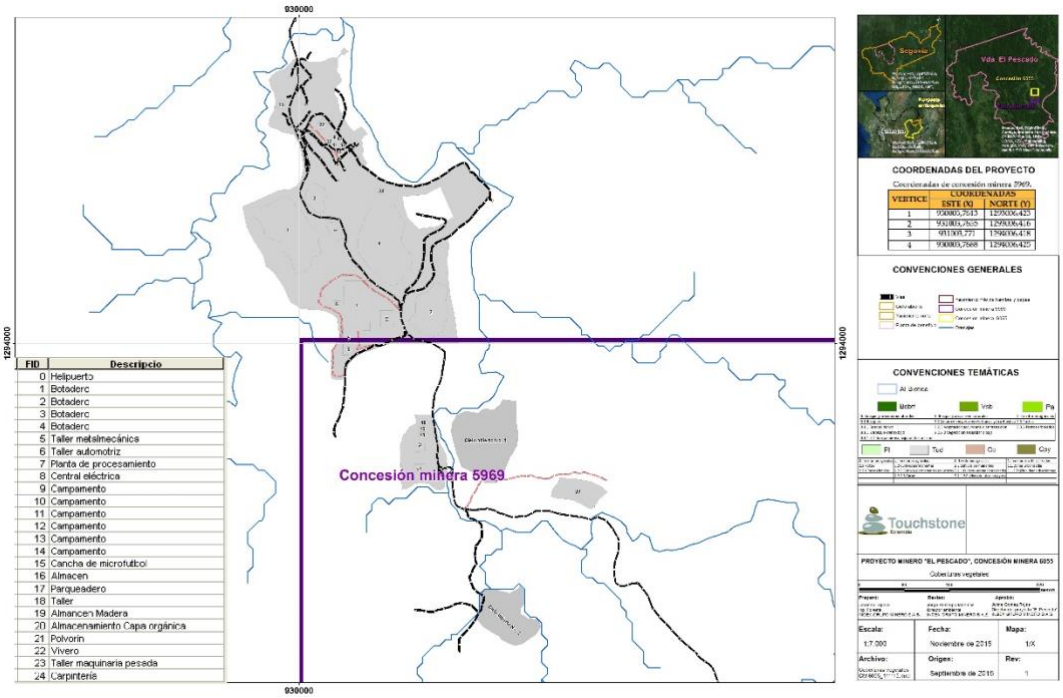
## 11.3 CLOSURE COMPONENTS

In Table 11-1 are listed and classified the areas that will intervene over the project useful life and that will be part of the mine closure. In the Table 11.1, it is reflected the spatial location of these areas.

**Table 11-1.** Mine components description that will be part of the closure phase

| MINE AREAS | ID | MINE AREAS COMPONENTS | PHASE | AREA (HA) |
|---|---|---|---|---|
| Exploitation areas | N/A | Open-pit mining No. 1 | Final Closure | 1.23 |
| | N/A | Open-pit mining No. 2 | Final Closure | 0.74 |
| Management areas of: sterile, tailings, benefit and tails | 1 | Dam of solids | Progressive closure | 0.838561 |
| | 2 | Dam of solids | Progressive closure | 0.447057 |
| | 3 | Dump | Progressive closure | 0.142061 |
| | 4 | Dam of solids | Progressive closure | 0.95688 |
| | 7 | Processing plant | Final Closure | 0.419278 |
| Auxiliary mining areas | 20 | Organic layer storage | Progressive closure | 0.330194 |
| | 21 | Powder keg | Final Closure | 0.039402 |
| | 16 | Store | Final Closure | 0.009375 |
| | 6 | Automotive workshop | Final Closure | 0.039402 |
| | 19 | Wood warehouse | Final Closure | 0.004453 |
| | 23 | Heavy machinery workshop | Final Closure | 0.069144 |
| | 5 | Metalworking workshop | Final Closure | 0.047861 |
| | 18 | Workshop | Final Closure | 0.009375 |
| | 8 | Electric power plant | Final Closure | 0.01876 |
| | N/A | Road infrastructure | Final Closure | - |
| Supportive areas | 9 | Camp | Final Closure | 0.005692 |
| | 10 | Camp | Final Closure | 0.005692 |
| | 11 | Camp | Final Closure | 0.005692 |
| | 12 | Camp | Final Closure | 0.005692 |
| | 13 | Camp | Final Closure | 0.005692 |
| | 14 | Camp | Final Closure | 0.005692 |
| | 0 | Heliport | Final Closure | 0.057208 |
| | 17 | Parking | Final Closure | 0.043932 |
| | 15 | Micro football field | Final Closure | 0.016274 |
| | 24 | Carpentry | Final Closure | 0.010408 |
| | 22 | Plant nursery | Final Closure | 0.020521 |

*Source: INGEX, 2016.*




| FID | Descripcio |
|---|---|
| 0 | Helipuerto |
| 1 | Botaderc |
| 2 | Botaderc |
| 3 | Botaderc |
| 4 | Botaderc |
| 5 | Taller metalmecánica |
| 6 | Taller automotriz |
| 7 | Planta de procesamiento |
| 8 | Central eléctrica |
| 9 | Campamento |
| 10 | Campamento |
| 11 | Campamento |
| 12 | Campamento |
| 13 | Campamento |
| 14 | Campamento |
| 15 | Cancha de microfutbol |
| 16 | Almacen |
| 17 | Parqueadero |
| 18 | Taller |
| 19 | Almacen Madera |
| 20 | Almacenamiento Capa orgánica |
| 21 | Polvorin |
| 22 | Vivero |
| 23 | Taller maquinaria pesada |
| 24 | Carpinteria |

Illustration 11-1. Spatial location of the infrastructure and areas to be subtracted.

## 11.4 INITIAL CLOSURE PLAN

The initial closure plan contemplates the preliminary scenarios and the general management measures for the progressive, temporary and final closure; from what is considered in the planning phases based on the current knowledge of the mine and its associated facilities.

In this plan, the alternatives for closing to each one of the project components are identified and formulated, which must respond both to environmental and technical mining as well as social environmental requirements. On one hand, some of these components will be demolished once the project is completed, since it will not have utility under the new conditions of land use. On the other hand, others are of importance under the new conditions or its demolition is not possible since their morphological features make it necessary to remain on the site.

### 11.4.1 Activities

#### *11.4.1.1 Implemented activities during the operation and closure*

The area recovery from the mining project of Touchstone Colombia will be carried out with a view to restoration of affected areas and surrounding places of the project, for which several activities will be conducted in order to establish the proposed uses for each zone. Below, those activities are going to be defined:

1. The communities and municipal authorities will be informed of the influenced areas at least 6 months before of the closure stage starting; the staff requirements for this stage, the profiles of the same and the mechanisms established for the progressive reduction of personnel.
2. In the final stage of the closure, important information to the interested parties will be provided about the criteria for decreasing employment demand and applicable social benefits.
3. In order to minimize the huge social impact due to the employment reduction in the area during the previous stage and until the mining project ends, the company will promote training and vocational training both for people in the influenced area as for the personnel linked to the project according to their specific activities.
4. In the course of the mining operation, productive crops will be created in partnership with the communities to ensure that at the time of activities completion, the families and workers who depend directly and indirectly on the mine will not be affected in their income generation.

#### *11.4.1.2 Disassociate of goods and services suppliers*

The decoupling of goods and services suppliers will be done in a phased manner and when the closing date is approaching. The enterprise will ensure that suppliers can continue their productive activities, therefore, it has conceived entrepreneurship days for new productive projects. To existing ones will be given training to consolidate and strengthen their businesses. Such training will be oriented to the projects formulation, formalization of existing businesses and banking and accounting advice.

#### *11.4.1.3 Isolation of towns and villages*

Areas released after mining activities that require monitoring during post-closure will be kept isolated to prevent unauthorized persons from entering, thus leaving pedestrian crossings and signs within the operation; and will be kept in good condition at all times.

#### *11.4.1.4 Post-closure monitoring*

The monitoring programs in the closing and post-closure will allow to evaluate the performance of implemented measures and the necessary adjustments identification for the effective achievement of the activities.

It is important to clarify that the programs are developed at guidelines levels, leaving in any case the possibility of improving them regarding, when the technologies, the regulatory framework and the evolution of the project merit it.

#### *11.4.1.5 Main socioeconomic issues as a result from the mine closure*

Within the closure plan, the proposed land use will be disclosed to the community as a result of the studies which were carried out, and the economic dynamic that will govern in accordance with the PBOT guidelines of the municipality will be agreed upon parties.

#### *11.4.1.6 Preliminary estimate of costs*

For the estimation of costs, the main activities of the Closure stage were grouped, ones that unit values were obtained, and the required quantities were estimated; however, it is necessary to become clear that these amounts may vary given the conditions of the project operation.

**Table 11-2.** Costs plan of the initial closure.

| ACTIVITIES | COSTS ($) |
|---|---|
| Community information | 5.000.000 |
| De-linking of goods and services suppliers | 10.000.000 |
| *Isolation of populated nucleus* | 10.000.000 |
| Dismantling infrastructure | 100.000.000 |
| De-energize facilities and equipment | 3.000.000 |
| Disconnection of water supply and pipeline layout | 5.000.000 |
| Demolition of infrastructure | 50.000.000 |
| Disposal of solid and liquid waste | 6.000.000 |
| Conformation of slopes | 50.000.000 |
| Reconfiguration of the soil and rupture of compacted surfaces | 8.000.000 |
| Rehabilitation of soil and plant cover | 100.000.000 |
| Adequacy of Constructions | 8.000.000 |
| Delimitation and signaling | 3.000.000 |
| Closure monitoring | 50.000.000 |
| Other services | - |
| Personal protection items | 5.000.000 |
| Staffing | 8.000.000 |
| Solid waste management | 5.000.000 |
| Total | 426.000.000 |

*Source: INGEX, 2016.*

### 11.4.2 Updating

Considering the dynamism and progressivity that characterize the mining projects and the conceptualization of the present plan, it is necessary to develop a mechanism that allows to update the closure plans and adapt them to the generated changes and the reality situations that occurs; In this way, a transition process from a closure plan to a detailed closure plan is generated. In accordance with above, it will be considered: the initial closure plan will be updated every three years and the advance in the progressive closure programs, the research results, the modifications to the development of mining project (if applicable), the consultation tables results with the community and all the aspects that would have changed in the operation in accordance with what was reported in the initial closure plan and the environmental management plans, in addition to all those aspects that are relevant to the effect of the different plans.

The following are detailed the variables that will be taken into account when the initial closure plan is updating:

- Changes in the process, scale, or pace of mining.
- Changes in operational designs.
- Increase or decrease in the useful life of the project.
- Addition of new infrastructure to the process.
- Identification of new social risks.
- Changes in the structure of the community.
- Rehabilitation rate with respect to the planned time.
- Identification of new environmental risks.
- Increase or decrease in the impacts foreseen in the evaluation.
- Consideration of the investigations carried out.

Finally, it is important to bear in mind that financial aspects may require annual updates, and this may lead to reviewing the costs of the closure plan. However, these updates will be reflected in the closure plan document, as it is updated every three years.

## 11.5 PROGRESIVE CLOSURE PLAN

The progressive closure reaffirms our commitment to rehabilitate the intervened areas as soon as they are released by the mining operation. It is developed in order to minimize the potential for contamination, take advantage of having equipment and other facilities to optimize the costs of final closure.

Thus, Touchstone Colombia seeks to rehabilitate the progressive closure of the liberated areas resulting from temporary construction and rehabilitation of the areas that are being released in the waste and tailings deposit. The progressive closure for these last two activities will begin to be developed in year 3 of the project's operation.

## 11.6 FINAL CLOSURE PLAN

The final closure plan includes the absolute ending of those facilities that have completed their useful life once the operation of the mining project has finished. This plan will be updated based on modifications made to the initial closure plan, the mining plan and the changes that lead to a better closure for the mine. The final closure embraces the execution of the activities for the dismantling previously mentioned, demolition, land stabilization, lands rehabilitation for later uses, social and environmental commitments.

Above is presented the activities that is going to be developed:

### 11.6.1 Final geomorphology designs for land use

With the aim of recovering the land according to prior conditions to mining, in all disturbed areas the vegetation will be restored, with the exception of those roads that will remain operational during post-closure.

These activities will specifically include:

1. The leveling in order to provide a stable surface that resists erosion.
2. The road ripper and traffic zones to apply pressure to compact the soil.
3. The preparation of the surface by placing organic soil and nutrients
4. The plants sowing which can adapt to the edaphic and climatic conditions of the area and that can be self-sustainable.

### 11.6.2 Socioeconomic commitments acquired with the communities

Depending on how it can be defined during the project closure, a balance of commitments, prepared with the community and signed by both parties, will be made. This information will be registered in a specific format to have control and monitoring of obligations with the community, during and after the closure of mining activities.

### 11.6.3 Specific activities to comply with environmental commitments

The Table 11-1 shows the location and components type of the "El Pescado" mining project that will be closed once the mining activities are completed. The following are the activities that will be part of the abandonment plan:

#### *11.6.3.1 Exploitation areas*

The exploitation areas are open pit no.1 and open pit No. 2. The mining project "The Fish" has established different criteria to guarantee the physical stability of these areas once the mining activities have ceased. It will be considered a safety factor equal or greater of which was used during the operation for static conditions (see chapter 5).

#### *11.6.3.2 Management areas of: sterile, tailings, benefit and tails*

11.6.3.2.1 Plant

Touchstone Colombia will uninstall the benefit plant at the end of its useful life and will take the resulting equipment to be used in operations of the same company. The facilities will be demolished. The resulting surface will be conformed and leveled to be reforested and delivered to the community.

11.6.3.2.2 Tailings

From the plant, the tailings will be transported to three dams alternately by means of pipes in the form of pulp with a concentration ranging between 30% and 50% of solids by weight. Once the sediments have been decanted and one of the dams is plugging, the precipitate will be sent to Pit No. 1 to carry out a retro-filling. The final disposal site of the sediments will be profiled and accommodated to ensure the integrity and stability of the tailings against potential failures due to erosion, seepage, liquefaction or overflow.

The remaining water from the pulp will accumulate to be recirculated to the benefit process. A water quality control plant will be built, which will remain operational during the closure phase for the purpose of managing the water at the location. Additionally, the filtration collection systems will be installed below the tailings tank as long as necessary to handle any emergency.

As the tailings are potential generators of acid drainage, at the final closure, a cover made of impermeable and inert material layer with a thickness not less than 1 m; that will be placed to avoid contact of the tailings with water and air, in that way ensure its chemical stability in the long term. The second layer will be of a thickness not less than 0.25 m of organic soil on which native species will be planted, supplemented by nutrients and fertilizers to promote the fast vegetation growth.

11.6.3.2.3 Dump

For the physical stability of the dump a safety factor ≥ 1.3 shall be considered. The slopes will be rehabilitated landscape with native species of the zone and forest species to incorporate them to the surrounding environment in function of the future use that will be given to them. This process will be developed progressively during the life of the mining project, extending to the final closure stage.
To guarantee the chemical stability of the dump, the design and construction of this will point out that any material generating acid rock drainage is not going to be exposed to the moment of final conformation. It will be built with sub drainages to capture and conduct the water that infiltrates to be treated passively or actively, depending on its quality.

### *11.6.3.3 Auxiliary and support areas of mining*

The facilities and equipment will be dismantled and moved out of the project area for appropriate places and then offered them for sale to third parties or used in other activities. The minimum electrical installations that allow supplying lighting and energy to the equipment used in the closure stage and to those that are necessary for the new uses will be left operational.

The water supply to the mine will be cut off and the pipes will be dismantled, which will be conveniently removed by a company authorized to dispose of non-hazardous solid waste. Only the necessary connections for the closure phase and for subsequent uses of the land will be left operational.

Prior to closing, the mine coordination of operations will ensure the use of all existing explosive material in stock. Any remaining unexploded explosives will be destroyed in accordance with current legal regulations.

When the exploitation and mineral processing are completed, buildings, equipment and infrastructure, that will not provide any post project service, will be demolished. Discarded materials and remains of walls and floors will be transferred to an authorized plant or site in accordance with legal requirements and good practices in order to be submitted to the different processes of treatment and disposal.

In the case that some soils contaminated appear by oil, oil and fats, it will be removed to a depth of 10 cm below the lower contamination level; subsequently it will be rehabilitated and integrated into the surrounding landscape.

#### *11.6.3.4 Support areas*

Depending on the commitments that will agree with community, the infrastructure that is part of the camp will be adapted and improved for a final selected use. The soccer field will be delivered in optimal conditions to the community. In the heliport is going to apply the revegetation with native species and both the carpentry and the nursery, will be delivered to the community assembly for their administration.

#### *11.6.3.5 Underground work*

Once finished the useful life of the exploitation of both pits, underground work will begin in each one of them. When these tasks are completed, the galleries and tunnels closing will be performed through the filling it with sterile material. The portal will be sealed up to at least 5 times to the height of the excavation. The parameters detail for this closure will be reflected in the updates prior to the closure of mining operations.

11.6.3.5.1 Reconfiguration of the soil and compacted surfaces rupture

The areas to be rehabilitated usually show compaction due to the continuous transit of haulage equipment. Therefore, the land will be reconfigured by filling holes or spreading the accumulated material in mounds through the use of crawler tractors and motor graders. Subsequently, the surface will be plowed with the purpose of adapting the land before proceeding with the placement of the edaphic material. It should be noted that this soil breaking procedure does not apply to hillside and slopes.

11.6.3.5.2 Rehabilitation of soil and Profit plant

One time the mining operation is completed, most of the areas will be released for rehabilitation. The land surface will be leveled for sowing with edaphic material, arranging it in an orderly manner throughout the area and then spreading it evenly with the help of tractors. Subsequently, a motor

grader will be used to grade the field and the required drainage works will be carried out to avoid soil losses due to runoff.

Herbaceous cover is very important in this first stage of soil rehabilitation due to its ability to recycle nutrients and promote the physical restructuring of soils. Then native or cultivated grasses of low size will be used to favor the recovery the biophysical characteristics of the soil. For the sowing of tree species, native shrubby adult species with a height greater than 1 m will be used to achieve the function of mooring the land and accelerate the restoration and natural regeneration of the affected areas.

#### 11.6.3.5.3 Construction adaptation

The support areas will be rehabilitated and adequate structurally and spatially, so that they allow for operate properly under the new conditions of use. This seeks to generate new spaces and improve existing ones, renewing the structure of the camps and other service areas; thus, prolonging the buildings useful life and delivering them in their best state to the community.

#### 11.6.3.5.4 Delimitation and signaling

The area will be perimeter fenced and properly signaled to warn the closure of the mine, dumps and other infrastructure, also to inform about the potential risks of entrapment, fall and blows. For the final closure of the mining project and in order to achieve the end in use for the intervened area, it will be taken into consideration the different components generate a particular risk depending on their physical or chemical characteristics. Therefore, some of them will be isolated or separated from the others through the creation of fences or live barriers.

### 11.6.4 Commitment activities of final closure

The summary of the environmental commitments undertaken by Touchstone Colombia for the final closure of the mine is presented below.

**Table 11-3.** Commitment activities of final closure

| FACILITIES | COMMITMENT |
|---|---|
| Pits and underground work | Access closure Dismantling<br>Slopes stability<br>Signaling<br>Retro filling of the pits with tails that coming from plant<br>Access closure Dismantling |
| Dump | Construction of interceptors and channels for the evacuation of rainwater.<br>Compaction and definition of final surface slopes<br>Slope rehabilitation of (land cover and revegetation)<br>Delimitation and signaling of the dump location |

| | |
|---|---|
| Roads, auxiliary facilities and camps | Access closure<br>De-energize facilities<br>Closure of facilities, buildings, equipment and machinery<br>Protection and adaptation of the remaining structures |
| Processing plant | Closure of facilities, buildings, equipment and machinery<br>De-energize facilities<br>Access closure<br>Conformation and leveling of the land (revegetation)<br>Delimitation and signaling<br>Withdrawal of supplies and spare parts<br>Removal and disposal of industrial, domestic and hazardous waste<br>Removal of debris<br>Final and stable disposal of mining waste<br>Leave some power lines and basic sanitation operational |
| Tailing dam | Closure of facilities<br>Emergency spillway Maintenance of the perimeter channel<br>Rehabilitation pending (land cover and revegetation<br>Access closure<br>Closure of facilities |

*Source: INGEX, 2016*

## 11.7 TEMPORAL CLOSURE PROGRAM

The temporary closure may be caused due to economic, market, operational circumstances or at the request of mining and environmental authorities.

The main activities within the temporary closure plan will be:

- Barriers Installation that prevent the access to different equipment and work.
- Surveillance of existing infrastructure to prevent thefts and accidents.
- Signaling of the exploitation sites that inform about the impediment of access to them.
- Socialization of project situation with the communities, reporting them the temporary closure of the exploitation activities.
- Periodic geotechnical inspections to verify stability conditions, which will be carried out quarterly during the duration of the temporary closure and will be developed by specialized staff. According to the novelties found in each inspection, there will elaborated an action and follow-up plan to reduce the risk that may arise.

- The behavior and evolution of the mine slopes will be constantly verified with its own technical personnel. Minor corrective actions will be programmed to maintain the safety conditions of the different areas subject to temporary closure.
- A corrective treatment will be applied to slopes that show negative variation according to the conducted inspection. In general terms, the corrective treatment consists of removing material that may present risk of detachment.
- During the temporary closure, it will be performed some periodical cleaning, maintenance of channels, gutters and protection works with a monthly basis or according to the need.
- During the extended time in the temporary closure, the irrigation of roads will be maintained in order to mitigate the emissions from the wind action on the unpaved roads and on exposed fronts. To the extent possible, irrigation will be carried out with a regularity similar to that of the operation, provided that the cause of the suspension of activities related to the operation of the mine allows it.
- Install signage around the mine to indicate that hunting is prohibited, as is the capture of species.
- During the temporary closure periodical inspections will be carried out to control the inadequate disposal of waste in bodies of water and in places other than those authorized, as well as the burning of waste in the open air.
- During the temporary closure, surveillance activities will continue to develop on a regular basis. The administrative activities will be limited to those necessary to ensure the maintenance of the area from the technical, environmental, and legal and tax point of view.

**Table 11-4.** Estimating costs for temporary closure.

| FINAL CLOSURE PROGRAM | COSTS ($) |
|---|---|
| Final geomorphological designs for land use | 10.000.000 |
| Socioeconomic commitments acquired with the communities | 10.000.000 |
| Specific activities to comply with environmental commitments | 2.500.000 |
| Water quality monitoring program | 3.000.000 |
| Slope stability monitoring program | 2.500.000 |
| Flora and fauna monitoring program | 4.000.000 |
| Total | 32.000.000 |

*Source: INGEX, 2016.*

## 11.8 POST-CLOSURE MONITORING PROGRAM

During the post-closure stage, the project will implement a monitoring program for each of the mining facilities, whose frequency will depend mainly on the stabilization conditions of each facility.

The verification of the stability of the structures will be based on visual observations and on physical and chemical evaluations of the different sites and will be carried out by qualified personnel. The results of these monitoring will dictate the need or not to modify the sampling frequency. The entire sampling program will be implemented in compliance with Colombian legislation. The scope of

defined post-closure monitoring will focus on those aspects that are related to a potential danger of continuous contamination, or that provide data about the success of rehabilitation work.

### 11.8.1 Water quality monitoring program

This will be a program to identify processes of deterioration of the quality of surface and groundwater, and alteration of the fluvial dynamics of water bodies in the area of influence of the project. With regard to infiltration water and runoff from the waste deposit and operating fronts, it is estimated that its quality is acceptable in the long term during closure.

#### *11.8.1.1 Slope stability monitoring program*

Slope monitoring will include the evaluation of revegetation and the accumulation of surface runoff. The condition and functioning of the drains will be checked and, if necessary, they will be repaired to prevent runoff from breaking through the walls of the slopes.

The main control to take into account is the observation of the appearance of cracks, fissures and mass movements. If possible, the depth of the cracks will be measured and if large blocks with a probability of collapse appear, they will be removed to avoid an accident and the loss of vegetation in the lower part of the slope.

It is important to perform these checks periodically during the first years of closure, especially after periods of rain. If the reappearance or increase of the channels excavated by the runoff is observed, the drainage systems will be revised and the areas with scarce vegetation will be replanted and / or fertilized. If the channels are large, the soil lost at these points will be restored.

#### *11.8.1.2 Flora and fauna monitoring program*

Within the flora and fauna monitoring program, resources such as vegetation and landscape will be evaluated. The vegetation monitoring will identify areas that require supplementary management and / or soil amendments. At the same time, the physical conditions of the soil will be inspected at the beginning and at the end of the rainy season after the closure (for example, the evidence of erosion and landslides).

In the reforested areas the production of seedlings and the evolution of the planted surface will be monitored, making a weed management including studies to identify the invasive species and physical, mechanical or chemical treatments to eliminate them. As far as the landscape is concerned, the intervened areas will be monitored, and an integral management of the landscape will be made, that is, the change suffered by the surrounding landscape when mixed with the components recovered from the mine.

#### *11.8.1.3 Socio-economic aspects needed as a result of the closure mine*

The good planning of the closure of the project "El Pescado" should be focused on reducing the social, economic and environmental negative impacts generated by the closure of the mine. The

crucial issues of a socio-economic nature are those that may undergo some modification in the local populations at the time of the mining operation closure. These issues can be considered from the social responsibility policies and work policies adopted by Touchstone Colombia during the development of the project.

Some socio-economic issues for which mitigation guidelines will be established here:

- Labor untying.
- Use of the post-closure floor.
- Perceptions and expectations related to the preservation of the environment.
- Attention to complaints and claims.
- Local and community development.
- Completion of social health and education programs.

### 11.8.2 Commitment activities for the post-closure period

As the closure and rehabilitation of the project components progresses, a post-closure program will be carried out that includes the maintenance, care and monitoring of the closure measures executed, namely:

**Table 11-5.** Commitment activities for the post-closure period

| MAINTENANCE | COMPONENT | ACTIVITY | METHOD |
|---|---|---|---|
| Physical | Exploitation pits | -Inspection of accesses<br>-Inspection of slopes<br>-Inspection of safety and signaling berm | -Visual inspection<br>-Inclinometers |
| | Dump, tailings dam and tailings deposit | -Inspection of slopes<br>-Inspection of coverage systems for the recovery of soil and vegetation<br>-Inspection of the state of the drainage system and channels<br>-Inspection of the state of the signaling | -Visual inspection<br>-Inclinometers |
| | Roads | Inspection of gutters and berms | -Visual inspection |
| Hydrological | -Systems of drainages and channels | -Inspection of the state of the coatings of the channels and dumps<br>-Inspection of the state of erosion | -Visual inspection<br>-Cleaning of channels, drains and landfills<br>-Removing of vegetation cover that obstructs the passage of water |
| Biological | Revegetation areas | -Inspection of the state of erosion<br>-Inspection of the loss of plant cover<br>-Inspection of cover systems for the recovery of soil and vegetation<br>-Inspection of arid zones | -Visual inspection<br>-Re planting<br>-Pruning of vegetation<br>-Elimination of invasive plant species<br>-Fertilization, cleaning, stakeout, irrigation |

| | | | |
|---|---|---|---|
| Geochemical | Areas filled with water (Pits after rains, and sedimentation pools) | -Inspection of water level<br>-Monitoring water quality | -Piezometers<br>-Water sampling |

## 11.9 CLOSURE EVALUATION

The criteria for the performance evaluation of installations closure that is object of this plan include the following:

- Results of surface and underground water quality, which should be indicative of compliance with the maximum permissible limits on overspill.
- Successful determination of revegetation by qualified personnel.
- The slopes and rehabilitated lands which do not present conditions of instability.
- The closing activities are passive and no additional pumping is required.
- Satisfactory fulfillment with all the commitments agreed with the local community.