

MODULE II

JURIDICAL AND LEGAL FRAMEWORK

MINE CLOSURE: THE SEARCH FOR A LEGAL FRAMEWORK

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SUMMARY

This paper seeks to analyze the ambiguity and flexibility currently prevalent in legal systems and in related literature regarding mine closure and proposes an approach based on stages in the mining process.

It also seeks to deal with the main controversial aspects of regulation, based on critical analysis of the legal systems of various Latin American and North American states. The focus of research was mine closure as a new phase in mining operations, legal/technical and economic instruments, and regulatory and monitoring bodies responsible for this new stage in mining. This second aspect (instruments) is examined with an emphasis on responsibilities and guarantees.

LEGAL CONCEPTS: REFLECTIONS

Up until the 1980's, legal codes governing mining were principally concerned with regulating the various methods of mineral resource exploration, establishing administrative procedures and the rights and obligations of the mining entity. In addition, these regulations were concerned with defining the jurisdiction and authority of the various bodies responsible for the licensing and inspection of mining activity. The objective of the legal codes was the optimization of the exploration and use of mineral resources. As a result, mining activity was divided into phases: prospecting; research; mining (extraction)/refining.¹

The focus of the laws and regulations was therefore on the exploitation of mineral resources and activities directly related to it. Public authorities were not concerned with, for example, the project pre-planning, or the project planning and did play a part in addressing the process of mine-closure or environmental revitalization of areas affected by mining. These were regarded as activities related to the commencement and development of the mining process, which should be left entirely up to the mining entity.

So far as the mineral project is concerned, in Brazil for example, only the research work plan (together with the budget, chronology and economic operational plan for site excavation, including a description of the refining process), needs to be submitted to the National Mineral Production Department – DNPM, when applying for permission to excavate. All other studies undertaken by the mining entity, are not analyzed during the licensing process. These unanalyzed studies include those relating to the socio-economic evaluation of the area, and form the actual basis for the investment decision.

This procedure is being gradually modified by the introduction of environmental variables. The Environmental Impact Study - EIA/RIMA and the Environmental Control Plan are indicative of this change. In other words, current government interest in mining activity is no longer limited to mining operations *stricto sensu* in isolation from its socio-economic and environmental reality. Rather, mining activity is seen as an activity which can generate national wealth and promote environmentally-friendly regional development; an essential component of sustainable development. Mine-closure is an important issue in this new vision.

¹ Some minor differences in the denomination of mining phases may occur as a result of the aggregation of some phases or simply because of differential denomination of the same process.

Given that this is a relatively new area it is perhaps not surprising that the related literature is full of apparently synonymous terminology, e.g. mine decommissioning, revitalization of affected areas, pit closure; mine closure, etc. In fact, it seems that these terms relate to different procedures, which occur at different times in the production process.

The process may be diagrammatically represented as follows:

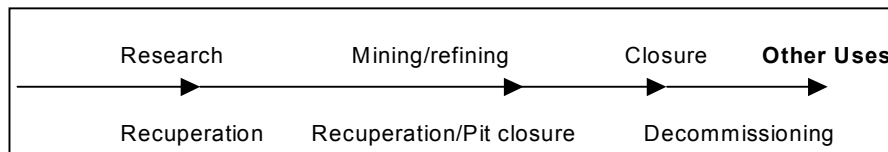


Figure 1: Stages of mining activity versus environmental processes

Several matters merit consideration. Mine closure is a phase, which should be borne in mind from the outset, as part of the mineral project stage, with a view to assessing the environmental impact and costs of this stage. The revitalization of affected areas should be considered during the research stage whether or not the mining entity intends to remain operational in the location after closure.

Revitalization of affected areas is, during the mining process, related principally to pit closure. It is important to note that pit closure has historically been seen by the mining entity in terms of safety and the continuation of mining activity, and not in the wider sense of environmental recovery. In addition to issues of safety and continuity of operations, this involves the cleaning up of contaminated areas and finding alternative uses for deactivated areas.

Mine closure, on the other hand, should be seen as a mineral phase, which commences when the mine has been completely excavated or when continued mining of the site is no longer technically/economically viable. Mine closure involves a complex decommissioning process with various aspects:

- technical;
- environmental;
- socio-economic;
- political.

The basic question to be posed is: What is the destiny of the area? It is in order to satisfactorily answer this question that the process of decommissioning is begun, and culminates with the area being returned to those legally entitled to it in conditions which permit its future use.

Diagrammed out below in **Box 1 and 2** below contain diagrams

Box 1
Canadian View of “Key Activities and Potential Environmental Impacts of Each Phase Of Mining”

Mining Phase	Key Activities	Potential Environmental Impacts
Exploration	Prospecting Geochemical and geophysical surveys Drilling and trenching Staking mining claims	Generally low or no impact When exploration reaches a stage of requiring, drilling, or road access, habitat disturbance increases and the discharge of contaminants can occur
Mining and milling	Feasibility and engineering design studies Public review Mine construction and pre-production Extraction and crushing and/or grinding of ore Flotation or chemical concentration of ore	Discharge of acid mine drainage that contains contaminants that are released to surface water and groundwater; particular concerns are related to: - heavy metals originating in the ore and tailings (can be accelerated by naturally occurring acid generation) - organic compounds originating in the chemical reagents used in the milling process - cyanide, particularly from gold milling processes - ammonia Alienation of land as a result of waste rock piles and tailings disposal areas Increased erosion; silting of lakes and streams Dust and noise
Post-operational waste management	Mine reclamation and abandonment	Continuing discharge of contaminants to groundwater and surface water (particularly heavy metals when naturally occurring acid generation exists) Alienation of land and one-time pulse discharge of contaminants and sediment to water as a result of dam failure

Source: Canada. House of Commons. *The State of Canada’s Environment*. Environment Canada. Standing Committee on Natural Resources, Ottawa: Government of Canada, 1996. Chapter 11, tables 11.14 and 11.15, em BARRETO (1997)

Box 2: Canadian Government View of Mining Stages

DEVELOPMENT	PRODUCTION	SUSPENSION	CLOSURE
<p>LAND CREATION Development Concept Promotion Research</p> <p>Geologic Prospecting</p> <p>Acquisition of Licenses</p> <p>Acquisition of Land</p> <p>Aerial Geophysics Surface Geophysics and chemistry Overhead Transects (Volume) of sample</p> <p>Sampling and Tests Geologic Survey Excavation (drilling) Access (entry) Mineral Inventory estimates</p>	<p>Exploration to increase reserves</p> <p>Mineral estimates</p> <p>Technical and Economic Modifications mineral/industry/initially Waste Disposal Environmental Rehabilitation Progressive Rehabilitation Annual Reports Commercial marketing and sales</p>	<p>Initial closure</p> <p>Mineral estimates</p> <p>Technical and Economic Modifications mineral/industry/initially Waste Disposal Environmental Rehabilitation Progressive Rehabilitation Annual Reports Commercial marketing and sales</p>	<p>Final closure</p> <p>Final rehabilitation Monitoring of Closure</p>
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TIME → Land acquisition → Discovery of Deposit → Decision to produce → Production → End of Production → Closure
 Permanent Maintenance Source: Intergovernmental Working Group on the Mining Industry of Canada (1996), in BARRETO (1997)

THE MAIN ASPECTS OF A LEGAL APPROACH TO THE MINE CLOSURE

Roberts & Others (2000), Zenteno (1999), Sirotheau (2000) e Menezes & Barreto (1997), discuss many experiences related to mine closure in other countries. Three aspects were selected based on this discussion as being crucial to a legal approach to mine closure: the treatment of mine closure as a new phase in the mining process; legal/technical and economic instruments and regulatory/inspection agency.

MINE CLOSURE AS A NEW PHASE OF THE MINING PROCESS

Mine closure should be seen as another phase or step in the mining process. This already occurs in some countries, particularly in the traditional mining countries of the Northern Hemisphere. The concept is not always present in Latin American countries and is frequently confused with mere environmental revitalization of the area.

The dangers of this latter approach are twofold. Firstly, the fact that recuperation of the area affected by mining is a process which occurs only at the end of mining activity and not a continuous process beginning at the research stage and ending with the mine closure stage. Secondly, mine closure is seen merely as an environmental issue and not as a socio-environmental process.

Canada was chosen as an example of a country where mine-closure is regarded as a new mining phase as illustrated in **Box 2** above.

As all other stages, it should have a beginning and pre-established duration period, which should be communicated to the control and inspection agency. This period, according to the experience of some countries, should be from 3 to 6 years depending on the type of operation. The estimated duration should be reviewed and altered as and when necessary.

The rights and obligations of both the mining entity and the relevant public authority should be clearly established. Examples include the need to present a mine closure plan for approval; annual reports designed to aid the public authority in its monitoring capacity and inspection visits.

TECHNICAL/LEGAL AND ECONOMIC INSTRUMENTS

Mine Closure Plan

This is an important legal/technical instrument which on the one hand aims to plan the activities and on the other to provide the mining entity with guarantees. This is because, like all other mining activity, mine closure involves a series of different actions, which must be planned and co-ordinated, for example:

Technical/Environmental Actions

- Dismantling/re-use of the infrastructure of processing and refining units, support installations, maintenance and access equipment (hydraulic and ventilation system);
- Technical solutions for the pit, envisaging future use for the same and its surroundings;
- Cleaning of containment dams and other types of waste, particularly when it contains heavy metals or dangerous substances such as those involved in acid drainage;
- Restocking and re-forestation of deforested areas;
- Future monitoring;

Socio-Economic Actions

- Economic alternatives for the region: other mining projects or other economic activities;
- Redeployment of the workforce;
- This plan should be based on a realistic diagnosis of the mining undertaking's socio-environmental and local/regional situation. The plan should be elaborated by the mining entity, and approved by the relevant public authority.

The community affected should be involved in the elaboration of the plan and should have an opportunity to discuss and debate its proposals, as well as playing a part in its implementation. This objective may be achieved in different ways: such as the establishment of a council including community representatives, which takes decisions, monitors the elaboration of the plan, approves it prior to its presentation to the public authorities and holds public meetings to discuss the project and its execution.

Responsibilities

Issues relating to responsibility are crucial, both from the point of view of the mining entity and the public authorities, in the sense of providing security in the sense of the work to be undertaken by the former and with a view to ensuring that the latter does not make unreasonable demands. It is therefore important that all the obligations of the parties involved in the process be defined in relevant legislation. The legislation should be as detailed, as possible, and generic formulae should be avoided. The educational and informative role of legislation should be borne in mind with a view to attaining its ultimate objective: compliance.

In most mining countries, the determination of the person/entity responsible for the mine-closure phase is complex. For example:

- New projects. The mining permit-holder is responsible;
- Projects already underway. In principle, the original mining permit holder is responsible, however the extent of responsibility requires analysis given that this new phase was not considered at the technical/economic viability stage, or if it was, it was probably not analyzed in the way required by the current system;
- Previously terminated operations, the so-called abandoned mines;
- Previously terminated operations in which the previous permit holder is unknown, the so-called orphan mines.
- These last two situations are the most complex given that the public authorities and society in general cannot ignore the impact (particularly in terms of the environment) of these projects, which despite having been terminated did not undergo any decommissioning process or previous preparation for closure, and which may continue to have a negative impact on the environment. In the case of orphan mines there appears to be no viable alternative to the State assuming responsibility for the environmental rehabilitation of the area, given that the identity of the permit-holder is unknown.
- In the case of projects previously terminated, where the identity of the title-holder is known, there is the possibility of requiring the previous title-holder to arrange environmental rehabilitation of the area. In any event, regulation of mine closure requires clear directives covering the two items referred to above. Further, it is important to bear in mind the various types of responsibility; administrative, civil and criminal. The current trend in environmental law is the imposition of criminal responsibility on the basis that the

threat of severe punishment induces compliance with the law. However, at times, administrative punishment can be quicker and more effective, since it is free of procedural delays characteristic of criminal proceedings.

Guarantees

Almost all legal systems find it necessary to require economic guarantees for the mine closure phase. This is due to the fact that the activities to be undertaken may have a high cost, which it may be difficult for some companies to bear, resulting in problems in meeting future obligations.

When legal systems regard financial guarantees as necessary they tend to use financial/economic mechanisms which can be triggered if and when necessary. Such measures, according to ROBERTS & OTHERS, include:

- Letters of credit;
- Payment of Deposit;
- Insurance;
- Guarantor.

There are advantages and disadvantages to each of these guarantees, and the legislator should select that which is most appropriate in the particular country and mining situation. A guarantee should never be used as another form of taxation on mining activity. This is crucial if the system is to maintain credibility. The example of Argentina is instructive in this context.

The magnitude the sum guaranteed is a delicate issue in that each project has its own specifics, depending on the type of mine and pit, dimensions, locale, the technology used and other variable factors which may have varying socio-economic and environmental effects. It falls to the legislator to be aware of the specifics of each type of operation and establish appropriate conditions based on:

- Type of mine/pit;
- Size of undertaking;
- Locale: urban/rural area; vulnerable ecosystems; culturally sensitive areas (e.g. Native Indian Reserves).

It should be borne in mind that the level of the guarantee is a factor, which will feature in analysis conducted by national and foreign investors.

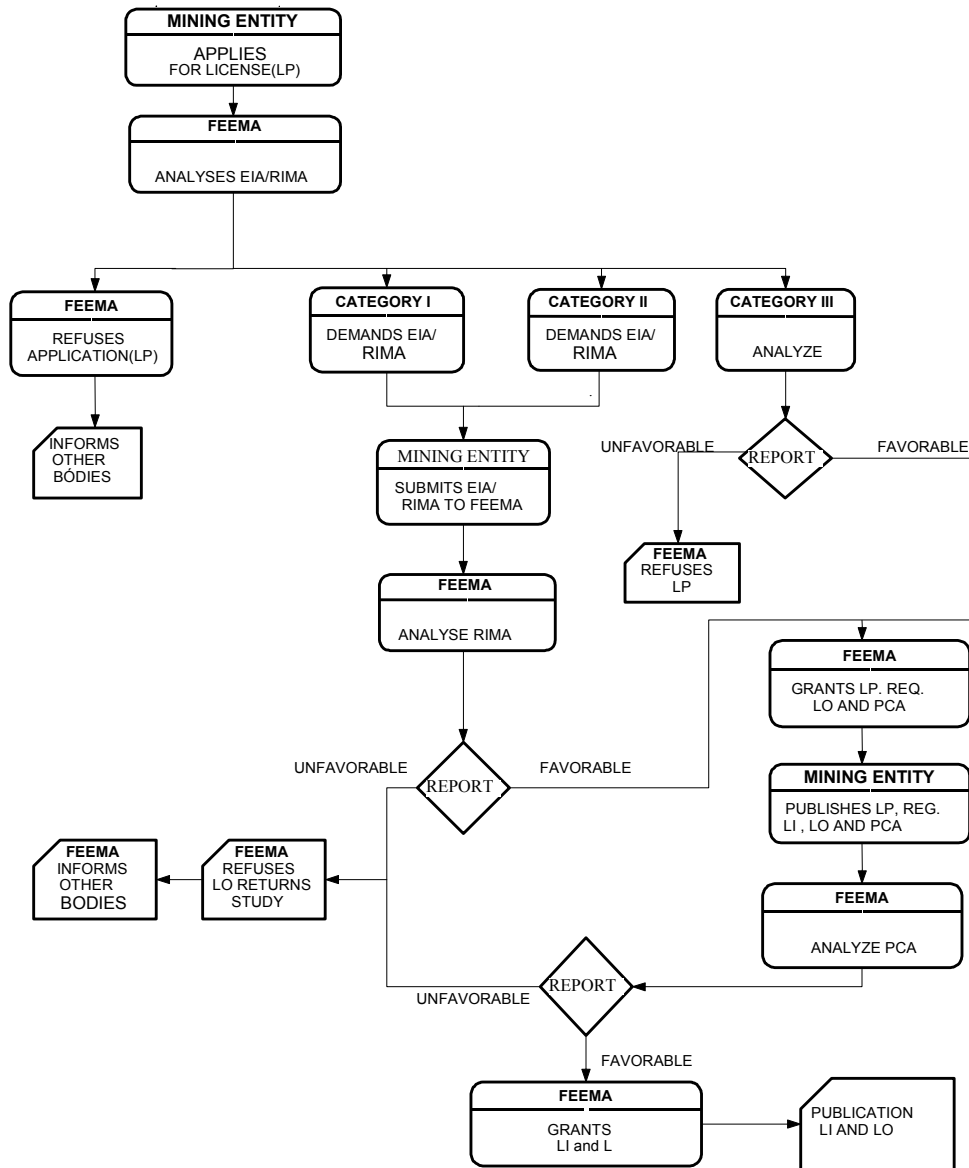
REGULATORY AND MONITORING AGENCY

The mining sector has special characteristics, and is as a result considered an economic activity worthy of State control, as is the energy sector. As such, mining is regulated by an agency, which is responsible for issuing permits, inspection and control. This occurs in almost all Latin American countries.

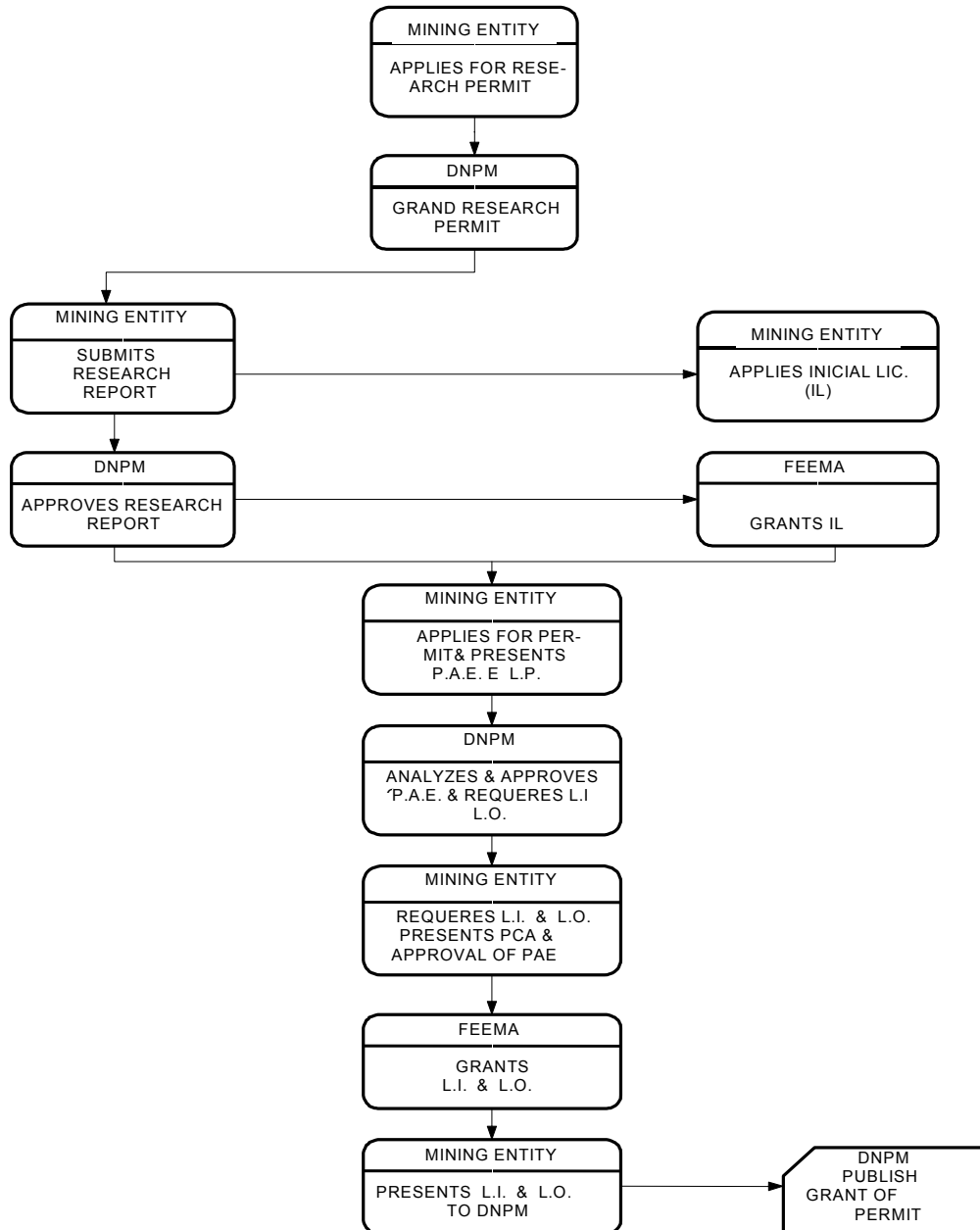
Environmental concerns have been high on the national and international agenda of most countries since the 1980's. As a result, economic activity is subject to environmental policies, regulated by federal, state and municipal agencies.

The large number of mining regulatory agencies has resulted in some cases in duplication and in problems arising out of excessive bureaucracy in relation to the issue of mining permits as set out in **flowcharts 1 and 2**, where the example of Brazil is examined.

In practice, there are two simultaneous and inter-linked procedures, for example, municipal licensing requirements frequently assume certain environmental measures have been complied with, and vice-versa (see **flowchart 2**)



Flowchart 1: Environmental Licensing Procedure



Flowchart 2: Mineral and Environmental Licensing

At the heart of this problem lies a theoretical and philosophical question. The current view of the regulatory function of the State in relation to the economic activities cited above is that the regulatory function should not be exercised separately in relation to economic development and the environment. The aim is sustainable development of all economic activity, including mining. The agencies responsible for regulation and inspection of the mining industry should base their activities on the goal of sustainable development.

In this context, there is no sense in having on the one hand governmental regulatory and development agencies and on the other environmental regulatory and control agencies. It does make sense to maintain the environmental regulatory agencies in respect of economic activities which are not subject to any form of regulation other than environmental, which in reality means most of the economic activities of any given country.

This issue is clearly relevant to the mine-closure phase. Which agencies should be responsible for establishing norms, for monitoring and inspecting this phase? Environmental agencies or mining regulatory agencies? The mine-closure phase is clearly hybrid; part environmental, part mining. On the one hand it is necessary to minimize the local, regional and national impact of the closure of an undertaking which generated wealth for the nation, and on the other, to reduce the present and future socio-environmental impact of the cessation of activities. This reinforces the argument presented above that there should not be any dichotomy between economic development and the environment, and there should be no agencies, which reflect this dichotomy.

3. BIBLIOGRAPHY

- BARRETO, Maria Laura. **A Experiência Canadense de Desenvolvimento Sustentado: A Política Reguladora Mineral**. CETEM/CNPq. Rio de Janeiro: 1997. Mimeo.
- MENEZES, MÔNICA& BARRETO, MARIA LAURA. **Decommissioning of Mines, Sustainable Development Policies and Environmental Solutions**: Brazil and Canada. 1997. Mimeo.
- ROBERTS, Steve and OTHERS. **Overview of Mine-closure in the Americas**. Executive Summary. Mine Closure Bibliographic Database Project. UBC/CETEM/MPRI/IIPM/IDRC. Vancouver: April 2000.
- SIROTHEAU, Glória; BARRETO, Maria Laura; PEITER, Carlos e FERREIRA, Gilson. **Overview of Mine-closure in Latin America**. Executive Summary. Mine Closure Bibliographic Database Project. UBC/CETEM/MPRI/IIPM/IDRC. Rio de Janeiro: 2000. Mimeo.
- ZENTENO, Patricia González. **Tratamiento Normativo de la Fase Minera Pos Operacional en los Países Latinoamericanos y la Planificación del Cierre**. Informe Internship. IDRC/CIID. Canada: Noviembre 1999.

CLOSING MINES IN MEXICOIng. *Margarita Lozada Nava*Ecology Sub Director - General Mining Office

Mexico counts with more than 400 years in mining and the mining industry had been closely linked to the history and development of the country, contributing to the foundation and growing of many of the main cities, like Zacatecas, Durango, Chihuahua, Hidalgo, Guanajuato, San Luis Potosi which are still having great deal of participation in the mining-metallurgical national production.

The mining resources in the national territory had allowed Mexico to be placed among the main producers of 18 metals and minerals where we can find silver, celestite, fluorite, arsenic, bismuth, cadmium, graphite, molybdenum, zinc, antimony, barium oxide, lead, manganese, salt, gypsum, copper, feldspar, and sulphur. Mexico stands up for its importance in the sustained production of silver well known world wide.

As the majority of our countries, the mining sector importance in the mexican economy lays in the amount not only of the metals and minerals but also in the thousands of employees direct or indirect generated particularly in remote locations where another kind of different industries than mining could not be developed because of the infrastructure.

From its conception mining had found challenges of all kinds, which had been sort through development of technical skills and/or practising human resources. On time this challenges are more complex and required more skills to be overcome among them is the environmental challenge.

In the XXI century mining will face less real costs of metals and the necessity to process minerals of less quality and major mineralogical complex. Also will require to elevate the recuperation of values in the process, a production of concentrate and metals of best quality, a major productivity, the development of more sophisticated technologies but efficacious and above all its compromise for a better tilt and rehabilitation in mining sites.

Nowadays among the main environmental problems that our activity faces is the high energy consumption, the generation of important volumes of residues (tailings) the emissions to the atmosphere (gases and particles) the biological diversity deterioration in the mining sites, the risks of ground and water contamination the process of closing and abandoned of mines as well as a growing negative social perception.

In this context the "prints" of the mining activity in a country like Mexico are found at peoples sight. The residues generated and deposited in tailing ponds represent environmental risk that worries the population and authorities. But before we are completely in the mining subject and environmental we would point some important aspects in both legislation as well as its relations.

In Mexico the mining resources are nation property and is this who gave particulars through a concession the possibility to explore (even 6 years without an extension) a mining lot, having the right to substitute this concession for an exploitation one (for a period of 50 years and extensions).

The Political Constitution of the United Mexican States designated mining the quality of public nature that is why, the rights given from the State to particulars through The General Mining Direction of the Secretary of Commerce and Industrial Foment (SECOFI) oblige to establish agreements with the superficial owners where the fund is

located it can be through different ways like temporarily occupation (indemnification and monthly rent) a pass right of way (indemnification and monthly rent) or via presidential expropriation (indemnification) only if it fulfil the Mining Law conditions for this case.

According to the present Mining Law, this had been from 1992 and was modified in December 1996 its regulations was actualised and published for its application in February 1999 contemplate in different articles that following are described and all of them with responsibility for the mining concessionaire to obtain the rest of the permits that the activity requires among them the environmental.

Art. 20 “ The work and labour in exploration and exploitatio within the federal zone ground of maritime and the protected natural areas can be only authorised by those who have the mentioned goods zones or areas in the dispositions and terms pointed applicable.”

Art. 55 Will be punish with cancellation of the mining concession for whatever of the followed:

VII.- Do work or labour for exploration or exploitation without the authorisation pointed in the 20 article of the present law.

In the case of the Regulation of the Mining Law established in the 62 article that for the realisation of work or activities in the exploration or exploitation and benefit of minerals the interested will fulfil with the dispositions of the LGEEPA its regulations, official Mexican norms and rest of norms applicable in this matter.

Reference to the required in the environmental legislation even the first preceding in the 60 decade, was not till the emission of the General Equilibrium Ecological Law and Environmental Protection (LGEEPA) in 1988

The LGEEPA counts with some rules in the Evaluation of Environmental Impact, Prevention and Contamination Atmosphere Hazardous Residue Control, matter and to protect the ambience against contamination derived from noise. Actually is working with the Natural Protected Areas (ANP's) that results a special interest in the mexican mining activity.

The regulation that in a special way leads the mining activity is The Environmental Impact Evaluation in it is establish the evaluation procedures that all the mining activities such like exploration and exploitation have to follow.

For the first case, we have an official mexican norm (Obligatory fulfilment) that establish the environmental protection conditions that can be carry out when exploring, in the case of exceed the parameters of reference that the norm contains should elaborate a preventive inform that includes a major amount of information that allows the environmental authorities to evaluate the impact potential that can be caused in the ecosystem where the projects are located.

When the activities are exploitation, must be elaborated an environmental impact manifest (MIA) that included studies and information in the most amount and details. Is here where can find the first antecedent of the activities of closing mines, because the miners or companies should present an estimate of what their plans are for when the useful life of the mine expires.

The authority in charge to supervise the fulfilment of the terms of the opinion of the environmental impact is The Federal Agency of Environmental Protection (PROFEPA) meanwhile the authority that effects the evaluation is the National Institute of Ecology (INE)

both assigned to the Environmental Natural Resources and Fishing Secretary (SEMARNAP)

The mining concessionaires should give PROFEPA a periodically inform of the advance in the fulfil of the operation conditions pointed by INE in the opinion of its MIA and at the present is lot of cases in Mexico where companies are working in restoration and closing of its mines.

Nevertheless the above, the main worry of the environmental authorities is centred in those mining installations that left operations many years ago, that are abandoned and where the environmental passive are really high.

The State does not count with enough resources to restore the contaminated site and look for some alternatives to resolve the situation, in the other hand, in the case of the mining installations in cooperation, regulations are establish and warranty that allows reasonably assure that when it is stop cooperating will effect actions that take care of the abandoned aspects of the same.

In special in the 48 article of the LGEEPA regulation in matter of Evaluation of the Environmental Impact, foresighted in the cases of conditioned authorisations, the SEMARNAP will point the conditions and requirements that should observe in the step previous to the start of activities as well as in the construction, operation and abandon stages.

In the other side in its 51 article the cited regulation, is establish that SEMARNAP could demand the issuing of insurance or warranties regarding the fulfil of the conditions establish in the authorisations, when during the realisation of the work could produce big damage to the ecosystem. Must understand this last concept, when:

- Could freed substances that in contact with the ambience will transformed in toxic, persistent or bio-accumulated,
- In the places where planing to realise the work, exist water bodies, wild endemic flora and fauna species, menage, in extinguish hazarous or tied to special protection,
- The projects implicated in the realisation of activities considered highly risk according to the legislation and applicable dispositions; and
- The work or activities carried in ANP's.

Complementary, the articles 52 and 53 prevent that the SEMARNAP set the amount of the insurance and warranties attending the value of the damage reparation that could derived from the no performance of the conditions imposed in the authorisations, meanwhile the promotes of the projects should renew or actualised annually, the amount of the same.

Is good to point that when its accredit to SEMARNAP, to fulfil with all the conditions that gave origin to all the warranties, previous application, will order its cancellation.

In our country, the schemes of the economic instruments are of recent application and still does not count with enough experience to evaluate its effectiveness, notwithstanding, take part of the present environmental mexican policy.

Considering the exposed panoramic, I should point to you that mexican mining continues in a change process, the present way to work is already considers the ambience variable within the costs of the operations; nobody can denied the way of work of the miners had been improvement technologic and socially in many of our countries.

In the special case of Mexico, before the 60 to 70's decade the mine and industrial activity in general, were not worried to do its activities taking care of the environmental surrounded them, nevertheless as time passed the challenge of mine were extended farther of the international quote pressure of metals and minerals, but international tendencies in health and environmental matter, to the influence of the social perception of the mining projects and to the environmental impact direct or indirect that generates.

It is clear now that the technical problematic of operation could never again be done without environmental responsibility from here that the liability of the mining projects will also be in function of the environmental costs that should considered to execute the closing of mines.

The experience from mines that up to date worked or still working in process of abandon and close, is coming from Peñoles Company, Luismin Industries and North Steeler Group, three of the most important national mining groups to whom I really thank for let it me have this information to make this presentation to all of you.

Peñoles Industries Case: Sultepec Unit in the State of Mexico, Cuale Unit in the State of Jalisco and La Minita Unit in the Sinaloa State.

LUISMIN INDUSTRIES CASE: SAN MARTIN UNIT IN THE STATE OF QUERETARO.

North Steeler Group Case: Minera Carbonífera Río Escondido in the State of Coahuila.

Conclusions:

The mining-metallurgic mexican sector contributes in an important way to the national economy, what makes necessary to attend its operation under a strategic view of modernisation to continuing being competitive in the international ambit.

The mining activity involves itself, physic-chemistry process that represents a potential risk of the environmental impact, these alterations should be attended in a legal way in each of our countries, such way that warranty the profit of the mining resources with which it counts and adequate quality of life for the towns where mining exists, it is fundamental in this process the mitigation of environmental impact generated, only that way could be a reality the maintainable mining.

The activities for closing a mine results of main importance for mining, because is also that the communities accept the presence of the operations in the surrounding area. An adequate environmental performance not only is a moral responsibility of the Enterprises but a tool more with which its activities develop a better social acceptance.

In the other hand the control and environmental instruments designs and apply for the activities when closing mines should walk and be applied gradually taking care its impact how the costs of a project could affect its feasibility.

ENVIRONMENTAL POLICY IN PERU AND LEGISLATION ON MINE CLOSURE

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INTRODUCTION

The Mining Industry plays an important part in the economy of many countries, so much industrialized as in development. However, they also figure among the industrial sectors whose activity involves the emission or discharge of enormous quantities of pollutants in the environment. Each stage of the production of a metal can be associated, to a certain extent, with an impact for the environment. This effect can even be bigger for the same magnitude of the industry and for the type of pollutants that generates.

The new technologies reduce the quantity of pollutants or they allow to transform the pollutants into inoffensive chemical products, preserving the environment.

The application of new and rigorous environmental norms in the world, has stimulated the development of new technologies which have rebounded positively in the environment.

In the last years, in the Peru, the Ministry of Energy and Mines has been placed to the vanguard of the other sectors concerning environmental topics and care of the environment. In these last five years, the mining sector has being adapted to the new environmental demands and the execution of the environmental normativity of the sector that tends to reach the international standards. The opening of the government to foreign investments in the Peru, has promoted the development of new technologies that try to mitigate to the maximum the impacts to the atmosphere.

Environmental norms in Peruvian Mining

1. CODE OF THE ENVIRONMENT AND THE NATURAL RESOURCES

This Code, approved and promulgated the 08/09/90 according to Legislative Decree No 613, expresses in a general way the necessity to protect the environment and the natural resources, leaving clear that is the competent authority (as it is the sector) the one in charge of the technical evaluation of the atmosphere.

In chapter III of this Code (of the Protection of the Environment) the Studies of Environmental Impact are already mentioned (EIA) indicating that the same ones could only be able to be elaborated by the properly qualified public or private institutions and registered in front of the competent authority, indicating also that the cost of its elaboration is of responsibility of the holder of the project or activity.

Also in this chapter it is clearly defined that the EIA will contain a description of the proposed activity and of the foregone direct or indirect effects of this activity in the physical and social environment, to short and long term, as well as the technical evaluation of the same ones. They will indicate, equally the necessary measures to avoid or to reduce the damage at tolerant levels.

In the XII chapter (of Mining Resources) and their modifications according to the D.L. 708 published the 14/11/91 the following points were established:

- That the holder of a mining activity requires of approval of his project by the competent authority to carry out it, with the obligation of the defense of the environment and natural resources according to the parameters settled down by the competent authority.

- The new applications of benefit concessions will include a study of environmental impact.
- The Study of Environmental Impact in exploitation labors, will be dedicated to the control of the solid and liquid effluents.
- When requesting miner metallurgical waste deposits (tailings dam) the Construction Project, in order to avoid the contamination of water in particular and of the environment in general will include the following aspects:
 - a) That the technical conditions guarantee the stability of the system.
 - b) That the operation of the system is specified technically.
 - c) That the technical measures of abandonment of the deposit are explained.
- Obligation of the holder of including equipment for controlling pollutants in their installation.
- The exploration and exploitation of mineral resources will be adjusted to the following dispositions:
 - In Open Pits measures that guarantee the stability of the land will be adopted.
 - All water used for processing minerals must be recirculated as much as possible.
 - All mining operation with use of explosive in the vicinities of populated centers will maintain the levels settled down by the competent authority, the noise impact, the dust and the vibrations.
 - The residues and discharges to the atmosphere of processing plants and/or refineries will undergo a discharge control before treatment, so that it won't contaminate.
 - The radioactive residuals evacuated from the miner-metallurgical installations won't overcome the passable limits settled down by the competent authority.
 - The competent authority will make periodic samplings of soil, water and air in order to preserve the environment and to take in case of being necessary the corrective measures.

As can be seen in this Code, it is framed in a general way the conditions in which the mining activity will be developed in order to take an appropriate environmental handling, inside obligations that concern the holder of the mining activity so as the authority of the sector.

Later on in the Orderly Unique Text of the General Law of Mining (D.S. 014-92-EM) approved the 04/06/92, in their Title Tenth Fifth on environment (art. 219 at the 226) this one reaffirms that what has been settled down by the Code of the Environment and Natural Resources and their modifications referring to the chapter of Mining Resources. This also adds that the competent authority for this sector will be Energy and Mines.

The Code of the Environment and Natural Resources, frames in a general way the obligations of the holders of mining concessions, and is the Sector of Energy and Mines which regulated in detail the environmental obligations that govern to date, and established the Regulation that is detailed next :

2. REGULATION OF THE GENERAL LAW OF MINING REFERING TO THE ENVIRONMENT

In this Regulation (D.S. 016-93-EM of date 28/04/93) were clearly defined the obligations of the holders of the mining activity in order to fulfill the environmental protection

in the mining-metallurgical activity and the measures of control of the sector that guarantee their execution.

This Regulation, contains obligations programmed by stages, and for that reason a series of measurements and establishment of periodic monitoring programs were requested initially, to be able to have a starting point and this way the mining companies could go focusing the environmental problem in a reliable way gradually and then present an adaptation program that would allow them to fulfill the required standards.

To the date some of them have already concluded, having achieved their objective. Inside the obligations proposed in this regulation these are the following ones :

2.1 Anexo 1:

This is the Report about Emissions and/or flows of residuals of the Mining_Metallurgical Industry that will be presented annually, before June 30 and enclosed to the Consolidated Annual Declaration.

This report has character of juridical declaration and initially it has been good to know the kind of activity developed by the holder as well as the emissions and flows it has to have a starting point; later on it has been good to make a pursuit to the EIA or the PAMA as it is the case. Case

2.2 Monitoring Programs

Systematic sampling of the effluents of a mining operation that was carried out from March 94 to February 95, based on two guides published by the General Address of Environmental Matters of the Mining sector (protocol of water monitoring and protocol of air monitoring) and whose results were presented quarterly to the Ministry (June, September and December of the 94). With this program it has been possible to be able to take a registration of results that reflect in a real way the quality of the emissions.

2.3 Preliminary Environmental Evaluation(EVAP)

The EVAP constituted the final part of the Monitoring Program , and identified the problems in the atmosphere caused by the mining activity. This Preliminary Environmental Evaluation (EVAP), subscribed by a registered Environmental Auditor was presented to the Ministry in marzo-95, in the following month to the end of the Monitoring Program . This study included in addition the results of the monitoring program, the identification of the environmental problems and probable solutions.

As can be appreciated in the regulation, specific obligations were detailed and they served as starting point for the programs that are detailed next.

2.4 Program of Adaptation and Environmental Handling (PAMA)

Program that contains the actions and necessary investments in order to reduce or to eliminate the emissions of a mining metallurgical operation , at passable levels. The PAMA, obligation of all mining Company in operation, should be subscribed by a Environmental Auditor and presented to the MEM in one period that didn't exceed of 12 months of having approved the EVAP. To the date all the mining companies have fulfilled the presentation of the PAMA that represents an investment commitment, having as main objective to reduce the levels of environmental contamination diagnosed by the EVAP until reaching the permissible maximum levels. The pursuit of the PAMA, is carried out by the Ministry through the inspectors (auditors) whose existence is normed as it will be seen later on.

The PAMA has an execution chronogram that won't be smaller than 5 years neither bigger than 10 respectively, depending on, if it is an operation that doesn't include processes of sinterización y/o foundry or if it includes them. Also the annual investment that this PAMA represents won't be smaller to 1% of the annual sales of the company that presents it. In the PAMA, the holder commits to execute a chronogram of activities whose objective is to mitigate the impacts and to apply the necessary technology to have processes that don't contaminate the environment.

To the date there are 69 presented PAMA's that correspond to different mining operations or foundries and that include a commitment of total investment of US \$928'038,495. Depending of if it is a mining operation or foundry the terms to be adapted to the commitments assumed in the PAMA vary from 5 to 10 years, and the investment distribution according to the operation type is shown in the following square:

PAMA's	Tipo de Operación	Inversión US \$	%
55	Operation of Metallic minerals	117'619,668	12.7
05	Foundries and Refineries	809'528,350	87.2
09	Operation of Non Metálic minerals	890,477	0.1
69		928'038,495	100

The biggest investment percentage corresponds to foundries and refineries having in consideration the commitment assumed by Southern Perú in implementing a new copper foundry, with clean technology that ensure the conservation of the environment.

To the date, the committed investments for foundries and refineries and no-metallic operations have been completing according to the previously established chronograms, in a same way for the case of metallic operations of old mining holders, however there are medium metallic operations that have been privatized, this is the cause for which there is a small delay, having achieved an advance of 60 to 70% on the originally committed thing, but it is necessary to highlight that the assumed commitments will be completed in their entirety.

At the moment there are already concluded PAMA's , in those that in some cases the required investment has been bigger to the committed one in the PAMA and it is through the Inspection of activities whose norm will be explained later on that the Ministry verifies its execution.

2.5 Studies of Environmental Impact (EIA)

The EIA comes to be the integral study that should be made in projects for the realization of activities in mining concessions, of benefit, of general work, and of mining transport, that should evaluate and describe the physical-natural, biological, socio-economic and cultural aspects in the area of influence of the project, with the purpose of determining the existent conditions and capacities of the means, to analyze the nature, magnitude and to foresee the effects and consequences of the realization of the project, indicating forecast measures and control to apply to achieve a harmonic development between the operations of the mining industry and the environment.

This study will be presented by the applicant of a mining and/or benefit concession (new project), as well as those that carry out production amplifications in its operations or size of benefit plant superiors to 50%. Also, this study will be carried out by some of the registered entities and authorized to carry out studies of Environmental Impact in the General Address of Environmental Matters of Mining.

The objectives of a Study of Environmental Impact are:

- to Determine the environmental conditions around the area of the project
- to Identify the possible potential impacts
- to Identify the mitigation measures or elimination of the environmental impacts
- to Elaborate the plan of environmental handling
- to Elaborate an appropriate closing plan
- to Elaborate the respective contingency plans and of security
- to Carry out the cost/benefit of the project

The closing plan also constitutes an element of the EIA. The new projects must consider from a beginning the plans for a technical abandonment once the project has finished so that it could be able to restore the impacted areas as much as possible or in certain cases to assign them another use. Also in this case it is through the Inspection that the energy Ministry and Mines verify their execution.

3. REGISTRATION OF ENTITIES AUTHORIZED TO CARRY OUT STUDIES OF ENVIRONMENTAL IMPACT IN THE SECTOR OF ENERGY AND MINES

According to R.M. 143-92-EM/VMM of date 03/07/92 it was created in the General Address of Environmental Matters the registration of entities authorized to carry out Studies of Environmental Impact in the sector Energy and Mines. Being the EIA, a study that implies the interrelation of several disciplines, one of the requirements to be able to register is having a team integrated for not less than 5 professionals in some of the disciplines corresponding to the natural sciences, social sciences, sciences of the health, economic sciences and specialties related with the scientific or technological development in general.

4. INSPECTION OF MINING-ENERGY ACTIVITIES BY THIRD

Starting from the 01/10/92, according to D.L. 25763 it was established that the obligations related to the mining activities, of electricity and of hydrocarbons would be investigated through Auditor and Inspection Companies. The obligations to which reference is made are: Obligations derived of contracts taken place with the State, security norms and hygienic, technical norms and norms for environment conservation. This way, the Inspection passes at the hands of companies or private consultants, previously inscribed in the Address of Mining Inspection. Through these Inspectors or Auditors, pursuit is made to the execution of that settled down in the PAMA's or EIA's, as it is the case. So these Inspection Companies are hired by the mining companies, and there are carried out two annual inspections at the end of which there is a report presented to the Ministry of Energy and Mines. However, this system appeared like a necessity to exercise control on the mining activities and it is susceptible of being improved. At the moment a proposal modification of this Law exists, in way of improving this system that has reported some deficiencies.

5. LEGISLATION ON STANDARD AND PERMISSIBLE LIMITS

With this whole existent normativity and being the objective of the same one not to contaminate, it was necessary to get adapted to certain standards and although in a first moment, there were some devices of other such sectors as the Law of Waters and the Law of Health, in all the measurements and samplings carried out in the different mining operations, (was to make) comparisons with international standards were made, in cases

that the Peruvian laws had some hole in reference to the contents of some metal either in water or in air.

Finally in 1996, through ministerial resolutions of the Ministry of Energy and Mines this is achieved:

- To approve the permissible maximum levels of emission of liquid effluents for the mining metallurgical activities. According to this the following parameters are regulated: pH, suspended solids, lead, copper, zinc, iron, arsenic and total cyanide.
- To approve the permissible maximum levels of emissions of gases and particles for the mining metallurgical activities, regulating the emissions of sulfurous anhydride, particles, lead and arsenic present in the gassy emissions.

6. LEGISLATION ON MINES CLOSURE

The mine closure is a wide and varied topic that do not only understands the physical atmosphere and the operative aspects of the mine but also the measures for contrarestar the economic impact in the hard-working population that rotates its economy around the mining operation.

Most of the mining operations in Peru consist of all or most of the following components:

- Underground and Open Pit mines.
- Waste Dumps.
- Mineral Processing Plants.
- Tailings Dam.
- Heap Leaching.
- Ponds, treatment plants and discharge points of residual waters.

Previously, the practices of mine closure in mines in Peruvian, included in general the abandonment of the operation without considering expenses to avoid environmental consequences. It is as well as they have left accumulating the environmental passive, for lack of technical planning for the closing. This has changed, and for the new projects it is required to include inside the EIA, a closing plan that identifies the problems, the focus, the objectives and the costs of the closing.

The acid drainage is a problem that all the mining industry faces. In Peru this is of particular importance, being necessary the appropriate characterization of mine rock and of waste material to incorporate inside the design of mine closure appropriate measures for the prevention of the generation of acid water.

In July of 1995, a guide of limits was published for considerations of closing of mining operations that describes the design mine closure like an specific activity for each deposit and which should take into account the climate, the hydrogeology the sensibility of the environment and the final use that the land will be given once to the mining activities have concluded.

The environmental guide for the Closing and Abandonment of Mines published by the Ministry of Energy and Mines of Peru and by the other side the international environmental guides, as well as specialized information of the topic coincides in establishing that all plan of mine closure should consider the following:

- Protection of the life and the population's health located in the influence area.
- Prevention of the environmental deterioration, avoiding negative impacts in courses of water, air and floors.
- Reclamation of the disturbed area trying as much as possible to return to their original conditions and in case it cannot be this possible, to give them an use so that it will be useful for the population of the area.

ANALYSIS OF THE CHILEAN LEGISLATION ON THE CLOSING AND ABANDONMENT OF MINING TASKS AND A CASE OF APPLICATION

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INTRODUCTION

In the Chilean mining a group of laws exists, supreme ordinances, ordinances with law force and norms that regulate the one that to make of the exploration work and exploitation of locations. In it finishes it decade laws they have been dictated it has more than enough medioambiente and norms that link to this with the work in the mining industry, this has been applied to the new projects, but it is necessary that it is applied to the old tasks that a they are operating those that the law has given them term so that they are adapted to the new demands, inside these they are the closing plans and abandonment of the tasks, point of which we will make an analysis of the existent thing in legal matter.

STAGE OF CLOSING AND ABANDONMENT

The closing stage and abandonment, respond to the idea that the mining activity involves a temporary use of the floor and underground, Well-known as rehabilitation or restoration of mining tasks, it is that activity that has for purpose the repair or restoration of the areas affected by the extractive mining activity, in terms the next thing possible to the good economic and ecological values.

The main objectives of this activity are the reduction of the risk for contamination, the recovery of the floor and of the landscape, the improvement of the aesthetic aspects of the area and the prevention of future degradation.

For that exposed, it should be considered the physical stability, chemistry of the area, I eat **THE FUTURE USES OF THE FLOOR ALSO.**

The restoration of mining tasks in the Chilean right

The restoration as long as own and independent instrument, endowed with their own foundation, not yet this present in the Chilean mining legislation.

A first approach is verified from the system of evaluation of environmental impact (SEIA) according to what prescribes the articles 2 letter s, 12 letter and, 16, 24 and the paragraph I of the I Title III of the law 19.300, (Law on general bases of the environment, published in the official newspaper March 1994 09), which makes synonymous repair and restoration, in spite of constituting slightly different concepts, since they have a gender relationship to species.

The treatment that this law and the regulation of the SEIA make of the topic, they place it inside the minimum contents of the studies of impact environmental, when this plan it is reasonable. Likewise they include it inside the requirements that it should complete the project and that it should be certified in the resolution of favorable qualification.

The measures of repair y/o restoration should be expressly in a plan of measures of repair y/o restoration. This plan in the context of the study, is conjugated with the plans of mitigation measures and compensation, which should describe the measures that were adopted to eliminate or to minimize the adverse effects of the project or activity and the actions of repair y/o compensation that were carried out, when it is reasonable.

Now then, to the margin of the considerations that you/they can be made of these plans from the perspective of the System of Evaluation of Environmental Impact, the legislation sectoral mining Chilean counts alone with an artificial norm that is related with the abandonment of tasks that corresponds to the Regulation of Mining Security (I Decree supreme N° 72, ministry of mining of October 21 1985) text that in its I articulate 22 it establishes the obligation of the company or mining task of informing to the mining authority in writing SERNAGEOMIN, of the abandonment of the works or mining tasks in terms that when the mining company decides to abandon an exploration work or tasks of exploitation, this forced to give written warning from this decision to the Service, before the works have become inaccessible, and in case it doesn't Complete this obligation, the Director of Sernageomin he/she will be able to order that the laboreo is rehabilitated to coast of this company.

As it is of manifesto, the holder's only obligation is the one of notifying in writing to the service to effect of maintaining it properly informed on the mining economic activities of the country.

It is in any event legally excellent the sense and reach of the I finish of mining tasks, which are defined by the one mentioned Regulation settling down that these they understand the group of facilities and places of work of the mining extractive industry, such as mines, plants of benefit, foundries maestranzas, houses of force, shops, shipment activities in earth and in general, the entirety of the necessary support works to assure the operation of the extractive mining industry.

On the other hand THIS SAME Regulation prepares the reach of the I finish extractive mining industry designating to the whole activities corresponding to prospecting of locations extraction, transformation, concentration, foundry of minerals and intermediate products, transport, storage of waste and shipment of metallic and not metallic minerals, rocks, natural deposits of fossil substances and liquid or gassy hydrocarbons and fertilizers.

It is the own SERNGEOMIN the one that incorporates to the concept of mining tasks, the exploration works in a mining concession. This implies the obligation therefore of informing in writing to this service of the tasks, giving their location, the proprietor's name and of the administrator, to the fifteen days before beginning the works. The same reason should be applied being abandonment of mining tasks, when these they have implied single exploration tasks.

The only direct reference of the Regulation of Mining Security regarding the obligation of making a closing of the mine, is the one that you points to the escombreras or botaderos of sterile for whose localization and construction, without the letter of the law makes reference to the abandonment, if he/she mentions the exhaustion of the location, that which impacts evidently in direct form in its appropriate abandonment.

Indeed the one mentioned Regulation points out that the botaderos should be established according to a project carried out by the administrator and to approve for the director. To get the stability of the I deposit, they will be kept mainly in mind in their design the resistance of the land where it will locate, the materials that will be employees and their characteristics, the bank angle that should be stable even after the exhaustion of the location, the appropriate natural or artificial drainage and the seismic movements.

The expressed mention of the long term stability of I deposit them after the exhaustion of the location, it involves a concern regarding the abandonment of the tasks, including like it expresses, not alone the angle of the bank, but also such factors as the

natural drainage, that is to say eventual contamination of superficial or underground waters and the seismic movements, aspects that it is linked with a plan of forecast of risks.

It is possible to point out that the same guideline is the one that guides the articles 40 and 44 of the ° N° 86 of August of 1970, 13 that approves the construction regulation and operation of Tranques of Relaves decree (prey of residuals), text that doesn't mention in expressed form the abandonment of these works, but that if it demands measures of security and such stability that it doesn't generate risks for the population seated in the valley hidrográfica, at a dangerous distance in the event of spill for earthquakes, risks that evidently diminishes once concluded the mining tasks, but that he/she stays regarding eventual avalanches, torrential or grown rains of waters that can cause breaks in its structure and material haulage.

This risk is focused fundamentally in function of the life and the population's health during the operation of the tranque. In fact one of the emergency measures of the I articulate 34 of the respective regulation (letter d) it is the suspension of the tranque. However it is necessary to point out that at the moment it is also considered their localization to effect of avoiding a future contamination of underground or superficial waters.

Other linked norms are those that say relationship with the closing and demolition of hydraulic works of the I Title I, book third, of the Code of Waters, which are particularly prominent since demand from those that build this type of works, enough guarantees to finance the cost of their eventual modification or demolition, so that they don't constitute danger, if was you abandon during their construction.

To conclude this point it is necessary to highlight the distinction that can be made about physical abandonment and legal abandonment of a mining task, focusing this I finish from the perspective of the legal finalización of the possession of a mining task on the part of the holder of the project or activity and of the responsibility for environmental damage that this possession generates during the validity of the mining concession, as well as the one that lasts later on to the closing.

Parallely to that exposed and from the perspective of the environmental value of the territory, in the measure that is not defined regionally or nationally, the tourist value, paisajístico or environmental of the territory in that is sought to summon a project of this nature, difficult it will be to find a support juridical solid so that the competent authority not bases the demand of restoration measures endorsed legally by the sectoral legislation.

CASE OF APPLICATION

Project of Mining Expansion The Hides

The following one is an example of the application of the closing norms and abandonment to which should undergo the Project of Expansion of Production of Mining The Hides, according to that had by the effective Law, and their necessity to present the Study in the face of the authorities of the corresponding COREMA.

Plan of Closing and Abandonment

The Plan of Closing and Abandonment specifies the measures that will be adopted at the end of the useful life of the project, with the objective of leaving controlled mitigated y/o the situations that can give origin to impacts environmental indeseados during the abandonment, granting a condition environmentally sure in the long term.

In the Project of Mining Expansion The Hides 85.000 tpd whose useful life is of 30 years, the plan of previous elaborated abandonment to its construction cannot foresee a series of situations that you/they can modify the conditions and measures of abandonment in the future that finally will be adopted, among those that highlight:

New technologies that allow to improve at a cost reasonable problems that at the moment are not feasible of solving;

- Development of later projects that use total or partially the built infrastructure;
- use of the infrastructure on the part of third (State, matters).

For such a reason, the measures that intend in this plan are of preliminary character and in the conceptual environment.

Next a listing of closing measures and abandonment contemplated by the expansion project is presented. These measures are described with the following order:

- applicable measures of general character to facilities and process teams, separated by area;
- specific measures for him rend;
- specific measures for the deposits of sterile The Hides and Hualtata;
- specific measures for the relave deposits.

Process teams and facilities

The works that The Hides can leave enabled for later use in projects characteristic of the company or in activities that can carry out third, they are the following ones:

- bocatomas for receptions of superficial waters (The Cascade, rivers The Hides, Cuncumén and Totoral and Esteros Piuquenes and Chacay);
- pipe for conduction of fresh water from the previously signal points;
- electric substations The Chacay and The Hides;
- Electric line between The Hides and The Chacay-Piuquenes.

In case that these works are not dedicated to another use, the company will proceed to retire the surface structures and to recondition the lands if was necessary, avoiding mainly that they are material exposed to erosion hídrica.

The new facilities specifically mining that will be able to be good for later operations of the company they are:

- chancado team;
- teams and mill circuit;
- teams and flotation circuit;
- molybdenum plant;
- auxiliary facilities.

Of equal it forms, in case that these teams are not dedicated to another use, the company will proceed to retire them next to the associated surface structure; complementarily they will be carried out the following measures:

- Remodeling of the surfaces of the land in the sector The Piuquenes corresponding to the abandoned areas of the plant to soften the topographical contours.

- To improve the control of the erosion and the reinstatement from the land to the atmosphere, they will cover exposed areas to erosion and mainly those that are visible from sectors trafficked inhabited y/o, with vegetable earth of it escarps and adapted vegetable species will be planted, being given priority to native species.
- Finally they will settle signs with information of prevention inside the area of the project.

I rend

The condition of abandonment of the I rend it will be the following one:

- The final configuration will correspond that of the last year of exploitation. The Hides won't execute restoration measures or special remodeling.
- The company will analyze the final security of the I rend, and it will adopt the technical measures that it corresponds to grant stability of long term to the banks and banks.
- Also the company will install the necessary signalings preventing about possible entrance risks to the I rend.

As measure to reduce the generation of sour waters the following ones will be analyzed alternative:

- Construction of a channel perimetral that intercepts the superficial flows of melted snow and it drives them waters under the I rend, avoiding that he/she enters in contact with rusty rock of the mine;
- qualification of a system of horizontal or inclined drenes (type sondaje) that depress the napa in the environment of the I rend, in which case the intercepted flow would be driven gravitacionalmente through a canaleta waters under the I rend.

The objective of these measures is to minimize the entrance of waters to the I rend, its possible acidification and the creation of a sour lagoon.

Deposits of sterile The Hides and Hualtata

As first measure the company will evaluate the final stability of the deposits to verify that the condition of abandonment will be the one contemplated in the designs.

On the other hand, the deposits of sterile will have channels interceptores of waters rain built in the exposed perimeters to superficial flows of water to evacuate these flows. These channels will be adapted (they will enlarge y/o they will deepen) to be able to evacuate flows associated to a condition of long term. The objectives of this measure are basically the following ones:

- to avoid that the exposed banks you erosionen;
- to avoid that the waters enter in contact with deposited materials.

This way, the only contributions hídricos that you/they will be able to receive the deposits corresponds to the direct precipitation (it snows) and blooming that can take place in the bottom of the involved gulches. They are these flows those that will be able to be exposed to acidification during the abandonment, for their contact with the rock.

In case that the operational monitoreo reveals that the acid generation is significant and that this can stay lingeringly during the abandonment, they exist as alternative applicable mitigadoras to the deposits of sterile the following ones:

- installation of a layer of material of low permeability in the final surface of the deposit, either of a single time after the useful life, or in the measure that this he/she leaves completing;
- compactación of the final surface and readecuación of the slope to facilitate the superficial drainage.

This measures are dedicated to reduce the possibility of infiltration of precipitations (it snows).

Complementarily, the system of basal dren (type "it pricks with thorns of fish") of the deposit of having broken Hualtata will be able to be connected to the I rend, for it avoids any sour precolación that arrives to the base of the deposit, for their evaporation in the bottom of the I rend.

Finally, the company seeks to continue with the monitoreo of quality of waters in the river The Hides and The Cascade, for a 3 year-old period after the closing.

Deposits of Relave

An important aspect of having in all in connection with the abandonment of the relave deposits, is that they will go concluding its useful life before The Hides conclude their operations; for example the deposit The Quillayes its operation will culminate a year 8 or 9, that is to say, but of 20 years before it finishes the project. This advantageous situation will allow to The Hides to maintain a control of the condition post-operation of the first two relave deposits, in such a way that its condition of definitive abandonment will be able to be verified as for its security. Any accidental situation that is generated in the first deposit "abandoned" he/she will be able to be solved by the company, in which case it will adopt the pertinent preventive measure in the other deposits.

The measures of abandonment considered a priori for the relave deposits refer to the following aspects:

- The superficial escorrerías generated by precipitations will be intercepted and evacuated by means of the works of deviation perimetrales (ataguías and canales/túneles). In case that a part of the escorrerías enters to the deposit, this will be evacuated through the drains of grown. These works will be designed for an extreme hydrological condition.
- In order to producing the permanency of waters rain in the deposit, the deposit of the relave at the end of the operation will be managed in way of generating a surface lightly bowed in address to the drain. This geometry of the relave will avoid the generation of a lagoon in the later part of the deposit, allowing the practically total evacuation of the water entered to the few days of having happened the precipitation.

The transitory formation of a lagoon during the grown ones that it can be in contact with the wall of sand makes necessary to design a wall crowning that doesn't allow filtration from the lagoon. For this end a clay nucleus has been designed protected by a rip-rap. Also, the wall considers an additional revenge of abandonment of 2 m (on the 5 normal m) and a width of crowning of 10 m to compensate possible establishments of seismic solicitations.

The final surface of the walls of the deposits will be protected with a layer of thick material (it burdens sandy or similar) to minimize the eolic erosion.

Complementarily he/she will settle a layer of floor vegetable in the final surface of the walls to allow the plantation of appropriate species, as much as possible native. This measure will be applied to the visible walls from trafficked sectors and inhabited. The company will have enough time to prove spices that give success to this objective.

During the operation of the deposits he/she will have a line of wells to capture eventual infiltrations from the deposits. In case that is verified significant infiltrations, the wells will continue operating once concluded the operation of the respective deposit, until the quality of the water reaches acceptable ranges. The water captured by these wells will be pumped toward the own relaves deposit for its evaporation.

Plan of Actions of Repair and Compensation

Next the measures are presented that The Hides have considered to execute in the time, starting from the first years of operation, to restore the original condition of the affected components insofar as possible that they require it, as well as the actions and measures that it will execute to compensate the irreversible significant impacts.

The impacts that it is considered should be in some measure compensated to be them significant and irreversible they are the following ones:

- Alteration of the hábitat of gumps in having Broken Hualtata, product of the deposit of sterile in a sector of this gulch.
- Floor loss in the half valley and under of the one it Maims and their associate biodiversity, product of the construction of 2 relave deposits.
- In both cases they are not applicable the restoration measures in the intervened sectors, due to the characteristics and span of the involved works.

Broken Hualtata

In the Quebrada Hualtata a population of Gumps residents has been verified, for what constitutes an excellent hábitat for this species. As compensation measure to the impact generated by the hábitat loss intends the following plan:

- The Quebrada Hualtata will be used as deposit of sterile for a 6 year-old period, starting from the setting in march of the project; during this lapse of time he/she will be carried out a monitoreo of gumps in the gulch and sectors bordering, in order to make a pursuit of the species and to identify near places in those that it can apply a handling plan and protection of the species later on. The monitoreo in detail will remember with SAG and CONAF.
- At the end of the period of 6 year-old intervention he/she will start a protection plan and handling of the Quebrada Hualtata and of some other eventual place bordering, guided to potenciar the not altered hábitat and to generate appropriate conditions for the reintroduction of Gumps (access restricted people, veranadas prohibition, among other).

Fence of the one it Maims

As compensation of the loss on behalf of the existent natural community in the Valley of the one Maims, The Hides propose the following measures:

- To consider the high part of the valley (not intervened by this project) as a protection area and ecological recovery, under the form of a plan coordinated among SAG, CONAF and The Hides. You will also proceed to an improvement of the hábitat by means of the transfer and plantation of species that will get lost with the development of the deposits. Also, with this plan it will be possible to recover the ecological system, the one which at the moment is degraded by agricultural activities developed in previous times
- In the low part of the valley (you dilute under the deposits) a plan of afforestation will be made with native species of the one it Maims; this sector would be visible from the road, with that which an improvement of the quality paisajística of the place would be obtained.

- To support and to collaborate with programs of conservation of the wild life of the IV Region that are carried out in their Protected Wild Areas.
- Realization of the pejerreyes population's studies (*Basilichtys microlepidotus*) and bagres (*Trichomycterus areolatus*), species in extinction danger and vulnerable, respectively that exist in the River it Maims and in the Río Choapa. He/she intends to settle down their space and temporary distribution, abundance, characterization of its hábitats, structures of the population and reproductive aspects of the species, particularly its reproductive fenología. With the results of a program of this type he/she will be able to be defined together with the authority a program of conservation of the species inside the system hídrico of the Choapa.

Plan of Monitoreo

Objectives

The objectives of the monitoreo program are the following ones:

- To validate in he/she practices it the real effect caused by the activities of the project that have bigger predicted impact or potential, through the mensurations from the susceptible environmental components to be affected;
- To verify the effectiveness of the mitigation measures and proposed prevention;
- to verify the execution of the applicable environmental measures; and
- To detect in an early way any not foreseen effect and not wanted, so that it is possible to control it taking measures or appropriate actions.

Effective Monitoreo

The Hides maintain a monitoreo of the quality of superficial and underground water of the rivers the Hides, Cuncumén and Choapa, which is associated to specific permits obtained at the moment for works in operation (General Address of Waters). This monitoreo began in March of 1992 and he/she understands samples of water superficial and underground waters under the industrial facilities of The Hides in the sector of The Hides and The Chacay.

The current monitoreo of superficial and underground water is carried out monthly, and it considers the determination of the physical quality and chemistry according to the following parameters:

- pH
- temperature
- get paid (Cu)
- molibdeno(Mo)
- calcio(Ca)
- sulfates (SO₂--)
- dissolved total solids (STD)
- iron (Faith)
- manganese (Mn)

The samples of water are obtained along the Rivers The Hides, Cuncumén and Choapa

The sampling, the preservation of samples and the laboratory analyses are carried out according to the procedures of the Standard Methods for the Examination of Water and Wastewater.

Content of the Program of Monitoreo of the Project

The program of monitoreo of the expansion project specifies the following aspects:

Environmental component: it corresponds to the resources or constituent elements of the environment like air, it dilutes and floor that you/they will be monitoreados.

Parameters: they correspond to the physical and chemical variables that will be, measured y/o registered as indicators of the behavior of each environmental component.

Places of Monitoreo: it corresponds to the mensuration places and sampling selected for each parameter.

Frequency: he/she refers to the rhythm with which the mensurations, takings of samples y/o analysis of each parameter will be made.

Methodology: it is indicated the mensuration procedure and analysis of the information in each case.

Environmental components

The program of monitoreo of the expansion project considers the following environmental components:

Air

It dilutes superficial

It dilutes underground

Floors

Noise flora and fauna

THE ABANDONMENT OF MINES IN MEXICO UNDER THE NEW ENVIRONMENTAL LEGISLATION

Luis R. Vera Morales

México

The abandonment of mines in Mexico is a severe problem that has not been sufficiently studied. To this date, there does not exist a single documented case of planned closure of any mine that has been exhausted, neither before mining nor environmental authorities. This can be explained by the absence, until very recently, of specific instruments for the control and regulation of these activities and that the authorities lack creativity in the use of instruments of environmental policy within their reach. This document will explore the different legal ordinances existing in Mexico and the difficulty in their application to this worrisome matter.

I. DEFINING THE PROBLEM

The mineral wealth of Mexico has been a guiding line for the development of the people and nations, which have settled this territory for more than three thousand years, but sometimes to their detriment. During the pre hispanic period mining activities focused primarily on the extraction of metals and precious stones, since the Conquest and through out the colonial times, mining was, without any doubt the primary economic activity of New Spain. In fact, the history of its colonization can be almost totally explained by two phenomenons: mining exploration and the evangelistic catholic crusades. Consequently, a great many of our colonial cities are or were mining centers or transitional points of them. During all this time, the law as well as mining institutions gave order and direction for the prosperity of New Spain and that of the Spanish Crown.

By the end of the colonial period, mining activity in Mexico had decayed due to the fight for independence and the consolidation of the new State. This lethargy lasted practically the whole XIX Century. In the last quarter of this century, the new country saw the arrival of foreign companies, mainly English and American, bringing with them the economic means and technical personnel to exploit its riches. It was not until 1932 that the government of Mexico ordered the nationalization of gold, silver, copper, mercury, aluminum, iron, bismuth, and platinum mines.

In this century the extracting industry has been one of the most important economic activities in the country, although the exploration and exploitation of its mineral deposits has kept practically to the same proportion as that during colonial times. In this sense, the numbers are quite revealing: the actual area of Mexico is almost two million square kilometers, and an estimated 80% or 1.6 million square kilometers of this, meet the appropriate geological conditions for metallurgic processes. Regardless of this, the government has granted concessions for the exploration and exploitation of only 3,500 square kilometers or 2.2% of this area.

As an obvious result, accompanying the activities of discovery and mining operations we eventually encounter their abandonment, along with the effects of each of these stages on the environment. It is important to indicate that we have evaded the term "closure" when referring to the post operative mining stage, because it encapsulates the idea of being a planned activity. The habitual indifference to legislate for this phase has not resulted in the development of planned systems for the closure of mines. In reality, the legislation recently enacted, which we will analyze in depth in this work, has adopted the term commonly used in these cases, that of "site abandonment".

II. THE PROTECTION OF THE ENVIRONMENT WITH RESPECT TO THE EFFECTS ON THE MINING ACTIVITIES

As previously mentioned, traditionally, Mexican legislation has not bothered to establish *ad hoc* norms to counteract the impacts from the post operative or abandonment phases on the environment, wild life or human health. Although there have been recent attempts to correct this omission, there are instruments which have not yet been identified by legal analysts, which could both allow the holders of mining concessions to limit their liabilities, as well as provide the environmental authorities with means to comply with the purpose for which they were created: the preservation of the ecological equilibrium and the protection of the environment. In the following we will analyze those legal ordinances and instruments.

A. Mining Law (LM)²

This Law, fundamentally productive in nature, contains scarce regulations with respect to the protection of mining resources and does not contemplate legal provisions regarding the protection of the environment from the effects of the exploration, exploitation, smelting and refinement of minerals. Moreover, it mandates that these activities will be preferable over any other use or usage of lands (art. 6), whether agricultural, cattle raising, forestry, conservation, etc., except to those cases expressly considered as exempt (arts. 13 and 14).

Notwithstanding the above, according to the LM the holders of exploration and exploitation concessions are obliged to comply with the general provisions and specific norms on mining safety, ecological equilibrium and environmental protection applicable to the metallurgic industry (art. 27, section IV). Likewise, in accordance with the mining legislation, the holders of concessions for the exploration, exploitation and smelting of minerals or substances, must procure the conservation and protection of the environment (art. 39). Finally, exploration and exploitation activities that are undertaken within properties (real estate), zones or areas under the control of other authorities (dams, channels, population centers, federal maritime zone, natural protected areas), require the previous authorization from the latter (art. 20).

B. General Law on Ecological Equilibrium and Environmental Protection (LGEEPA)³

LGEEPA does not establish any specific provision for the abandonment of mines, but, initially, it does contemplate the use of instruments of environmental policy, that is, Official Mexican Norms and the environmental impact evaluation procedure (EIEP), in order to prevent and control the effects caused by mining exploration and exploitation activities. Furthermore, it is possible to find generic provisions on the conservation of soils, which could be applicable to the site abandonment stage.

² *Mining Law*, Official Gazette of the Federation, June 26th, 1992.

³ *General Law on Ecological Equilibrium and Environmental Protection*, Official Gazette of the Federation, January 28, 1988. Amended by Decree published on the Official Gazette of the Federation on the 13th of December 1996.

1. The use of environmental policy instruments for control

a. Official Mexican Norms (NOMs)⁴

In accordance with the LM, LGEEPA provides that, in order to prevent and control the effects generated by the exploration and exploitation of non-renewable resources, the Ministry of Environment, Natural Resources and Fisheries (SEMARNAP) will issue NOMs which may allow: i) the control of water quality and the protection of that which has been used or that which results from these activities so as to permit their use for other purposes; the timely and proper protection of soils and of wild flora and fauna from the topographic alterations caused by these activities, and iii) the adequate locations and the forms of deposits from clearing activities, cuttings and slag from mines as well as establishments for the smelting of minerals⁵. The holders of concessions, authorizations and permits for the use, advantage, exploration, exploitation and refinement of non-renewable resources⁶ must comply with these norms.

Environmental Impact Evaluation Procedure (EIEP)

Even though NOMs, which regulate the effects of the exploration, exploitation and abandonment of mines, do not exist, there is however an instrument in the LGEEPA which can contribute significantly to the protection of the environment in respect to the effects of mining activities: the EIEP.

i). Jurisdictional problems

Article 28 of the LGEEPA lists the works or activities that prior to their development⁷ require an environmental impact authorization from SEMARNAP, among those the exploration, exploitation and refinement of materials and substances are reserved to the federation (section II)⁸. There are other sections related to mining activities such as

⁴ NOMs regulating environmental matters are technical provisions whose purpose is to: i) establish the requirements, specifications, conditions, procedures, goals, parameters and permissible limits which must be observed in regions, zones, basins or ecosystems, for the exploitation of natural resources, the development of economic activities, the use and destiny of real estate, input and processes; ii) consider the necessary conditions for the well-being of the population and the conservation and restoration of natural resources and the protection of the environment; iii) to boost or induce the economic agents to reorient their processes and technology for the protection of the environment and a sustainable development; iv) grant certainty, in the long term, to investments and induce economic agents to assume the costs of the environmental affectations that they may cause, and v) to stimulate efficient and sustainable productive activities (LGEEPA, Art. 36).

⁵ LGEEPA, Art. 108.

⁶ LGEEPA, Art. 109.

⁷ It is important to indicate that notwithstanding the fact that the Regulations of the LGEEPA on the Evaluation of Environmental Impacts excludes several works or activities from the environmental impact procedure this should not be understood as a renouncement from the federation to the jurisdiction granted by article 28 of the LGEEPA to regulate them, neither does it constitute a competence gap which could be solved with the intervention of the States, as provided in article 124 of our Constitution (*“Those faculties which have not been expressly granted by this Constitution to federal officers, should be considered as reserved to the States”*). Thus, the States may not regulate any of those activities, which have been excluded from the environmental impact evaluation procedure in terms of the Regulation of the LGEEPA on the Evaluation of Environmental Impacts, but only those activities, which have not been listed in the first paragraph of article 28 of the LGEEPA.

⁸ According to article 6 of the LGEEPA, States and Municipalities have the authority to regulate the exploitation of minerals and substances not reserved to the federation, constituting natural deposits of materials similar to the components of the lands, such as rocks and products of their decompose which can

the one regarding installations for the confinement of hazardous waste (section IV), land use modifications of forestry lands, jungles and arid zones (section VII), and generic works competence of the federation which have not been specifically listed (section XIII).

Furthermore, article 28 provides in its second paragraph that the Regulations to this Law (that is, the recently enacted Regulations on the Evaluation of Environmental Impacts or REEI) will define the works or activities which due to their location, dimensions, characteristics or scope: i) **do not produce significant environmental impacts**, ii) **do not cause or might not cause ecological imbalances**, iii) **do not exceed the limits and conditions set forth in the legal provisions referring to the preservation of the ecological equilibrium and the protection of the environment**, and therefore do not need to submit the EIEP.

In a nutshell, mining activities in general are subject to the EIEP (article 28, first paragraph, section III, of the LGEEPA) except those, which are expressly exempted and listed by the REEI (article 28, second paragraph, of the LGEEPA).

On the other hand, article 5 of the REEI details the works or activities of federal jurisdiction which are subject to the EIEP, as well as those which are exempt from this procedure; particularly section L), lists the works which must submit the environmental impact procedure provided for in the LGEEPA, as well as its exemptions: I. Works for the exploitation of minerals and substances reserved to the federation as well as support infrastructure, II. Exploration works, **except those**, with gravity, superficial geology, geothermic, magnetic-telluric, magnetic susceptibility and density prospecting; as well as those involving drilling, ditches or rock exposure, when carried out within agricultural, cattle raising or uncultivated lands or in zones with dry or warm climates in which flora such as: xerophilous scrub, deciduous tropical forest, coniferous forest or holm oaks grove, grows and which are located outside of natural protected areas, III. Refining of materials and the final disposal of their waste in tailing reservoirs, excluding refining plants not using hazardous substances and the filling of water carried out in underground mining works⁹.

Even though neither article 28 of the LGEEPA nor article 5 of the REEI, establishing that the works and activities are subject to the EIEP at the federal level, include nor exempt the abandonment of mines, the latter provides that any resolution that the SEMARNAP may issue on the projects submitted to the EIEP may establish conditions to the authorization addressed to avoid, mitigate or compensate the negative environmental impacts caused during the **construction or normal operation** of the project and **in the event of an accident as well as the abandonment or end of the project's useful life**¹⁰. The REEI however pretends to extend the reach of those resolutions subject to conditions that according to the LGEEPA only include the construction, normal operation and in the event of accident¹¹, but not abandonment. We consider that besides the fact that REEI could be in violation of principles of legality by pretending to increase their faculties expressly established in the LGEEPA for SEMARNAP, it disregards the preventive character of the instrument as well as the purpose for which it was designed: the reasonable making of decisions, not the control (correction) of consequences.

only be used for the production of construction or ornamental materials, for environmental protection purposes.

⁹ We must assume that the term "exploitation" does not include the concept of "site abandonment", neither in its literal nor legal context (the REEI differentiates the "abandonment" and "exploitation" concepts. *Supra* footnote 10.

¹⁰ REEI, Arts. 45, section II and 48.

¹¹ LGEEPA, Art. 35, fourth paragraph, section II.

Another position complementary to that of the aforementioned would be the following: Due to the fact that the “site abandonment” was not expressly included in the mining activities listed in the above-mentioned articles, there are two possibilities: that they fall under State jurisdiction or that they maintain their federal jurisdiction but that the federation has decided to exempt them from the EIEP. The former case is easily discarded as that the LGEEPA establishes those cases of State jurisdiction (see footnote 8). The second case is more defensible from a technical jurisdictional point of view even though it apparently impedes the SEMARNAP from revising the impacts of said activity. Notwithstanding the aforementioned the LGEEPA and the REEI contain a mechanism through which the impacts of unlisted activities can be revised at the discretion of the federation.

ii) Exception to the Exception: The evaluation of the abandonment of mines

Section XIII of article 28 of the LGEEPA allows for the possibility that SEMARNAP can evaluate the environmental impacts of works or activities that correspond to matters under federal jurisdiction that could cause serious and irreparable ecological imbalance, harm to public health or to ecosystems, or exceed the limits and conditions established in the legal provisions relating to preservation of ecological equilibrium or protection of the environment.

It is noteworthy that this section permits two interpretations, in our opinion, as equally valid and furthermore, compatible: the first is that the SEMARNAP can attend matters listed in the first two sections of article 28 of the LGEEPA, between them the III referring to mining, **but subject to evaluation by virtue of article 5 of the REEI, whether by exclusion or express exception**, this faculty constituting a literal exception to the exception; and the second can attend to matters apart from those listed under federal jurisdiction in general, with those being added to the list on article 28 of the LGEEPA, those matters under federal jurisdiction which are detailed in article 5 of the same LGEEPA, allowing for wide discretionary possibilities in the type of matters that can be evaluated by the authority¹².

In all cases, the limits of this faculty to evaluate works or activities, otherwise exempted or excluded (under the first interpretation), or in the case of the so called “extended or added jurisdiction” (under the second interpretation), will be those indicated in section XIII: to cause serious and irreparable ecological imbalance, harm to public health or to ecosystems or exceed the limits and conditions established in the legal provisions relating to preservation of ecological equilibrium or protection of the environment. It is evident that the abandonment of mines could cause or maintain one or more of these effects.

The REEI establishes the following procedure for exercising this faculty: (i) when the possible development of any work or activity under federal jurisdiction comes to the knowledge of SEMARNAP in any way (under any of the above-mentioned interpretations), this agency must notify the interested party of a justifiable resolution to submit them to an EIEP; (ii) Within a term not greater than 10 working days the interested party must present reports, opinions and considerations that are deemed convenient; (iii) within the following 30 days of receiving the documentation SEMARNAP will notify the interested party of their

¹² This last interpretation in particular will only reinforce our conclusion that federal jurisdiction is not limited by the list contained in article 5 of the REEI, as the federation could always subject all types of works and activities under their jurisdiction to the EIEP, including not only those listed under article 28 of the LGEEPA, excluded or not of the EIEP, but inclusively others where the jurisdiction of the federation is not derive from the cited article but from article 5 of the same legal ordinance.

decision on the requirement to present an environmental impact statement (EIS) or not and the term for its filing; (iv) the silence of the SEMARNAP implies that it is not necessary to present the above-mentioned EIS¹³.

The reparation of damages under the REEI

Once the way in which the authority may access to the evaluation of the effects that must be counteracted due to the mining abandonment works has been explained, and having established that, as a result of the EIEP, SEMARNAP may conditionally authorize the development of a work or activity, we consider it necessary to analyze in depth the standards of mitigation to be observed.

In accordance with the REEI, “mitigation measures” are defined as the “combined actions to be undertaken by the applicant to **diminish** the impacts and to **re-establish or compensate the existing environmental conditions prior to the disturbance** originated by the development of a project in any of its stages¹⁴. This concept constitutes a radical change for the repair of environmental damages from an administrative perspective, as it differs from the rules that the LGEEPA or the National Waters Law establish in relation to the affecting of natural resources, approaching the civil regulation for compensation¹⁵.

2. Control by generic rules

The LGEEPA contemplates several provisions which contain criteria regarding the control of the effects of activities which affect the environment and can be applied by the SEMARNAP in the event that the aforementioned instruments turn out to be inefficient or should a restriction to the application, such as those already mentioned, arise. Each of these alternatives present difficulties in their application or otherwise have a limited scope.

Restoration Zones

The LGEEPA provides that in those areas that display processes of degradation or desertification or severe ecological imbalances, SEMARNAP must prepare and implement, with the participation of owners, occupants, social organizations, whether public or private, etc., ecological restoration programs for the purpose of undertaking the actions necessary for the recovery and re-establishment of conditions that favor the evolution and continuity of the natural processes developed therein¹⁶. Conceptually, nothing would impede SEMARNAP, in the use of this faculty, to issue restoration programs for zones that may have been affected by mining activities. The transaction costs (negotiations with proprietors and other social parties), would constitute the most relevant obstacles for their implementation, depending on whether the liabilities of any of the parties involved in this problem have been limited or not.

¹³ REEI, Art. 16.

¹⁴ *Ibid*, Art. 3, section XIV.

¹⁵ See Civil Code for the Federal District in common matters and for the entire Republic on matters of federal nature (CC), Art. 1915.

¹⁶ LGEEPA, Art. 78.

b. Measures for soil remediation

Within the LGEEPA there is only one criterion for the remediation of soils, which only applies to sites, which have been contaminated by hazardous waste and materials. In these cases, LGEEPA establishes that the responsible party must undertake the necessary actions to recover and re-establish its conditions so that it may be used in any of the activities provided for in the urban development or ecological ordinance program applicable to that site or respective zone¹⁷. The future use of a site contaminated by hazardous waste or materials, as established by the administrative criteria for damage repair, in opposition to its **prior use**, has been interpreted as legal acceptance (*strictu sensu*, as the criteria is provided in the Law) of an environmental loss, that which opposes the civil and REEI rules, which demand the repair to the condition existing prior to its affectation, including, in the case of the civil rule, the indemnity from any foregone gain or earning that could have legitimately been obtained by the affected party, without allowing any losses, should the damage have not have been caused.

The remediation standards, that is, “how clean is clean?”, have not yet been established, conversely, the efforts of the government to impose sanctions that have been easily truncated in court (although the obligation is indisputable). On the other hand, even though article 152 Bis clearly establishes that the generator and the company or person in charge of the handling or final disposal of those hazardous waste or materials are liable, it does not give a solution in the event that the responsible party cannot be identified. In the latter case, SEMARNAP has applied article 134 section V, of the LGEEPA, establishing for the prevention of soil pollution, in soils contaminated by hazardous materials or waste, that the actions necessary to recover and re-establish its condition, must be undertaken in order to allow their use for any of the activities provided for in applicable urban development or ecological ordinance program. Hence, the general criteria does not define who should bear the responsibility for the remediation of the soil. Moreover, this criterion applies to pollution currently present, regardless of when, how or the party responsible for its presence. Based on the aforementioned, this criterion is applicable to the present owners and occupants of the polluted soil (plot), regardless of their intervention in the process (of contamination).

The aforementioned is of great relevance for the definition of the repair obligation that may derive from the acquisition of a contaminated plot due to the historic undertaking of mining activities. Another interesting fact is that there is no obligation to notify the authority of the existence of soil pollution. Hence, in the event that the owner of the land becomes aware that his or her land is polluted, he or she is not compelled to appear before or to inform SEMARNAP or any other authority of said circumstance. However, the law obliges him or her to clean up the soil. This obligation arises from the moment that the owner or possessor becomes aware of the existence of the contamination.

III. CONCLUSIONS

Even though both the LM and the LGEEPA contemplate provisions to protect the environment against the effects from the mining activities, to this date, the ad hoc instruments, that is, the NOMs, have not yet been developed.

Due to the aforementioned, it is feasible to regulate the effects of the abandonment of mines through other instruments of environmental policy, such as the EIEP. Nevertheless, their successful application will be subject to the correct interpretation of the REEI within the context of the LGEEPA.

¹⁷ LGEEPA, Art. 152 Bis.

Regardless of having other criteria, which bring attention to the negative effects that mining activities may cause to the environment, including site abandonment, those criteria are insufficient in that they only refer to soil and not to the elements of the affected ecosystems as a whole.

Finally, the difference that the remediation standards present with regard to environmental damages, resulting from the application of the REEI or of the criteria established in the LGEEPA lead to violations and to a legal defense from the holders of concessions against the authority's intentions to apply any instrument or criteria for remediation, causing inefficiencies in the system and as a result, the deterioration of the environment.