

**Environmental Management Plan**  
**Fauna**  
**Marlin Project**  
**San Miguel Ixtahucán, San Marcos**  
**Guatemala**

**Montana Exploradora de Guatemala S.A.**

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## **1.0 INTRODUCTION**

Mining is an activity that can make possible the economical development of a municipality, and can be one of the basic elements for the progress of industry and commerce. Mining production should consider the potential environmental impacts compared to the potential positive economic benefits.

One of the Marlin Project's goals is to promote harmony between economic development, and the protection of the environmental receptors as well as the surrounding communities. These interrelations are vital and should be balanced with sustainability.

The Marlin Project is a gold and silver mine currently in the construction phase. The project will operate as an open pit and underground combination with mineral processing via steel leach tanks. The project is located approximately 276kms northwest of Guatemala City, Guatemala. The Mine is located in the municipalities of San Miguel Ixtahucán and Sipacapa, in the Department of San Marcos. The Mine is 100% controlled by Montana Exploradora de Guatemala, a subsidiary of Glamis Gold Ltd.

As a subsidiary of Glamis Gold, the business philosophy of Montana Exploradora S.A. is to produce gold and silver in a cost-effective manner, focused on safety, community relationships and good environmental performance. Thus, environmental management is one of the highest priorities of Montana Exploradora, supported by the corporative management. A complete and practical Environmental Management System (EMS) is critical to achieving environmental objectives, including compliance with environmental regulations and the implementation of appropriate mitigation measures. An EMS also helps in the implementation of an environmentally sound operation.

Marlin Project's Environmental Impact Assessment (EIS - Consultoría y Tecnología Ambiental, 2003) determined that during mining operations some minor impacts on the local flora and fauna would be likely to occur. Wildlife protection is also a permit condition. Wildlife includes all species of mammals, birds, reptiles, fish and invertebrates living freely in the area.

This Environmental Management Plan for Fauna (Plan) has been developed in order to provide Montana Exploradora S.A. with a tool to reduce environmental impacts on the wildlife around the mine, likewise to fulfill Guatemalan regulations and Montana's environmental policies. The main purpose of this Plan is to define the necessary actions to maintain or improve the habitat's

existing conditions and/or to reduce or mitigate the impacts caused by the activities on site. This plan is part of the Environmental Management System.

### **1.1 Responsibility**

The execution of this Plan is the responsibility of the Marlin Project's Environmental Manager, and all the employees and contractors. The Environmental Manager will be the person responsible for compliance with the Plan.

### **1.2 Overview and Assessment of the Plan**

This plan will be reviewed periodically and will be updated as a result of any change in the activities or conditions on-site which might result in an impact to wildlife.

## **2.0 GOALS AND NEEDS OF THE PLAN**

The goal of this Plan is to provide procedures to reduce environmental impacts on the fauna and its habitat. Specific goals of the plan are as follows:

- Compliance with Guatemalan legal requirements and Montana's corporate requirements;
- Compliance with the existing Environmental Management System for the Marlin Project;
- Stipulation of the procedures for wildlife and habitat management.

### **2.1 Guatemalan Legal Requirements**

Montana Exploradora de Guatemala S.A. applied for an environmental license in June 2003 through the submission of the Environmental and Social Impact Assessment (EIA&S), to develop mining operations at the Marlin Project. The following commitments are as a result of the EIA&S:

- Construction of fences to restrict wildlife access to process and other mine facilities;
- Records of animals affected by the mine's activities or by the processing chemicals/solution will be noted in wildlife mortality reports.
- Educational lectures with students of schools near the Marlin Project will be carried out about the importance of wildlife protection.

- Chemical characterization of the pit water at closure, and if determined acceptable access ramps for wildlife will be maintained and revegetation of the pit perimeter conducted;
- Prohibition of hunting and the use of weapons within the mine’s facilities, closure of the unnecessary access routes, and the incorporation of wildlife protection education into the employee training programs;
- Coordination with MARN to evaluate wildlife resources.

## **2.2 Corporate Policy**

Montana Exploradora de Guatemala S.A., is a subsidiary of Glamis Gold. Thus, Montana follows the business policy of Glamis Gold that is to produce gold and silver in an efficient way focusing on safety, community relationships and environmental performance. Therefore, environmental management is one of Montana’s highest priorities, supported by the corporation’s highest levels. Sound environmental management is emphasized in Glamis Gold’s vision by the excerpt “environmentally safety mines”.

## **2.3 North American and International Best Practices**

Montana Exploradora S.A. wishes to increase levels of environmental awareness in its Guatemalan operations to a level equal to Glamis Gold’s operations in the United States. The use of internationally accepted design criteria, and operation and management practices is referred to as “International Good Practice” or “Best Management Practices”. Environmental guidelines from the World Bank provide one of the more extensive and written sets up what could be considered “Best Management Practices”. These guidelines have been developed by the environmental teams of the World Bank and the International Financial Corporation (IFC) in cooperation with the United Nations Environment Program (UNEP), the United Nations Industrial Development Organization (UNIDO) and the World Organization for Health (WHO). World Bank’s guidelines applicable to this management plan are as follows:

- World Bank Environment, Health and Safety Guidelines “Mining and Milling - Open Pit”, August 11, 1995; and
- World Bank Operation Policy 4.04 – Natural Habitats (June 2001) and
- IFC Environment, Health and Safety Guidelines for Wildlands.

## **2.4 Current Environmental Management Plan**

This plan has been developed to complement the other management plans that have been developed for the Marlin Project to date.

## **3.0 BACKGROUND**

### **3.1 Brief Description of the Project**

The Marlin Project is a gold and silver mine, which will operate as an open pit and underground mine with leaching performed in steel tanks. The facilities are located about 12kms northwest of the municipality of San Miguel and about 10kms southwest of the municipality of Sipacapa, in the Department of San Marcos, Guatemala. Even though the mining concession is 2,000 hectares, the mining process area is only 200 hectares.

Minerals will be extracted from three separated areas, the main pit, the secondary pit, and the underground mine. The extracted material will be processed through a crushing and grinding circuit followed by the cyanide processing in steel tanks. A 50 hectare tailings impoundment will receiving the material upon completion of the extraction process.

### **3.2 Description of the Site**

The mine is located north of the Rio Tzalá, at an approximate elevation of 2200 m.

The mine's drainage reports to both the Rio Tzalá and the Quebrada Quivichil. These drainages run mainly north-south and eventually discharge into the Rio Cuilco.

Annual precipitation in the area is about 950 to 1100mm, being higher during September and lower in March. Monthly precipitation is 264.16 mm. Annual average temperature is 15°C and ranges between 23.9 °C in July and 25.2 °C in August. The registered lowest temperature occurred in November and was 3.3 °C; the highest temperature occurred in April and was 27.8 °C. The annual average for relative humidity is 80 %.

### **3.3 Previous Land Use and Fauna Management Plan**

For many years the project area has been dedicated to agricultural activities, basically subsistence corn crops, and also for housing purposes, the shortage of water in the region and the low soil productivity have limited much population growth. Due to the long history of these uses, the flora and fauna communities in and around the Marlin Project have likely been altered over extended periods.

The small diversity of non-flowering, resinous trees in the zone (*Pinus montezumae*, *P. oocarpa*, *P. pseudostrobus*, *Alnus jurulensis* and *Quercus sp*) forms the typical forest cover in the area.

Frogs and snakes are rarely observed in the region after the rainy season. They are scarce in the winter and non-existent in the summer, climatic conditions including high temperatures, rocky soils and steep slopes not absorbing water during the rainy season all contribute to their scarcity.

### **3.4 General Characteristics in the Area of Study**

#### **3.4.1 Climatic Conditions**

Throughout time, geological and climatic changes have influenced the structure and composition of the ecosystems of the mountainous area.

The Marlin Project area specifically, and the municipality of San Miguel Ixtahuacán in general, are located in a humid forest zone, the Low Montano Subtropical (bmh – MB), according to the Holdridge classification.

The Marlin Project has meteorological equipment that has been in operation since July 2003, measuring precipitation and temperature.

## **4.0 IMPORTANCE OF FAUNA CONSERVATION**

Species diversity varies depending on habitat. A more complex habitat supports more species diversity than simple habitats. All impacts to habitat can become impacts to fauna, as these biotic elements (flora and fauna) are strongly connected, through dependency via dispersion and pollination.

For the conservation of fauna in the project area, an inventory was conducted in order to obtain information regarding the existing fauna and flora, as well as an evaluation of the status of conservation, water sources and ecosystems, to identify any potential impacts. The distribution of fauna in the ecosystem was found to be balanced with ecological niches, and with a number of dependant interrelationships of migration and displacement.

The natural complexity of ecosystems promotes a special niche for reproduction, therefore, forests should provide availability of a variety of food, shelters, reproductive and nests sites, as well as the presence of multiple micro-climates allowing for the formation of communities adapted to special conditions.

## **5.0 FAUNA IN AND AROUND THE MARLIN PROJECT**

A considerable number of birds were observed in the region, while mammals and snakes in the area were scarce. This is fundamentally due to the high human population in the area, the cultivation of much of the soil for corn crops and shepherding, and the influence of climatic factors (low temperatures).

### **5.1.1 Mammals in the Area**

Signs of raccoon were observed at the banks of the Rio Tzalá and a squirrel was observed in a pine tree. Armadillo holes and caves were not observed to indicate the presence of other species. Some fruit bearing bushes were noted.

For more information about mammals, see Appendix 1.

### **5.1.2 Snakes in the Area**

During the visit to the field, a coral snake was found to have been captured and sacrificed by the inhabitants of the region. A masacuata (snake) was also held for two days. For more information regarding snakes, see Appendix 1.

### **5.1.3 Birds in and Around the Area**

A total of 66 species of birds was observed in the area (see Appendix 2 for the details).

## **6.0 FAUNA MANAGEMENT PLAN**

The program for the management of fauna was designed based on ecological criteria, attempting to reduce the number of impacted individuals resulting from the construction and operations of the mine, or by other activities associated with the project.

### **6.1 Location of Biological Corridors**

The biologic corridors are formed by three main ecosystems, which are: the Rio Tzalá at the low side of the project (south section), the Quebrada Quivichil at the north section, and the area near San José Ixcaniche - Ixcanichel (Appendix 4).

### **6.2 Management**

During operations the purpose of management focuses on the protection and enrichment of the habitat, as well as the elimination or minimization of animal mortalities related to mining operations.

Potential impacts to fauna as a result of the mining activities are described in detail in section 12.4.2 of the EIA. Based on the information obtained during the baseline studies, the following impacts were defined as possible to occur during mining operations:

- Temporary or permanent loss of food source and protection resources;
- Temporary or permanent displacement of wildlife;
- Animal mortalities from increased traffic or from contact/exposure to process solution;
- Agitation or disturbance to fauna as a result of continued human activity at the site (this includes the fact that fauna may avoid the area as the result of the mining activities);
- Modifications in fauna's behavior, particularly regarding food sources from wastes or garbage produced by the mines personnel.

### **6.2.1 Goals and Objectives**

Goals and purposes have been developed to avoid, reduce or mitigate impacts to fauna that may be produced by the mining activities, and to improve the conditions of the existing habitat (and the environmental awareness in general) according to environmental policies of Montana Exploradora de Guatemala S.A.

Management's Goals and purposes are:

- To emphasize the importance of fauna to the mine's staff and in the community's education programs as related to wildlife, the presence of protected species, local hunting regulations, and the prohibition of the capture of wildlife within the company's property.
- To reduce losses and mortality of wildlife through protection, and the protection of wildlife habitat, by restricting the access to high risk areas and by the implementation of measures to reduce mortalities as the result of traffic.

### **6.2.2 Management Practices during Operations**

The following measures have been designed for appropriate management of wildlife and habitat.

#### **6.2.2.1 General Considerations for Habitat Management**

Main requirements to be considered in wildlife management include nutrition, coverage or protection, water and the appropriate distribution of these elements. The wildlife and its habitat management will be addressed for the maintenance of health and to a productive ecosystem. Plant and animal communities, along with soil, air, and sunlight form the ecosystem. All management activities should be addressed toward the conservation and improvement of the quantity and quality of the soils, water and vegetation.

#### **6.2.2.2 Management Practices for Fauna**

Protection of the native wildlife includes mitigation of potential impacts through direct and indirect methods. Indirect methods include practices developed in connection with local governments, surrounding communities, government organizations and non-government organizations that may result in the improvement of the site conditions. These actions may include: conservation of secondary forests and riparian zones;

hunting and plant extraction regulations, fire control, maintenance of biological corridors, control of access, and environmental education programs.

The following are practices of direct and indirect management that will be used by Montana Exploradora de Guatemala, S.A., Marlin Project as part of the current Environmental Management System to achieve identified goals and purposes:

- Should Montana's personnel or contractors find a dead animal or an animal in imminent danger within the operations area, they must immediately inform the Environment Supervisor of the area.
- Should Montana's personnel or contractors find a dead animal or are a witness to a mortality, they must fill out an animal mortality report, which is attached in Appendix 5.
- Hunting and capturing of wildlife or domestic animals in Montana is completely prohibited, except when they are in imminent danger and will only be relocated to an appropriate site and under the supervision of the Environment Department.
- Any type of extraction and/or relocation of species will be performed only within the company's property, and only with the authorization and supervision of the Environment Department.

### **6.2.2.3 Hunting and Plant Extraction Regulations**

Guatemalan Environmental Law prohibits hunting of wildlife and the extraction of plants without license. Montana S.A. has prohibited these activities and also the use of weapons inside the property. All mine personnel will be informed of this prohibition in the company policy, as part of the environmental education program. Unnecessary access will be closed and patrolled regularly.

### **6.2.2.4 Maintenance of Biological Corridors**

To prevent further fragmentation of forest stands, which are already limited and fragmented, and to prevent the formation of isolated vegetation stands that could result in continued loss of biological diversity in the area, Montana Exploradora de Guatemala S.A., will preserve biologic corridors where possible inside the project's area, particularly within the drainages. Buffering vegetation zones will be maintained along the river Tzalá and the Quebrada Quivichil to keep riparian species and the diversity of the habitat. Biologic corridors will provide safe routes for the movement

of fauna from one place to another and to promote the exchange of genetic material, guaranteeing the natural success of the wildlife populations.

#### **6.2.2.5 Environmental Education**

Environmental Education Programs help the enforcement of the conservation attitude and responsible management. Communication processes, including lectures, expositions, videos, pamphlets, etc., can be used for education issues not only to local and regional inhabitants but for the employees also.

An important concern at the site is to avoid mortalities from traffic. Drivers should be educated regarding this issue and will be encouraged to be aware of wildlife that may be along the sides of the access roads, additionally they will be advised to reduce speed in the presence of animals.

#### **6.2.2.6 Biological Research and Monitoring**

The implementation of the mining project represents an opportunity to improve scientific knowledge about the region. Baseline studies provide an important information source, which may be increased and completed by the studies performed by other organizations. Additional investigations could improve biodiversity recovery practices.

Montana S.A., will coordinate with the Ministry of the Environment and Natural Resources the accessibility to all monitoring data and the supervised access to the sites around the mine.

#### **6.2.2.7 Maintenance of Food Supply**

A significant measure of the management of the wild fauna is to provide supplementary nutrition to some selected species, during critical periods of the year. Montana Exploradora de Guatemala, S.A. is planting fruit trees (orange, peach, avocado and granadilla) in and around the Marlin Project to attract more fauna to the zone.

### **6.3 Monitoring and Maintenance of the Plan**

The following measures have been designed for monitoring the wildlife and the habitat in the project area to guarantee its appropriate management.

### **6.3.1 Surface Water**

Information will be collected from surface water to determine presence of additional sediments and the identification of discharges of substances potentially contaminated such as cyanide. Early detection of these parameters will allow taking the necessary recovery and mitigation steps.

### **6.3.2 Monitoring of Aquatic Habitat**

During the baseline studies monitoring of macro-invertebrate populations was performed. This type of monitoring will be continued to observe potential impacts associated with mining activities in local aquatic ecosystems.

### **6.3.3 Monitoring of Fauna**

The monitoring plan for fauna will include:

- Monitoring of mortality related to activities, process solutions or traffic at the mine. The number and the amount of species will be registered by each death according to the following categories: predatory, songbirds, aquatic, mammals and other (reptiles);
- A record will be maintained of the efforts to relocate fauna to more appropriate sites inside and outside the mine's area, such as those sites that will not be affected, or recovered sites. The number of the animals that have been relocated should be registered and the success or failure of the relocation where known.
- Documents about reclamation efforts including land preparation, use of topsoil, incorporation of mulch, or the type of seed or plant used. If trees are planted, the number of trees and the species should be registered, and
- The reclaimed status of the different areas of the mine.

## **APPENDICES**