

# What is going on in Mexico relating to the OHES in Mining

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## Contents:

- Introduction and Background
- Experience of Minera Autlán regarding the potential effects of Mn exposure
- Brief description of regulation on OHES in Mexico
- Conclusion

## Introduction

Mining is a two edges sword. On one side, mining is inherently disruptive and unfriendly to the environment, both visibly and invisibly. Also, mining is an important generator of solid wastes by volume. Many people distrust the mining industry and fear its environmental impacts.

On the other side, mining is essential if we are to maintain or expand our standard of living and should be considered the foundation of all subsequent industrial activities in a modern society. Mining creates wealth, secondary industrial activities add value. Most existing and potential mines can be operated in an environmentally safe and acceptable way if we agree with a period of physical disruption. Modern mining companies are voluntarily committed to environmentally safe operations.

## Background of Minera Autlán

Founded in 1953 in Jalisco State, on the western side of Mexico

Started operations in an underground manganese mine near Autlán, Jalisco

1953-1967 300,000 mty high grade ore; braunite and pyrolusite.

1960 Started exploration in **Molango** district, Hidalgo State close to the Gulf Coast.

1968-1975 500,000 mty low grade ore, **Mn** carbonate with 27% Mn. Open Pit

300,000 mty of manganese **nodules** with +39% Mn Content

1973-1974 Started gradual vertical integration to the **Mn** ferroalloys production

1975-1985 600,000 mty low grade ore, **Mn** carbonate; simultaneous Open Pit and **Underground** production. 330,000 mty **Mn** nodules with +39% Mn

1985-2002 700,000 mty low grade carbonate, **100%** from underground mine/open pit. 350,000/375,000 mty **Mn** nodules + raw carbonate to the steel plants.

The total present capacity of **Mn** ferroalloys production is 210,000 mty of equivalent ferromanganese in three plants  
In the same district, Autlán also exploits and concentrates **manganese dioxide** for the dry battery and ceramic industries.

### **Experience of Minera Autlán regarding the potential effects of Manganese Exposure**

In the case of Minera Autlán, originally engaged exclusively in the mining of manganese ores up to 1974 and from this year on gradually integrated to produce manganese ferroalloys, two special and highly motivating factors experienced by Autlán at the start of its operations in Jalisco State were determinant for the company to properly address the safety and occupational health of its employees in the future. Those favourable influencing factors were:

- a) As far as the occupational health is concerned, it was decisive the fact that Autlán, even before starting operations in Jalisco during 1953, “inherited” from the original concessionaire of the mining rights, a group of 12/15 miners, showing, in different degree, the effects of a chronic manganese intoxication. The explicit reason for this was the exposure to a high manganese dust concentration within the “room and pillar” artisanal exploitation they had carried out for years, before Autlán came into scene during 1953.
- b) The high concern Bethlehem Steel Co., our partner at the time of Autlán’s establishment, had on the safety of its employees. After exhaustive and detailed surveys and investigation, Bethlehem issued and implemented at its worldwide operations, the accident prevention program called **“Our next step zero”**, which was introduced to Autlán during the mid fifties. The key factor for the program successful adoption in Autlán was the strong and genuine motivation engaged in at all levels (top down) of the organisation when implementing it.

Learning the hardest way about the potential effects of exposure to manganese and on the poor working conditions (dry drilling), under which the miners became intoxicated, acting as a powerful and shocking catalyst for the Autlán’s management to enforce, after a thorough consultation with experts on the subject matter from Cuba and from the Wayne University of Michigan in the USA, some few although effective preventive actions and measures to cancel out any possibility of a new case of manganism resulting in the mine future operation. The actions included:

1. By no means any drilling without water injection should be allowed within the mine.
2. Under no circumstance the handling (loading and transporting) of the blasted manganese ore at or from the production stopes was allowed, before the muck being plentifully water sprinkled/soaked to avoid any dust generation.

3. At any time, provide all the working places of the mine with the proper mechanical ventilation, monitoring it through periodic checking on the volume of fresh air being received by the people or circulated through the mine circuits.
4. A stringent and reliable control of the total dust and airborne manganese concentration must always be observed through the periodic air sampling, taken at the working areas of the mine and in the breathing zone around the workers performing the different mining activities. The periodic sampling on the air quality would allow to assess on this important factor and to correct the conditions whenever the established standards are not met (permissible exposure limits).
5. Emphasis should be placed that each man working in the mine is properly trained and motivated to always use his complete safety equipment, including a dust mask with adequate filters.

Obviously, all the above mentioned measures have been carefully preserved up to the present operations in Molango.

#### Brief description of the regulation on OHES in Mexico

There are some historical signals on the claim the mine workers raised for better labour conditions as early as 1906, when the Cananea Copper Company went on the first officially recognised strike in the country, preceding the Revolutionary Movement of 1910.

More recently, following the conclusions of a popular consultation forum held in 1995, aimed the enactment of the **National Plan of Development** for the period 1995-2000, the simplification and updating of the existing legal framework for safety and hygiene at work matters was promoted, thus resulting in the following instruments:

- **The new Federal Regulation on Safety and Hygiene at Work – 1997**, which included also all the applicable norms as issued by the labour and Social Security Secretariat. The revised and updated federal regulation on safety, hygiene and worksite environment is unifying the different ordinances on the same matters which appeared dispersed in six previous and obsolete regulations in force during/before 1934 to 1978, which were revoked.
- **The Official Mexican Norm 121 STPS-1996**, which specifically deals with the safety in all mine workings. This norm has been recently updated to **Official Mexican Norm 028-STPS-2000**. There is a clear established correspondence between the contents of the Official Mexican Norms (NOM) and the clauses of the New Federal Regulation on Safety and Hygiene. Besides, it is liable to the updating and/or issuance of new Official Mexican Norms.
- In general, by all the regulations related with the Occupational, Health and Safety matters, which are contained in the **Mexican Federal Labour Law**.

In addition to the general legal framework established by the above mentioned instruments, there are complementary internal tools having the same purpose, specifically designed by each mining company. In the case of Minera Autlán, the additional controls on **OHES** are:

- Internal Labour Regulation
- Safety and Hygiene Regulation
- Safety Manual “Our next step zero”, already commented and updated during 1991/92
- Induction to the Safety Program, mandatory to all new mining workers
- Procedure for preparation and response to emergencies
- ISO 9002 and ISO 14000 procedures

On the international side, and as an active primary member of the IMnI, Minera Autlán is subject to the **OHES** Committee’s precepts of the institution for its mining operations, its ferroalloy and chemical manganese derivative divisions.

Under the **OHES** Committee’s programs, Minera Autlán continues to perform the following actions with the objective that all company’s personnel is conscious on the excessive workplace exposure, improve the understanding of the mechanisms of potential action of **Mn** in humans to be better prepared to cope with the subject matter when regulatory proposals are made by the Mexican governmental agencies.

The current health monitoring practices include:

- The periodic monitoring of manganese at the mines and processing plants, through systematic measurements on the concentration of Mn and total dust in the workplace, where a permissible exposure limit (PEL) of 5.0 mg/m<sup>3</sup> (maximum) has been established for 8-hour TWA, which is coincident with the stipulated limit by the Mexican regulation, specifically under the Official Mexican Norm that deals with substances where the manganese is included (NOM-010-STPS-1994).
- In relation with the health surveillance program for workers, it consists of periodic clinical examinations for all workers (chest, lungs, hearing, sight, etc.) with a frequency according to the corresponding Official Mexican Norms and precepts under the Secretariat of Labour and Social Security as applicable to the workers health.
- Special clinical examinations, including the determination of manganese in the mine workers blood and tremor testing have been performed without results of concern, although these specific exams are not yet a routine practice.

However, it should be stressed that the continuous observance of the established preventive actions to avoid/eliminate any dust generation at source, still is one of the most effective technique to minimise the impact of manganese in workplace’s environment and its potential effects on the human health.

## Conclusions

Zero tolerance for accidents should be the goal. Productivity and safety are two sides of the same coin. Safety procedures, including accidents investigation, need to be fully implemented and monitored for compliance.

Occupational health and safety is a shared responsibility. Employers have the responsibility for supplying the ways and means (training and equipment) for a safe work site; workers are responsible for learning how to perform their work safely and authority is responsible for legislating safe working conditions.

While it is not possible to eradicate all possible hazards, it is indeed possible to control the causes of the majority of the risks through a combination of:

- Adoption and implementation of national regulations on the subject.
- Use of safety inspectors and occupational health and safety workplace committees.
- Education and training. Trade Unions, companies and governments should train employees on health and safety matters, so as to foster safe and healthy working conditions.

Workers and company labour organisations should take part in the debates prior to issuing regulations.

International organisations should be required to produce, standardise, gather and publish national statistics on occupational health and safety in mines, as IMnI is doing through the OHES Committee regarding manganese.

Training staff (at all levels) is vital for occupational health and safety in mines. Therefore, it is necessary to promote the creation of graduate and post graduate future programs on occupational health and safety, so as to obtain professionals and technical specialists able to disseminate their expertise and lead the training process.