# Implementation of the Mine Closure Law in Chile: learned lessons and opportunities

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## ABSTRACT

The promulgation and the entry into force of the Law Nº 20.551 that regulates the closure of mining operations and its facilities, through the Supreme Decree Nº 41, on November 2012, has been one of the most relevant regulatory changes in the last few years for the mining industry in Chile.

In summary, the new Law has three fundamental pillars: the obligation to submit for the approval of the authorities a closure plan that guarantees the physical and chemical stability of the mining facilities after finishing their operations; the requirement to provide the State with a financial guarantee equal to the value of the implementation of the closure measures and works; and the establishment of a post-closure fund.

In addition, the Law gives more attributions to the corresponding Authority (SERNAGEOMIN, part of the Chilean Mining Ministry) to establish audits and apply rigorous sanctions to those non-compliant mining companies.

The Law was successfully implemented through a collaborative public-private strategy, and the result was the presentation in time of the mine closure plans by 90% of the industry, with closure cost gradually guaranteed from 2015, for an amount superior to US$ 12.000 millions.

This article presents a vision of the main lessons learned from the process of the implementation of the Law during its key installation stage (2012-2014), from the perspective of a world class mining company and its mine closure consultant experts; as well as improvement opportunities and challenges that the mining industry will face with this new Law within the next years.

## INTRODUCTION

Sustainability is recognized more and more as an essential concept to the viability of businesses in the long run. In line with this tendency, environmental regulations and regulatory requirements have increased in Chile. New legal bodies, a reformation of the environmental institutionalism and the restructuring of supervising agencies have all formed part of this process. The creation of the Superintendence of the Environment, the Environmental Evaluation Service and Environmental Courts in recent years are examples of this.

One of the relevant legal changes in the mining industry in Chile in the last few years is the enactment of the Law N° 20.551 (Ministerio de Minería de Chile, 2011) (hereafter "the Law"), that regulates the closure of mining operations and its facilities, and its regulation, Supreme Decree N° 41 (Ministerio de Minería de Chile, 2012), valid as of November 2012.

This new legislation radically increased the requirements in this field, and its implementation signified an important challenge for the actors in the mining industry: the Authority, in this case the National Geology and Mining Service (hereafter "SERNAGEOMIN"), mining companies and consultants.

In order to facilitate its implementation, the Law conceded a period of two years (called a "transitional period"), so that mining companies would value its closure plan, incorporating also the commitments of closure acquired in other instruments, and delivering a financial guarantee to the State.

This article has as its objective the documentation and sharing of a vision of the principal lessons learned in the key stage of implementation of the Law N° 20.551 (November 2012 – November 2014), from the perspective of a world-class mining company such as Codelco, and it's expert consultants, to identify opportunities for improvements and challenges that the mining industry in Chile or other countries could face in the next years within this field.

## BACKGROUND OF THE MINE CLOSURE LAW IN CHILE

Mining has been one of the main drivers of the Chilean economy in the 20th Century, representing only during the last decade 59% of exports of the country, 15% of gross national product and has generated 20% of tax collection (Cochilco, 2013).

Modern mining history of Chile is more than a century old (El Teniente 1904, Chuquicamata 1915, Salitre 1884, Carbón 1852). However, this long development hasn't always been harmonious, finding itself with shortfalls in areas such as the environment, community relation, the management of water, as in the closure and legend that the mining companies leave once they finalize their operations (Sanzana, Weeks & Fernandez, 2015).

Throughout this time numerous mines, in distinct points of the national territory, were abandoned without having had an adequate closure process, principally gold, copper, silver, polymetallic, coal and iron mines, whose processes of exploitation and benefit have left installations that represent a potentially significant risk for the security and health of people and the environment (Golder Associates, 2008).

During the first decade of the 21st Century, SERNAGEOMIN conducted a registry of abandoned and paralyzed mines which allowed for the identification of 461 environmental liabilities caused by the abandonment of mining ventures within the country (SERNAGEOMIN, 2015). This reality, among other causes, motivated the development of a Mine Closure Law in Chile, which took approximately 20 years: in 1994 the Environmental Impact Evaluation System (SEIA) came into effect, which required that the closure phase be handled by new mining projects. The next important step came in the year 2004 with the publication of the new Mining Security Regulation (DS N º 132), which established for the first time the obligation of all mines in operation and new mines to present a closure plan to SERNAGEOMIN that focused on physical stability and security of persons (Sanzana, Weeks & Fernandez, 2015).

Finally, in November of 2012, the Law Nº 20.551 came into effect which regulated the closure of mining operations and its facilities. It purpose is the prevention of the future generation of abandoned sites through the establishment of a guarantee sufficient enough to execute closure by the State, before a mine operator failure in their closure plan, in addition to drastically increasing the role of the Authority in this field. This new regulatory body within the industry

requires, in synthesis, that the closure of mining operations and its facilities must be conducted during the useful lifespan of the ore deposits, impose payment of guarantees, and constitute a post-closure fund.

## CODELCO´S STRATEGY IN THE IMPLEMENTATION OF THE LAW

CODELCO, the National Copper Corporation of Chile, is a 100% State-owned enterprise. With its 8 mining operations (Chuquicamata, Radomiro Tomic, Ministro Hales, Gabriela Mistral, El Salvador, Ventanas, Andina and El Teniente) is it the largest individual producer of mined copper in the world, 1,671,672 tons in 2014 (Codelco, 2014), and owner of approximately 10% of the known copper reserves in the world.

However, its State property is monitored and reported using the same standards as a private company, complying with the same legal obligations as the rest of the mining industry. Since the publication of the Law, the Authority showed a willingness to implement it in an environment of agreement and collaboration with the industry actors. Before this, Codelco's strategy was the active participation in the process of implementation of the Law, in all instances in which it was requested, conscious of its role because its size and the characteristics of a State-owned company.

In 2013 Codelco started a program led centrally, to conduct all of its operations and projects, in plain compliance with the Law, within the established period (November of 2014). For this objective, a corporative authority was established, the management of projects and the methodology of execution were defined, a simple but strict plan with realistic milestones, was established, and finally the establishment of a demanding goal that is able to be fulfilled, to deliver all their closure plans within the legal timeframe, while simultaneously developing a competitive bidding process to elect a suitable consultant**,** ultimately awarding it to Golder Associates.

In relation to the numbers, the eight closure plans of Codelco represented 6% of the total number of closure plans presented to SERNAGEOMIN. However, its total value was US$ 5.377 million, which represented 44% of the closure costs of the mining industry in Chile, and additionally, two of its mines (El Teniente and Chuquicamata), are among the ranking of the 5 most costly closures in Chile.

In general terms, the implementation of the Mine Closure Law in Chile can be considered successful from the point of view of the presentation of the closure plans, such that in a lapse of 2 years (2012-2014), 140 companies presented plans, which represented 90% of the expected closure plans by SERNAGEOMIN in the transitional period of the implementation of the Law, whose joint value added up to US$ 12.238 million (Revista Minería Chilena, 2014).

## COLLABORATIVE PUBLIC-PRIVATE ACITIVITES DURING THE IMPLEMENTATION PROCESS OF THE LAW

One of the characteristics of the process of implementation of the Law that permitted the acquisition of these results was SERNAGEOMIN's generation of a series of collaborative activities with the goal of involving and guiding the private sector. Next, the main activities developed during the process and an evaluation of results is presented.

- *Production of Guidelines as support document:* SERNAGEOMIN promoted, under its supervision, the emission of public guidelines. At first, SERNAGEOMIN proposed the development, with the support of distinct consultants, of a total of nine guidelines, that were classified in the following way (see Figure 1):

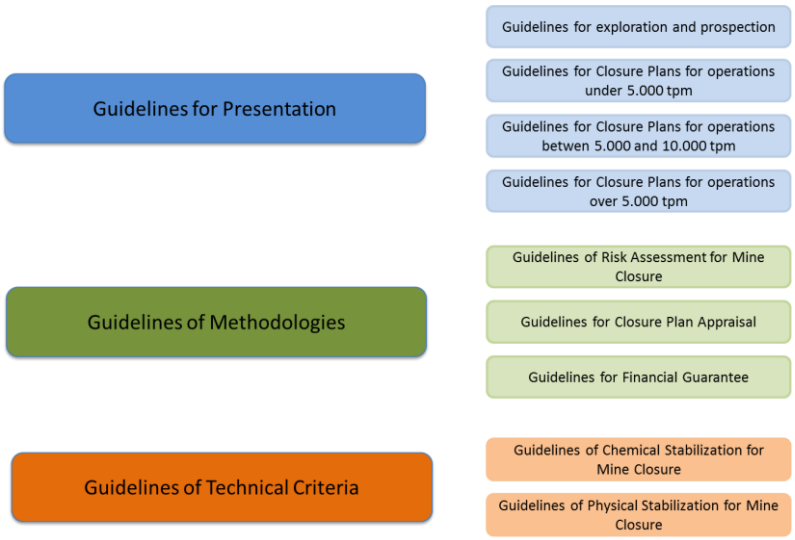
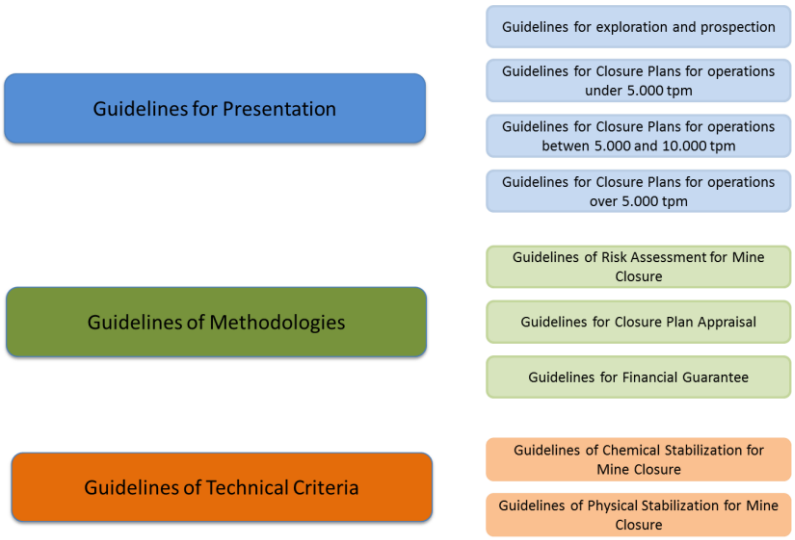



**Figure 1** SERNAGEOMIN Guidelines for the closure of mining sites (source: SERNAGEOMIN)

This activity provided important benefits in the industry upon setting and standardizing the structure as the methodology of the closure plan, such as knowing the presentation and the technical criteria with which the Authority will conduct this review:

- *Diffusion of the Law through workshops and seminars:* SERNAGEOMIN organized several diffusion workshops and seminars about the Law and its application. Although in general terms these instances allowed for the clarification of doubts from the mining companies, in some occasions they introduced space for confusion among those being regulated.
- *Cabinet inspections:* During the year 2014, SERNAGEOMIN carried out an inspection of the closure plans of all mining companies within the country. This activity was called "cabinet inspection" by the Authority, and its purpose was to detect eventual inconsistencies between the applicable closure plan and the current conditions of the mining operations, in addition to the environmental commitments related to the closure phase within it. Although the objective of these inspections appeared laudable, and the inspection activities are found within the powers of SERNAGEOMIN, it doesn't seem more convenient to carry out an inspection during the implementation process of a new law, so, in addition to the cost of resources for the Authority and those being regulated, it caused confusion and distraction from the main objective which was the preparation of the Closure Plan. Additionally, an inspection isn't an appropriate instance for discussion of the criteria between the Authority and those being regulated, or between members of both teams among themselves, which was observed in the exercise.
- *Technical consultant meetings:* SERNAGEOMIN permitted and recommended the realization of bilateral meetings with mining companies to resolve technical issues that arose during the development of the closure plans. In general terms it can be described as a recommendable and very useful activity. However, from the Chilean experience, it is possible to point out the difficulty that this activity caused, in that, in intending to resolve each specific case privately, the risk was run of operating on a case-by-case basis which can result in an arbitrary conduct.
- *Review of pilot Plans:* This initiative pledged an early and unofficial evaluation of the closure plans by SERNAGEOMIN, with the purpose of creating security of the mining company in the moment of the presentation of the definitive closure plans. Codelco presented two pilot plans during this process. However, the positive results of its preliminary evaluations

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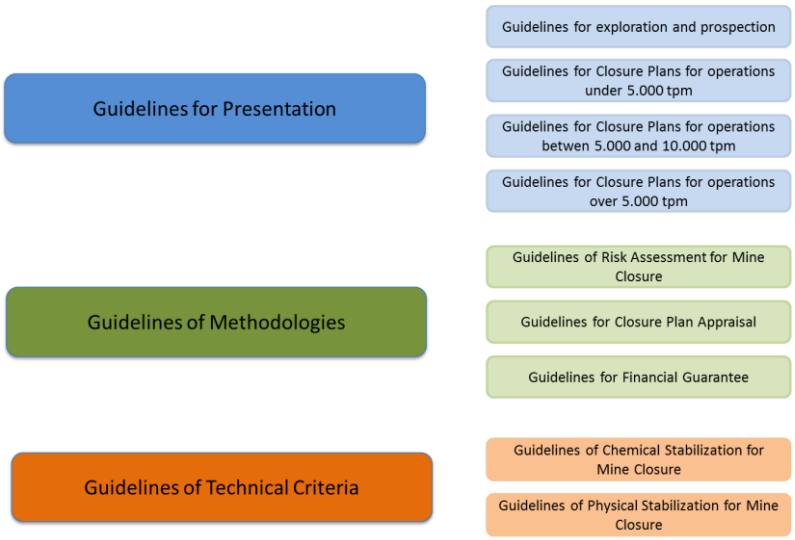


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weren't binding with respect to the definitive presentation, ultimately receiving many background observations that weren't made in the pilot plans.

Next, in Table 1, a summary of the collaborative exercises mentioned, and their evaluations by the authors of this article, is presented.

**Table 1** Evaluation of collaborative activities

| | | **ctivity evaluation** | **ecommendation** |
|---|---|---|---|
| **1** | Distribution of support guides | POSITIVE | Make guides public, and ideally with deadlines indicated |
| **2** | Diffusion workshop | POSITIVE | Always communicate consistent criteria and maintain specialized rapporteurs for topics |
| **3** | Inspections during the process | NEGATIVE | Introduces confusion among the actors and diverts resources from the main objective |
| **4** | Technical Consultant Meetings | IMPROVABLE | Answers must be consistent and binding |
| **5** | Revisión de planes pilotos | IMPROVABLE | Observations of the lack thereof must be binding. |

## LEARNED LESSONS

The implementation of a new law produces learnings and opportunities for improvements much for the Authority as for those being regulated. In the case of the new Mine Closure Law in Chile, in the key period of its implementation, between 2012-2014, the following lessons can be identified:

### Institutional

- *Relying on a modern mine closure legislation:* the coming into effect of the Law Nº 20.551 in November of 2012 about the mine closure has established a stage normally forgotten or not treated adequately as a part of the lifecycle of a mining operation. The closure constitutes a stage of the mining cycle in which the true commitment to sustainability of a company is put to the test, because it is necessary to cover important projects in a period of minor or nonexistent cash flows.
- *Implementation in collaborative environment and jointly with the industry:* the collaborative implementation of a law will always be positive from the point of view of the industry that is regulated. However, the participative model bears an important risk for the authority, being that it must combine two things: the acceptance of criteria put forth by the industry in such a way that the respondents don't feel that their participation is symbolic, and at the same time while not losing the key aspects of a law as products of an excesses of consensus.
- *Maintaining key authorities throughout the implementation process:* the Law came into effect in November of 2012 and its first relevant benchmark of compliance was set for November 2014. In March of 2014, a change of Government took place in Chile, which resulted in a change of

authorities and technicians from those that had initiated the process. As is natural, new authorities carried the risk of modifying criteria that was previously agreed upon.

- *Clarity of roles and uniform criteria among central, zonal, and regional authorities:* cabinet inspections carried out in the mines during the Law's implementation period revealed the existence of discrepancies in criteria and competencies among central and regional authorities, which are recommended to be resolved previously and internally by the Authority.
- *Early identification and non-casuistic resolution of controversial points:* controversial points with reference to key aspects such as the determination of the life of mine were identified late, when many of the definitive closure plans had already been presented, which will be explained in more detail further in opportunities for improvement.

### Instrumental

On an instrumental and operational level, the relevant learned lessons from the point of view of the Authority are:

- *Convergent and not divergent review:* Codelco received 140 observations in the first round of queries, 40 observations in the second round, and finally six observations in the third round. If the reviews of the closure plans were numerically convergent, it wasn't as such at the root of the observations, being that queries arose in the second and third rounds that weren't observed in the first round**,** which were then understood as accepted.
  The recommendation is to follow the model of the of the Chilean Environmental Evaluation System (SEA), in that the reviews are convergent in content, which is to say, the parts understand that what isn't observed is accepted, and in this way obtain a progressive, objective review as much for the mining operator as for the Authority.
- *Uniform criteria in the revision:* Observations of transversal character existed, which were only realized in some Divisions and not in others (i.e. the percentage of contingencies), which demonstrated a lack of uniformity among distinct reviewers.
- *Complying with legal timeframes of queries and approval:* As the timeframes impact the constitution of the first quota of the guarantee, the Authority should balance the relevance of certain technical accuracies versus the opportunity to take advantage of closure plans and in this way achieve the beginning of the real constitution of the guarantees, which definitively is the goal of the implementation of the Law. The aforementioned, especially taking into account the closure plans and their costs, will be updated in several opportunities before the effective closure.

In the case of Codelco, more than 183 of the observations received raised the global cost of guarantees approximately 6%, versus a rise in the timeframes of approval by more than 40%.

### From the Industry

Although the case of Coldelco is particular due to its complexity, size and long-standing nature, there are key structural factors that permitted for the compliance with the Chilean Mine Closure Law, and that can be extrapolated or adapted to other cases:

- *Will of compliance:* The Executive President formally ordered to the corporation that it comply with the contents and timeframes of the Law.
- *Temporary involvement and informed participation:* Codelco participated in all instances of the Law´s management, and actively collaborated in its implementation.

- *High-level leadership:* Since the beginning one corporative authority was established for compliance with the Law, which reported to a committee of Vice-presidents and acted through Delegate of Mine Closure in all operative mines.
- *Early planning:* A demanding but feasible schedule was established from the beginning, which didn't suffer important alterations during the two years of the development of the closure plans.
- *Election and supervision of the consultant:* A competitive bidding process was developed, and coordination and permanent supervision was maintained and kept very close to the consultant's team.

In relation to industry deficiencies in the implementation of the Law, those most often reported by SERNAGEOMIN (Morales, 2015) in an operative plan are the following:

- Incorrect application or a lack of consideration of the Guidelines.
- Lack of rigorousness in the identification of the closure commitments.
- Excess of "global" costs, which is to say, without detail or justification.
- Excess of copy, lack of supervision, and involvement with consultants.

In this last point, it should be noted that the unsuccessful situations of the presentation of closure plans were related to an incorrect selection of consultants. Some mining companies contracted the services of consultants with a single line of work (i.e. just environment), which resulted in difficulties due to the multidisciplinary nature of mine closure.

Next, in Table 2, a summary and classification of the most important learnings of the Authority and the industry during the key period of implementation of the Chilean Mine Closure Law is presented.

**Table 2** Learning of the process by the Authority and by the Industry (2012-2014)

| Type of learning | Authority | Industry |
|---|---|---|
| **STRUCTURAL LEARNINGS** | • Existence of the Law<br>• Collaborative implementation<br>• Maintain criteria and key authorities<br>• Clarity of internal roles<br>• Early identification of controversies and non-causistic resolution | • Willingness to comply<br>• Early involvement<br>• High-level leadership<br>• Early planning<br>• Informed participation |
| **INSTRUMENTAL LEARNINGS** | • Key, on-time guidelines<br>• Consistency in talks and seminars<br>• Convergent review<br>• Compliance with time constraints | • Application of the Guidelines<br>• Rigorousness in the identification of commitments<br>• Appropriate selection of consultants and involvement with them<br>• Avoid "global" costs |

## OPPORTUNITIES AND CHALLENGES

Even though the general results of the process were positive, important opportunities for improvement exist, as much for the Authority as for the industry. In the case of the Authority, 2 key points for improvement were identified: the clarification of the role of the "Competent Person" in the determination of the life of mine, and aspects of the closure costs with a clear definition still pending.

## Determination of the life of mine

The industry understands that "Competent Person", who in Chile certify resources and mine reserves under the Law 20.235 (Ministerio de Minería de Chile, 2007), are people who are legally authorized to certify the life of mine under the text of the Mine Closure Law.

SERNAGEOMIN considers that these persons just can certify reserves, and that it is necessary to use the extraction rate of the mineral in order to determine the life of mine (Morales, 2015). This rate is obtained from the last method of exploitation that is approved in the mining operation. In other cases, it intended to enforce environmental resolutions or other sectorial permissions as the valid life of mine. These are interpretations that intend to eliminate legal inconsistencies among permits granted by these or other authorities, but in a narrow sense, it is unrelated to the real life of mine in the moment of preparation of a closure plan, which is precisely what the legislator wanted to safeguard with the report of the "Competent Person".

The lack of consistency in the mining operations closure date among different authorizations granted by SERNAGEOMIN or among these, and those granted by other authorities, can't be used in the closure plans on behalf of the Authority, in order to arbitrarily estimate the life of mine, enabling the prevalence of one permit over another, which isn't considered in the Law.

This interpretation was reported late by the Authority, once the closure plans had been presented through offices and within the approval period which entailed formal responses and within the defined timeframes, with an important depletion of time and resources.

## Closure plans costs

The opportunity of improvement in terms of closure plans costs can be found in 3 lines of action:

- *Extensive use of the closure cost guideline:* the closure cost guideline was developed and wasn't officially published. However, there were different workshops during the preparation that permitted the understanding of its simplified methodology and its end goal of permitting a primary evaluation to the regulator of the order of magnitude of the closure costs presented by the mining company. Due to its relevance, it should have been used extensively to calculate the long-term closure costs (i.e. when the closure will happen in >10 years), being that it would permit a substantial saving of resources for operators, consultants, and for the inspecting Authority. Additionally, it would allow for a standardization and comparison of closure costs between mining operations, as well as an easy and fast approval process free of case-by-case queries. Even when this type of guidance on a global level requires periodic updating, its limitation, due to the fact that they seek to cover a wide spectrum of mining operations, is related to the accuracy of calculation. However, this point isn't so relevant for long-term closures (>10 years), which is to say, for closure plans based on conceptual engineering, or those with a margin of intrinsic error of costs greater than +/- 25%.

  Once the transitional period is finalized, SERNAGEOMIN relies on an important database at the national level to update this guideline, with information provided for the mining operations in their closure plans.

- *Tax matters:* The industry objected to the application of the Value-Added Tax (IVA) of 19% to closure plans. Finally, this additional cost was incorporated, at the express request of the Authority, without conviction or clear basis of its relevance.

- *Use of contingency:* the technical definition of contingency refers to a percentage that is added to the most indirect direct costs, that is determined according to the development of the engineering that is presented. In no case is it used to cover unknown changed in the reach of the closure due to its distance in time, as is understood by the Authority.

From the point of view of those being regulated, their principal challenges are found when initiating the real mine closure each time that corresponds (in Chile there have been 2 or 3 relevant closures before the Law's existence), which requires a deepening of technical areas that were resolved through assumptions in the transitional period of closure plans, because the Law in its normal framework considers greater requirements, such as the existence of a risk assessment, whose end is to define the closure measures most appropriate for each facility.

The risk assessment demands more detailed technical knowledge of the impacts that mining residues will generate during closure and post-closure, and the ways to reduce them. For this, mining companies will need to develop programs and specific studies that allow for the deeper examination of aspects such as: potential for the production of acid rock drainage of its residues; physical stability in the long-term in remainder facilities; cover designs; design of contact and non-contact water management works; characterization and management of contaminated soils; and management of hazardous and non-hazardous waste from plants demolition, among other activities.

Finally, it should not be forgotten that compliance with the Law, states relation to the mine closure from the point of view of works and dismantling required in guaranteeing physical and chemical stability, as well as the security of the persons. However, one relevant and still very incipient task in Chile is related to the comprehensive management of mine closure, such as for example the future of its own workers, the fulfillment of voluntary commitments, the impact and the requirements of surrounding communities, such as the business decisions relating to the future of their activities and licenses, among other matters.

## CONCLUSIONS

The Mine Closure Law in Chile, enacted in 2012, was well received by the industry and didn´t receive important opposition, apart from the discussion about punctual technical issues.

It was successfully implemented through a collaborative public-private strategy, whose result was the presentation of closure plans within a period of time for 90% of the industry with gradual guaranteed closure costs as of 2015, for more than US$ 12 billion.

An analysis of the process detected lesson learned and opportunities for improvement for the future. From the point of view of the regulator, the early detection and resolution of potentially controversial issues, such as the importance of defining a clear, realistic plan that prioritizes the objectives of the implementation of the Law and avoiding distracting activities, are fundamental. From the point of view of those being regulated, the existence of strategic corporative definitions is recommended, such as the early involvement in, and being informed about the Law, a reasonable choice of consultant, and an active participation in the activities proposed by the Authority.

A large opportunity for improvement for mining in the future in this matter, beyond the elaboration of closure plans and constitution of guarantees, that are only an instrument, will be successfully complying with the implementation of mining closures, avoiding the legacy of environmental liabilities for future generations, which mustn´t only circumscribe the closure plans themselves, but also the future of their workers and the surrounding communities.

Ultimately, the Chilean Mine Closure Law signified an important advance for the country's mining industry. However, there is still a long way to go, being that the principal challenge of mining in the 21st century consists of relying on the social acceptance of this economic activity. This will be achieved through the repair and recuperation of abandoned mining sites; respecting the environment and the surrounding communities in their current operations; and conducting a responsible closure that leaves a valuable legacy for future generations.

## REFERENCES


Comisión Chilena del Cobre (COCHILCO) (2013). *Una mirada a la productividad del sector minero en Chile*. Ministerio de Minería, Gobierno de Chile.

Corporación Nacional del Cobre (2014). Memoria Anual 2014.

Decreto Supremo N°41/2012. *Reglamento de la ley de cierre de faenas e instalaciones mineras*. Ministerio de Minería, Gobierno de Chile.

Golder Associates (2008). *Manual de evaluación de riesgos de faenas mineras abandonadas o paralizadas (FMA/P).* Texto no publicado. BGR-Servicio Nacional de Geología y Minería, Gobierno de Chile.

Ley Nº 20.235 que regula la figura de las personas competentes. Ministerio de Minería. Gobierno de Chile.

Ley Nº 20.551 Regula el cierre de faenas e instalaciones mineras. Ministerio de Minería. República de Chile.

Morales, A. (2015). *Lecciones aprendidas planes de cierre >10.000 tpm*, ppt Sernageomin, Abril 2015

Morales, A. (2015). *Análisis de informes personas competentes*. Taller "estimación de vida útil para el cierre de faenas mineras". Abril 2015.

Revista Minería Chilena (2014), 24 de Noviembre de 2014.

Sanzana, E., Weeks, B., Fernandez, S. (2015). *Closure planning for the largest copper producer in the world*. Mine Closure 2015 Conference, Vancouver, Canada.

Servicio Nacional de Geología y Minería (SERNAGEOMIN). www.sernageomin.cl.