Oscar Campanini Gonzales

THE BUSINESS OF MERCURY IN BOLIVIA

A STUDY ABOUT THE COMMERCIALIZATION OF MERCURY FOR GOLD MINING IN BOLIVIA

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Oscar Campanini Gonzales

La Paz-Bolivia, 1979

Oscar Campanini Gonzales is sociologist and researcher specialized in water, mining, extractivismo, natural resources and human and nature wrights. He is currently director at the Centro de Documentación e Información Bolivia – CEDIB. Though his research and accompanying social demands he contributes to build critical thought and public policy in Bolivia.

He is athor of books like “Extractivismos en Bolivia: el uso minero del agua y las demandas sociales de una transición” (2015); “El negocio del mercurio en Bolivia” (2020) and “Derechos y violencias en los extractivismos” (2019).

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Author:
Oscar Campanini Gonzales

Style editing:
Patricia Quiñones G.

Layout and graphic editing:
Efraín Ramos

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Content

Abbreviations Used in the Book

AAC	Autoridad Ambiental Competente (Competent Environmental Authority)
ADEMAF	Agencia para el Desarrollo de las Macrorregiones y Zonas Fronterizas (Agency for the Development of the Macro Regions and Border Zones)
AJAM	Autoridad Jurisdiccional Administrativa Minera (Jurisdictional Mining Administrative Authority)
ANH	Agencia Nacional de Hidrocarburos (National Hydrocarbon Agency)
CAN	Comunidad Andina de Naciones (Andean Community)
CCA	Comisión para la Cooperación Ambiental (Commission for Environmental Cooperation)
COMIBOL	Corporación Minera de Bolivia (Bolivian Mining Corporation)
DAA	Declaratoria de Adecuación Ambiental (Declaration of Environmental Adequacy)
DIA	Declaratoria de Impacto Ambiental (Declaration of Environmental Impact)
DS	Decreto Supremo (Supreme Decree)
EBO	Empresa Boliviana del Oro (Bolivian Gold Company)
FECOMAN	Federación de Cooperativas Mineras del Norte de La Paz (Federation of Gold Mining Cooperatives of the North of La Paz)
FERRECO	Federación Regional de Cooperativas Mineras (Regional Federation of Gold Mining Cooperatives)
FOFIM	Fondo de Financiamiento para la Minería (Financing Fund for Mining)
LASP	Licencia de Actividades con Sustancias Peligrosas (License for Activities with Hazardous Substances)
LGA	Ley General de Aduanas (General Customs Law)
LGC	Ley General de Cooperativas (General Law of Cooperatives)
LMM	Ley de Minería y Metalurgia (Mining and Metallurgy Law)
MSDS	Material Safety Data Sheet
MEFP	Ministerio de Economía y Finanzas Públicas (Ministry of Economy and Public Finance)
MINEM	Ministerio de Energía y Minas del Perú (Ministry of Energy and Mines of Peru)
MMAyA	Ministerio de Medio Ambiente y Agua (Ministry of Environment and Water)
MMM	Ministerio de Minería y Metalurgia (Ministry of Mining and Metallurgy)
UN	United Nations Organization
OSC	Organismo Sectorial Competente (Competent Sectoral Body)
UNEP	United Nations Environment Program
PRONACOPs	Programa Nacional de Contaminantes Orgánicos Persistentes (National Program of Persistent Organic Pollutants)
RASP	Reglamento para Actividades con Sustancias Peligrosas (Regulations for Activities with Hazardous Substances)
RAAM	Reglamento Ambiental para Actividades Mineras (Environmental Regulations for Mining Activities)
RLGA	Reglamento de la Ley General de Aduanas (Regulations of the General Customs Law)
SENARECOM	Servicio Nacional de Registro y Control de la Comercialización de Minerales y Metales (National Service for the Registration and Control of Minerals and Metals Trading)
SERGEOMIN	Servicio Geológico Minero (Geology and Mining Services)
SERGEOTECMIN	Servicio Nacional de Geología y Técnico de Minas (National Geology and Mining Technical Service)
SUNAT	Superintendencia Nacional de Aduanas y de Administración Tributaria del Perú (National Superintendency of Customs and Tax Administration of Peru)
VDPM	Viceministerio de Desarrollo Productivo Minero Metalúrgico (Vice Ministry of Mining and Metallurgy Productive Development)
VMA	Viceministerio de Medio Ambiente, Biodiversidad, Cambios Climáticos y de Gestión y Desarrollo Forestal (Vice Ministry of Environment, Biodiversity, Climate Change, and Forest Management and Development)
YPFB	Yacimientos Petrolíferos Fiscales Bolivianos (Bolivian Public Oil Deposits Company)

Glossary of Terms

TERM	DEFINITION
Cooperative	Economic and organizational form that is based on the cooperation among its members. However, in the case of Bolivia, this organizational form in many cases harbors structures similar to those of small companies.
Retort	A mechanism for the recovery of mercury at the time of burning the amalgamated gold. Some institutions that support the mining sector in Bolivia have their own retort designs.
Crew	Group of workers with a specific task. It is how underground miners are usually organized. There is a drilling crew in charge of extracting the material from the deposit (through drilling or dynamite blasts) and the cleaning crew, which removes the extracted material.
Blasted material	The material that is extracted from the deposit through drilling or blasting.
Manual Scaling	The activity of rock removal, also known as loosening that could be a hazard for the personnel at the top or front of the works. It is done as part of the mineral cleaning or drilling tasks.
Panning	Gold screening by washing fine material with water in a circular container, that is usually metallic, very shallow, and of large diameter. The washing process in the container permits separating the light material from the heavier material that is mixed with the gold.
Sluice	The mechanism used in artisanal mining consisting in a trap for solids, which can count with the injection of water through a gutter with carpets. Heavier solids are settled at the bottom of this trap and retain the gold.
ANFO	High power explosive consisting of a mixture of ammonium nitrate and diesel oil. It is used for rock blasting.
Cuya	Metallic container used in the verification of the mineral. It is also used to store mercury temporarily. Depending on its size, it is used in retort equipment or amalgamated gold burners.
Ball mill	Equipment widely used in mining allows raw material grinding to achieve the desired granulometry and thus optimize mineral recovery.
Cupellation	The metal separation process based on the principle that unlike base metals precious metals do not oxidize or chemically react. Thus, when they are heated to high temperatures, precious metals separate from the others that do react, forming slags or other compounds.
Removal	The activity of collecting or removing the pre-concentrated material, whether in carpets or other concentration equipment, such as centrifuges, to later move on to another refining process.

Introduction

This study seeks to generate knowledge concerning the commercialization of mercury for gold mining in Bolivia and its link with commercialization chains to or from other countries in the region. It is part of a set of investigations in different countries about the commercialization of mercury within the framework of the SRJS Mercury Governance program of the International Union for Conservation of Nature Netherlands (IUCN NL), which in the case of Bolivia has the Centro de Documentacion e Información Bolivian (CEDIB) as its investigative counterpart.

The object of the research focuses on mercury trading for gold mining since this is the primary use given to this element and since this activity is the main activity responsible for mercury emissions in Bolivia (Ministry of Environment and Water, 2017).

It should be noted that there are no studies about mercury trading for the country, so this research lays the foundations for an in-depth understanding of this issue at the national level and mainly to assess the importance of paying attention to the problems linked to the impacts of mercury. Therefore, it is a contribution for the different actors involved and affected by this issue: for the Plan de Acción Nacional (National Action Plan) to be developed by the government of Bolivia within the framework of the Minamata Convention; for the members of gold cooperatives and their communities who are the main protagonists and users of mercury and, at

the same time, the most directly affected population sector; for the communities settled on the riverbanks, that although they do not benefit by alluvial gold mining, are also the most affected, and for all the Bolivian population as a whole

The first part of the study briefly characterizes the main gold mining areas in Bolivia and their use of mercury. In a second section, it is described the relevance and import data of this input in Bolivia. Finally, in a third chapter, it is presented the normative and institutional framework regarding mercury.

1 Gold Mining and the Use of Mercury in Bolivia

Gold mining cooperatives are the primary users of mercury. The relevance of this sector, as well as the main characteristics of the way they use this element, is described next:

1.1 Gold Mining Cooperatives in Bolivia[1]

Bolivia has a mining history that goes back even to the pre-Columbian period. Silver, tin, and zinc have been the primary minerals mined in its territory, but that does not mean that there were not significant gold deposits, which are still existent and make gold a significant mining potential in the country.[2]

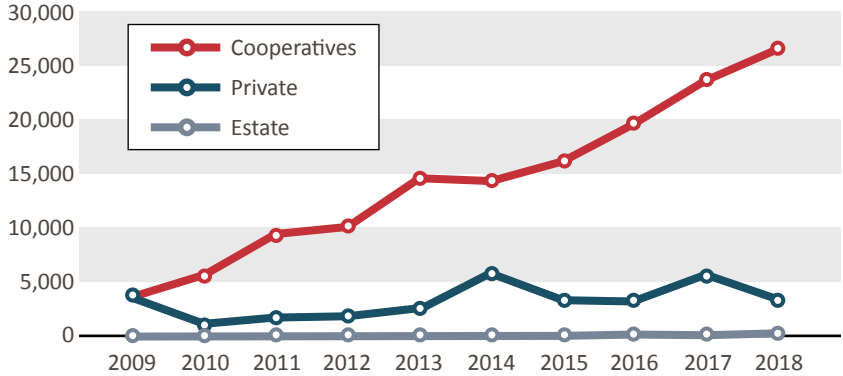
Gold mining in Bolivia has quadrupled during the last nine years. In 2018, it was mined 29,997 kilograms with an equivalent value of 1,217.8 million dollars.

1 Subchapter prepared based on Jiménez (2019).

2 In La Paz: La Paz stream, Itenez border with Brazil, Guanay, Mapiri, Tipuani, Challana, Coroico, Kaka, Sorata, Vilaque, Huallani, Palca, Emma, the western flank of the Apolobamba mountain range, Pelechuco, Cajuata, Choquetanga, Saya, Corani, Cocapata, Altamachi, Cotacajes, Santa Elena, Yucán, Alaska and Lenay Rusia. In Oruro: San Bernardino, La Joya, Kori Kollo, Iroco and Kori Chaka mines. In Potosí: Agua de Castilla (Porco), Yura River, Caracota, Chilcobija, Yaretani and Candelaria. In Tupiza: San Antonio, Cotani, Santa María, Cosuña Pulacayo, Quetena, Marte, Guadalupe, Amayapampa, Capacirca, Cebadillas, Irpa Irpa, San Pablo de Lípez and K'ari K'ari. In Beni: the alluvial ones of Madidi, Tuichi, Mamoré, Itenez, Cachuela Esperanza, Riveron, Araraz and Alto Beni Quiquibey. In Santa Cruz: Concepción, San Ignacio, San Ramón, San Javier, Don Mario and to the northeast of San Juan de Chiquitos. In Cochabamba: Choquecamata and Ayopaya. In Pando, the Madre de Dios river, over 400 kilometers long, which is the longest and crosses the country from west to east on the border with Peru; the mines of Itenez, Tahuamanu, Mapiri, El Cairo, Genechiquia, Carmen mines with concentrations of 0.25 grams / m3, Guayaramerín, Riveron, Araras (Gutierrez Bernal, 2010)

Figure 1 Volume of gold mining in Bolivia by type of actor, 2009-2018 (kg)

Source: Own elaboration based on the Ministry of Mining and Metallurgy (2018) data from 2009 to 2017 and the Ministry of Mining and Metallurgy (2019) data for 2018.



Although the main gold operations in Bolivia belonged to private companies.[3] The role of the small mining sector, a sector known as mining cooperatives, has become the most important and was responsible for 89% of the total gold mined in 2018 (Figure 1).[4]

Mining cooperatives in Bolivia essentially respond to the logic of small-scale mining at the international level, although they have specific particularities. They are organizational structures where a group of miners becomes partners and workers of their mining venture. Although this type of organization dates back to the 50s decade, it had its boom in the mining sector after 1985. Because of the neoliberal adjustment measures, tens of thousands of mineworkers were dismissed, and those who remained in the mining industry independently organized themselves into cooperatives.

The mining cooperatives that were established as economic organizations with social purposes in recent decades achieved a more permissive and flexible regulatory regime than other mining entities: they do not have to comply with labor regu-

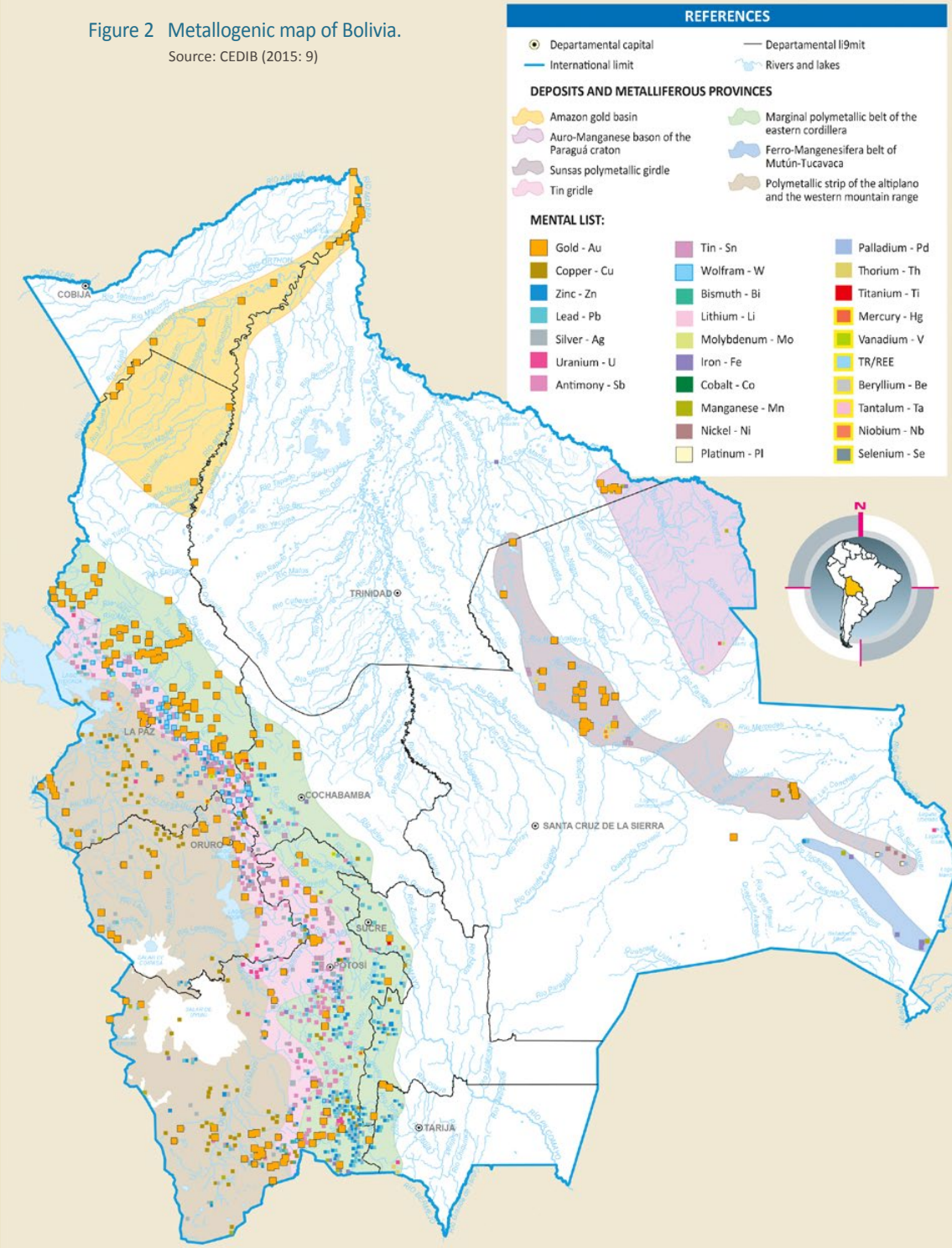
3 At present, the principal mining operation in gold is Don Mario in the departament of Santa Cruz. EMIPA/Orvana operates it. However, the process in this mine does not use mercury but cyanide. The rest of the gold mining operations, small and artisan, uses mercury for amalgamation. Although they are not comparable to Don Mario in terms of their unitary volumes extracted, the number of these operations is so significant that they represent the largest part of the gold extracted in Bolivia.

4 It should be remembered that data about the extraction of gold show substantial inconsistencies among different documents of the same government (Ministry of Mining and Metallurgy). Given these inconsistencies, it is assumed that the last data is valid and official. See a sample of those inconsistencies in the Annex further ahead.

BACK TO CONTENT

Figure 2 Metallogenic map of Bolivia.

Source: CEDIB (2015: 9)



lations[5], have a preferential tax regime[6], direct state support[7], direct participation in state instances,[8] and permissiveness in the fulfillment of environmental regulations.

Some investigations could unveil that there are elites that control many cooperatives and their leaderships. These organizations acquire similar functioning as small and medium-sized companies that exploit workers under subhuman conditions, unprotected socially and as workers, and receiving minimal economic remunerations.[9] The economic growth of cooperatives has made them the second most crucial sector in Bolivian mining:[10] to the year 2018 with 1,560 million dollars, they represent 38% of the total value extracted by the mining sector[11] and employ 136,848 workers.[12]

With this economic power and favorable regulatory and public policy conditions, the cooperative sector has also acquired great political power: it has representatives from different political forces in the Asamblea Legislativa Plurinacional (Plurinational Legislative Assembly), in various departmental assemblies, municipal councils, and the Viceministerio de Cooperativas Mineras (Vice-ministry of Mining Cooperatives.)

The link of mining cooperatives, an essential economic and political power, with significant mining capitals is likewise a logical consequence of this process of preferences and flexibility of regulations. The denouncement of contracts between mining companies and cooperatives was the motive for a great debate during the approval of Law 535 of Mining and Metallurgy in 2014[13] and in the year 2017, this same issue generated protests that resulted in the assassination of a Vice-minister.[14]

5 Restrictions to unionization (art. 37, IV General Law of Cooperatives, LGC) and non-compliance with labor regulations (art. 17, II LGC).

6 Restrictions to unionization (art. 37, IV General Law of Cooperatives, LGC) and non-compliance with labor regulations (art. 17, II LGC).

7 Mining cooperatives are "exempted from paying the Impuesto a las Utilidades de las Empresas (Tax on Business Profits) (IUE), the IUE Additional Tax Aliquote, and the Impuesto al Valor Agregado (Value Added Tax-VAT). In addition, regarding the 100% mining royalties stipulated for each mineral by Law 3787, cooperatives only pay 60% after the commercialization process to which they are subject. Moreover, some of them work in "marginal" deposits (as is the case with some gold deposits)" (Zaconeta Torrico, 2012).

8 Participation in the board of directors of the state mining company COMIBOL (DS 27192 of 2003).

9 See Michard (2008) and Francescone & Diaz (2013).

10 It can be said that the mining sector as a whole has been restructured in recent years (Villegas, 2013).

11 Data from the Statistical Yearbook 2018 (Ministry of Mining and Metallurgy, 2019).

12 Data from the Ministry of Mining and Metallurgy (2018).

13 See Mamani (2014).

14 See La Razón (2016) and Agencia de Noticias Fides ANF (2016).

Since a little over a decade ago, the Brazilian and Peruvian influence progressively introduced water pumps, diving, dredgers, and rafts, which improved the performance of alluvial gold extraction. Currently, the influence of the capital and technology of companies and people of Colombian and Chinese origin improved such performance and increased the intensity of gold exploitation. Adding to the fact that gold is one of the few metals whose international price was not significantly affected by the 2008-2009 crisis, these aspects made gold mining cooperatives the most important group within the mining cooperatives sector.

They represent 62% of the total number of mining cooperatives in Bolivia. Namely, 1,102 cooperatives are gold producers and of this total almost 1,000 are located in the department of La Paz.[15] The mining cooperatives bring together 28,750 direct workers and 143,750 people are benefited by this economic activity.[16] It should be noted that the size, form of operation, and specific organization of each of these gold cooperatives differ according to the region where they belong. These cooperatives are organized in two instances: the Federación de Cooperativas Mineras del Norte de La Paz (Federation of Mining Cooperatives of North La Paz) (FECOMAN) and the Federación Regional de Cooperativas Mineras (Regional Federation of Mining Cooperatives) (FERRECO).

La Paz is the department with the most significant volume of gold extracted (70.1% in 2017 and 41% in 2018) and where 56.90% of the total number of cooperatives of the country operate. The second one is Beni, with 26.3% of the total in 2017 and 46% in 2018.

The main gold zones of Bolivia are:[17]

- The Yungas region in La Paz's department extends up to the north of the Bolivian high plateau (from the Titicaca Lake to the Suchez River border with Peru and Apolobamba).

15 Presentation of the Federación de Cooperativas Mineras Auríferas del Norte de La Paz FECOMAN at the 2017 Gold Symposium (Paredes, 2018). However, in the 2020 version of the same symposium, the Wildlife Conservation Society WCS informed that out of 2,077 mining cooperatives in Bolivia, 1,406 are gold mining cooperatives (Loayza, Reinaga, & Salinas, 2020).

16 Presentation of the Federación de Cooperativas Mineras Auríferas del Norte de La Paz FECOMAN at the 2017 Gold Symposium (Paredes, 2018).

17 These official data regarding the place of origin of gold mining are not necessarily accurate. In order not to exceed the margin of 400 kilograms of gold established by Mining Law 535 (art. 277) and thus be able to benefit from the preferential treatment of royalties of 1%, when volumes are higher, it has become common practice not to report the actual place of origin of said extraction. However, the cooperative miners themselves denounce this practice, as it would significantly affect the allocation of royalties. See: Aguirre (2019), Soto (2019) and CCB (2019).

Figure 3 Gold extraction by department, 2018 (kg).

Source: Own elaboration based on the Ministry of Mining and Metallurgy (2018)

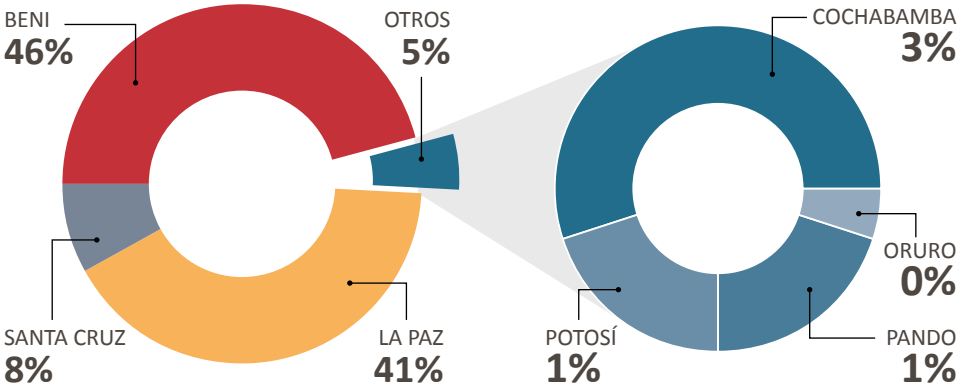
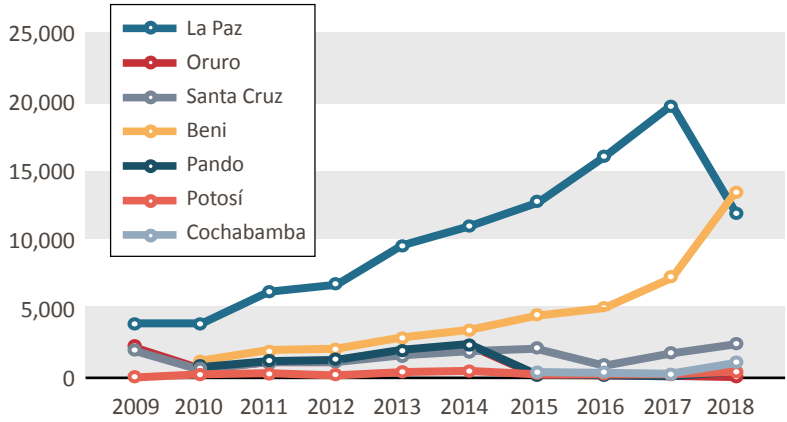


Figure 4 Gold extraction by department, 2009-2018 (Kg).

Source: Own elaboration based on the Ministry of Mining and Metallurgy (2018).

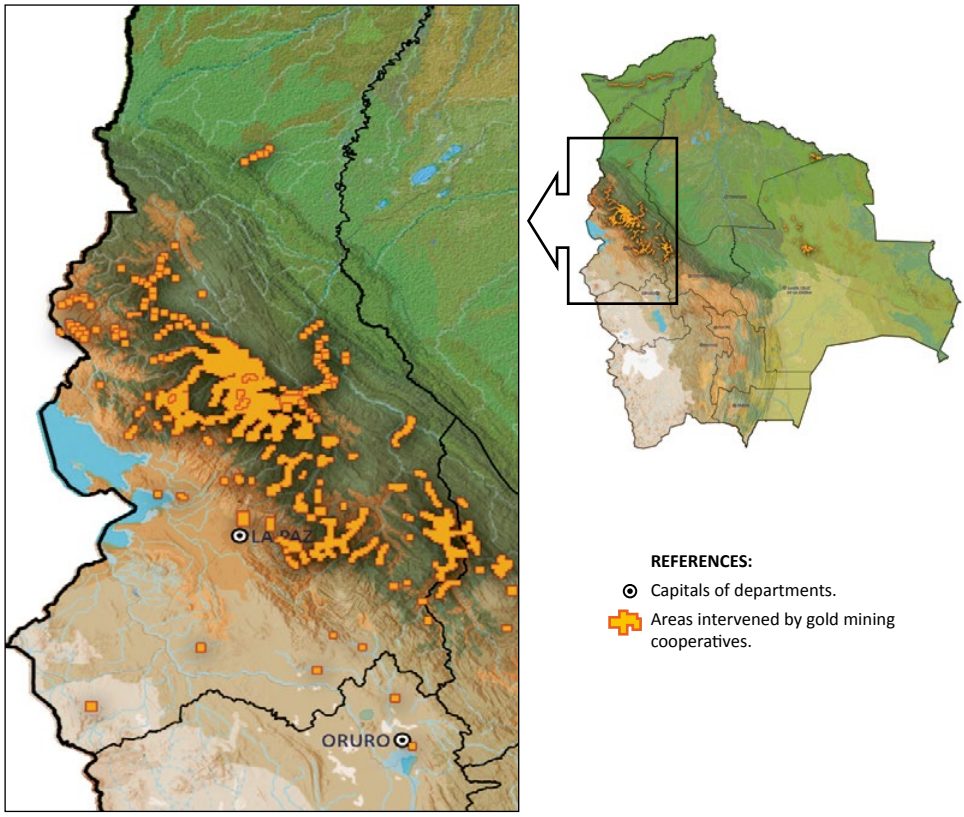


- The municipality of San Ramón and its surroundings (Guarayos region) in Santa Cruz.
- The Madre de Dios and Beni rivers, which demarcate the boundaries of the departments of La Paz, Beni, and Pando, comprise what we will name the North Amazonian region.

The following map of the mining concessions of the gold mining cooperatives[18] provides an idea of the extent of this activity in the Yungas area and the north of the Bolivian Altiplano (highlands), the region with the largest number of gold deposits to date.

Figure 5 Mining concessions of gold mining cooperatives in the Yungas region and the north of the Bolivian highlands, 2014.

Source: Own elaboration based on data from SERGEOTECMIN (2014)



18 The information available corresponds to 2014, and the mining concessions of the gold mining cooperatives were identified based on their denomination. This identification procedure could have left out the gold cooperatives whose names do not explicitly indicate that they extract gold, as well as those gold mining cooperatives that operated but did not have mining concessions.

The number of gold mining cooperatives identified with mining concessions to the year 2014 and the extensions of them is the following:

Table 1 Number of gold cooperatives with mining concessions in the Yungas region and the north of the Bolivian highlands to the year 2014 and the area of their right (Ha).

Source: Own elaboration based on Servicio Nacional de Geología y Técnico de Minas (SERGEOTECMIN) (2014).

DEPARTAMENT	NUMBER OF CONCESSIONS	EXTENSION (HECTARES)	TYPE OF CONCESSIONS
Cochabamba	1	300	Grid
La Paz	710	213,175	Grid
La Paz-Cochabamba	1	625	Grid
La Paz-Cochabamba	3	2,500	Grid
Sin dato	31	13,075	Grid
La Paz	86	14,910	Possesion
TOTAL	**832**	**244,585**	

Historically the eastern Bolivian region has not been a mining region, despite its Precambrian mineralogical potential. However, there are precedents of gold exploitation within the period from 1692 to 1767 in the Jesuit missions (Santa Rosa, San Javier, San Miguel, Santa Ana, Concepción, San Rafael, San Ignacio, San Juan, Santo Corazón and San José).[19] In this region that we call Guarayos, which comprises the provinces of Guarayos, Ñuflo de Chávez, and Chiquitos, cooperatives are not the main form of organization of mining operators. A significant number of small and medium-sized companies, besides the largest gold mine, are located in this zone. In the municipalities of San Ramón, San Javier and Concepción are registered the highest number of gold amalgamation operations (Table 2).[20]

Finally, in the North Amazonian region, the gold extraction is carried out with dredgers placed on rafts that navigate the river. Practically all the rafts of the zone are organized within the Cooperativa Minera Aurífera Asobal-Madre de Dios

19 See Tejada (2012)

20 All the concessions in this zone correspond to grids.

BACK TO CONTENT

Figure 6 Mining concessions of gold mining cooperatives in the Guarayos region, 2014.

Source: Own elaboration based on SERGEOTECMIN (2014).

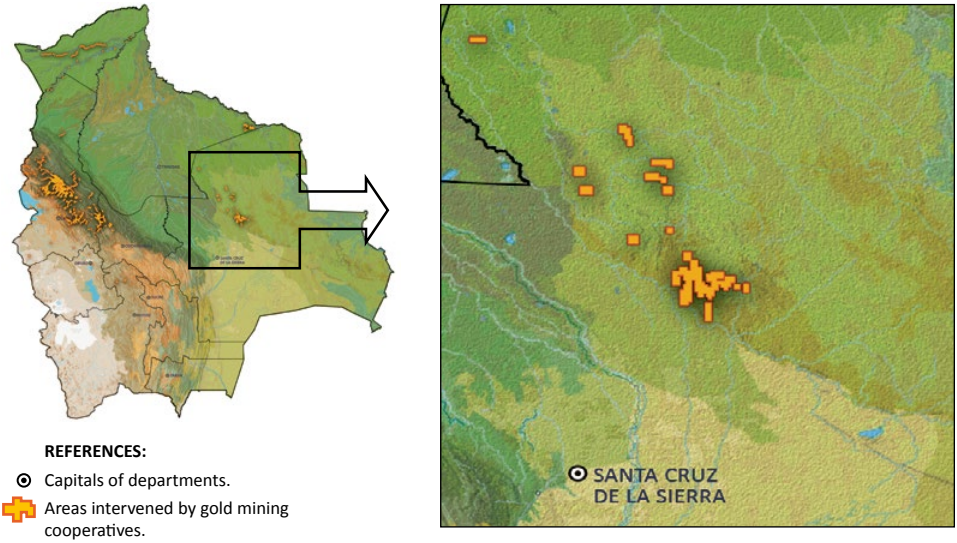


Table 2 Number of gold cooperatives with mining rights in the Guarayos region as of 2014 and the area of their concession (Ha).

Source: Own elaboration based on SERGEOTECMIN (2014).

DEPARTAMENT	NUMBER OF CONCESSIONS	EXTENSION (HECTARES)
Santa Cruz	40	22,525
Without date	4	2,000
TOTAL	**44**	**24,525**

Ltda.[21] This cooperative has a very particular operation since, before organizing around the exploitation of a deposit, there were multiple individual owners of gold extraction rafts who were organized as an association to achieve some common

21 The name ASOBAL comes from the acronym Asociación de Balseros del Río Madre de Dios (Association of Rafters of the Madre de Dios River), which is how they were initially organized in this region.

Figure 7 Mining concessions of gold mining cooperatives in the region of the Northern Amazon, 2014.

Source: Own elaboration based on SERGEOTECMIN (2014)

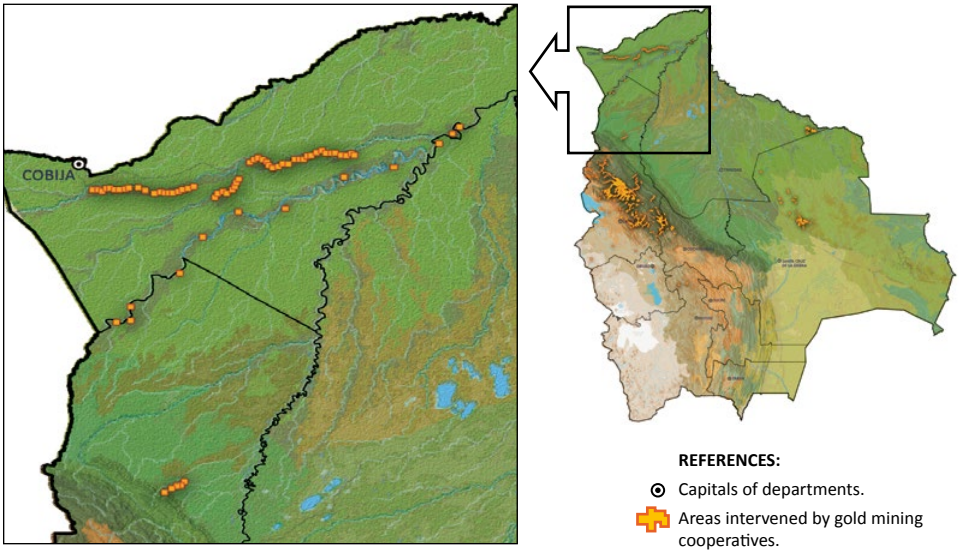


Table 3 Number of gold cooperatives with mining concessions in the North Amazon region as of 2014 and the extension of their concessions (Has).

Source: Own elaboration based on SERGEOTECMIN (2014).

DEPARTAMENT	NUMBER OF CONCESSIONS	EXTENSION (HECTARES)
La Paz	5	575
Pando	16	21,375
Pando-Beni	1	125
TOTAL	**22**	**22,075**

objectives: the legalization of the extraction of gold, the acquisition of fuel, the commercialization of gold and the purchase of mercury[22] (Table 3).[23]

22 Concerning the characteristics of gold mining and the case of the ASOBAL, see Gandarillas & Campanini (2015).

23 All concessions in this area correspond to grids.

1.2 The Use of Mercury in the Sector of Gold Mining Cooperatives

Although the amalgamation of gold with mercury is not the only technology used in the gold extraction process, it is the most widely used in Bolivia.[24] The quantity and form of mercury usage vary according to the mining deposit, operator, process, etc. As an example, it can be mentioned that the extraction of coarse gold does not require mercury, vein mining uses it in various stages of the process, and alluvial mining uses it mainly at the end of the extraction process. However, for the purposes of this study, it is important to have references of the proportion of mercury/gold used in cooperative mining, so secondary and primary information from different cases in each of the zones identified was taken as its basis[25]. Below is shown the data of such proportion:

These data are representative enough related to the main types of gold mining and average mercury consumption (except for the figure of 8.5 parts of mercury for each part of gold extracted, which can be considered high compared to the average).

Table 4 Proportion of Au/Hg used in the amalgamation according to data from different sources for the Bolivian case.

SOURCE	PROPORTION OF AU/HG
Carrilo Claros, Zenteno Pocoata & Rubín de Celis Cuba (2010: 25)	1 / 0,5-2
Antaquilla, interviews	1 / 2-5
Suchez, interviews	1 / 3-5
Chejepampa/ Rosapampa, interviews	1 / 2-5
Quiabaya, interviews	1 / 2
Gold cooperatives in Yani, Sorata-La Paz	1 / 8,5
Gold cooperatives in Zongo, Murillo-La Paz	1 / 0,5-0,67
Gold Cooperatives of San Ramón, Santa Cruz	1 / 1,5
Gold company of San Ramón, Santa Cruz	1 / 0,56-0,75
Raft of ASOBAL, Riberalta	1 / 1

Other data about the use of mercury – technology, costs, storage, and impacts – are not addressed in depth in this investigation since it focuses on commercial-

24 Large companies mainly use other processes such as cyanidation.

25 The information on the cases analyzed is presented in more detail in the Annex.

ization; however, a detailed description of the identified cases that serve as input to know these other elements and their impacts can be found in the annexes.

1.3 Mercury Emissions from Gold Mining Cooperatives in Bolivia

Within the framework of the Minamata Agreement, the Bolivian government carried out a baseline[26] and the Inventario Nacional de Fuentes de Emisión de Mercurio (National Inventory of Mercury Emission Sources[27]) as first efforts to diagnose the situation of mercury in Bolivia.

The inventory shows that the extraction of gold with the use of mercury is responsible for 82.3% of the national mercury emissions in Bolivia or its equivalent of 37,579.2 kg Hg/year (it is estimated that 10,146.39 Kg. are discharged to the atmosphere, 19,120.29 kg to water and 12,806.99 to the ground). According to this inventory, in the second place and far below, are related to dental fillings with 3.9% of the emissions (1,778.22 kg Hg/year).[28] For this reason, this study is limited to the analysis of the gold mining sector.

It should be noted that the inventory was prepared based on tools provided by the United Nations (UN), tools that take general data to calculate estimates as accurately as possible.[29] In the case of Bolivia, the official gold extraction data is not accurate since it does not adequately depict the reality of the gold mining sector. In addition, the estimates used in the inventory are conservative respect to what actually happens.[30] Therefore, we can say that the figures of the mercury emissions data from gold mining are probably much higher.

26 Ministry of Foreign Affairs & Ministry of Environment and Water (2015).

27 Prepared within the framework of the Development of the Initial Assessment of the Minamata Agreement Project (MIA project for its acronym in English for Minamata Initial Assessment), in charge of the Programa Nacional de Contaminantes Orgánicos Persistentes (National Program of Persistent Organic Pollutants) (PRONACOPs) under the supervision of the Viceministerio de Medio Ambiente, Biodiversidad, Cambios Climáticos y de Gestión y Desarrollo Forestal (Vice-Ministry of Environment, Biodiversity, Climate Change, and Forest Management and Development), of the Ministerio de Medio Ambiente y Agua 2017 MMAyA (Ministry of Environment and Water, 2017).

28 Data from the Ministry of the Environment and Water (2017).

29 Some assumptions used in this inventory to make the estimates are: that the 2014 gold extraction data from the Ministry of Mining and Metallurgy are accurate, that private companies do not use mercury in gold extraction, that 36% of the gold extracted by the gold mining cooperatives do not require mercury, that 90% of the gold mining cooperatives that use mercury do not use retorts and the remaining 10% make efficient use of retorts to recover mercury (Ministerio de Medio Ambiente y Agua, 2017: 69-70).

30 It is worth mentioning that the mining sector has complained about this inventory, and the BGI Oro Responsable program carried out another study that worked on more precise information than the estimates made in the inventory. This research was completed at the time of the conclusion of the present report, although it has not been published yet.

2 Mercury Trade in Bolivia

This section presents data and analysis on the commercialization of mercury in the country. This information mainly refers to the national and quantitative level, but to deepen the knowledge on the commercialization chains, it includes qualitative information about some specific importers as illustrative cases.

2.1 Relevance of Bolivia in the Global Mercury Market

Before describing the mercury trade in Bolivia, it is important to analyze the degree of relevance that the country has in the global mercury trade. According to the information on the free platform Trendeconomy based on data compiled by the UN (UN Comtrade, 2019) on international trade, in 2018, Bolivia ranked second among the mercury importing countries in the world, and the first was India.[31] Imports from Mexico[32] to Bolivia for the same year represented the principal commercial flow of mercury globally (25% of global imports) (TrendEconomy.com, 2019).[33]

31 In 2015, Bolivia became the number 1 country in global imports of mercury. The main mercury exporting and importing countries globally, according to this source, are listed in the Annex. Other platforms such as Resource trade.earth assign to the country the first place in imports for 2018 (Chatham House, 2018).

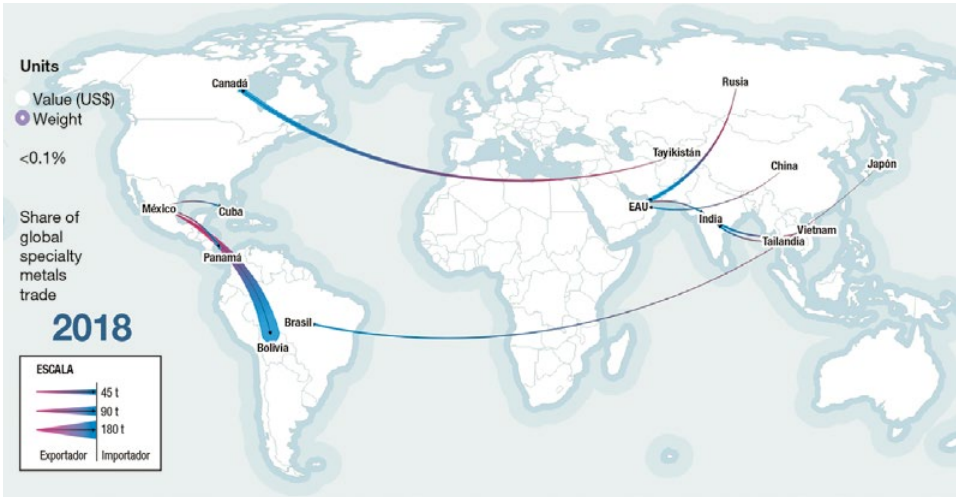
32 The same source identifies Mexico as the leading mercury exporting country with 32% of global exports.

33 See © TrendEconomy.com.

Table 5 Central mercury importing countries globally (2010-2018).
Source: TrendEconomy.com (2019).

COUNTRY	2010	2011	2012	2013	2014	2015	2016	2017	2018
India	2	2	3	2	4	2	1	1	1
Bolivia	54	37	20	21	13	1	2	2	2
South Africa	40	22	13	11	6	5	5	9	3
Kenya	21	128	132	12	124	127	118	8	4
Brazil	13	17	11	9	5	21	6	6	5

Figure 8 Main trade flows of mercury (2018).
Source: Chatham House (2018).



In 2014, the Coordinating Center of the Regional Center of the Basel Convention for Latin America and the Caribbean - Stockholm Convention and the United Nations Environment Program (UNEP) identified an increment of the intercontinental trade with a central role of Mexico as an exporter and Bolivia as an importer (Santana, Medina & Torre, 2014). Although the UNEP study of mercury trade also positions Bolivia as one of the most important importing countries, its analysis is focused on the period 2013-2015 (United Nations Environment Pro-

BACK TO CONTENT

gram, 2017:34). However, since 2015 it was registered an important enlargement of the import figures for the country.[34]

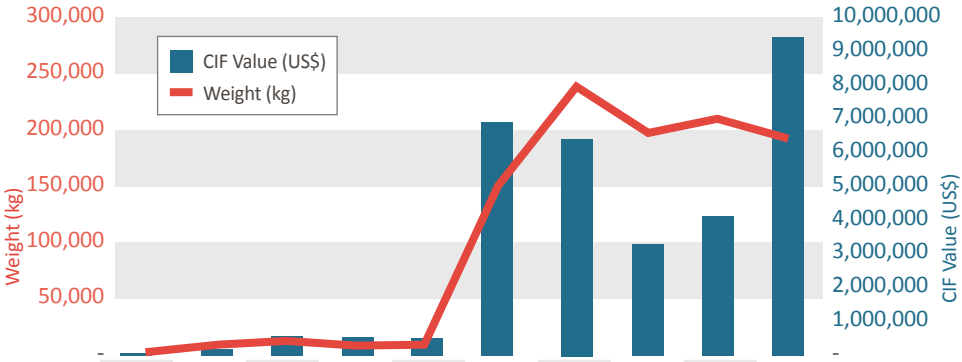
2.2 Official Imports and Analysis of the Data on Imports

In Bolivia, there are no legal restrictions for the importation and commercialization of mercury. Accordingly, next, we analyze the general information about its legal importation.

2.2.1. Official Data on the Importation of Mercury

The government entity that officially publishes statistics on imports and exports in Bolivia is the Instituto Nacional de Estadística (National Institute of Statistics) (INE).[35] The mercury import data from this institution are the following:

Figure 9 Weight and value of mercury imports to Bolivia, 2010-2019 (kg)[36]
Source: Own elaboration based on INE (2019).



	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
CIF Value (US$)	40,622	202,100	602,807	556,309	522,910	6,893,737	6,398,342	3,277,254	4,169,825	9,485,974
Weight (kg)	1,710	8,710	15,837	9,268	12,701	151,497	238,330	197,832	210,384	192,876

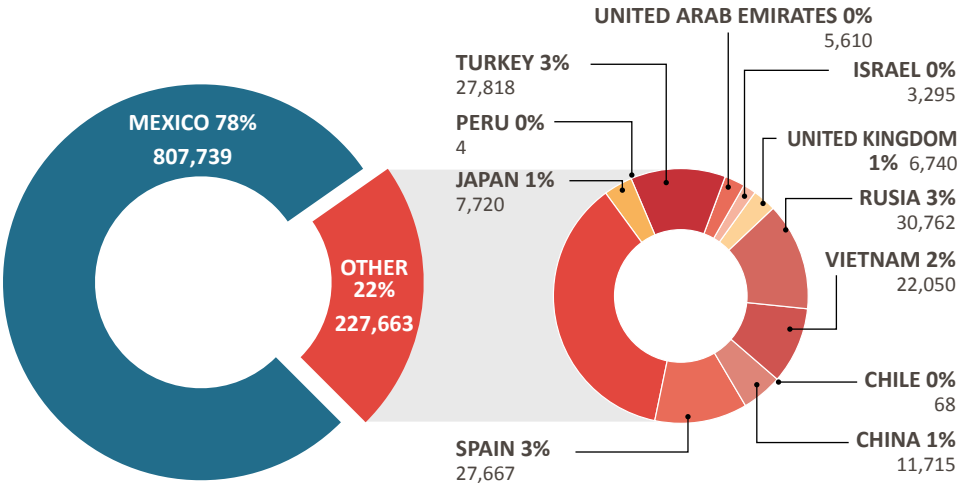
34 An annex includes maps showing the evolution of global mercury trade flows by year (2010-2018), thus visually showing Bolivia's importance in the global mercury trade since 2015.

35 Instituto Nacional de Estadística.

36 Data has been available since 2000. However, the volume in the period 2000-2009 is minimal (average of 502 kg/year, the total in the ten years is 5,021 kg), so the analysis is restricted to the period 2010-2019.

Figure 10 Percentage (%) and weight (kg) of mercury imports by importing country, 2010-2019

Source: Own elaboration based on INE (2019)



As can be seen, there was an extraordinary growth in the volume and value of imports since 2015, almost 12 times concerning the previous year's value. It was reached a historical peak in imports of 151.5 tons of mercury in that same year and 238.3 tons in 2016. In the period from 2015 to 2019, Bolivia legally imported a total of 990.9 tons.

The most important country in imports is Mexico, with 78% (807,739 kilos) of the total of imports in the 2010-2019 period, being the leading supplier from the year 2014 to the year 2018. In 2019, this tendency to import practically all mercury from Mexico changed and became the fifth supplier country. India was the leading supplier of mercury in 2019 with 76 tons, followed by Russia with 30.7 tons, Turkey with 24.4 tons, and Vietnam with 22 tons. Vietnam and Russia appeared for the first time in the mercury import statistics, and in the case of Turkey, it was its second year in that role.

As of the year 2018, practically the total of official imports entered Bolivia by land (98.9%), mainly through Arica (90.8%), and it was registered in the interior Customs of La Paz (98.4%).[37] For 2010-2018, the main entry route for legally im-

37 Detailed tables of imports for the period in question by the importing country, point of entry, and means of transport

Figure 11 Weight (kg) of mercury imports by the importing country, 2014-2019

Source: Own elaboration based on INE (2019)

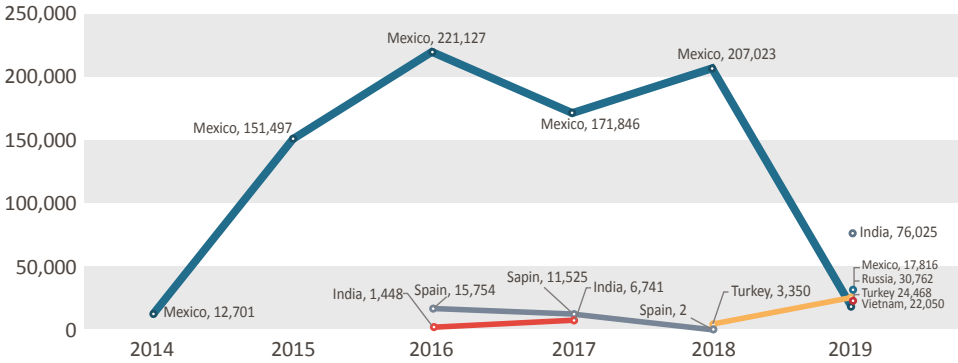
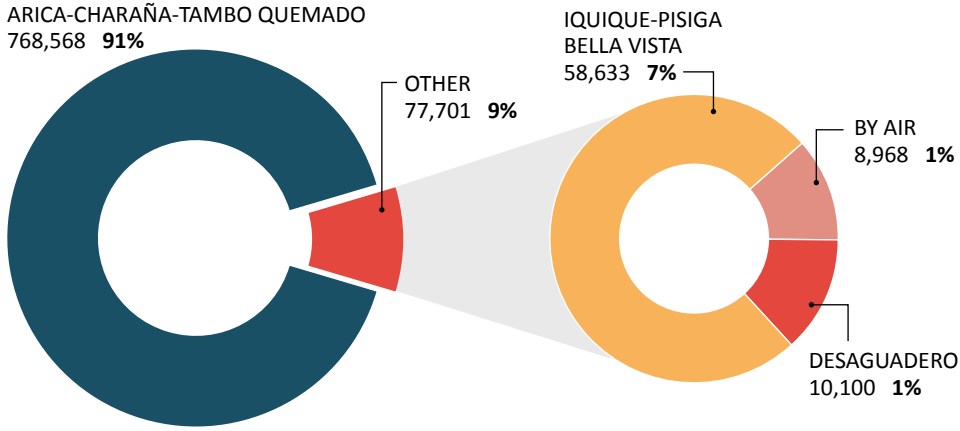


Figure 12 Percentage (%) and weight (kg) of mercury imports by point of entry, 2010-2018

Source: Own elaboration based on INE (2019)



ported mercury was by land using Chilean ports (97.7%). The Arica-Charaña-Tambo Quemado route was the most important route, with 90,8% (768.6 tons) of the total accumulated imports. The second one was the Iquique-Pisiga-Bella Vista

are attached in the Annex.

route with 6.9% (58.6 tons). Minimum import figures were registered as imports by air (1.1%: 8.9 tons) and through Peru (1.2%: 10.1 tons).

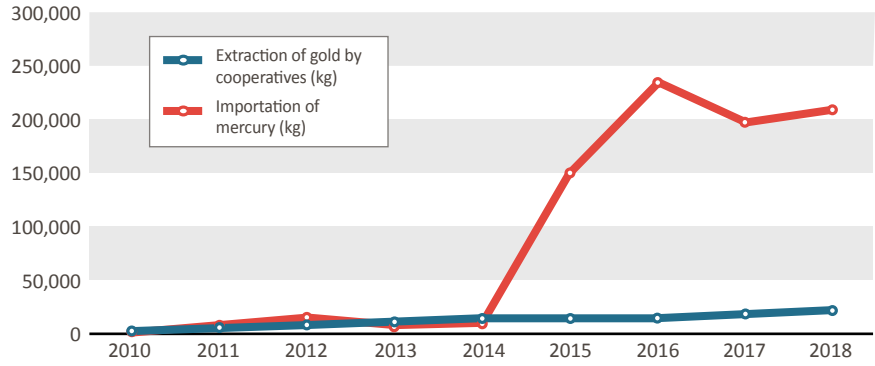
2.2.2 Correlation Between Gold Extracted and the Imported Mercury

Although there are data regarding the importation of mercury, it is worthy to compare the behavior of mercury imports with the gold extracted. Mercury has other uses besides gold amalgamation, but most of it is used for this purpose[38]. This exercise will allow another perspective to identify possible "quantities in excess" or "deficits" of mercury.

One parameter to consider is the extraction of gold by the cooperatives[39] in relation to the imported mercury.

Figure 13 Mercury import (kg) vs. cooperatives gold extraction (kg)

Source: Own elaboration based on the Ministry of Mining and Metallurgy (2018, 2019) and INE (2019)



The behavior of mercury imports in reference to gold extraction does not show a clear correlation, especially before 2015, since in some years, there was a more significant amount of gold extracted that even exceeded the imported mercury

38 According to the government's inventory of sources of mercury emissions, the sources of emissions from consumption of mercury in products, whether dental or other medical and laboratory equipment, reach 3.9. Gold extraction represents 82.3% of the sources of mercury emissions (PRONACOPs. MIA Project, 2019).

39 While many small and medium-sized companies use mercury, the volume of those that process gold with cyanide accounts for the majority of gold officially reported.

Table 6 Au/Hg proportion ratio between gold mining data from cooperatives and mercury imports

Source: Own elaboration based on the Ministry of Mining and Metallurgy (2018, 2019) and INE (2019)

YEAR	GOLD EXTRACTION BY THE COOPERATIVES (KG)	MERCURY IMPORTS (KG)	AU/HG PROPORTION
2010	3,550	1,710.00	1/0.48
2011	5,473	8,710.00	1/1.59
2012	9,447	15,837.00	1/1.68
2013	10,273	9,268.00	1/0.90
2014	14,667	12,701.00	1/0.87
2015	14,306	151,497.00	1/10.59
2016	16,191	238,330.00	1/14.72
2017	19,648	197,832.00	1/10.07
2018	23,789	210,384.00	1/8.84

in absolute terms. From 2015 on, imports have skyrocketed, and although gold mining also increased, this increase is not directly correlated with mercury imports.

According to the table above, the figures for mercury imports are very high compared with gold extracted by the cooperatives since 2015. The peak point was reached in 2016 with 14.72 kilos of imported mercury for every kilo of gold extracted by the cooperatives. A correlation is undoubtedly higher if it is considered the number of cooperatives at the head of the basin that obtains coarse gold without using mercury[40] and the number of those that recover it[41]. Although it is not correct to make this comparison, the same is not even related with data from exceptional cases where the proportion of mercury is very high, such as the case of the gold cooperative at Yani, where the amalgamation process is carried out in an open circuit.[42]

Therefore, between 2010-2014, the amount of imported mercury did not satisfy the cooperative's demand for gold extraction, so there was a "deficit." However,

40 People familiar with the subject estimate that 30% of the operations at the head of the basin are fine gold and require amalgamation. The rest is thick gold that does not require this process.

41 The degree of recovery is pinpointed for the case studies detailed in the annexes. However, the people interviewed mentioned that the higher the price of gold, the lower the effort made by miners in that area to recover the mercury, particularly for the Yungas region and the northern highlands.

42 The UNEP estimates that 75% of the small and artisanal mining amalgamates all the extracted material (United Nations Environment Program, 2017: 77).

from 2015 to 2018, the quantities of mercury were way above the requirement; in other words, a significant "surplus" was recorded. The deficit in the first period is an indication of possible illegal mercury imports, while the surplus of the second stage is a sign of either underreporting the actual gold extracted[43] in Bolivia, illegal re-exports of mercury to neighboring countries, or both.

2.2.3 Comparison with Export Data from Supplier Countries

A second exercise consisted in analyzing the discrepancies between the export data of the countries that supply mercury to Bolivia and the import data of Bolivia. The United Nations Environment Program (UNEP) mentions Bolivia among the countries that have differences in their mercury import reports in the 2013-2015 period[44] (United Nations Environment Program, 2017: 25-26).

Table 7 Comparison between imports to Bolivia and mercury exports from Mexico, 2010-2018

Source: Ministry of Economy (2019) for data from Mexico and INE (2019) for data from Bolivia

YEAR	REPORT OF EXPORT FROM MEXICO TO BOLIVIA		REPORT OF IMPORTS TO BOLIVIA FROM MEXICO		BOLIVIA-MEXICO DIFFERENCE			
	Value (US$)	Volume (kg)	Value (US$)	Volume (kg)	Dif. value (US$)	%	Dif. volume (kg)	%
2018	4,622,811	163,276	3,882,427	207,023	(740,384)	-19.1%	43,747	21.1%
2017	3,098,334	142,438	2,529,855	171,846	(568,479)	-22.5%	29,408	17.1%
2016	6,647,266	193,166	5,604,475	221,127	(1,042,791)	-18.6%	27,961	12.6%
2015	7,078,968	138,587	6,408,208	151,497	(670,760)	-10.5%	12,910	8.5%
2014	1,561,279	23,977	494,266	12,701	(1,067,013)	-215.9%	(11,276)	-88.8%
2013	399,323	4,004	543,640	9,267	144,317	26.5%	5,263	56.8%
2012	848,399	9,763	330,172	6,496	(518,227)	-157.0%	(3,267)	-50.3%
2011	183,283	7590	186,901	8,324	3,618	1.9%	734	8.8%
2010	34,838	1,516	34,837	1,642	(1)	0.0%	126	7.7%

43 13 Inconsistencies in the data of gold extraction confirm that the record of the gold extracted is a problem and that there is undeclared gold. The differences between the gold extracted and the gold exported confirm this situation. (Gandarillas & Campanini, 2015).

44 14 Likewise, it identifies Mexico as one of the countries with discrepancies in export data.

According to official information from the Bolivian State, the leading supplier of mercury is Mexico, thus simplifying the analysis to a single case. The table 7 compares the official data of exports from Mexico to Bolivia with those of imports to Bolivia from Mexico and calculates the difference.

As we can see, there are relevant differences (10-25%) in terms of weight and value in the 2015-2018 period, significant (more than 50%) in the 2012-2014 period and smaller (less than 10%) in the 2010-2011 period[45].

According to UNEP (2017: 24) and CCA (2017: 42), these differences are related to:

- The statistical treatment of re-exports and goods in transit.
- Errors in digital recording from manual documents.
- Undocumented shipments, especially with goods that go through duty-free or free trade zones, are stored in customs warehouses.
- Lack of clarity regarding the actual origin and destination of the goods.
- Incorrect coding of goods.

The analysis of the importers carried out below allows having criteria to assess which of these aspects responds to the differences identified in the official data. However, the lack of control and the deficits and surpluses of mercury are also factors to be considered.

2.3 Main Importers of Mercury in Bolivia and Illustrative Cases

The Bolivian customs denied access to information on importers, amounts, and quantities of imported mercury.[46] However, based on documentation on commercial transactions at a global level, it was possible to obtain a piece of detailed information on the importation of mercury to Bolivia.[47] Similarly, the interviews with some of the importers made it possible to complement the obtained quantitative and qualitative information. Based on these sources, we present a more extensive detail of mercury imports to the country.

45 Before 2010, mercury imports from Mexico to Bolivia were negligible (in 2007 were 86 kilos) or non-existent.

46 As part of the present study, this information was officially requested. The request was denied.

47 Two bases of information were used: Penta-Transaction. Online statistics (2018) and Great Export-Import (2018).

2.3.1 Legal Importers of Mercury

37 mercury importers were identified in Bolivia for the period 2014-2018[48]; 16 were located in La Paz, 10 in El Alto, 2 in Santa Cruz, 1 in Cochabamba, and for 8 of them, their location could not be determined. Despite having importers in Santa Cruz and Cochabamba, the number of transactions is minimal (3) compared to import operations carried out in La Paz (182) and El Alto (77).

It is important to clarify that when evaluating the number of operations, the weight and the value of imports were taken into account by two information databases, which do not provide similar data in all cases. Table 8 and the general analysis provided information that presents lower values (MIN or minimum).

From the total number of transactions observed, 242 (84%) correspond to importers that have established in their constitution the activity of commercialization of inputs for mining or explicitly the sale of mercury. A minimum quantity of imports comes from companies whose category belongs to laboratories (0.7%) and paints or chemicals (1.4%). It calls our attention the presence of some entities whose purpose differs from the sectors that use mercury, such as hardware stores, clothing businesses, and the sale of household appliances.

According to these information databases, during the 2014-2018 period it was imported 647 tons of mercury for 18,098,880 US. Dollars as a minimum, and a maximum of 1,366 tons for 39,943,456 US. Dollars.[49].

In terms of weight, the mercury trading entities and those related to mining activities imported 541,806 kilos (84%), those corresponding to chemicals, textile, and cosmetics 3,560 kilos (0.6%). In comparison, those companies with different objectives listed in their constitution: hardware stores and household appliances sales commercialized 41,472 kilos (6.4%). A total of 59,815 kilos (9.2%) correspond to importers without information about their category. Most of the imported mercury went to La Paz (392,764 kg, 60.7%), followed by El Alto (191,002 kg, 29.5%).[50] This differentiation, due to the proximity of both cities, is insignificant,

48 Only in one database are registered some transactions before 2014 and for 2019. However, in the first case, the information is not complete, and in the second case, it is partial or preliminary.

49 For the same period, the official data of the INE reports 810.74 tons.

50 There are importers whose records in Fudempresa and Boliviapymes differ between La Paz and El Alto. In these cases, it is assumed as they were based in La Paz. These importers most likely have offices/warehouses in both cities.

Table 8 Identified importers of mercury to Bolivia, 2014-2018.

Source: Own elaboration based on information obtained from Penta-Transaction. Statistics (2018) and Great Export-Import (2018) for data by importers, Fundempresa (2019), and Bolivia pymes (2019) for data about category object of constitution, contact, address, registration, and NIT.

IMPORTER	COMPANY TYPE	SECTOR	CITY	PERIOD	# OP. MIN	WEIGHT (KG) MIN	FOB VALUE ($US) MIN
PALOAN SRL	SRL	Mining, textiles	LP	2015-2018	47	161,414.5	5,891,661.8
INSUMER BOLIVIA SRL	SRL	Mining	LP	2015-2017	74	116,224.0	4,767,822.1
JUAN ORIHUELA MAMANI IMPORT-EXPORT	Uni	Mining	EA	2016-2018	20	63,002.7	718,425.0
VIRGINIA QUENALLATA KELCA, REYREX INTERNATIONAL	Uni	Mining	EA	2015-2016	23	41,985.0	858,187.5
JUAN CARLOS CALLA KAJCHAYA	w/i			2016-2018	12	40,570.7	209,680.5
HUGO ANSELMO RIVERA CHOQUE	Uni	Hardware, clothing	EA	2014-2018	13	38,191.5	433,247.8
MERCURIO Y QUÍMICOS SRL	SRL	Mining, industrial, related	EA, LP	2015-2018	18	34,600.1	1,083,390.0
EMPRESA MINERA OKORANI BRAND SRL	SRL	Mining	LP	2015-2016	10	24,175.3	330,666.7
CONSORCIO DIEMIENSA SRL	SRL	Mining	EA	2016-2018	9	21,679.0	340,655.4
IMPORTADORA ESCARCENA Y ASOCIADOS SRL	SRL	Mining	LP	2014-2015	6	12,550.0	564,484.5
AUROSOL SRL	SRL	Mining	LP	2014-2015	5	11,370.0	527,585.7
ALVIOR BOLIVIA SRL	SRL	Mining	LP	2014-2015	6	10,227.3	379,505.4
LUIS ENRIQUE RODRÍGUEZ MORENO	w/i			2018	5	9,004.5	105,915.0
GUSTAVO MIRANDA HULLIRI, IMPORTACIONES GMKC	Uni	Mercury marketing	EA	2018	4	7,854.0	156,828.0
NICOLE CORP SRL	SRL	Mercury marketing	EA	2015-2016	4	7,566.0	271,505.0
NEORCIN SRL	SRL	Mining	EA	2016	1	7,495.0	289,800.0
THE MORPHAZ INVERSIONES SRL	SRL	Mining	LP	2014-2015	5	5,209.5	184,230.0
THALASSACORP SRL	SRL	Mining	LP	2015	2	4,587.3	136,620.0
GENARO ADRIÁN CERDA ACARAPI	w/i			2016	1	4,002.0	145,840.0

(Table continues on next page)

Table 8 Identified importers of mercury to Bolivia, 2014-2018.

Source: Own elaboration based on information obtained from Penta-Transaction. Statistics (2018) and Great Export-Import (2018) for data by importers, Fundempresa (2019), and Bolivia pymes (2019) for data about category object of constitution, contact, address, registration, and NIT.

IMPORTER	COMPANY TYPE	SECTOR	CITY	PERIOD	# OP. MIN	WEIGHT (KG) MIN	FOB VALUE ($US) MIN
AMRESH TRADING SRL	SRL	Mining	LP	2017-2018	2	3,880.0	49,895.9
RUTH APARECIDA SILVA DE QUIROGA	Uni	Chemical, textiles	LP	2015	2	3,420.0	44,812.0
GENNY GLADYS HOYOS CUELLAR	Uni	Home appliances	SC	2018	1	3,280.0	51,745.0
J.G.& J.P.IMPOR.EXPOR.REPRESENTACIONES SRL	SRL	Mercury marketing	EA	2016	2	2,780.0	116,580.8
METALES DE BOLIVIA SRL METBO SRL	SRL	Mining	LP	2016-2018	2	2,687.5	116,845.0
VICTORIA HURTADO MAMANI	w/i			2018	2	2,477.2	28,945.5
INGENIEROS EN QUÍMICOS Y MINERALES INGERQUIM SRL	SRL	Mining, industrial, related	LP	2018	1	2,070.0	60,030.0
CINTIA RENGEL ARUQUIPA	w/i			2015	2	2,035.5	119,818.5
ELISA HUAMAN CHÁVEZ	w/i			2016	1	1,035.0	31,050.0
PERCY FERNÁNDEZ VITORINO	w/i			2018	1	690.0	20,700.0
A F FUTURO SRL	SRL	Mining, industrial, related	EA	2015	1	448.5	29,601.0
SOCIEDAD QUÍMICA POTOSÍ SRL	SRL	Paints	LP	2015	1	345.0	18,970.0
JORGE CARLOS GONZALES FELICIANO	Uni	Chemical and cosmetics	CBBA	2014	1	140.0	13,490.0
VEGA ALARCÓN DANIELA MABEL	Uni	Laboratories	LP	2018	1	3.6	229.0
ABENDROTH INTERNACIONAL DE SOLUCIONES ANALÍTICAS Y TECNOLÓGICAS SRL AISATEC SRL	SRL	Laboratories	SC	2018	1	1.9	76.0
ANDRÉS IGNACIO VARGAS ROJAS	w/i			2016	1	0.3	41.0
LOXIN	Uni	Mining	EA, LP	2015	2*	2,237.1*	119,818.5*
STACEY IMPORTS	Uni	Mining	EA	2016-2018	17*	62,690.2*	1,433,118.9*

Op: Number of operations performed
s/i: Without information
Uni: Sole ownership
City: LP = La Paz | EA = El Alto | SC = Santa Cruz | CBBA = Cochabamba

* These data correspond to the information database with maximum values (MAX) since the base assumed as principal did not present regarding these importers.

BACK TO CONTENT

so more than 90% of the mercury reached La Paz-El Alto. The cities of Santa Cruz and Cochabamba are smaller as importers (3,422 kg, 0.529%).

9 of the 37 importers listed in Table 8 brought near 84% of the total of imported mercury and 3 of them more than 50% or at least 340 tons (Paloan SRL, Insumer Bolivia SRL, and Juan Orihuela Mamani Import-Export).

Some of the most important mercury importers were interviewed.[51] Below there are some qualitative data of them:

Case: Supplier Nº 1

General data

- Country of origin of the imports……. Mainly from Mexico and to a lesser extent from Chile
- Purchase price:…….14-15 US$/kg
- Sale price:…….1,100-1,500 Bs/kg
- Supply zones:……...Beni, La Paz and Santa Cruz

Table 9 Imports of Supplier N° 1 in the period 2017-2018

Source: Penta-Transaction. Online statistics (2018)

DATE	ORIGIN	FOB VALUE $US	GROSS KG
28-2-17	Mexico	88,320.00	2,760.00
30-5-17	Mexico	93,150.00	3,105.00
30-8-17	Mexico	44,436.00	1,587.00
30-8-17	Mexico	43,470.00	1,552.50
30-11-17	Mexico	68,310.00	3,105.00
28-2-18	Mexico	90,045.00	3,105.00
30-7-18	Mexico	99,360.00	3,105.00

51 At least six importers were contacted, but only three of them agreed to the interview.

Importation

The supplier purchases mercury mainly from Mexico and, to a lesser extent from Chile, loosely in some period, it obtained it from the United States and England. He commented that the United States and the European Union banned the exportation of this metal.

The mercury coming from Mexico is sent in a metal container; each container carries 34.5 kilos and is hermetically sealed.

Sale of Mercury

According to this supplier, the selling price in the domestic market is 1,100-1,200 Bs/kg and can reach up to 1,500 bolivianos depending on the place of demand in the country. He sells on a wholesale basis to distributors in the national territory. He mentioned that he has clients in Peru, where the use of mercury is controlled. He does not know the form of entry of the mercury there, but frequently these clients look for him in Bolivia.

The sale of mercury is constant and continuous.

His clients are in all the areas where they work with gold: Beni, La Paz, and Santa Cruz. Most of their sales are to wholesalers who resell the mercury.

The product purchased in Mexico is transferred to plastic containers with the name of mercury "El Español" since this is the name preferred in the country.

Storage

The imported mercury is stored in the city of El Alto and distributed or delivered to the clients from there. He also said that there is no special permit to store this merchandise.

Controls

There are no restrictions to importing mercury as long as they are registered as an importer. There was not any control or prohibition applied to its commercialization. He mentioned that he knows that Bolivia signed the Minamata Convention, but he does not know when the imports will be prohibited. People who sell mercury disagree with the prohibition since it was not socialized; no alternatives that could replace this input were presented, and thinks is even worse now with the current price of gold. That is why he is considering importing cyanide because there are no restrictions for this element.

Case: Supplier Nº 2

General data

- Country of origin of the imports……Mainly from Mexico and to a lesser extent from Chile
- Purchase price:…….... 14-16 US$/kg (outside Customs) 900 Bs/kg or ~ 128 US$/kg
- Sale price:……. 1,200 Bs/kg
- Supply zones:……... Beni and La Paz

Importation

The supplier purchases the product mainly from Mexico and, to a lesser extent, from Chile. The mercury from Mexico is characterized by its metallic container containing 34.5 kilos, is hermetically closed, and is packed on pallets.

Table 10 Imports of Supplier N° 2 in the period 2017-2018

Source: Penta-Transaction. Online statistics (2018)

DATE	ORIGIN	FOB VALUE $US	GROSS KG
30-3-17	Mexico	36,225.00	3,450.00
30-4-17	Mexico	24,150.00	2,415.00
30-6-17	Mexico	38,775.00	2,837.00
30-6-17	Mexico	31,050.00	3,105.00
30-7-17	Mexico	31,050.00	3,105.00
30-8-17	Mexico	40,020.00	4,388.00
30-9-17	Mexico	43,470.00	4,347.00
30-10-17	Mexico	20,700.00	2,070.00
30-11-17	Mexico	31,050.00	3,405.00
30-12-17	Mexico	34,500.00	3,450.00
30-1-18	Mexico	34,500.00	2,799.21
28-2-18	Mexico	34,500.00	3,450.00
28-2-18	Mexico	34,500.00	3,450.00
30-4-18	Mexico	34,500.00	3,450.00
30-5-18	Mexico	51,750.00	3,450.00
30-6-18	Mexico	51,750.00	3,450.00
30-7-18	Mexico	51,750.00	3,450.00

Sale of Mercury

The supplier commented that the price outside Customs is 900 Bs/kg, while in the domestic market is 1,200 Bs/kg. The clients are primarily other distributors responsible for offering the product to cooperatives located in regions such as La Paz and Beni. He sells as it usually comes from the factory in 34.5 kg metal containers.

He is only dedicated to the importation and commercialization of mercury. He pointed out that the demand for input in recent years has been increasing, but he fears the prohibition by the Minamata Convention.

Storage

The importer has a warehouse in El Alto where it stores the merchandise to be sold.

Controls

He had no problems commercializing mercury or with any prohibition under the framework of the Minamata Convention.

Regarding the Minamata Convention, he said that it prohibits mercury in mining but gives the possibility that it could be an agreement for its controlled commercialization among producers and those that need the input. He hopes the government could grant at least ten years of adequation.

He is aware of the environmental problems caused by mercury. However, he attributes them not to its commercialization but to the irresponsible use of the mining operators who do not have more efficient processes.

Case: Supplier Nº 3

General data

- Country of origin of the import:..... Mexico, to a lesser extent from Chile and in the past from Blegium
- Purchase price: ..... 13-16 US$/kg
- Sales price: ..... 1,200 Bs/kg
- Supply zones: ..... Beni, La Paz and Santa Cruz

Importation

The supplier purchases mercury mainly from Mexico and to a lesser extent from Chile; he exceptionally imported it from Belgium before the European Union ban on the export of mercury.

Although his sales are constant, the supply depends on the international marketing price. He acquires larger volumes in certain months of the year.

Table 11 Imports of Supplier N° 3 in the period 2017-2018

Source: Penta-Transaction. Online statistics (2018)

DATE	ORIGIN	FOB VALUE $US	GROSS KG
30-1-17	Mexico	149,040.00	4,140.00
30-1-17	Mexico	149,040.00	4,140.00
28-2-17	Mexico	161,460.00	4,485.00
30-3-17	Spain	162,000.00	5,175.00
30-5-17	Mexico	76,569.30	3,105.00
30-6-17	Spain	143,477,98	5,750.00
30-7-17	Japan	178,825.00	6,900.00
30-9-17	Mexico	82,800.00	4,140.00
30-10-17	Mexico	48,300.00	2,415.00
30-10-17	Mexico	82,800.00	4,140.00
30-12-17	Mexico	109,054.50	3,760.50
30-1-18	Mexico	80,730.00	2,070.00
30-1-18	Mexico	40,365.00	1,035.00
28-2-18	Mexico	203,550.00	3,450.00
30-3-18	Mexico	113,195.00	3,588.00
30-5-18	Mexico	166,648.80	2,760.00
30-6-18	Mexico	248,400.00	4,140.00
30-7-18	Mexico	219,420.00	4,140.00

Sale of Mercury

The price of a kilogram of mercury in the domestic market in 2019 was 1,200 Bolivians. The input is delivered to distributors from different places who sell it at a higher price. It is commercialized among well-known clients who demand large quantities; basically, the imported merchandise is already sold when entering the country.

Most of his clients are resellers in La Paz, Santa Cruz, and Beni since it is in those places where there is a greater demand. He stated that most of his clients are nationals.

Mercury is sold in its original packaging (of 34.5 kg) since customers buy it that way.

The commercialization is constant throughout the year. The importer pointed out that there is an increase in the demand for this product.

Storage

The importer counts with adequate facilities in El Alto, which allow for safe storage by having more space and ease of access.

Controls

He never had problems with the importation or marketing of mercury. He affirmed, however, that there is susceptibility regarding its future commercialization and importation. He assured that there is a total ignorance of the Minamata Agreement concerning the term they have to continue with the commercialization of mercury as to the present date. He pointed out that if the government could establish specific conditions that guarantee greater control, whether, in the storage, handling, and use of mercury, he would be willing to meet all those requirements to continue with his commercial activity in the best way possible.

2.4 The Mercury Business

Although the information available is insufficient to analyze the characteristics of the mercury business in Bolivia, it is possible to make estimates that provide a general idea of its economic dimensions.

2.4.1 The International and National Prices of Mercury

Mercury, unlike other minerals, is not listed on the exchanges, so its price is defined in each transaction. It should also be noted that, in recent years, the price has been significantly influenced by the implementation of the Minamata Convention.[52] Therefore, despite the difficulties in identifying an international price,

52 The bans on the sale of mercury that have been made effective, particularly in the US and the EU, generated specific

the prices displayed on the website www.metalary.com serve as a reference to understand the behavior of the mercury market globally.

Table 12 The International price of mercury, 2000-2018 (US$/Flask, US$/kg)
Source: Metalary (2019)

YEAR	PRICE (US$FLASK)[53]	PRICE ADJUSTED FOR INFLATION (US$/FLASK)	MARKET PRICE (US$/KG)	MARKET PRICE ADJUSTED FOR INFLATION (US$/KG)
2000	155.00	228.43	4.47	6.58
2001	155.00	222.21	4.47	6.40
2002	170.00	218.71	4.90	6.30
2003	170.00	234.48	4.90	6.76
2004	400.00	537.22	11.53	15.48
2005	775.00	1,006.64	22.33	29.01
2006	670.00	843.27	19.31	24.30
2007	530.00	648.90	15.27	18.70
2008	732.00	863.41	21.10	24.88
2009	753.00	891.74	21.70	25.70
2010	900.00	1,049.04	25.94	30.23
2011	1,450.00	1,637.72	41.79	47.20
2012	1,990.00	2,201.40	57.35	63.44
2013	2,600.00	2,833.69	74.93	81.66
2014	3,540.00	3,797.42	102.02	109.44
2015	3,740.00	4,007.95	107.78	115.50
2016	4,120.00	4,315.91	118.73	124.38
2017	1,450.00	1,484.80	41.79	42.79
2018	2,000.00	2,000.00	57.64	57.64

Based on official information from the INE, it is possible to calculate an average price of the imports to Bolivia, resulting from the comparison between the value and the weight officially reported. These data and the comparison with the behavior of the price behavior at the international level are presented next.

markets in these spaces, remaining outside a free trade market with the rest of the countries (mainly Latin America, Africa, and Asia). These restrictions also caused a period (2011-2016) of extraordinary increase in the price of mercury (without a clear correlation with the demand at that time) to finally drop and become regular since 2016. In this regard, see United Nations Environment Program (2017: 47-48), Bender & Narvaez (2016).

53 Flask=76 lb

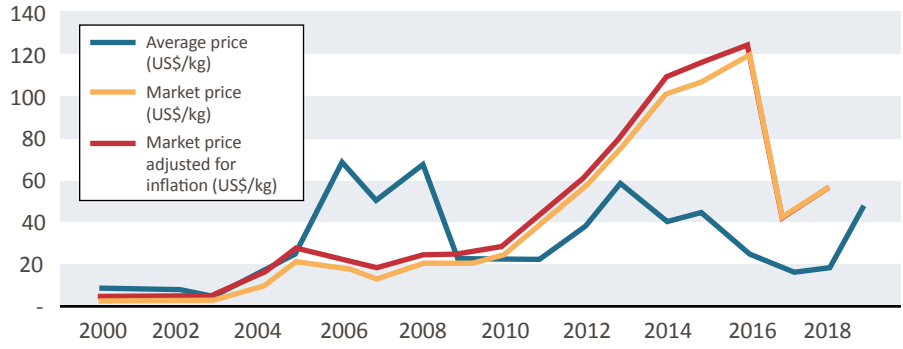
Table 13 Estimated mercury price in Bolivia from official import data, 2000-2019 (US$/kg)

Source: Own elaboration based on INE (2019)

YEAR	CIF VALUE ($US)	WEIGHT (KG)	AVERAGE PRICE (US$/KG)
2000	4,111	395.00	10.41
2001	1,727	162.00	10.66
2002	199	20.00	9.95
2003	18,586	3,027.00	6.14
2004	7,148	438.00	16.32
2005	9,723	369.00	26.35
2006	6,372	90.00	70.80
2007	13,613	264.00	51.56
2008	17,501	252.00	69.45
2009	93	4.00	23.25
2010	40,622	1,710.00	23.76
2011	202,100	8,710.00	23.20
2012	602,807	15,837.00	38.06
2013	556,309	9,268.00	60.02
2014	522,910	12,701.00	41.17
2015	6,893,737	151,497.00	45.50
2016	6,398,342	238,330.00	26.85
2017	3,277,254	197,832.00	16.57
2018	4,169,825	210,384.00	19.82
2019	9,485,974	192,876.00	49.18

Figure 14 Behavior of the international price and the estimate from official data on imports to Bolivia, 2000-2018

Source: Own elaboration based on INE (2019) and Metalary (2019)



BACK TO CONTENT

The mercury price in Bolivia has partially followed the international trend, with the price peaks responding to a global trend but with its own dimensions.

The data on transactions by importers corroborate that the trend is similar, although the official reports presented by the government lack precision.

Figure 15 Box diagram of unit FOB value of mercury imports to Bolivia, 2014-2018 (US$ / kg)

Source: Own elaboration based on Penta-Transaction. Online statistics (2018)

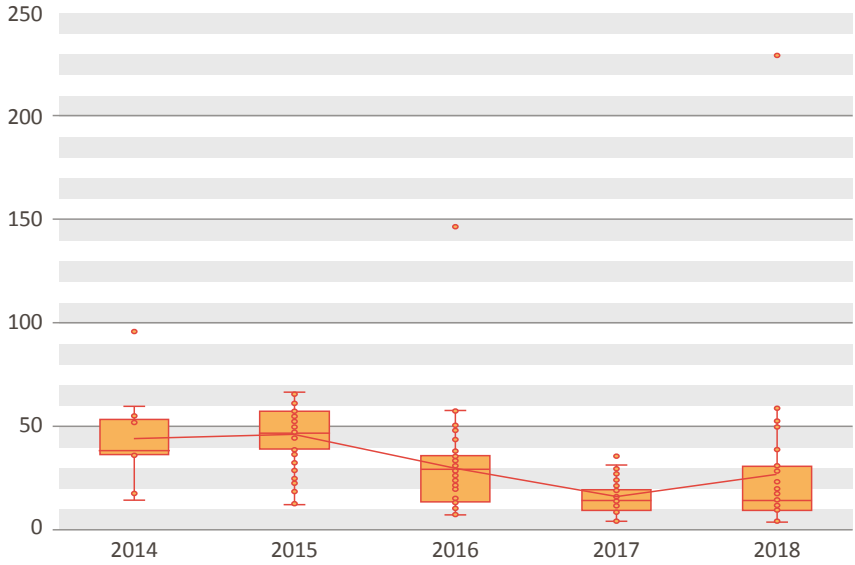


Table 14 Statistical indicators of unit FOB values of mercury imports to Bolivia, 2014-2018

Source: Own elaboration based on Penta-Transaction. Online statistics (2018)

	2014-2018	2014	2015	2016	2017	2018
Average (US$/kg)	31.91	44.26	46.41	29.62	16.27	26.88
Median (US$/kg)	30.00	38.64	47.00	29.71	14.51	15.00
Mode (US$/kg)	62	38.64	62	14	10	10
Standard deviation	22.12	21.16	14.27	17.31	8.61	35.31
Maximum (US$/kg)	229.00	96.36	67.00	146.43	36.00	229.00
Minimum(US$/kg)	4.26	14.80	12.88	7.93	4.75	4.26
Number of transactions	291	11	83	97	58	42

So far, this is a description of mercury import prices. However, the prices of the internal sale to end-users in gold mining are different. Based on fieldwork, the following prices were identified.[54]

Table 15 Minimum and maximum price of mercury for the case of internal sellers in Bolivia, 2019

Source: Own elaboration based on fieldwork

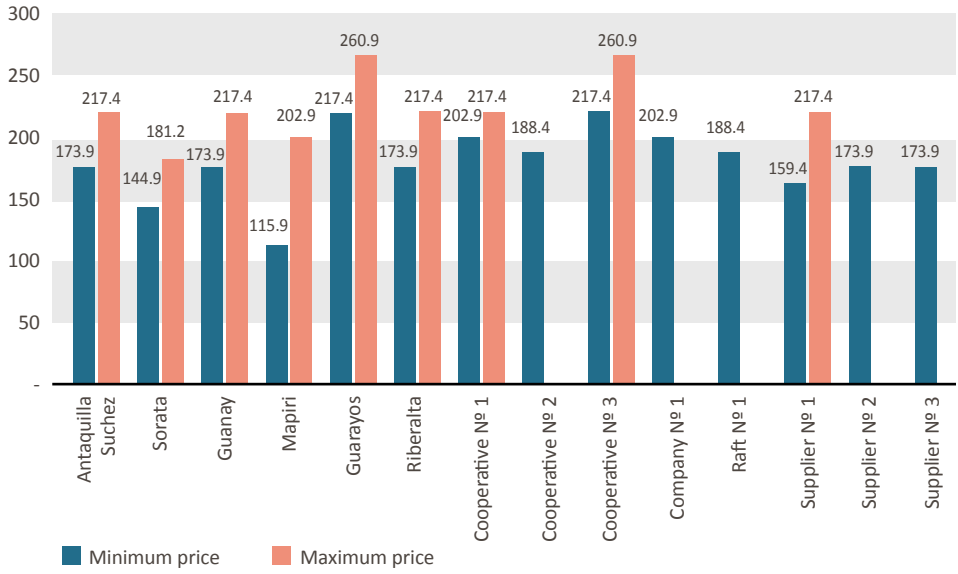
POPULATION CENTER	TYPE OF SALE	PRICE OF MERCURY		UNIT	PRICE OF MERCURY		UNIT
Antaquilla-Suchez	Wholesale	1,200	1,500	Bs/kg	173.9	217.4	US$/kg
Sorata	Retail	5		Bs/g	0.7		US$/g
Sorata	Wholesale	20,000	25,000	Bs/20 kg	144.9	181.2	US$/kg
Consata-Mapiri	Retail	5		Bs/g	0.7		US$/g
Guanay	Retail	3	8	Bs/g	0.4	1.2	US$/g
Guanay	Wholesale	1,200	1,500	Bs/kg	173.9	217.4	US$/kg
Mapiri	Retail	3	10	Bs/g	0.4	1.4	US$/g
Mapiri	Wholesale	800	1,400	Bs/kg	115.9	202.9	US$/kg
Guarayos	Wholesale	1,500	1,800	Bs/kg	217.4	260.9	US$/kg
Riberalta	Wholesale	1,200	1,500	Bs/kg	173.9	217.4	US$/kg
MINING COOPERATIVE/ MINING COMPANY							
Cooperative N° 1	Wholesale	1,400	1,500	Bs/kg	202.9	217.4	US$/kg
Cooperative N° 2	Wholesale	1,300		Bs/kg	188.4		US$/kg
Cooperative N° 3	Wholesale	1,500	1,800	Bs/kg	217.4	260.9	US$/kg
Company N° 1	Wholesale	1,400		Bs/kg	202.9		US$/kg
Raft N° 1	Wholesale	1,300		Bs/kg	188.4		US$/kg
WHOLESALE SELLER							
Supplier N° 1	Wholesale	1,100	1,500	Bs/kg	159.4	217.4	US$/kg
Supplier N° 2	Wholesale	1,200		Bs/kg	173.9		US$/kg
Supplier N° 3	Wholesale	1,200		Bs/kg	173.9		US$/kg

54 Unfortunately, historical prices could not be accessed, only those in force for the year of the study: 2019.

BACK TO CONTENT

Figure 16 Minimum and maximum prices of mercury, 2019 (Bs/kg and US $/ kg)

Source: Own elaboration based on fieldwork



For all the cases identified, the average price in 2019 was between 179.1 and 221.4 US $/kg. According to the space where it is an actor in the mercury chain, the prices identified are:

Table 16 Minimum and maximum average prices of mercury, according to the actors in the marketing chain, 2019 (US $/kg)

Source: Own elaboration based on fieldwork

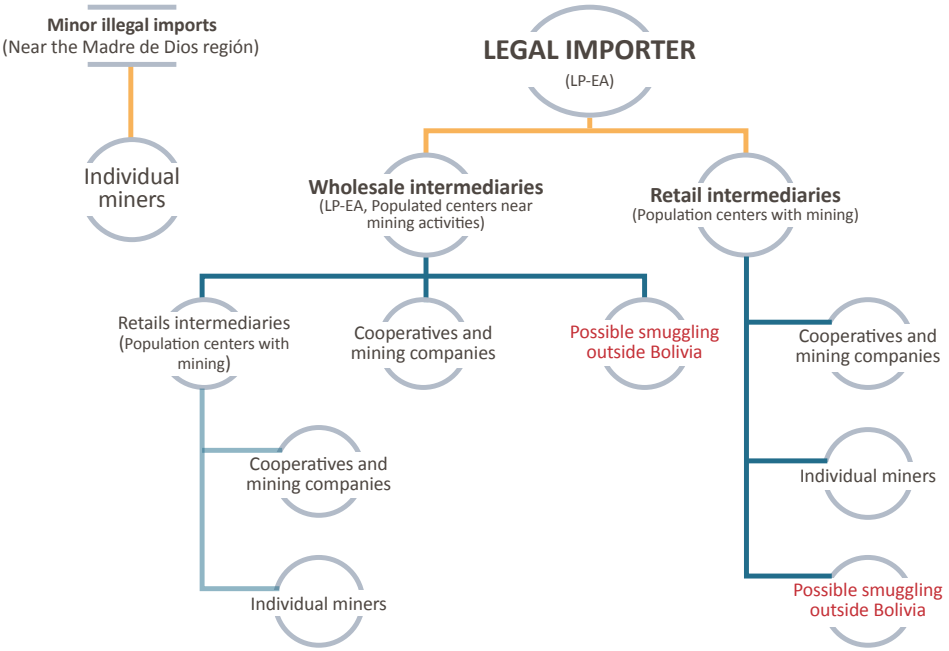
ACTOR IN THE MERCURY MARKETING CHAIN	MINIMUM	MAXIMUM
Local source space	166.7	216.2
Mining companies/mining cooperatives	200.0	239.1
Wholesalers	169.1	217.4

2.4.2. The Commercialization of Mercury

The following actors participate in the mercury commercialization chain:

Figure 17 Actors in the mercury value chain in Bolivia, 2019

Source: own elaboration based on fieldwork



The leading legal importers of mercury are wholesale intermediaries and sell to wholesale intermediaries, retail intermediaries, and mining cooperatives/companies that buy mercury wholesale.[55] This kind of commercialization is carried out in La Paz or El Alto (usually the transactions are made in La Paz, and the warehouses are in El Alto). [56]

55 A more detailed description of these intermediaries is also included in the Annex.

56 Transactions are usually made in cash and with payment in advance of 24 hours. Once the money is verified, the instruction is given to transport the mercury from the warehouses to the office in La Paz, where the transaction was

BACK TO CONTENT

The transfer from El Alto/La Paz to the population center closest to the mining operation is carried out by land, generally through interdepartmental passenger and cargo transportation companies (buses) or, in some instances, in the buyer's vehicle.

Although the retail intermediaries, located in populated centers close to the mining operations, can make wholesale sales, their most frequent clients are cooperatives, companies, or individual miners who acquire low volumes of mercury.

The qualitative information identified the existence of illegal importation of mercury from Peru to mining areas near the Madre de Dios region. In this place, this input is acquired from Peruvian sellers. This situation is understandable due to the distance from the main commercialization centers in Bolivia, which turns greater than that between Madre de Dios and Peru. However, the volumes are minimal.

As will be developed later on, the data on legal mercury imports in Bolivia and Peru suggest a significant flow of contraband to that country. These channels are not known yet, and it could be that retail intermediaries are the ones who supply the smuggling of mercury, especially in populated centers near the borders of Peru and Brazil.

Table 17 Possible average prices of mercury in the different stages of the marketing chain, 2018/2019 (US$/kg)

Source: own elaboration based on fieldwork and Penta -Online Transaction statistics (2018)

STAGE OF THE VALUE CHAIN	MINIMUM PRICE (US$/KG)	MAXIMUM PRICE (US$/KG)	MINIMUM AND MAXIMUM DIFFERENCE (US$/KG)
Legal import (LP-EA)*	10	31.2	
Sale to intermediaries	166.7	217.4	Concerning legal importers: 135.5 to 16.4
Sale to end-users	200.0	239.1	Respect to intermediaries: 21.7 to 72.4

* The first and third quartile respectively of the data of unitary FOB prices of the transactions of legal imports of mercury carried out in 2018 is taken as the minimum and maximum prices. The variability of these data is very high, and the extreme values are highly exaggerated. That is why it is decided to use quartiles to represent the minimum and maximum prices.

carried out. Afterward, the purchased product is delivered.

It should be noted that due to the difference in prices, without a doubt, the most significant gain is for legal importers. In other words, the sale price can become around 5 to 21 times the purchase value of mercury.

2.4.3 Value Dimensions of the Mercury Trade

As an exercise, to have an idea of the mercury trade's value dimensions, we multiplied the prices by the quantities of mercury sold in Bolivia in the year 2018 (210,384 kilos, according to the INE).

Table 18 Estimated minimum and maximum value of the total mercury traded in Bolivia, 2018 (US$)

Source: Own elaboration based on fieldwork, Penta-Transaction. Online statistics 2018) and INE (2019)

STAGE OF THE VALUE CHAIN	MINIMUM PRICE (US$/KG)	MAXIMUM PRICE (US$/KG)	VOLUME TRADED 2018 (KG)	MINIMUM VALUE ($US)	MAXIMUM VALUE ($US)
Legal import (LP-EA)[57]	10	31.2	210,384	2,103,840.0	6,563,980.8
Sale to intermediaries	166.7	217.4	210,384	35,071,012.8	45,737,481.6
Sale to end-users	200	239.1	210,384	42,076,800.0	50,302,814.4

According to this estimate, in 2018, the mercury trade in Bolivia represented approximately around 40 to 50 million dollars. Concerning the value of the gold extracted and exported by the country for the same year (1,083,905,778 US dollars), it meant between 3.7 and 4.6%; however also in 2018[58] unlike the extraction of gold that involved more than 1,100 gold cooperatives, the importation of mercury was concentrated in 15 importers.

57 The first and third quartiles of the FOB unit price data of the legal mercury import transactions to Bolivia in 2018 are taken as the minimum and maximum prices. The variability of these data is very high, and the extreme values are very exaggerated, which is why the use of quartiles is assumed to represent the minimum and maximum prices

58 Transactions are usually made in cash and with payment in advance of 24 hours. Once the money is verified, the mercury is transported from the warehouses to La Paz, where the transaction was carried out. Afterward, the purchased product is delivered.

BACK TO CONTENT

2.5. Legal and Illegal Exports

2.5.1. Legal Re-exports

According to official data of the INE (Statistics National Institute), in 2017, there was only one re-exportation of 212 kilos with a FOB value of 15,840 US dollars to Peru. There is no other data on legal re-exports, so it can be said that any other volume re-exported from Bolivia is illegal.

2.5.2. Bolivian Importers Linked to Peruvian Companies

The importers that follow were identified as importers with apparent participation of foreign people and related to other companies in the mining sector or commercialization of mercury in Peru.[59]

- JUAN ORIHUELA MAMANI IMPORT-EXPORT, founded in Bolivia as a sole proprietorship company for importing mining supplies in El Alto (trade registration number: 355243 and NIT: 320232025). It managed to legally introduce to Bolivia around 63 to 153 tons between 2016 and 2018.
- Such name coincides with the name of the manager of three Peruvian mining companies: JY JP CONSTRUCTORES SRL, REYREX INTERNATIONAL EIRL, and PLANT CONCENTRADORA SAGITARIO SRL.[60] Both Juan Orihuela Mamani as a person and the company Reyrex International EIRL appear as importers of mercury in Peru (Peñaranda Iglesias, 2015: 12).
- VIRGINIA QUENALLATA KELCA, the representative of REYREX INTERNATIONAL, was established in El Alto-Bolivia as a sole proprietorship company for importing and distributing mining products. This company (with trade registration number: 284784 and NIT: 3346499018) imported around 41 to 93 tons. It calls the attention that its name is identical to that of the Peruvian company.[61]

59 It was impossible to access more detailed information on the importing companies (legal representatives, partners, others), so this analysis was restricted only to the company's name. With more information, it will be possible to identify other relationships with traders from Peru or neighboring countries.

60 See https://www.datosperu.org/ejecutivos-1de59370c148321a4c625b476c18e9bc.php

61 Ibíd.

- ELISA HUAMAN CHÁVEZ, without registration in Fundempresa, it imported a ton of mercury in 2016. A person with the same name appears as the general manager of the Peruvian companies Dimeprom Inversiones and Ipexim Peru. Both were denounced in 2012 for illegally trading mercury in Lima, Juliaca, and Ica in Peru.[62]
- SOCIEDAD QUÍMICA POTOSÍ SRL, a Bolivian company, established in 2014 as a Limited Liability Company (NIT: 288078021 and commercial registration: 315597) with a capital of 1.4 million Bolivianos for the manufacture of paint and the importation of supplies and chemical products.[63] In 2015 imported 0.345 tons of mercury. Its shareholders are: Leopoldo Santiago Rosas Cervantes (PE), Víctor Teobaldo Toribio Tamara (PE), Pastor Pachacutec Apaza (PE), Percy Aguilar Chila (PE) and Pavel Gorki Valencia Barrenechea (BOL).[64]According to press releases from Peru, Leopoldo Santiago Rosas Cervantes was arrested in January 2016 as part of the criminal organization "La Grifa," which diverted chemical inputs to coca-growing areas in VRAEM and Huallaga Peru[65] through the Peruvian companies Aqua Mamacocha. Verpe and Adhemax. Víctor Teobaldo Toribio Tamara appears in Peruvian records as dedicated to the transport of cargo by road (RUC: 10425265178, deregistered) [66]. Pastor Pachacutec Apaza according to Peruvian records is listed as manager of the company Corporación Chelpag S.A.C and representative of the companies Contratistas e Industriales Mecánicos Civiles, Two EI S.A.C and TWO EI S.A.C.[67] Finally, Percy Aguilar Chila appears registered as a manager of INKABEST SRL.[68]

These apparent relationships with Peruvian importers and traders raise the need to clarify the information on mercury imports and deepen the knowledge about the relationships between mercury traders from both countries.

62 See https://mercurioilegal.wordpress.com/2014/04/23/empresas-objetivo-abastecer-mineria-ilegal

63 "Manufacture of paint, emolution paints, latex, sealers, primers, enamels, putties, lacquers, waxes, varnishes, formaldehyde, solvents, thinners, printing papers. Import of inputs and chemical products for the manufacture of food and pharmaceutical paint. Export of the entire range of products manufactured by the company

64 See: https://www.paginasiete.bo/u/archivos/2017/2/16/206297.pdf

65 See: https://rpp.pe/politica/judicial/fiscalia-logra-que-se-dicte-prision-a-organizacion-que-operaba-en-el-vraem-noticia-938817 and https://andina.pe/agency/news-disrupt-band-dedicated-to-diversion-chemical-inputs-to-vraem-and-huallaga-596753.aspx, https://issuu.com/cu-edicionesdigitales/docs/755/11

66 See: http://www.personasperu.com/negocios_toribio-tamara-victor-teobaldo-10425265178.html

67 See: http://www.personasperu.com/negocios_toribio-tamara-victor-teobaldo-10425265178.html

68 See: https://www.datosperu.org/ejecutivos-5c8432efbe5b5f85df3ea40614800170.php?Page Speed=noscript

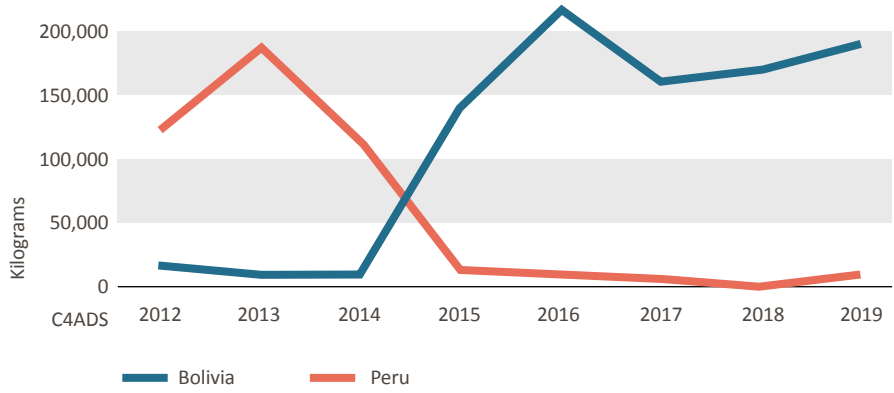
There are no similar relationships of importers with other countries identified, although traders in Riberalta affirmed that this place is also a point of purchase of mercury from Brazilians.

2.5.3. Illegal Imports from Bolivia to Peru

In Peru, it is established control and supervision of the distribution, transport, and commercialization of mercury as part of chemical inputs used in illegal mining (art. 1 and 2 of Legislative Decree 1103 of 3/3/2012). In addition, in 2019, the "Plan Nacional de Acción en el marco del Convenio de Minamata" (National Action Plan within the framework of the Minamata Convention) was approved. There were executed actions to control the illegal trade in gold and mercury,[69] These measures generated a drastic decrease in legal mercury imports and an increase in illegal imports from Bolivia. There are no official data on the illegal flow. However, experts on the subject very firmly put forward this hypothesis.[70] The

Figure 18 Comparison of legal imports between Peru and Bolivia, in kg, 2012-2019.

Source: Veritrade cited in Peyronnin (2020)



69 The so-called Operation Mercury 2019 "was developed in the Buffer Zone of the Tambopata National Reserve to eradicate illegal mining and its related crimes in the Amazon, such as illicit drug trafficking, human trafficking, child sexual exploitation, tax evasion, among others. Likewise, it seeks a sustained multisectoral intervention in the region" (Peru 21, 2019).

70 See Sierra Praeli (2020).

seizures at the border with Bolivia,[71] the comparison of import data between the two countries is a clear sign of this assertion.

In Peru, there is a more systematic and institutional effort to control mercury, which increases the smuggling of the input from Bolivia, a country with insufficient controls and restrictions, to supply to the small-scale Peruvian gold mining sector.

71 See Sánchez (2019) and Ibarrola (2020).

3 Governmental Actions: Institutional and Legal Framework

This last section provides an overview of the regulatory, institutional, and public policy framework regarding mercury proposed and implemented[72]. In this way, it contributes to an assessment of what the Bolivian State is really doing regarding the mercury issue.

3.1 Regulatory and Institutional Framework Regarding Mercury

3.1.1 Regulatory Framework for Mercury

In Bolivia, no norm expressly regulates the use, trade, and disposal of mercury. However, some of technical nature stipulate specific parameters about this element as a toxic substance.[73]. Recently, a norm was issued that establishes restrictions regarding the dental use of mercury.[74] These norms are considered diffuse and with significant gaps by the state authorities themselves.[75]

72 In addition to reviewing regulations and official documents, interviews were conducted with officials from the MMAyA, MMM, and MEFP.

73 A list of specific and general rules and provisions related to mercury is annexed.

74 The Resolución Ministerial (Ministerial Resolution) 416 of July 5, 2019, of the Ministry of Health, establishes in its first article "PROHIBIT the use of mercury in dental amalgams, in the entire national health system comprised by the for-profit or non-profit short-term, public and private social security sectors."

75 The MMAyA (2015) recommends the elaboration of specific regulations for the comprehensive regulation of

There are no rules with specific provisions concerning other aspects such as trading, import/export, and disposal of mercury.[76] Furthermore, therefore these are governed by general rules.

Since 1995 mercury, among others, was classified as a dangerous substance.[77] (DS 24176, 12/8/1995), so its management is subject to the Reglamento para Actividades con Sustancias Peligrosas (Regulations for Activities with Hazardous Substances) (Annex 5 of the aforementioned decree) and for the case of mining to Título VI del Reglamento Ambiental para Actividades Mineras (Title VI of the Environmental Regulation for Mining Activities) (art. 54-64, DS 24782, 7/31/1997). The most relevant specific provision for gold mining in the regulation above establishes that:

The use of mercury in mineral concentration processes is only allowed when mercury recovery equipment is installed at the process's exit. The amalgam treatment must be carried out in retorts or other equipment that avoids the release of mercury into the environment. (art. 27, RAAM).

Regarding the general regulations, the most relevant provisions are:

- Any public or private natural or collective person that carries out activities with dangerous substances must obtain registration and a license for activities with dangerous substances (LASP) (art. 15, RASP). These activities include the supply, transport, confinement of the waste, and containers of dangerous supplies (art. 56, RAAM).

mercury. The following aspects stand out:
- Regulations that can improve and enrich the information available on mercury.
- Regulations on the environmental quality that establish the maximum acceptable concentration of mercury for different purposes.
- Actions and regulations related to environmental sources to control the emissions of mercury into the environment.
- Actions and regulations for the control of products with mercury.
- Additionally, other regulations, actions, and programs, such as regulations on exposure to mercury in the workplace, information and notification requirements on the use and release of mercury in the industry, recommendations for fish consumption, and safety measures for the consumer.

76 However, as part of the implementation process of the Minamata Convention, there is a draft of a supreme decree not yet presented to the cabinet of the executive body, which would address some of these aspects.

77 The Regulation for Actividades con Sustancias Peligrosas (Activities with Hazardous Substances) (RASP) only defines characteristics among which toxicity is an identification criterion for these substances (art. 2). The Reglamento Ambiental para Actividades Mineras (Environmental Regulation for Mining Activities) (RAAM) does accurately identifies mercury as a hazardous substance used in mining activities (Annex I). Finally, the Bolivian standard NB 758 (Point 5) identifies it as a hazardous residue.

- About the importation:
  - It is not allowed to import or enter the national customs territory of items harmful to the environment, human health and life, animals, or against plant preservation (art. 85, LGA). However, the regulation and description of Mercancías para Autorización Previa y/o certificación (Goods with a Previous Authorization and certification) does not include mercury (art. 117, RLGA and DS 572)[78].
  - To import and export dangerous substances (art. 17-19, RASP) It is required a license valid for three years (art. 21, RASP).
  - It should be contracted insurance for possible harms resulting from the commercialization of dangerous substances (art. 31, RASP).
  - The importation must be communicated in writing to the Competent Environmental Authority (art. 45, RASP).
  - About the transportation:
  - The container and packaging of dangerous substances must follow specific norms of the manufacturer and be marked according to the dangerous characteristics of the substance (art. 57, RAAM).
  - Requires submission of the Manifiesto de Transporte (Transport Manifest) to the Competent Environmental Authority (art. 25, RASP).
  - It should be contracted insurance for possible harms resulting from the transport of dangerous substances (art. 31, RASP).
  - Every transporter of dangerous substances must verify that they are adequately packaged and that the data correspond to the Transport Manifest (art. 46, RASP).
- About the storage:
  - Must be stored in areas, places, and environments that meet conditions and guarantee their safety (art. 52, RASP).
  - Warehouses should be built in places far away from streams and water sources (art. 59, RAAM).

78 The Regulations of the Ley General de Aduanas (General Customs Law) (RLGA) was promulgated through DS (Supreme Decree) 25879 of August 11, 2000, and the Nómina de Mercancías Sujetas a Autorización Previa y/o Certificación (List of Goods Subject to Previous Authorization and Certification) were approved through DS (Supreme Decree) 572 of July 14, 2010.

- It should be adequately identified, labeled with the commercial, scientific name and formula, characteristics, and degree of danger. It should carry the necessary recommendations for its proper handling (art. 53, RASP).

- About the usage:
  - The Declaratoria de Impacto Ambiental (Environmental Impact Declaration) (DIA) y la Declaratoria de Adecuación Ambiental Environmental Adequacy Declaration) (DAA) expressly approve ranges in magnitude and composition of the dangerous substances (art. 26, RASP).
  - It should be contracted insurance for possible harms resulting from activities with dangerous substances (art. 31, RASP).
  - There is an obligation to register in detail the activities carried out (art. 32, RASP).
- About residues, waste, and containers:
  - Treat waste, waste, and input packaging through systems that eliminate, neutralize or reduce their danger before reuse, recycling, or final disposal (art. 62, RAAM).
  - Once containers of dangerous substances are emptied, they cannot be used for different purposes if the remnants of the dangerous substance they contained are not extracted from them (art. 62, RAAM).

3.1.2 Institutional Authorities to Control Mercury

As previously mentioned, there are no specific regulations for the control of mercury. Different Bolivian government officials affirmed that the ratification of the Minamata Convention gives the MMAyA (Ministry of the Environment and Water) the responsibility for its compliance and therefore makes this institution responsible for controlling the commercialization of mercury; but also indicated that this institution and other government agencies involved (Customs, MMM, etcetera) do not count with normative instruments to allow them to fulfill that role.

Despite this gap, current regulations regulate mercury in a general way as a dangerous substance. In this sense, the leading authority in charge of its control is the

BACK TO CONTENT

Ministerio de Medio Ambiente y Agua (Ministry of the Environment and Water) (art. 95, b of DS (Supreme Decree) 29894 of February 7, 2009).

The primary mechanism implemented so far by the MMAyA for regulating mercury is the Licencia para Actividades con Sustancias Peligrosas (License for Activities with Hazardous Substances) (LASP). From the information available, the following LASPs granted for the use of mercury were identified:

Table 19 Licenses for Activities with Hazardous Substances granted between 20 00 and 2018

Source: Own elaboration based on information available at snia.mmaya.gob.bo/

SECTOR	NUMBER OF LASPS GRANTED	OBSERVATION
Mining	37	This number does not necessarily correspond to mining operations, as some LASPs are awarded for more than one mining operation[79]. One of these LASPs is from a non-metallic mining company.
Comercialization	0	Only one trading company is classified as part of the commerce and finance sector, but it does not sell mercury.
Multisectorial	2	Although corresponding to the "multisectoral" sector, two mercury traders with LASP were identified.
TOTAL	**39**	

This number of LASPs granted is far less than the number of existing mining activities.

In the specific importation case, Customs is in charge of the surveillance and inspection of imported and exported goods (art. 3, LGA; arts. 22, 24, 26, and 296 RLGA). However, as previously mentioned, the List of Goods that require prior authorization and certification does not include mercury (DS 572). As can be seen in the Buscador Arancelario de Aduanas (Customs Tariff Search Engine)[80] in ad-

79 LASP documents are public in the National System of Environmental Information (SNIA) on the web: snia.mmaya.gob.bo/. Unfortunately, LASPs provide minimal information regarding the use of mercury; only hazardous substances are identified without further information regarding quantity, process, etcetera. Such information is not public. In most cases, each LASP corresponds to a mining concession. In some mining, concessions operate more than one dredger.

80 General Customs digital service that specifies the value of the tariffs for imported merchandise and

dition to the 5% tariff, mercury does not require any particular document for importation. Therefore, there is no specific control beyond that carried out on other common and current merchandise.

Regarding the exports of mercury.[81] Besides customs, the entity in charge of its control is the Servicio Nacional de Registro y Control de la Comercialización de Minerales y Metales (National Service for the Registration and Control of the Commercialization of Minerals and Metals) (SENARECOM). Although a reference is made to the export of mercury as an industrial input, the Resolución Ministerial (Ministerial Resolution) 123/2012 of the Ministry of Mining and Metallurgy (MMM) identifies it as part of the metals whose exportation should be controlled through a particular form.[82]. In 2017 it was officially recorded a re-export of mercury. However, there is no information that SENARECOM had intervened on that occasion.

Concerning the issue of illegal exports or imports, the Agencia para el Desarrollo de las Macrorregiones y Zonas Fronterizas (Agency for the Development of Macroregions and Border Zones) (ADEMAF) has the competence "to propose mechanisms for the prevention and control of the traffic of merchandise at the borders, in coordination with the competent public entities." Even though its authority is focused on border trafficking, between 2009 and 2015, this entity carried out different operations to control illegal gold mining in the regions of Guarayos, and Madre de Dios and Beni rivers[83]. No specific operations regarding mercury were recorded.

As a result of the denouncements about the significant illegal gold trade between Bolivia and Peru, in 2014 and 2015, binational mechanisms were implemented to control illegal gold mining and the commercialization of mercury. As part of the issues coordinated in the Bolivia-Peru bilateral relationship, it was established the Comisión Bilateral Peruano-Boliviana de Lucha Contra el contrabando (Peruvian-Bolivian Bilateral Commission for the Fight Against Smuggling), a binational entity to coordinate actions regarding smuggling between the two countries. This committee held its tenth meeting in June 2019.

additional documents that require its importation. See: http://anbsw08.aduana.gob.bo:7601/buaran/search.do;jsessionid=CrDqdthZVzLdgnN2x4yGJsGJZx1nbLh432bQWhzjstyTkHnv5Q4Q!-866727360

81 In the case of Bolivia, since there is no mercury production, SENARECOM should control re-exports.

82 "Form M-03 in each export, under arts. 12 and 13 of Supreme Decree 29165 of June 13, 2007" (Single art.)

83 See: ABI (2010), Luksic (2010) and Alanoca (2015).

Within the commission, it was created the Grupo de Trabajo Multisectorial (Multisectoral Working Group) (GTM) comprised of public institutions of the Peruvian and Bolivian governments. Its presidency representing Bolivia is in the hands of the Viceministerio de Lucha contra el Contrabando (Vice-Ministry of the Fight against Smuggling), together with National Customs acting as the Secretaría Técnica del GTM (Technical Secretariat of the GTM) (La Paz Regional Management, the departments of Human Resources and Operational Coordination and Investigation, and the International Affairs Unit). In its meetings, various public institutions participated in the discussions on illegal gold mining: SENARECOM, AJAM, ADEMAF, National Customs on behalf of the Bolivian government, and SUNAT and MINEM on behalf of the Peruvian State.

At its VII meeting held in June 2017, this commission addressed the issue of mercury. Peru committed "to provide the legal and regulatory technical background to support the ban on the use of mercury so that Bolivia can analyze and incorporate the same into its legislation" (SENARECOM, 2017.) At its IX meeting in November 2018, it was agreed to elaborate "the diagnosis on the traceability of the exploitation and commercialization of gold, the control of the use of mercury and the execution of binational operations" (National Customs, 2018). Unfortunately, both agreements had not been implemented yet by the time of the conclusion of this investigation.

Following this line of action coordinated at the Andean level, the Comunidad Andina de Naciones (Andean Community of Nations) (CAN), on May 26, 2019, approved decision No. 844 of "Creation of the Andean Observatory in charge of the Management of the Official Information on Mercury"[84], for "the exchange of objective, reliable, updated and comparable information on the production, import, export, commercialization, transport and use of existing mercury in each Member Country of the Andean Community" (art. 1). Among its functions are not only the exchange and analysis of information, but it also has the possibility of issuing public policy recommendations. Its implementation is subject to the regulation, which was not approved at the time of the completion of this study,[85] despite the condition of compliance with 90 days deadline established in the decision (art. 7).

84 There also exist decision N ° 774 of control and surveillance of the import, export, transportation, processing, and commercialization of minerals from illegal mining, and N ° 797 that creates the Comité Andino Ad-hoc de Minería Ilegal (Andean Ad-hoc Committee on Illegal Mining) (CAMI) among others

85 As of October 17, 2019, the regulation mentioned above was not approved, even though on August 24, meetings were held to prepare it.

3.2. Status of the Minamata Convention

Bolivia is part of the Minamata Convention, signed by the country on October 10, 2013, and ratified by Law 759 of November 17, 2015[86]. The official notifications of the Bolivian government to the Secretariat of the Minamata Convention[87] are:

- (9/4/2020) Note of designation as the national coordination focal point (art. 17.4 of the agreement) to the Viceministro de Medio Ambiente, Biodiversidad, Cambios Climáticos y de Gestión y Desarrollo Forestal (vice minister of Environment, Biodiversity, Climate Change and Forest Management and Development) that is part of the MMAyA.
- (5/30/2019). Notification regarding artisan and small-scale gold extraction activities describing the processes in which amalgam is used in Bolivia as "more than insignificant" (art. 7.3).

It should be noted that, according to the information provided by the website of the Secretariat of the Convention, Bolivia is one of the three member countries (with Costa Rica and Suriname) that reported that artisan and small-scale gold mining is "more than insignificant." The note does not specify the criteria assumed by the government to make this statement.[88] However, the reason for this assertion, rather than describing the use of mercury in small and artisan mining, reflects the need to enter into a gradual process of eliminating its use in this sector. According to Annex C of the agreement, the country must develop and apply a Plan de Acción Nacional (National Action Plan). There are no further notifications on other aspects established by the agreement.[89]

The Bolivian government identifies this agreement as one of the main challenges for the sector.[90] Although the VMA, a part of the MMAyA, is the focal

86 Such ratification was only submitted on January 26, 2016.

87 Attached in the Annex are both communications obtained from the official website of the Minamata Convention Secretariat (http://www.mercuryconvention.org/Pa%C3%ADses/Notificaciones/tabid/5730/language/es-CO/Default.aspx)

88 According to the agreement's implementation guidelines (Minamata Convention Secretariat, n.d.), there is no criterion to present this assessment, so it depends on each member State. Some possible criteria suggested are: quantities of mercury used and released by such processes, the amount of gold produced, its contribution to the gross domestic product, the number of people involved and affected, the location of the activity, the sensitivity of the surrounding environment, the practices used, and others.

89 Notifications concerning the following articles of the agreement are registered on the website: 3.6 and 3.7, 3.8 and 3.9, 4.2, 6, 17.4, 30.4, 30.5, and 7.3.

90 "Challenges of the environmental integrity sector and climate change (...) Facing challenges together between the different ambits of the sector, that seek to achieve better prevention and management of the risks of environmental contamination caused by mining. One of these possible challenges is to establish an action program around mining

point of the agreement, the Programa Nacional de Contaminantes Orgánicos Persistentes (National Program for Persistent Organic Pollutants) (PRONACOPs) was designated as the technical entity in charge of implementing the actions of "management of anthropogenic emissions and releases of mercury and compounds of mercury" as part of the implementation of the Minamata Convention.[91] Within this framework were proposed indicators for the implementation of this agreement by 2020[92] as follows:

- The development of normative or operational instruments.
- A report from the country.
- The design and implementation of two projects.

The advances reported by the MMAyA, that from our perspective, are limited concerning the mercury-related problems described later on are the following:

- To 2015 the main activity carried out by the Bolivian State within the framework of the agreement was the preparation and publication of the Baseline Uses, Emissions and Contamination by Mercury in Bolivia as "an initial tool that contributes to the national agenda" (Ministry of Environment and Water, 2017:106). Although it was not based on primary information but on a broad compilation of secondary information, this is the first official document that raises the mercury issue as a whole and makes this information official as a parameter for subsequent public actions.
- To 2017:[93]
    - It was developed the Proyecto Desarrollo de la Evaluación Inicial del Convenio de Minamata en América Latina y el Caribe (Development of the Initial Assessment of the Minamata Convention in Latin América and the Caribbean) (MIA), whose result was the publication of the Inventario Nacional de Fuentes de Emisión de Mercurio en Bolivia (National Inventory of Sources of Mercury Emissions in Bolivia.)[94]

in the Amazonian rivers, which articulates the scope of the integral management of water resources with the management of environmental quality, including the area of analysis of the situation of gold mining and the trade and use of mercury" (Ministry of Environment and Water, 2017: 126).

91 See Ministry of the Environment and Water (2017).

92 By 2019 it should have had the advancement of 80% (Ministry of the Environment and Water, 2017: 5-69.

93 Raised in the Sectoral Plan of Integral Development of the Ministry of Environment and Water (2017).

94 This inventory mainly takes secondary information and applies the Toolkit of the Chemical Products Division of the United Nations Environment Program (UNEP Chemical Products).

- It was in formulation the Plan Nacional de Implementación del Convenio de Minamata (National Plan of Implementation of the Minamata Agreement.)
- Project for elaborating the Plan Nacional de Acción para la Minería Artesanal y a Pequeña Escala del Oro (National Action Plan for Artisan and Small-Scale Gold Mining) in order to access to the GEF funds for the initial activities for a prompt application of the Minamata Agreement.

- To 2019:[95]
  - National Plan of Action Project within the framework of the Minamata Convention in the Plurinational State of Bolivia.
  - Proposal for a Regional Project on Mercury Trade (Ecuador, Colombia, Peru, and Bolivia).
- Ongoing actions:
  - Within the framework of article 3 of the agreement are evaluations of the mercury written consent forms following the guidelines established by this agreement for the importation of mercury. The applications have been received since November 2018.
  - Request to the Ministerio de Economía y Finanzas Públicas (Ministry of Economy and Public Finance) to update DS 572, which approves the list of goods subject to Prior Authorization and Certification, so the list mentioned above is updated with the purpose to consign elemental mercury subject to Autorización Previa (Prior Authorization) AP before its importation into Bolivian territory.
  - Preparation of a proposal for a supreme decree to regulate mercury in Bolivia, establishing the administrative procedures for the granting of Prior Authorization and Certification for the import/export of mercury, mercury compounds, and products with added mercury within the framework of the Minamata Convention.
  - Coordination with National Customs and the Viceministerio de Política Tributaria (Vice Ministry of Tax Policy) of the Ministry of Economy and Public Finance to review the tariff items on mercury to help National Customs in the control of mercury trade.

95 Presentation of PRONACOPs within the framework of the Tercer Encuentro del Grupo Interinstitucional de Trabajo en Oro Responsable (Third Meeting of the Interinstitutional Group of Responsible Gold Work) (PRONACOPs, 2019), complemented with an interview with the MMAyA.

Conclusions

From the study, we reached the following conclusions:

- In the last five years, Bolivia has become the leading mercury importing country in the region and became the second one globally. The volume of imported mercury exceeds by far the requirements of legal and illegal gold mining. It can be said that Bolivia is also an informal distributor of mercury to other countries in the region (a regional mercury "hub").
- There are no specific regulations on the commercialization of mercury in Bolivia. However, the general regulations applicable to mercury do not necessarily respond to the control requirements that its trade deserves, and they are not applied either. The license for activities with dangerous substances, the only existing mechanism applied in particular cases, have not been effective for monitoring and controlling the mercury trade and is very deficient for the control of use, transport, storage, and disposal of mercury.
- Although the Bolivian government ratified the Minamata Convention and included in its strategic planning actions to advance its implementation, the goals set and its progress to 2019 are insufficient concerning the increase in the importation and use of mercury in the last five years. The efforts made are not related to the intensification of this problem.
- Access to public information is an essential deficiency in the control and monitoring of the mercury trade. There is not an adequate flow of infor-

mation between the different state entities. In practice, there is no entity responsible for the consolidation and follow-up of this information either. In addition, adequate and effective exchanges or coordination of information with neighboring countries to control smuggling is inexistent.

- It is vital to investigate in greater depth the illegal exports of mercury to neighboring countries, their routes, and the actors. The efforts made to date to control smuggling with Peru have not achieved practical and effective progress in reducing this flow of mercury. Much less could come to identify the role of Peruvian companies and entrepreneurs in the commercialization of Bolivian mercury. The progress in terms of bilateral agreements with Peru or within the framework of the Comunidad Andina de Naciones (Andean Community of Nations) has not yet been put into practice, so it does not have any impact yet.
- A balance between the requirements and the imports of neighboring countries can indicate the relevance of these in the illegal re-exports of mercury from Bolivia to neighboring countries. Although there is advancement in deepening the knowledge of the actual requirement of the mining sector in Bolivia, it is expected that this information is used impartially by the Bolivian State.
- When faced with an economic crisis, gold becomes a "refuge" for investments, so its demand and price rise. Adding to the post-pandemic social crisis, this will also convert the cooperative sector into a "labor refuge" for the unemployed population. Therefore, can be expected growth in cooperative gold mining, which will increase the demand for mercury.[96]

96 In most cases, each LASP corresponds to a mining concession. In some mining concessions, they operate more than one dredger.

BACK TO CONTENT

Recomendations

Within the framework of this study, the following recommendations are made to address the issue of mercury:

- To the government of Bolivia:
  - Strengthen impartial monitoring and control policies of the gold sector concerning gold extraction and the use and commercialization of mercury.
  - Develop mechanisms for the generation, harmonization, and access to sectoral information on mercury.
  - Issue a regulatory decree to control the mercury trade.
  - Strengthen inter-ministerial coordination mechanisms (Customs-Mining-Environment-Health) for an adequate implementation of mercury control mechanisms.
  - Strengthen the capacities of government agencies to control the mercury trade (Ministry of the Environment, Customs, Police/Armed Forces, Prosecutor's Office).
- To traders:
  - Introduce awareness-raising processes about the impacts of mercury and training on its storage, transportation, and proper handling.

- To miners:
  - Develop awareness-raising processes about the impacts of mercury and the existing and potential mechanisms to reduce/eliminate its effects.
- To governments of neighboring countries (Peru, Brazil):
  - It is essential to strengthen bilateral mechanisms for controlling mercury smuggling since the commercialization chains identify the regulatory and institutional weaknesses in controlling this element in any of the region's countries to turn them into points of entry and distribution of mercury, particularly for gold mining.
- To the Secretariat of the Minamata Convention:
  - It is essential to pay attention and monitor the principal countries that supply and consume mercury. In the case of the present study: Mexico and Bolivia.
  - Identify mechanisms that strengthen the role of civil society in the Member States in monitoring the progress in their compliance with the Minamata Convention.

BACK TO CONTENT

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Annexes

Annex 1. Methodology and Case Studies

Unfortunately, environmental information in the gold mining sector, which as a rule should be publicly accessible, has been progressively restricted in Bolivia. Despite the fact that in 2018 the Bolivian government ratified the Escazú Agreement[1], in practice for more than five years it has closed the doors to public information on the extractive sectors. An example of this is that since the approval of the new mining law (Law 535 of May/2014) the government has limited the public the possibility of accessing information regarding mining rights[2].

The growth and power of mining cooperatives (small miners) and the price of gold that has not fallen to the level of other minerals have made the gold mining sector one of very restricted access. Therefore, obtaining secondary and primary information is highly difficult.

Review and processing of secondary information

Although there is some official information for the case of gold in Bolivia, there are many inconsistencies and contradictions in the different documents from year to year issued by the Ministry of Mining and Metallurgy. Therefore, these were contrasted and revised to assess the degree of reliability and determine

1 Regional Agreement on Access to Information, Public Participation and Access to Justice in Environmental Matters in Latin America and the Caribbean, signed on November 1, 2018 and ratified by Law 1182 of June 3, 2019.

2 In 2014, although the Minister of Mining publicly offered updated information to CEDIB, the written request was denied. Similar situations experienced indigenous peoples, municipal governments, and so on.

what information can be used to estimate the volume of mercury required for mining.

Public information on the commercialization of mercury is very limited and official requests for access to detailed information were denied by the relevant authorities[3]. For these reasons, international companies that provide import/export data from different countries were used, those international companies served as the basis for the estimates in UNEP reports.

From other secondary sources there is no information on marketing[4]. On the environmental and social impacts of mercury there is a diversity of academic studies that were compiled by official bodies, as the first steps towards a baseline of mercury emissions in the country.

Interviews and work of field

To inquire about the commercialization of mercury, 10 interviews were conducted with gold miners and gold/mercury traders; in addition to quick consultations with residents of important gold mining areas.

With mining actors, different levels of detail were reached in the information, and in a similar way with marketers. The degree of depth is directly related to the level of production/commercialization of gold/mercury, the more important the area of exploitation of the gold, the greater the degree of difficulty in accessing information. In this sense, in the Yungas/northern altiplano region, conversations were only possible with retail traders and through interviews with those responsible for two gold extraction operations; In the other two zones, actors in the mercury chain were interviewed, in addition to collecting more detailed information on gold processing and amalgamation.

3 It is argued that the tax information (for the payment of fees) is confidential and, therefore, it is not possible to make it public.

4 At the time of preparing this study, the BGI Oro Responsable program carried out another with similar scope; An exchange workshop was held in April 2020 and it was concluded that the results of both investigations are consistent and complementary to each other.

Mining Operators Case Studies

Case: Cooperative N° 1

The Cooperative N° 1, made up of 80 partners who work in the mining area, is located in Yani, municipality of Sorata, department of La Paz. It has an environmental license to carry out its gold mining activity.

Extraction data

- Gold extraction: ..... 4 kg/month
- Use of mercury: ..... 34 kg/month
- Price of mercury: ..... 1,400 a 1,500 Bs/kg
- Mercury recovery degree: 77-86%
- Environmental license: ..... Yes

Process

The process begins in the open pit mine, where colluvial material is extracted with free gold. An excavator loads it into dump trucks, which then transport it to a small concentration plant. The material enters the mailbox that serves as a dispenser and passes to a small ball mill in which the mercury is dosed –30 kg/month –. Then it goes through a copper plate to avoid the loss of mercury in the process. The rejected material goes to a dike that receives this metallurgical mining waste. The plant works in three shifts to be able to complete 24 hours of work. The process is constantly repeated until it is decided to raise the mineral; the predominant gold in the concentration is fine material. This pre-concentrate is introduced into a small drum where mercury is again introduced - around four kilos. According to the interviewee, approximately 27 to 30 kilos of mercury are recovered; the balance (8-5 kilos) is lost in the process. The members of the cooperative are participants in this activity to avoid susceptibilities.

Perceived impacts

According to the interviewee, there is awareness of the impact of mercury on the environment and health. They did not identify a partner with intoxication. They use mercury because they are unaware of another form of concentration.

Mercury Supply

The mercury is acquired by a purchasing manager in the city of La Paz and then transferred by land to the mining operation. The mercury supplier El Español is located on Tarapacá street in La Paz. The price, which varies depending on the seller and the amount that is purchased, is around 1,400 to 1,500 Bs/kg.

Case: Cooperative N° 2

The cooperative N° 2, located in Zongo, Murillo province of the department of La Paz, has 86 members, all of them from the communities surrounding the operation. Has an environmental license.

Extraction data

- Gold extraction: ..... 3-4 kg/month
- Mercury Use: ..... 2 kg/month
- Mercury Price: ..... 1,300 Bs/kg
- Degree of mercury recovery: ..... s/d
- Environmental license: ..... Yes

Process

The concentration process begins in the mine, where excavators are used to remove the material. The mineralized load is transported in dump trucks to the accumulation site, which is in front of the plant, and is classified according to size, first in grizzly, then a vibrating screen; the rejection products, sterile material, are placed in the dams. The material from the screen is fed

to the gravimetric preconcentration channels to obtain alluvial gold pre-concentrates. In a second installation, using concentrating tables, the final concentration is made to obtain the main product.

The pre-concentrated material, basically the fine material that remains in the carpets, is amalgamated with mercury for its recovery, approximately 30 to 40% of the gold is fine and 60 to 70% do not need mercury, because they are seeds.

They use about two kilos of mercury per month. The estimated production is three to four kilos per month.

Perceived impacts

The cooperative uses little mercury because part of the recovered gold is coarse-grained. They do not know of any other alternative to recover the fine gold, but they have heard of other processes such as concentration by flotation or cyanidation, which in their opinion are much riskier, since the tailings dam would have to be special and the equipment and supplies involve that would be much more expensive and not very viable.

Mercury supply

The cooperative obtains El Español mercury in the city of La Paz. There is no control over the transfer of the input to the operation, despite the fact that it stops at narcotics checkpoints. Mercury costs 1,300 Bs/kg.

Case: Cooperative N° 3

The Cooperative N° 3, located in the municipality of San Ramón in the Ñuflo de Chávez province in the department of Santa Cruz, is made up of 36 members, of which only 32 are active. It carries out the extraction of gold with mining rights granted by the Mining Administrative Jurisdictional Authority (AJAM), since May 10, 2017, in 10 grids. Obtaining its respective environmental license is in process, through an Environmental Impact Assessment Study, in the Competent Environmental Authority.

Extraction data

- Gold extraction: .....50-60 g/day[5]
- Use of mercury: .....5 kg/month
- Price of mercury: .....1,500-1,800 Bs/kg
- Degree of recovery of mercury: 70-80%
- Environmental license: .....In process

Process

The 32 partners work continuously, from 7:00 a.m. to 7:00 p.m., if the case requires it; At present, there are also external personnel: 2 drilling crews and 1 cleaning crews[6].

On average, 26 holes are drilled in each material blast, equivalent to four cubic meters of ore or 200 half-bags. A closed mesh is designed that allows to have a mineral of low granulometry in order to reduce the use of crushing machinery, such as crushers for larger material. The material is transported in dump trucks to small gold concentrating plants located in one of the five small camps near the extraction site.

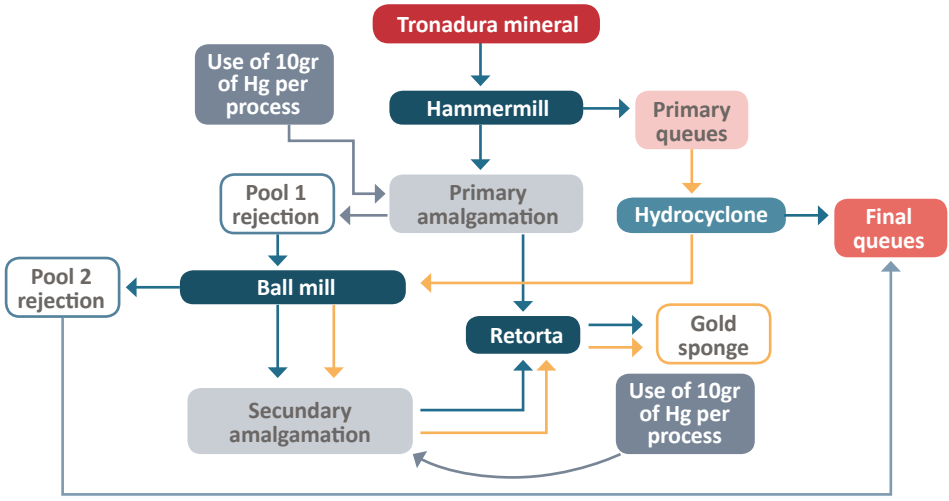
The extracted mineral enters blasting: as the first stage to a small hammer mill, which is fed manually. This ground material goes through an eferbedor, a box at the outlet of the hammer mill in order to retain the gold by its specific weight. This has a perforated pipe that injects water under pressure, stirs the material and prevents its sedimentation and clogging. Subsequently, the material enters gutters with a slope of 10 to 20% covered by a carpet that reduces the friction of the material and can trap fine gold. Approximately every 50 bags this process is stopped and the carpets are washed to extract the pre-concentrated material, which is washed manually in a metal pan in which mercury is added to produce amalgamated gold. 10 grams of mercury are used in each pan. The material in the pan is constantly squeezed and stirred and detergent is added to remove the diesel that comes from the

5 In the past, one gram per bag was extracted, equivalent to 200 g/day of gold. At present, between 50 to 60 g/day or less is extracted, due to the characteristic of the mineralized structure. Activities in this area began three years ago.

6 Drilling crew with jackhammers (two crews of three men on different work fronts). The cleaning crew is in charge of extracting the blasting material and leaving it clean and milled so that the drilling crew can start their activity.

Figure 19 Mineral concentration process in Cooperative N° 3.

Source: Own elaboration based on an interview



ANFO used in the blast. This amalgamated gold is stored so that at the end of the day all the portions are burned in the retort.

The primary amalgamation is introduced to a small pool of 3x3 meters so that later it passes to a small ball mill of 60x100 centimeters. The material is ground for one hour and then it is manually battered with the addition of mercury in another 2x2 meter pool. To obtain amalgamated gold these processes are repeated four times a day or more.

The primary tails[7] are concentrated, and when no ore is available or to improve the head grade, it is pumped as pulp through a 4x3 meter dredge to a hydro cyclone, which allows the classification of fine and coarse. The fine material goes on to form the final tails or metallurgical mining waste and the bulk is collected to be concentrated in the small ball mill and to be manually amalgamated with 10 grams of mercury in a pan. As in the process described above, this amalgamated gold is burned at the end of the day in the retort burner.

7 Reject material from hammer mill grinding.

In the retort, the amalgamated gold of the day is introduced into a small metal container or pots wrapped in newspaper to prevent the gold from adhering. Fire-resistant asbestos packing is used to cover the vessel. To prevent the escape of mercury into the atmosphere, it is fastened with bolts and nuts that allow better recovery of mercury. At best 70-80% recovers if there is no packing leak. This retort equipment works with a burner fed by a gas canister. At best 70-80% recovers if there is no packing leak. This retort equipment works with a burner fed by a gas canister.

Perceived impacts

Regarding the disposal of mercury, in the gravimetric concentration processes the materials with the possibility of being impregnated with mercury are in pools 1 and 2 of reject material that is introduced again into the process to be able to recover it. The containers are disposed of as any ordinary waste and not as hazardous waste.

Table 20 Possible impacts of the use of mercury identified in the Cooperative N° 3
Source: Own elaboration

ENVIRONMENTAL IMPACT	ENVIRONMENTAL ASPECT	PROCESS	ENVIRONMENTAL DEFICIENCY
Water quality degradation	Mercury as an input	Amalgamation process	Tributaries with traces of mercury
Soil quality degradation	Mercury as an input	Amalgamation process Retort process	Mercury absorption
Degradation of atmospheric quality	Mercury as an input	Amalgamation process Retort process	Emissions to the atmosphere
Occupational health degradation	Mercury as an input	Concentration	Different routes of mercury absorption, either respiratory and skin routes, due to high mercury exposures.

Regarding the transport, storage and disposal of mercury, those directly affected are the personnel who are in daily contact with mercury in the amalgamation and retort processes, as well as the atmospheric dispersion generated by the deficient retort process.

BACK TO CONTENT

Although the cooperative knows that mercury is a toxic substance, they have no knowledge of its magnitude or the symptoms of intoxication by this metal. Suppliers do not provide mercury safety data sheets[8], which describe the type of substance, its characteristics, risks, handling procedures, storage, and contingency plan regarding the spill or exposure to it.

Agreements

With the indigenous community where the mining operation is located, a commitment was made to build a road. This was fulfilled since it is the only access to enter the area. The public consultation was carried out under the supervision of the AJAM and the Intercultural Democratic Strengthening Service (SIFDE), part of the Plurinational Electoral Body (OEP). In addition, there is a rental agreement for the land to the owner. There is no commitment to the municipality of San Ramón.

Mercury supply, transport, and storage

The last purchase of El Español mercury was made in San Ramón at a trading company called Doña Simona Cervantes, a gold buyer and a well-known seller of mercury in said town. The price was 1,500 Bs/kg. For the purchase, they ask the price of other sellers in San Ramón and acquire the one with the lowest price.

The approximate consumption is 1 kg/month per artisanal plant. Therefore, it is inferred that the consumption of the cooperative is 5 kg/month. In this period of time, it paid up to 1,800 Bs/kg of mercury.

The consumption or demand for mercury is constant, there are no seasons of greater or lesser demand, while gold is concentrated it will be used in the amalgamation process. On several occasions it faced problems with the golden ant theft, as well as of mercury by staff of the cooperative.

The plastic containers of "Spanish" mercury have an airtight lid and a safety back cover that guarantees that it is not open. The input comes per kilo.

During the transport at no time did he have any incident with the containers, since they are 250 ml plastic and the mercury is always transferred to

8 It is commonly known by the name MSDS, an acronym that comes from the English language (Material Safety Data Sheet)

the plant in its original container. Once the container is opened, the amount of mercury required for amalgamation is weighed. On average 90 g/day is used. The mercury recovered in the retort is again used in the amalgamation process.

The camp has two closed environments: one works as an office and in the other the mercury is stored in its original containers along with other supplies for the operation, such as diesel, gasoline and minor tools. The recovered mercury is also stored in this warehouse.

Case: Mining Company N° 1

The Mining Company No. 1, one of the largest in the municipality of San Ramón, has been dedicated since 2007 to the exploitation, concentration or benefit of gold minerals and the commercialization of the product. It has the current Declaration of Environmental Adequacy that provides environmental authorization on mining rights with 25 squares (625 hectares).

Extraction data

- Gold extraction: .....150-200 g/day
- Use of mercury:.....1 kg/month
- Price of the mercury:.....1,400 Bs/kg
- Degree of recovery of mercury:.....88%
- Environmental license:.....Yes

Process

The company has 40 workers distributed in the mine, concentration plant, auxiliary section, dining room and administrative staff. The activities are carried out under the 21/7 regime[9]. More than 70% of the employees come from the communities near the operation.

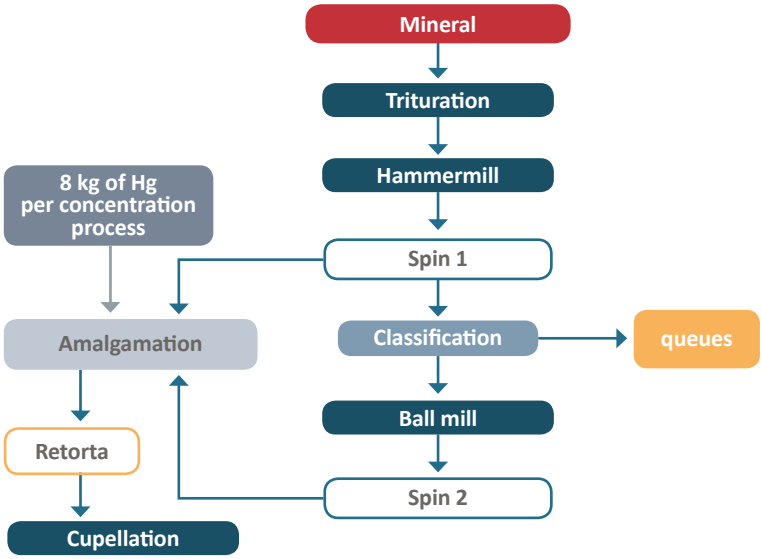
The concentration process begins with the ore from the mine transported to the ore collection area. The material is crushed and enters the loading

9 During the month: 21 days of work in camp and seven of rest.

BACK TO CONTENT

Figure 20 Mineral concentration process in Mining Company N° 1.

Source: Own elaboration



box where two mills, with the help of water, break it down in a ratio of 3 to 1, three parts of water and one of mineral. The material is distributed to two hammer mills with a capacity to treat 12 m^3/h, to then go to four manual discharge Knelson-type centrifuges and obtain one of the pre-concentrates. The rejection of the hammer centrifuges goes to a pumping box, which through a pulp pump sends the material to classification with hydro cyclones. The fine material becomes the tails of the process and the material of coarse granulometry passes to the grinding with a 3x8 meter ball mill and then passes to the centrifuges of the ball mill where the second pre-concentrate is obtained. This whole process is closed-loop.

The pre-concentrates that are obtained go to the refining laboratory, where the material is introduced to the amalgamators to later purify it. The amalgamated gold goes to the retort inside an exaction bell. As a procedure, the depletion of mercury, amalgamated gold versus sponge gold is controlled, and as the last process, the cupellation is carried out to obtain

molten gold with a grade of 87, depending on the work face. As a result of the refining process with a cupellation equipment, the balance sheets record an approximate loss of eight grams of mercury per day. This is due to amalgamation, in which the reject material contains mercury.

Perceived impacts

The personnel in direct contact with the mercury is one worker who performs the purification and two who do the amalgamation with amalgamating equipment.

Regarding the disposal of mercury, the refining laboratory has two pools waterproofed with concrete, which have the purpose of retaining the reject material from the amalgamation. This material, which contains the mercury lost in the amalgamation process, is extracted once every three months and is passed through hammer centrifuges where, due to its specific weight, a large part is recovered.

The populations most likely to be affected by the impacts of mercury, in the first instance, are the company's workers and, in the second, those that face the greatest vulnerability are the communities surrounding the operation as a possible source of contamination.

In the company they were trained regarding the use of mercury according to the product safety sheet MSDS (Material Safety Data Sheet), as part of the occupational health and safety training. For this reason, it purchased much more efficient retort equipment used properly. The control of mercury

Table 21 Possible impacts of the use of mercury identified in Mining Company N° 1.
Source: Own elaboration

IMPACT TO ENVIRONMENTAL	ENVIRONMENTAL ASPECT	PROCESS	ENVIRONMENTAL DEFICIENCY
Water quality degradation	Mercury as an input	Amalgamation process	Tributaries with traces of mercury
Degradation of atmospheric quality	Mercury as an input	Amalgamation process	
Retort process	Emissions to the atmosphere		

BACK TO CONTENT

entry and exit records and its metallurgical balance identify and account for the reduction in mercury loss.

Agreements

The relationship of the company with the community is good. It built the sports arena, the water connection and provided the community college with electricity through a diesel generator.

It has a lease with the community for the use of land, since a part of the mining right covers its territory. On the other hand, the relationship with the municipality is basically in compliance with current legal regulations.

Mercury supply, transport, and storage

El Español brand mercury is provided by a supplier in the city of La Paz known as Señora Mónica[10], one of the largest buyers of gold in La Paz. When the mercury is required, the supplier sends it by land from the city of La Paz to the city of Santa Cruz, where the company's personnel are in charge of the transfer to the mining operation. The 10 kg box of mercury contains 10 bottles (250 ml capacity) of one kg of mercury each. It claimed not to have had any problems in transportation regarding the safety of the original containers.

The cost of mercury is 1,400 bolivianos per kilo.

The mining operation requires one kilo of mercury per month, taking into account that it maintains eight kilograms that are constantly used in the amalgamation process. For this reason, the demand for the input is constant.

The company did not face problems due to the lack of mercury, since the permanent supplier has the product at a good price in relation to the San Ramón marketers.

On the other hand, neither the transport company from La Paz to Santa Cruz nor the one that carries out the transfer from Santa Cruz to San Ramón put forward any objection or problem to the transport of mercury and there are even fewer controls on the aforementioned routes. They said

10 Mrs. Mónica

they never had any kind of inconvenience in transporting the mercury to the mining operation.

Mercury is stored in an exclusive area, to which only three people have access, and stored in the refining laboratory facilities, where the exit and entry of mercury are controlled through a consumption register. Security measures are in place, since on one occasion five kilos of mercury were stolen.

Case: Raft N° 1

Extraction data

- Gold extraction: .....~ 10 g/day, ≥ 400 g/month
- Use of mercury: .....1 kg/month
- Mercury price: .....1,300 Bs/kg
- Degree of mercury recovery: .....n/d
- Environmental license: .....Yes

Process

In the raft N ° 1, workers work two 10-hour shifts in four dredgers that work simultaneously and are connected to each other. It has two cooks and support staff who are dedicated to the fishing activities and gold summary. The removal of the material from each raft is carried out every 20 hours. These people receive as payment 10% of the daily production, they work continuously 26 days a month and rest four days.

According to the owner of the pond, the production is 10 g/day, but there are variations depending on the place where the material is extracted, as they move to improve their extraction. They need to extract 400 g/month to achieve a diesel quota of 7,200 liters of diesel for their rafts. Being close to the border and navigable rivers that cross it, the Bolivian government, through ADEMAF, implemented control mechanisms for illegal gold mining by establishing gold quotas that miners must sell to the Bolivian Gold Company (EBO) in exchange for quotas that YPFB is authorized to sell to

BACK TO CONTENT

miners. Despite these data, there are indications that production per raft is much higher.

For each summed up of gold –every 20 hours of the charging process– 200 grams of mercury are used, that is, two caps, as they call it. One kilo is 10 caps, this measure is known by the staff and by many operators of the raft. The relationship that is established is one gram of gold for one of mercury to amalgamate it. In the concentration process, mercury is used only with the pre-concentrated material.

The gold concentration process in most ponds consists of the following stages:

- Dredging
- Homogenization of the bed
- Pre - concentration in gutter
- Amalgamation with mercury
- Recovery of fines and mercury
- Retort

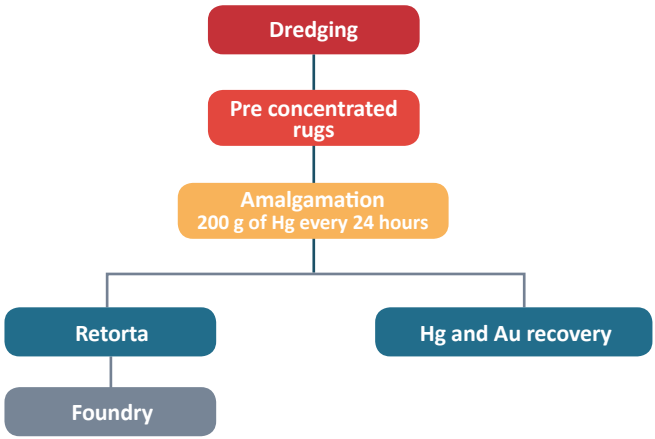
The concentration process begins with the extraction of the material through a dredge, which is composed of a 6x6 corrugated sleeve dredge pump. The dredge pump is powered by a direct coupled four-cylinder diesel engine using rubber pads. The material is sent to a triangular box that allows its homogenization and a correct or adequate distribution in the 4x6 meter gutter. This must not exceed the dimensions of the barge.

The material is pumped for 20 hours through the dredge and then goes to fishing stage. This activity consists of removing the oversize objects, and then shaking the rugs in plastic bins, in which the pre-concentrated material with mercury is amalgamated –approximately 200 grams– and where it is shaken manually. This material is washed in trays manually to obtain amalgamated gold. The approximate amalgamated weight is 20 grams of gold and mercury. The rejection material goes to a short gutter under the same operating system as the first one, passes through a box that homogenizes the material flow and then through a 1.5x2 meter gutter, where the finest gold and scattered mercury remain.

The amalgamated gold goes to a retort, where the amalgam is burned, resulting in sponge gold and mercury. In the retort process, to obtain the burned gold, recover the mercury and return to the process, only one person participates. Despite trying to recover most of the mercury, this is not possible; reason for which the same decrease in a month.

Figure 21 Mineral concentration process in Pool N° 1.

Source: Own elaboration based on an interview



Perceived impacts

Regarding the disposition of the mercury, the material, after being amalgamated, passes again through another gutter with a carpet. The objective of this part of the process is to retain the disaggregated gold and mercury. The material that is not retained in this second gutter, as effluent from the process, goes to the river current.

The amalgamated gold is introduced to the retort equipment and it is hermetically sealed, but with the passage of time the machine does not recover adequately, according to the interviewee.

It is known that mercury is a dangerous substance, it causes damage to the environment, as well as to human health, but the operators of the raft do not know of another input that can substitute it. They do know about oth-

Table 22 Possible impacts of the use of mercury identified in Pool N° 1.

Source: Own elaboration

ENVIRONMENTAL IMPACT	ENVIRONMENTAL ASPECT	PROCESS	ENVIRONMENTAL DEFICIENCY
Water quality degradation	Mercury as an input	Amalgamation process	Effluents with traces of mercury
Soil quality degradation	Mercury as an input	Amalgamation process Retort process	Mercury absorption in river flood zones
Degradation of atmospheric quality	Mercury as an input	Amalgamation process Retort process	Emissions to the atmosphere
Degradation of occupational health and human health	Mercury as an input	Concentration	Different routes of absorption of mercury, either respiratory and skin routes, due to high mercury exposures. Fish intake

er processes such as flotation and cyanidation, however, they consider that these can be more harmful to health and the environment.

The owner of the pool commented that if they were trained on processes that are appropriate to their operations or processes and that are better than amalgamation, they would be predisposed to carry them out, always to the extent of their economic possibilities to replace them.

Mercury supply, transport and storage

The ASOBAL cooperative, the main supplier of mercury to the ponds, delivers approximately 230 g/month of mercury to each member, who is responsible for its best use. However, the quantity sold is not enough, so each raft is supplied from other traders, usually individuals who sell mercury in Riberalta. You can also access the input in Guayaramerín. The mercury found is El Español and that from Mexico. The cost amounts to 1,300 Bs/kg.

In the gravimetric concentration processes per month, approximately one kilo of mercury is used, despite the fact that the retort is used to recover it. The amount used in the amalgamation is the same, there are months that

less or sometimes more is used, but on average one kilo. In the rainy season you can work, but there are risks.

Regarding the controls, they never had problems with the purchase of mercury or its transport. There is no control in the acquisition of the product. The owner argued that this may be due to the fact that the commercialization is not public (there are no public positions, but private homes for the sale of mercury) and only those who handle gold know who is selling.

Mercury is transported in a plastic bottle from the point of supply, both the one supplied to the cooperative and the one purchased in Riberalta. It is sold in 1 kilo plastic containers.

The mercury is stored in a small deposit in an auxiliary boat, where there is also the dining room for the workers, the kitchen and the place where the gold summary is made. The manager and the owner of the raft have access to the mercury stored in plastic containers with their respective lid. Reliable personnel are available to prevent theft of material and mercury.

Case: Cooperative ASOBAL

Extraction data

- Gold extraction: .....~ 10 gr/day, ≥400 g/month
- Use of mercury: .....1 kg/month
- Price of mercury: .....1,300 Bs/kg
- Degree of mercury recovery: .....n/d
- Environmental license: .....Yes

Scope

It has 15 mining rights, 11 of which have environmental licenses. To date, it has approximately 300 partners and 400 rafts, who work on mining rights along the Madre de Dios and Beni rivers. Although these are located at different points on both rivers, it is usual for the rafts to travel the entire length of the two rivers, so their effective reach is much greater than the space of their mining rights. Around 900 people work in the rafts that the cooperative brings together.

Among the many functions that the cooperative fulfills, the relevant one for this work is to provide mercury to its members.

Mercury provision

The cooperative purchases 69 kg/month of mercury from the city of La Paz. Your supplier Señora Monica also buys gold. Mercury comes in 34.5 kg metal containers, which is why you buy two. This input is transported by land to Riberalta. The kilo is between 1,300 to 1,500 Bolivians.

If the owner of each raft needs more mercury, he sources his supplies from vendors in Riberalta. These traders do not have positions as such, but are known to the owners of the rafts. It is even said that among them there is a policeman.

The input requested by the cooperative is sent from the city of La Paz by land. At no time were there any problems or control of it. The MMAyA held a talk regarding the Minamata Convention, in which the problem of mercury, its use and how harmful it is to human health and the environment was addressed. However, it did not provide viable alternatives or explanations for a better use and disposition of it.

Mercury sale

The 69 kilos of mercury acquired are distributed among the 300 partners, each one receives (not each raft) 230 g/month.

Each partner transports and maintains it in different containers. The containers can be made of glass, plastic or metal. Moving and storage are not necessarily the most appropriate. According to the president of the cooperative, they had no incidents either in the distribution or in their transportation.

Cases Studies of Local Mercury Traders

Case: Local Marketer N° 1

In San Ramón there are three permanent marketers. Occasionally people from Santa Cruz come to the population to offer mercury at similar costs. Information on one of these marketers is presented below[11].

Marketing data

- Origin of the commercialized mercury: La Paz
- Price of the acquired mercury: .....1,300-1,400 Bs/kg
- Quantity marketed:.....40 kg/month
- Destination of the mercury sold: .....San Ramón, Guarayos, San Julián
- Sale price:.....1,500-1,800 Bs/kg for wholesale, 3 Bs/g for retail

Mercury provision

The mercury that he sells is from the El Español brand because people and cooperatives demand it for its quality to amalgamate the gold. The product you buy comes in its original packaging, plastic of 250 ml of 1 kg hermetically sealed at the factory; however, he considers that it very rarely contains the indicated weight. The purchase price from the La Paz supplier is 1,300-1,400 Bs/kg, depending on the price of gold or the demand for mercury.

For several years the supplier of mercury in La Paz has been Señora Mónica because of the price, trust, seriousness and responsibility in shipments; thus, also it always has the input to sell. Send the order by land, by bus.

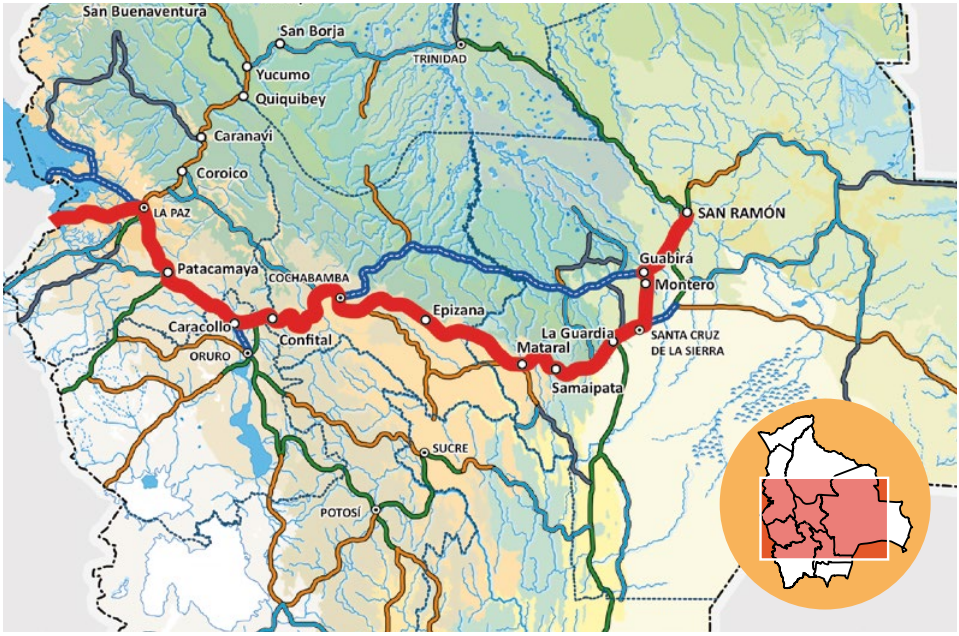
11 Three marketers were contacted, however, only one was willing to provide information in the interview, the other two refused to do so.

The supplier supplies 20 kilos of mercury every two weeks and requests more for the end of the year parties and carnivals, the most important celebrations and in which there is the greatest demand for the product.

At no time since the commercialization of mercury has it faced any control or prohibition on its transportation or sale, nor has it had any problem with the purchase in the city of La Paz.

Figure 22 Transport route: La Paz to Santa Cruz

Source: Own elaboration

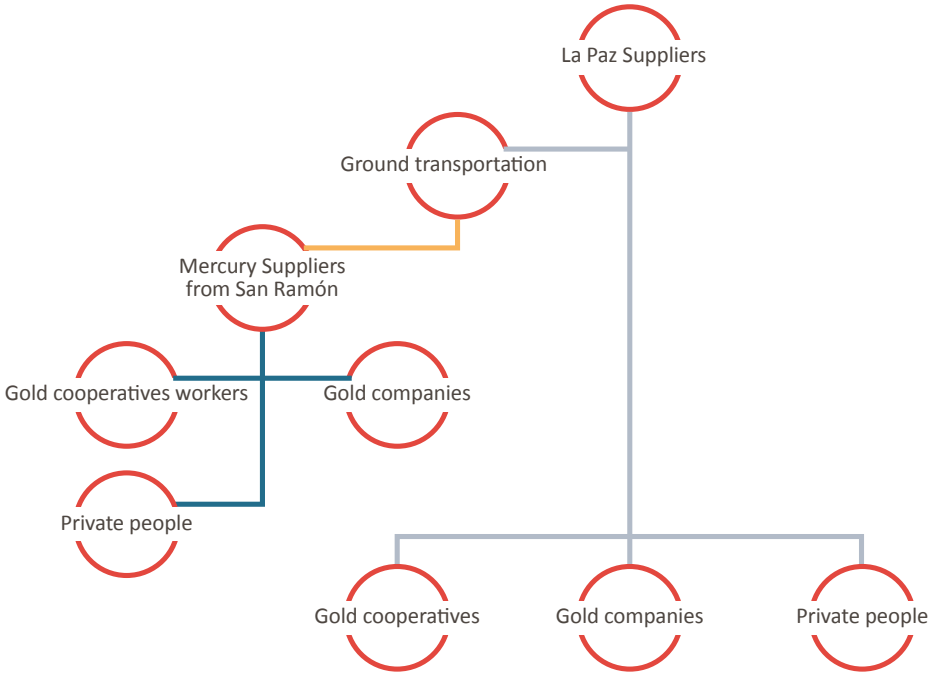


Mercury sale

Cooperatives and isolated batters buy the product, as well as people from San Julián and Guarayos. The price is 1,500 Bs/kg, it also sells three bolivianos per gram, this being the most profitable, although it prefers to market in large quantities due to the flow of money. The demand increases for the end of the year parties and carnivals.

Figure 23 Cadena de comercialización del mercurio en la región

Fuente: Elaboración propia



Case: Local Marketer N° 2

Marketing data

- Origin of the commercialized mercury: La Paz
- Price of the mercury purchased:.....1,200 Bs/kg
- Quantity marketed:.....190 kg/month
- Destination of the mercury sold: Riberalta, the Sena, Guarayos, San Pablo
- Sale price:.....1,200-1,500 Bs/kg

Mercury provision

His main supplier is from the city of La Paz, which is a nationwide mercury importer. He knows other importers due to the price at which the product is re-marketed, however, it has been several years that he obtains it from his supplier because of the trust and seriousness. Mercury is imported from Mexico, on the other hand, the quantity of this that the importer sells in the country is unknown. The purchase price is 1,200 Bs/kg. The input is transferred by land from La Paz.

Figure 24 Transport route: La Paz to north amazon

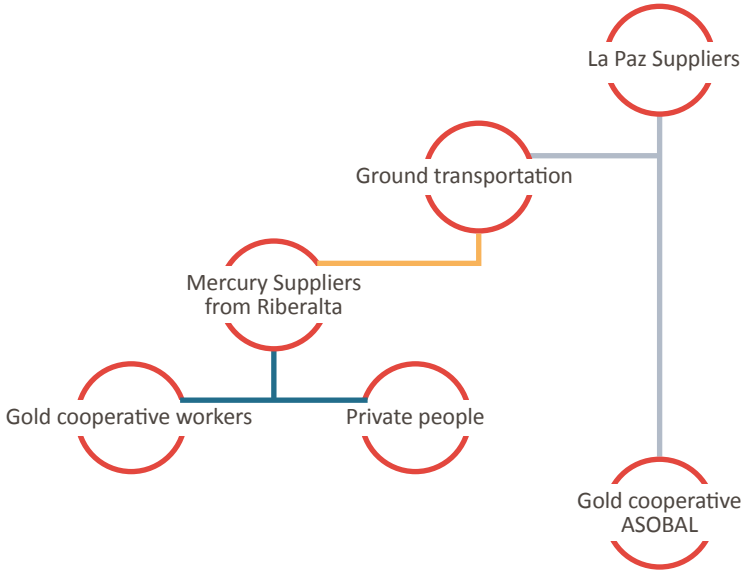
Own elaboration

Mercury sale

His clients are cooperatives, individuals and small businesses. The mercury it sells is of two types: that of Mexico in 34.5-kilo containers and that of the *El Español* brand in one-kilo containers. The first sells it at 1,200 Bs/kg

Figure 25 Mercury marketing chain in the region.

Source: Own elaboration



and the second at 1,500 Bs/kg in Riberalta, the difference is due to demand[12]. He supplies not only rafts in Riberalta, but also in the Seine, Guarayos, San Pablo. He sells 190 kg/month. Marketing is constant throughout the year and he says that there are months of lower sales and months of higher sales. On average, he has a stable behavior, his increase is due to new customers who demand the input.

Customers communicate or contact by phone to place their orders. Up to now, he has never had any problems regarding the commercialization of mercury or its transportation; He commented that in his experience, mercury is not controlled in its commercialization or in its transportation.

12 The mercury before 2014 came mainly from Spain and the El Español brand was the best known, so local knowledge was made that this was a good product. At present, it is not exported from Spain and it is known that one of the mercury importers to Bolivia repackages the Mexican input in containers with the El Español label.

BACK TO CONTENT

Annex 2. National Regulation Relating to Mercury

Table 23 Norms that establish specific technical normative criteria on mercury in Bolivia

Source: Own elaboration based on information from the Ministry of Foreign Affairs & Ministry of Environment d Water (2015: 113-115)

RULE	PROVISION
Regulation on Atmospheric Pollution, Annex 3 of Supreme Decree 24176 of December 8, 1995	Permissible air quality limits for specific pollutants: 1 µg/m3 of mercury (period and statistical characterization: annual arithmetic mean). Annex 3 List of dangerous pollutants to be considered when preparing inventories of emissions to the atmosphere: mercury classified as Class I.
Environmental Regulation for Mining Activities, Decree Supreme 24782 of July 31, 1997	Article 27. The use of mercury in mineral concentration processes is only allowed when installed equipment for the recovery of mercury at the exit of the process is in place. The amalgam treatment must be carried out in retorts or other equipment that avoids the release of mercury into the environment. Annex 1 List of hazardous substances used in mining activities: mercury and its compounds classified as toxic. Annex 4-A Characteristics of the leachate (Procedimiento de Extracción de Constituyentes Tóxicos (Procedure of Extraction of Toxic Constituents) (PECT) that make a substance dangerous due to its toxicity to the environment: for mercury 0.2 mg/l
Regulation on the Release of Industrial Waste into Water Bodies, Ministerial Resolution RM 010/85 of January 24, 1985	Article 3.4. Maximum values of parameters of receiving water bodies for mercury (mg / l): - 0.001 Special class[1] - 0.005 Class A - 0.01 Class B - 0.02 Class C - 0.05 Class D Article 4.1 Maximum admissible parameters for discharge into receiving water bodies: for mercury (mg/l): 0.05

1 Art. 3.2:
Special class. Waters destined for public supply without previous treatment or with simple disinfection.
Class A. Waters intended for public supply (after sedimentation, filtration, and disinfection), for the irrigation of vegetables (for consumption in crude oil), and swimming.
Class B. Waters destined for public supply (after conventional treatment; coagulation, flocculation, sedimentation, filtration, and disinfection) to preserve flora, fauna, and animal drinking trough.
Class C. Waters destined for public supply (after special treatment), irrigation, landscape harmony, navigation, and energy production.
Class D. Waters destined for the transport and removal of waste.

(Table continues on next page)

Table 23 Norms that establish specific technical normative criteria on mercury in Bolivia

Source: Own elaboration based on information from the Ministry of Foreign Affairs & Ministry of Environment d Water (2015: 113-115)

RULE	PROVISION
Regulation of the National Technical Standard for Ecological Production, Ministerial Resolution 280 of December 4, 2006[2]	Article 5. Environmental conditions. It is required to take all appropriate measures to minimize internal or external contamination in the organic production units. i) Non-biodegradable materials used for ground coverage, insect netting or silage wrapping, etcetera, must be removed after its use, and it is forbidden to burn them within the organic production units. The use of polycarbonate materials should be restricted to a minimum. The use of heavy metals, such as potassium, magnesium, chromium, cadmium, copper, mercury, nickel, zinc, is restricted up to 1g /h/year.
Regulation on Water Pollution (RMCH), Annex 4 of the Supreme Decree 24176 of December 8, 1995	Chart A-1, Annex A Maximum admissible values of parameters in receiving water bodies, for mercury: 0.001mg / l for the four types of water receiving bodies (A, B, C, and D). Annex A - 2 Permissible limits for liquid discharges in mg/l for mercury: 0.002 daily and 0.001 monthly.
Regulation for the Sanitary Inspection and Certification of Milk and Dairy Products (RMCH), 2011	5.3 Chemical residues and contaminants in milk. Maximum level established for mercury: 5 µg/L
International Instrument ILO-Convention C 121, 1964	Article 39. Occupational diseases. Those caused by mercury or its toxic compounds.
Basic Regulation of Hygiene and Industrial Safety, Supreme Decree 2348 of January 18, 1951	Article 20. Maximum permissible concentrations of pollutants in the atmosphere of occupied areas must include, but are not limited to, the following substances and their corresponding values concerning maximum permissible concentrations: b) Toxic dust, fumes, and mists (Milligrams per cubic meter) Mercury 0.1
INSO Occupational Health Regulations 2008	Limit mercury t in the blood of 15 µg of Hg. L-1 and urine of 50 µg of Hg.g-1 of creatinine. The limit for elemental mercury, in the inorganic and organic alkyl compounds, is LMP-ED1 = 0.025 mg.m-3 and LMP-ED = 0.01 mg.m-3, respectively.
Complements and modifications to the Environmental Regulation for the Hydrocarbons Sector, Supreme Decree 2400 of June 10, 2015	Annex 7 7.1. Maximum permissible limits for liquid discharges in bodies of water for the hydrocarbons sector. For mercury: 0.001 mg/l.

2 It Regulates the Law for the Regulation and Promotion of Non-Timber and Ecological Agricultural and Forest Production, Law 3525 of November 21, 2006.

BACK TO CONTENT

Table 24 Other general norms that govern the use, transport, and trade of mercury in a general way

Source: Own elaboration based on identified standards

AREA	RULE	PROVISION
Hazardous residues management	Bolivian Standard NB 742, Solid Waste Terminology on Solid and Hazardous Waste, Secretarial Resolution 383 of November 28, 1996	Hazardous residues are those that carry a potential risk to humans or the environment due to any of the following characteristics: corrosivity, explosiveness, flammability, pathogenicity, bio infection, radioactivity, reactivity, and toxicity.
	Bolivian Standard NB 758, Environment-Characteristics, Lists and Definition of Hazardous and Low-Risk Wastes, Secretarial Resolution 383 of November 28, 1996	5. General aspects. The residues considered hazardous are the residues classified as such in List No. 1. - Toxic substances that make a residue hazardous: mercury and its compounds residues of mineral origin including metals: batteries with mercury (code 2.19), residues with mercury (code 2.20).
	Environmental Regulation for the Industrial Manufacturing Sector, Supreme Decree 26736 of July 30, 2002	**Article 62.** (Safety Data Sheets). The industrial concern must have Safety Data Sheets for each of the dangerous raw materials and supplies it uses. **Article 82.** (Classification). The industrial concern must classify its solid residues following the Bolivian Standard NB 758 in hazardous and non-hazardous residues. **Article 83.** (Storage). The industrial concern that temporarily stores its residues must do so according to its dangerousness, as established in Annex 14 of this regulation. **Article 84.** (Prohibition). It is prohibited the final disposal of solid residues inside the industrial unit or other unauthorized places. **Article 85**. (Combustion). The industries must have a plan or operation that include the combustion of solid residues in their processes for energy use purposes must include this operation in their PMA (EMP.) **Article 86.** (Transference). The industry may transfer its solid industrial residues to another industry for recycling, reuse or benefit from it. **Annex 14** Conditions for the temporary storage of solid residues. 1. **Object** Minimum requirements that industries must meet for the management and temporary storage of residues on the premises of the industrial unit. 2. **Differentiated application** For the application of the requirements, the hazardousness of the residues should be established according to the technical criteria of the Norma Boliviana (Bolivian Standard) NB 758. 3. **Non-hazardous solid residues** Depending on the type of residue, the following conditions must be established: a) Adequate areas for the temporary storage of the type of residue, protected against the climate elements and the access of unauthorized persons and animals.

(Table continues on next page)

Table 24 Other general norms that govern the use, transport, and trade of mercury in a general way

Source: Own elaboration based on identified standards

AREA	RULE	PROVISION
Hazardous residues management	Environmental Regulation for the Industrial Manufacturing Sector, Supreme Decree 26736 of July 30, 2002	b) Containers that prevent the spillage of residues, appropriate for handling in sufficient quantities and reception volumes to guarantee the collection cycle of the operating company or the transference for recycling. 4. **Hazardous solid residues** a) Characterization - The characteristics of the dangerousness of each type of residue will be identified according to CRETIB, and they shall be specified in the containers, differentiated by color symbology, in safety sheets, and in handling guides available in the storage area and offices of the person responsible for the environmental management of the item involved. - A technical management guide should be elaborated which establishes the requisites for the containers, the manipulation and storage, and the procedures for spills and emergencies for each residue. b) Containers The containers holding hazardous industrial solid residues must have the following characteristics: - A solid material appropriate to guarantee resistance and durability according to the characteristics of the residue. The time limit of the container's durability will be established according to the storage conditions and type of residue. - Differentiated shape and color, labels with the identification characteristics and hazardousness of the residue. - The container must have a hermetically sealed lid and a maximum containment limit. - Instruments of control of the pressure, temperature, or others, depending on the type of residue. c) Manipulation The following aspects should be taken into account for the manipulation of hazardous solid residues: - The handling of hazardous residues must be carried out in specific containers. - The personnel in charge of manipulating hazardous solid residues must be trained for this purpose according to the technical guides for its manipulation. - The personnel in charge of handling hazardous solid residues must have protective clothing and equipment for safety and hygiene. - The equipment to handle them must have adequate maintenance to avoid any contingencies. d) Storage Storage areas must have the following characteristics: - Good ventilation and protection from weather conditions or should have artificial climate conditions depending on the type of residues. - Sufficient lighting and secure electrical installations to carry out a good operation during the manipulation and inspection of residues. - Restrictions to outsiders as well as animals.

(Table continues on next page)

BACK TO CONTENT

Table 24 Other general norms that govern the use, transport, and trade of mercury in a general way

Source: Own elaboration based on identified standards

AREA	RULE	PROVISION
Hazardous residues management	Environmental Regulation for the Industrial Manufacturing Sector, Supreme Decree 26736 of July 30, 2002	- Location in areas that reduce risks due to possible emissions, leaks, fires, explosions, and floods. - Be separated from the areas of production, feeding services facilities, offices, and storage of raw materials and finished products. - Have retaining walls and retention pits to capture spills or possible leachates that could flow outside the storage area. Provide the necessary corridors to allow the transit of mechanical or manual forklifts and the movement of security groups and firefighters in emergency cases. - Proper signage such as ads and signs alluding to the dangerousness of the materials stored in places and shapes that make them visible and understandable. - Have the proper drainage for the disposal of the water from cleaning. - Have sensors for leaks or fires, fire extinguishers, and other emergency materials and equipment placed in strategic areas of easy access. - The floor of the storage area must be built with waterproof material, and chamfers must be built at the unions to avoid 90-degree unions where dangerous particles can accumulate and adhere. - Develop and maintain an inventory of the stored solid residues and technical information specialized and updated. - Implement chemical, physical, and biological monitoring systems that could allow identifying the variations that may occur in the residues, containers, and area of storage. **Annex 15** Conditions for reuse, recycling, and use of hazardous residues from the industry. Toolbar While the list of hazardous industrial residues it is developed with specific possibilities and standards for its reuse, recycling, or reuse, the following is temporarily established: 1. The industry that transfers hazardous industrial residues for reuse and recycling must send two copies of the transfer contract to the Instancia Ambiental del Gobierno Municipal (Environmental Instance of the Municipal Government) IAGM, and this, in turn, will send a copy to the Organismo Sectorial Competente (competent sectoral body) OSC. The contract must contain at least the information described below: a) Description of the objective of the transfer, specifying recycling, reuse, and utilization. b) Description, characterization, quantity, quality, and frequency of transference of the residues. c) Description of the transport, address of the industrial unit of destination. d) Address, name, signatures, and identity card number of the parties involved. 2. The industry that transfers hazardous industrial waste for reuse, recycling, and utilization shall keep a detailed registration book of the documents of proof of the transfer, signed by both parties; available for inspection by the competent.

(Table continues on next page)

Table 24 Other general norms that govern the use, transport, and trade of mercury in a general way

Source: Own elaboration based on identified standards

AREA	RULE	PROVISION
Use of dangerous substances	Environmental Regulation for Mining Activities, Supreme Decree 24782 of July 31, 1997	**Title VI** About dangerous substances **Chapter I** Purpose and scope **Article 54.** Dangerous substances in mining-metallurgical activities are those named in the list of Annex "1" of this regulation. The licensee or mining operator that uses said hazardous substances as industrial inputs must comply with the standards of this title and with the manufacturer's instructions. To such effect he must fill out the form in Annex "1" and submit it to responsible of the Estudios de Evaluación de Impacto Ambiental (Environmental Impact Assessment Studies) EEIA, Medidas de Mitigación y Plan de Aplicación y Seguimiento Ambiental (Mitigation Measures and Environmental Implementation and Monitoring Plan) MM-PASA or the Manifiesto Ambiental (Environmental Manifest) MA, as applicable. The environmental license authorizes the licensee or mining operator to carry out activities with the dangerous substances mentioned in article 56 of the present. When appropriate, he must comply with the pertinent regulations for dangerous chemical substances established in Law 1008 of July 19, 1988. **Article 55.** The list in Annex "1" may be extended through a Resolution Biministerial (Bi-Ministerial Resolution) of the ministries of Desarrollo Sostenible y Medio Ambiente (Sustainable Development and Environment) and Desarrollo Económico (Economic Development) provided that a substance for industrial uses carries a label of dangerousness or when its dangerousness is established through standard tests. **Article 56.** In mining-metallurgical operations, activities with dangerous substances are the supply, transportation, storage, use, treatment of residues and containers, and the confinement of residues and containers of hazardous inputs. **Chapter II** About mining activities with hazardous substances **Section I** About the supply and transportation **Article 57.** The container and packaging of dangerous substances must follow the specific norms of the manufacturer, marking them according to the characteristics of the dangerousness of the substance. **Article 58.** It is prohibited the transportation of fuels, oils, and fats together with explosives. **Section II** About the storage **Article 59.** In the storage of dangerous substances, the licensee or mining operator must comply with the rules established in paragraphs b) to i) of Article 52 of the Reglamento para Actividades con Sustancias Peligrosas (Regulations for Activities with Hazardous Substances), approved by Decreto Supremo (Supreme Decree) 24176 of December 8, 1995. Additionally, the warehouses must be built in places away from streams and water sources.

(Table continues on next page)

BACK TO CONTENT

Table 24 Other general norms that govern the use, transport, and trade of mercury in a general way

Source: Own elaboration based on identified standards

AREA	RULE	PROVISION
Use of dangerous substances	Environmental Regulation for Mining Activities, Supreme Decree 24782 of July 31, 1997	**Article 60.** In the storage of explosives, the licensee or mining operator must comply with the following rules: explosives must be stored in a dry place at least three hundred (300) meters away from important buildings and facilities, such as offices, workshops, industrial plants, power plants, warehouses, deposits, and camps. For the collection of explosives on the surface, should be built a powder magazine surrounded by a firewall. Extinguishers that can cover possible fires in the different enclosures of the warehouse must be available. It should not be allowed the entrance to the explosives depots of any person who is not expressly authorized, and the explosives must be kept away from all kinds of fire. When entering the powder magazines, it should be forbidden to carry cigarettes, matches, carbide lamps, and any material liable to combustion. The components of the explosives like primers, guides, dynamite, ammonium nitrate, fuel oil, and others should be stored in deposits that are separated among them and from other supplies and materials. **Section III** **Article 61.** When using dangerous substances, the licensee or mining operator must comply with the following norms: the preparation of reagents must be carried out in a specific area equipped with gutters that lead spills to retention pits; the preparation area must have visible instructions and warnings indicating the methods for the management and preparation of reagents; there should be in place equipment, devices and procedures for emergencies in case of accidents. **Section IV** About the treatment of residues, waste, and containers of supplies. **Article 62.** The licensee or mining operator must treat the residues, waste, and containers of supplies through systems that eliminate, neutralize, or reduce their danger before their reuse, recycling, or final disposal. Treatment systems are the controlled incineration, chemical procedures, and the cleaning of containers. **Article 63.** Once the containers of dangerous substances are emptied, they cannot be used for other purposes if the remnants of the dangerous substance they contained are not extracted from them. In no case can the container be used to contain food or water for human or animal consumption or household chores. Containers from which it is not possible to extract the dangerous substance they contained may be reused to transport the same dangerous substances, recycled as raw material, or permanently confined following the provisions of article 64 of this regulation. **Section V** About the confinement of the residues of dangerous substances. **Article 64.** In the definitive confinement of dangerous substances, the licensee or mining operator must comply with the provisions of articles 55 to 59 of the Reglamento para Actividades con Sustancias Peligrosas (Regulations for Activities with Hazardous Substances), approved by the Decreto Supremo (Supreme Decree) 24176 of December 8, 1995.

(Table continues on next page)

Table 24 Other general norms that govern the use, transport, and trade of mercury in a general way

Source: Own elaboration based on identified standards

AREA	RULE	PROVISION
Use of dangerous substances	Regulations for Activities with Hazardous Substances, December 8, 1995	**Article 2**. For the purposes of this regulation, the dangerous substances are those substances that present or carry the following intrinsic characteristics: corrosivity, explosiveness, flammability, pathogenicity or bio infectivity, radioactivity, reactivity, and toxicity; as per standard tests. **Article 14.** The Ministerio de Desarrollo Sostenible y Medio Ambiente (Ministry of Sustainable Development and Environment) MDSMA, in coordination with the corresponding sectoral authorities, will establish the Programa de Acción Intersectorial (Intersectoral Action Program) as well as the Programa Nacional de Seguridad Química (National Chemical Safety Program) for dangerous substances, based on current international lists to elaborate appropriate technical standards, anticipating or considering the following: - The identification and classification of the dangerous substances based on their properties, characteristics, and degree of danger. - The recommendations of the United Nations, other international and national organizations, and the safety data sheets of the manufacturers and suppliers of dangerous substances. - The inventory of activities with dangerous substances, following section a), will serve to develop the registry of activities with dangerous substances at the national level. - The type of pre-treatment, treatment, or disposal appropriate for each dangerous substance, be it physical-chemical, biological, thermal, or other, as well as the pertinent technical regulations that establish the standards of dangerousness. - The cases in which the minimization and reuse of the substance are feasible. - The strategy to follow so that the companies that generate or operate with hazardous substances comply with the corresponding technical standards to achieve a progressive reduction of hazardous waste and residues. - The information contained in the Manifiesto Ambiental (Environmental Manifesto) is contemplated in the Reglamento de Prevención y Control Ambiental (Regulation of Prevention and Environmental Control) concerning dangerous substances. - Methods and technologies to achieve a progressive reduction of hazardous waste and residues. - The publication of manuals for the management and control of dangerous substances, intended to promote, in the scientific or technological ambit, the development of activities and the incorporation of clean technologies that help to optimize, prevent and reduce risks. - The elaboration of manuals with methodologies for Risk Analysis. **Article 15**. Any natural or collective person, public or private that carries out activities with dangerous substances must present the following documentation through a memorial (legal petition) addressed to the Autoridad Ambiental Competente (Competent Environmental Authority), as a complement to what is required in the Reglamento de Prevención y Control Ambiental (Regulation of Environmental Prevention and Control) to obtain the registration and license for activities with hazardous substances:

(Table continues on next page)

BACK TO CONTENT

Table 24 Other general norms that govern the use, transport, and trade of mercury in a general way

Source: Own elaboration based on identified standards

AREA	RULE	PROVISION
Use of dangerous substances	Regulations for Activities with Hazardous Substances, December 8, 1995	- A photocopy of the articles of incorporation of the company specifying the type of activity (or activities). - Sufficient power of attorney certified by a Notario de Fe Pública (Notary Public.) - List of the hierarchical personnel and curriculum vitae of the technical personnel responsible for the operational activities with hazardous substances. - The technical standards are applicable to the management, transport, storage, and disposal, as the case may be. **Article 17**. The natural or collective person, public or private, that obtains a license to import or export dangerous substances must comply with the present Regulations, the Código de Salud (Health Code), and other related and complementary legal provisions. **Article 19**. The license to temporarily import dangerous substances and to process them in the national territory must also take into account for each volume the following requirements, - Identify the means of transport to be used and routes that will be followed. - Identify the recipient. - Describe the treatment: flow diagram, operations, and processes, the balance of materials and energy at origin and destination, including characteristics of the residues or waste that is generated. - List the characteristics, physical-chemical or biological properties of the dangerous substance (s) to be imported or re-exported. - Indicate the place of origin and destination of the dangerous substances. - Indicate ports of entry and exit. - Present a certificate from the competent authorities of the country of origin on the degree of dangerousness, protection measures, and foreign trade requirements for the dangerous substance (s). - Attach copies in Spanish of the documentation in process to obtain the license of the country of destination in case of exportation and the country of origin in the case of importation. - In the case of import, export, or temporary importation of dangerous substances, the Autoridad Ambiental Competente (Competent Environmental Authority) will brief the Ministerio de Hacienda y Finanzas (Ministry of Treasury and Finance) to grant the respective licenses. **Article 21.** The registration is done only once. The import or export license grants its holder authorization to carry out activities with dangerous substances for 3 (three) years from the date of granting and is subject to periodic inspections. **Article 22**. Sixty (60) days before the expiration of the export and import license, it must be requested its renewal through a memorial (legal petition) together with a report that will have the quality of an affidavit detailing the activities carried out during the period elapsed since the license was granted and including unforeseen risk situations that may have occurred during the said period.

(Table continues on next page)

Table 24 Other general norms that govern the use, transport, and trade of mercury in a general way

Source: Own elaboration based on identified standards

AREA	RULE	PROVISION
Use of dangerous substances	Regulations for Activities with Hazardous Substances, December 8, 1995	**Article 25**. The natural or collective person that due to the nature of their activity requires to transport dangerous substances, inside or outside the country, must submit to the Autoridad Ambiental Competente (Competent Environmental Authority) the corresponding Manifiesto de Transporte (Transport Manifest), before doing the aforementioned transport, as per the regulations and procedures in force. **Article 26.** The Declaratory de Impacto Ambiental (Declaration of Environmental Impact) and the Declaratory de Adecuación Ambiental (Declaration of Environmental Adequacy) will expressly approve ranges in the magnitude and composition of the dangerous substances declared in the Estudio de Evaluación de Impacto Ambiental (Environmental Impact Assessment Study) or the Manifiesto Ambiental (Environmental Manifesto) respectively. **Article 30**. Any natural or collective, public or private person that uses, commercializes, imports, exports, or handles dangerous substances established in sectoral lists, must comply with the technical standards of this regulation. **Article 31**. The natural or collective, public or private person that handles dangerous substances must contract, obligatorily, an insurance that covers the possible damages resulting from activities with dangerous substances, including those inherent to their commercialization and transport. **Article 32.** Any natural or collective person, public or private that carries out activities with dangerous substances is obliged to record their activities in a logbook, signed by the person in charge, in which it must be indicated according to the case: - Date, quality, quantity, characteristics, and degree of dangerousness of the substances. - Date of receipt, shipment, movement, storage, origin, destination, and reason why the dangerous substances were received or delivered. - Report of incidents or accidents, which includes: o Identification, address, and telephone numbers of the company that owns the substances and the person responsible for its handling. o Indication of the volume, physical, chemical, biological characteristics, degree of dangerousness, or other data of the substance(s) involved. o Measures adopted and to be adopted to control its adverse effects. o Security measures that may be disseminated and made effectual to mitigate the negative impact. - Places of confinement of hazardous waste: o Volume, origin, characteristics, and degree of dangerousness of the deposited waste. o Place and date of confinement. o Disposal systems used. o Occupied area and available area. **Article 45.** In writing, the legal representative must communicate the export or import of dangerous substances to the Autoridad Ambiental Competente (Competent Environmental Authority).

(Table continues on next page)

BACK TO CONTENT

Table 24 Other general norms that govern the use, transport, and trade of mercury in a general way

Source: Own elaboration based on identified standards

AREA	RULE	PROVISION
Use of dangerous substances	Regulations for Activities with Hazardous Substances, December 8, 1995	**Article 46**. Every carrier that performs transport services with dangerous substances must verify that they are adequately packaged and that the data that identify them keep exact correspondence with the Manifiesto de Transporte (Transport Manifest.) **Article 47**. Under the responsibility of the transportation, every carrier must deliver the dangerous substances in his charge to the recipient, except in cases of force majeure. For no reason may these be abandoned or delivered to a natural or collective person, public or private, that has nothing to do with the transport mentioned above, or be deposited in a place of unauthorized collection or not specified in the Manifiesto de Transporte (Transport Manifest.) **Article 48**. In emergency cases, the carrier may temporarily deliver the dangerous substance(s) to a different natural or collective person, public or private, or deposit it in a place for the emergency. Under his responsibility, he will immediately notify the legal representative. **Article 49**. The containers and any other type of packing for transporting dangerous substances must comply with the relevant technical standards. **Article 50.** Any natural or collective person, public or private, carrying out activities with dangerous substances or hazardous waste must submit the Manifiesto de Transporte (transport manifest) to the Autoridad Ambiental Competente (Competent Environmental Authority) within seven business days from the date of shipment. **Article 51.** The transport of dangerous substances by air must comply with the technical standards and legal provisions in force. **Article 52**. Dangerous substances must be stored in areas, places, and environments that meet the conditions required and guarantee their safety, following the provisions of the Reglamento de Prevención y Control Ambiental (Environmental Prevention and Control Regulation.) For this purpose, at least the following should be considered: - Risk analysis. - Location in areas that reduce risks due to possible emissions, leaks, and fires. - Areas with little traffic, preferably separated from conventional places of production, administration, and storage of other materials and finished products. - Proper signage such as posters, signs, or other means for the storage facilities indicating the dangerousness of the place and the precautionary measures that must be followed. - The construction of gutters and retention pits to capture the residues and possible spills that flow outside the storage facilities. - In its design, foresee the spaces necessary to allow the transit of security personnel and equipment required to respond adequately to emergencies.

(Table continues on next page)

Table 24 Other general norms that govern the use, transport, and trade of mercury in a general way

Source: Own elaboration based on identified standards

AREA	RULE	PROVISION
Use of dangerous substances	Regulations for Activities with Hazardous Substances, December 8, 1995	- The choice of non-flammable, waterproof materials resistant to the substances to be stored, calculating the reactivity of the substances against said materials, and considering ventilation and lighting systems. - The equipment of the facilities with mechanisms and systems to detect leaks and deal with fires, floods, and emergencies that may arise according to the volume and nature. - The incompatibility between the substances to be stored. **Article 53.** Inside the storage sites, the containers or containers of dangerous substances must be duly identified with the labeling or other standardized means with the commercial, scientific name or formula, characteristics and degree of dangerousness of the substance(s), as well as with the necessary recommendations for their proper handling. **Article 63.** Per the provisions of the Reglamento General de Gestión Ambiental (Environmental Management General Regulations), the following administrative offenses are established: Import or export dangerous substances without authorization from the Organismo Sectorial Competente (Competent Sectorial Organism.) - Failure to implement and execute the corrective measures approved by the Autoridad Ambiental Competente (Competent Environmental Authority.) - Carry out activities with dangerous substances without renewing the operating license. - Failure to deliver to the Autoridad Ambiental Competente (Competent Environmental Authority., the respective Manifiesto de Transporte (Transport Manifest) issued by the Ministerio de Hacienda (Dirección General de Aduanas) (Ministry of Finance (General Directorate of Customs) within the term established in Chapter V, Title IV of this Regulation. - Failure to comply with the technical regulations regarding the recycling, selection, collection, transport, storage, treatment, and confinement of dangerous substances. **Article 65**. In the meantime, the technical standards and related programs for dangerous substances referred to in art. 14 of these regulations are formulated, approved, or homologated; will be effective in the country the corresponding ones recommended by the United Nations, World Health Organization, International Registry of Potentially Toxic Chemical Products, Transport of Dangerous Goods, among others. Preferably at the level of the different international conventions to which Bolivia expressly adhered. **Article 66.** While the lists and specific regulations for the management of dangerous substances to be prepared by the Ministerio de Desarrollo Sostenible y Medio Ambiente (Ministry of Sustainable Development and Environment) MDSMA in coordination with the competent sectoral bodies are formulated, the provisions recommended by the United Nations will be adopted.

Annex 3. Official Notifications from the Government of Bolivia to the Minamata Convention Secretariat

ESTADO PLURINACIONAL DE BOLIVIA

MMAyA
Ministerio de Medio Ambiente y Agua

La Paz, 30 MAY 2019
MMAyA/VMABCCGDF/ Nº1 067 / 2019

Mrs.
Rossana Silva Repetto
EXECUTIVE SECRETARY OF THE MINAWATA CONVENTION
International Environment House 1
Office address: 11-13 chemin des Anemones,1219 Chatelaine
Postal address: Avenue dela Paix 8-14,1211
Geneva 1o,Switzerland
MEA-MinamataSecretariat@un.org | www.mercuryconvent on.org | www.unep.org
Geneva, Switzerland.-

Ref. **NOTIFICATION THAT THE ARTISAN AND SMALL SCALE GOLD MINING – (ASGM) AND THE PROCESSING ARE MORE THAN INSIGNIFICANT WITHIN THE PLURINATIONAL STATE OF BOLIVIA**

Mrs.Silva:

The Plurinacional State of Bolivia notifies the Secretariat of the Minamata Convention that the extraction of artisanal gold on a small scale (ASGM) and the process where amalgam is used to extract the gold mineral is more than insignificant in its territory.

Sincerely,

Cynthia Viviana Silva Maturana
VICE MINISTRY OF ENVIRONMENT, BIODIVERSITY, CLIMATE CHANGE AND OF FOREST MANAGEMENT AND DEVELOPMENT
MINISTRY OF ENVIRONMENT AND WATER
PLURINATIONAL STATE OF BOLIVIA

VICEMINISTERIO DE MEDIO AMBIENTE, BIODIVERSIDAD CAMBIOS CLIMÁTICOS Y DE GESTIÓN Y DESARROLLO FORESTAL
CALLE POTOSI ESQ. AYACUCHO Nº 438, EDIFICIO CASA GRANDE DEL PUEBLO PISO 18 - Telf.: 2141929

ESTADO PLURINACIONAL DE BOLIVIA

MINISTERIO DE RELACIONES EXTERIORES

SUYUKUNAWAN RIMANAKUY - KAMACHIQ WASI
ANQAXA MARKANAKAMPI TUMPAŞINA KAMANI
MBOROKUAINESIRDA IRU TETAGUASURETA NDIVE REGUA

VRE-DGRM-UMTA- Cs- 421/2020
La Paz,

Messrs. Secretariat of the Minamata Convention:

I have the pleasure to write to you to request the registration of the new National Focal Point and the Additional Focal Point of the Plurinational State of Bolivia to the Minamata Convention about Mercury as per the following detail:

NATIONAL FOCAL POINT AND COMPETENT AUTHORITY DESIGNATED

Ministry of Environment and Water
Ing. Alfredy Guillermo Alvarez Saavedra
Vice-ministry of Environment, Biodiversity, Climate Change and of Forest Management and Development
Potosi St. esq. Ayacucho N° 438
Building Casa Grande del Pueblo, floor 18
La Paz - Bolivia
Phone:+591 (2) 214 63 82,+591 (2) 214 63 85,+591 (2) 2124321
Electronic mail: alfredy.alvarez@mmaya.gob.bo; vmabolivia@gmail.com

POINT OF TECHNICAL CONTACT

Ministry of Environment and Water
Lic. Enzo Aliaga Ressel
General Director of Biodiversity and Protected Areas
Tel: +591 (2) 214 63 82,+591 (2) 214 63 85,+591 (2) 2124321
Electronic mail: ealiaga@hotmail.com
Mobile Phone: + 591 68967310

Messrs.
SECRETARIAT
MINAMATA CONVENTION ABOUT MERCURY
Geneva, Switzerland.-

"Diálogo, respeto, complementariedad y unidad de los pueblos"
(Dialog, respect, complementarity, and unity of the peoples)

ESTADO PLURINACIONAL DE BOLIVIA

MINISTERIO DE RELACIONES EXTERIORES

SUYUKUNAWAN RIMANAKUY · KAMACHIQ WASI
ANQAXA MARKANAKAMPI TUMPASIÑA KAMANI
MBOROKUAINESIRDA IRU TETAGUASURETA NDIVE REGUA

ADDITIONAL FOCAL POINT:

Emb. ManuelJesus Suárez Avila
Vice minister of Foreign Affairs
Ministry of Foreign Affairs
Plaza Murillo between streets Junin and Ingavi
La Paz - Bolivai
Telephone) : +591 (2} 2408900 Intern: 3730
Electronic mail: boliviapuntofocalmercurio@gmail.com

In that sense, I will thank you will instruct to whom it corresponds that the official communications will be submitted to the accredited Focal Points from this date on.

For this purpose, I reiterate to you the assurances of my highest and distinguished consideration.

"Diálogo, respeto, complementariedad y unidad de los pueblos"
(Dialog, respect, complementarity, and unity of the peoples)

Annex 4. Data from the Top Five Mercury Importing and Exporting Countries

Table 25 Value (US$) and percentage (%) of the global trade flow of the five main mercury importing countries, 2010 - 2018

Source: TrendEconomy.com (2019)

COUNTRY	2010			2011			2012		
	Value (US$)	World Rank	World Share, %	Value (US$)	World Rank	World Share, %	Value (US$)	World Rank	World Share, %
India	5,553,160	2	13	12,552,446	2	12	10,520,948	3	7
Bolivia	40,622	54	0	202,100	37	0	602,807	20	0
South Africa	141,348	40	0	581,359	22	1	2,009,591	13	1
Kenya	345,526	21	1		128			132	
Brazil	757,568	13	2	953,847	17	1	2,527,217	11	2

COUNTRY	2013			2014			2015		
	Value (US$)	World Rank	World Share, %	Value (US$)	World Rank	World Share, %	Value (US$)	World Rank	World Share, %
India	16,984,863	2	15	4,834,186	4	11	6,420,466	2	18
Bolivia	556,309	21	1	522,910	13	1	6,698,818	1	19
South Africa	3,237,147	11	3	2,242,229	6	5	1,636,717	5	5
Kenya	2,736,029	12	2		124			127	
Brazil	3,851,271	9	3	2,954,334	5	7	215,640	21	1

COUNTRY	2016			2017			2018		
	Value (US$)	World Rank	World Share, %	Value (US$)	World Rank	World Share, %	Value (US$)	World Rank	World Share, %
India	8,173,308	1	25	5,008,545	1	26	9,352,500	1	40
Bolivia	6,398,342	2	20	3,277,255	2	17	4,169,824	2	18
South Africa	1,618,471	5	5	551,160	9	3	2,054,059	3	9
Kenya		118		576,721	8	3	1,174,163	4	5
Brazil	1,470,291	6	5	688,832	6	4	1,113,319	5	5

Table 26 Value (US$) and percentage (%) of the global trade flow of the five main mercury exporting countries, 2010 - 2018

Source: TrendEconomy.com (2019)

COUNTRY	2010			2011			2012		
	Value (US$)	World Rank	World Share, %	Value (US$)	World Rank	World Share, %	Value (US$)	World Rank	World Share, %
Mexico	958,941	12	2	8,669,938	4	9	21,454,783	3	16
Russia		67		1,260	43	0	242,365	17	0
United Arab Emirates		71			72		4,944,335	7	4
Japan	1,442,436	8	3	4,399,329	8	5	731,625	12	1
Brazil	2,528,812	6	5	5,362,813	6	6	6,228,308	5	5

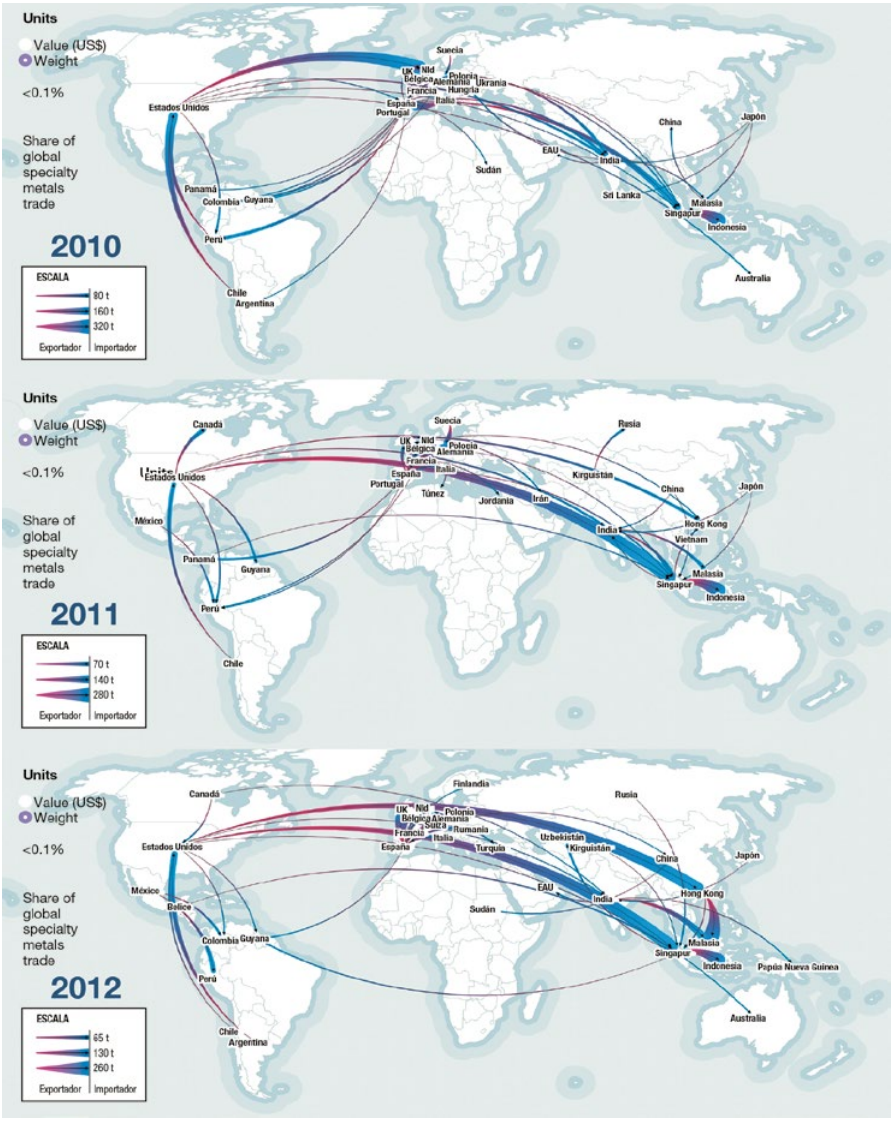
COUNTRY	2013			2014			2015		
	Value (US$)	World Rank	World Share, %	Value (US$)	World Rank	World Share, %	Value (US$)	World Rank	World Share, %
Mexico	23,406,327	2	20	17,681,581	1	32	13,909,189	1	41
Russia	339	37	0		66			70	
United Arab Emirates	10,521,458	4	9	2,360,986	7	4	894,389	7	3
Japan	4,752,667	9	4	713,431	10	1	848,590	8	2
Brazil	6,197,258	6	5	4,244,345	4	8	3,240,777	3	9

COUNTRY	2016			2017			2018		
	Value (US$)	World Rank	World Share, %	Value (US$)	World Rank	World Share, %	Value (US$)	World Rank	World Share, %
Mexico	9,651,774	1	29	5,234,522	1	28	8,901,406	1	33
Russia	5,554	23	0	1,213,941	6	7	6,057,816	2	22
United Arab Emirates	848,879	10	3	1,842,625	3	10	4,018,326	3	15
Japan	1,632,723	6	5	635,219	10	3	2,387,666	4	9
Brazil	3,614,380	4	11	2,148,423	2	12	1,250,700	5	5

Annex 5. Maps of Global Mercury Trade Flows, 2010-2017

Figure 26 Global trade flows of mercury, 2010-2018

Source: Chatham House (2018)



BACK TO CONTENT

Figure 26 Global trade flows of mercury, 2010-2018

Source: Chatham House (2018)

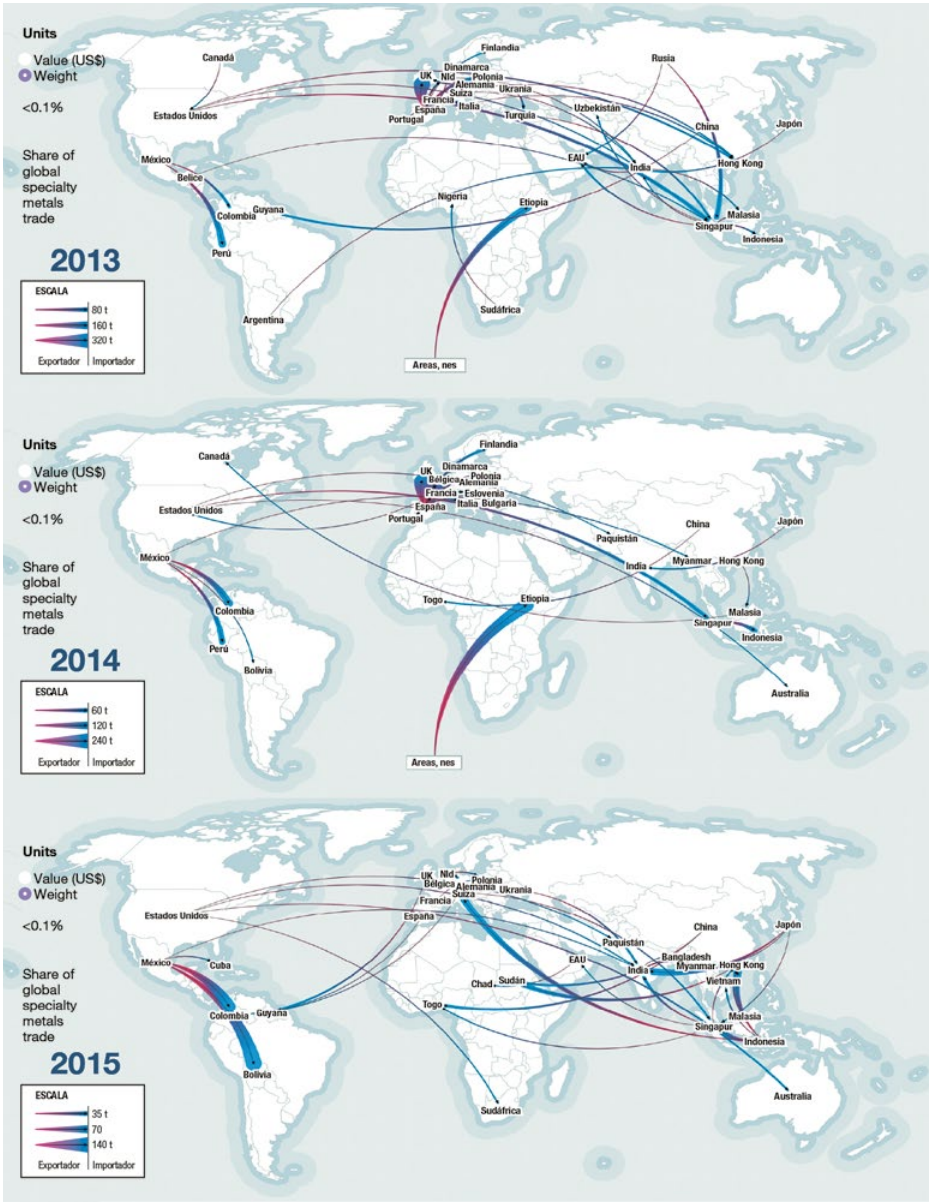
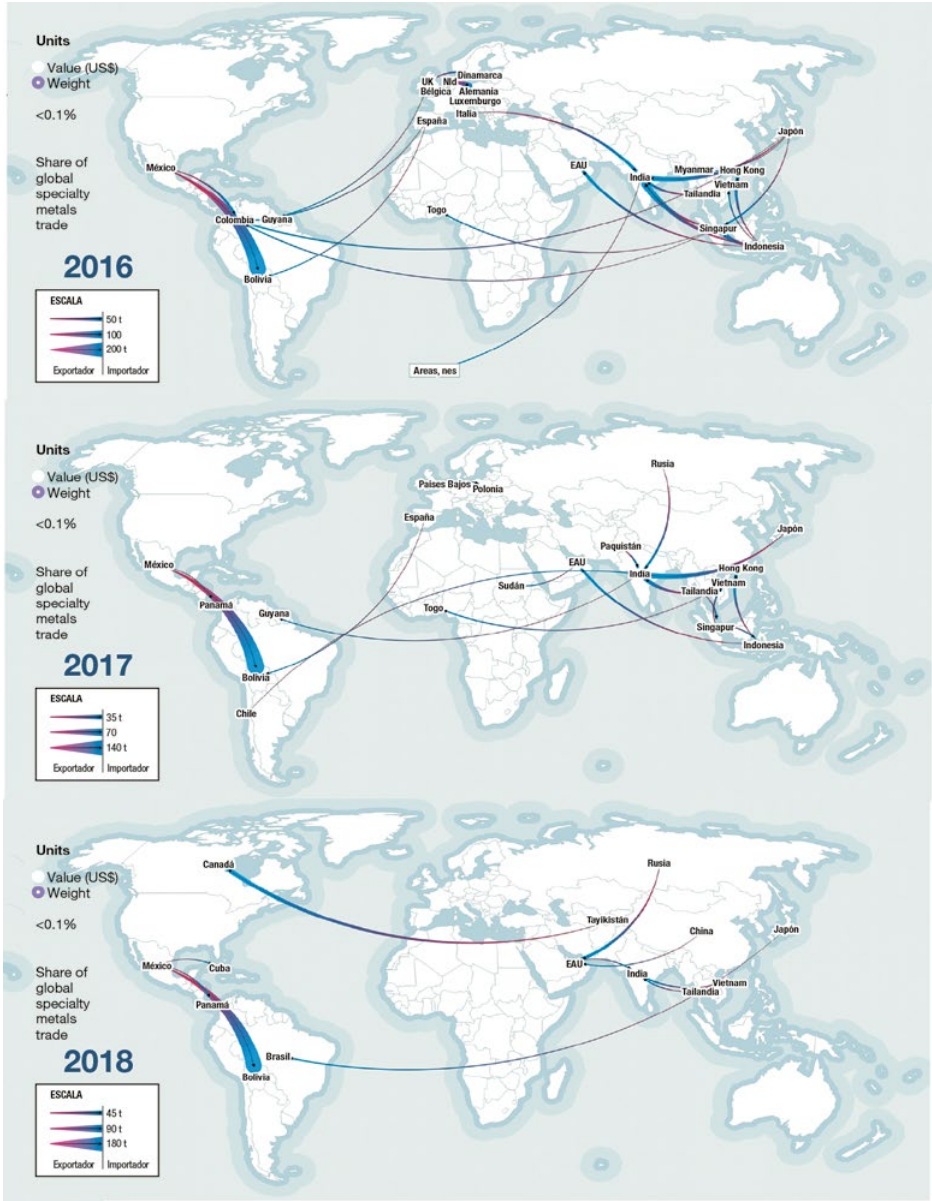


Figure 26 Global trade flows of mercury, 2010-2018

Source: Chatham House (2018)



BACK TO CONTENT

Annex 6. Official Mercury Import Data to Bolivia

Table 27 Weight, value, and tax of mercury imports by way of entry to Bolivia, 2010-2018. Source: INE (2019)

ENTRY ROUTE	GROSS WEIGHT (KG)	FOB VALUE ($US)	CIF VALUE ($US)	DUTIES PAID (BS)
Desaguadero	10,100	343,844	372,625	-
Iquique - Pisiga - Bella Vista	58,633	934,088	1,001,210	152,197
Arica - Charaña - Tambo Quemado	768,568	19,860,391	20,936,633	483,292
Corumbá - Puerto Suárez	-	-	-	-
Pocitos - Yacuiba	-	-	-	-
By Air	8,968	330,285	353,523	10,535
TOTAL	**846,269**	**21,468,608**	**22,663,991**	**646,024**

Figure 27 Weight, value, and duties of mercury imports by way of entry to Bolivia, 2010-2018. Source: INE (2019)

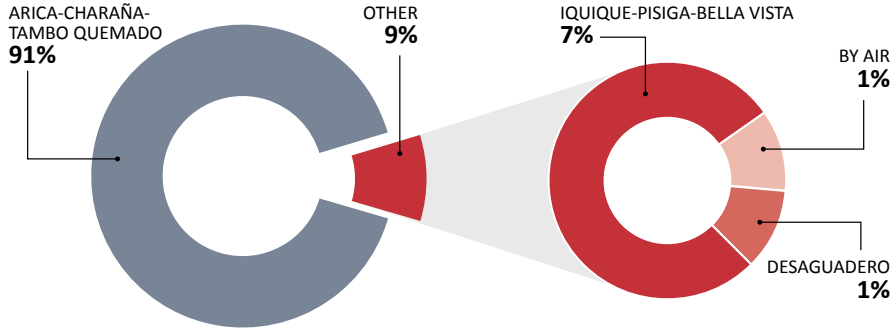


Table 28 Weight, value, and duties of mercury imports by means of transport to Bolivia, 2010-2018. Source: INE (2019)

ENTRY ROUTE	GROSS WEIGHT (KG)	FOB VALUE ($US)	CIF VALUE ($US)	DUTIES PAID (BS)
By Air	8,966	330,267	353,452	10,511
Courier	2	18	71	24
By Railway	-	-	-	-
By Land	837,301	21,138,323	22,310,468	635,489
TOTAL	**846,269**	**21,468,608**	**22,663,991**	**646,024**

Figure 28 Weight, value and duties of mercury imports by means of transport to Bolivia, 2010-2018. Source: INE (2019)

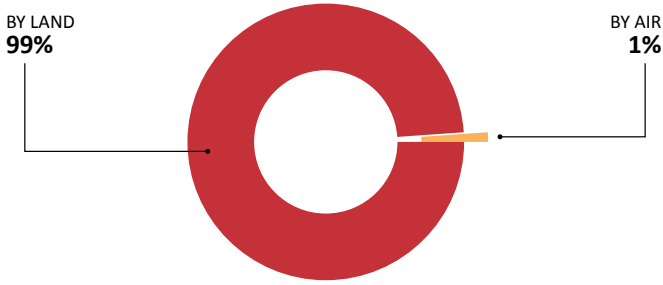
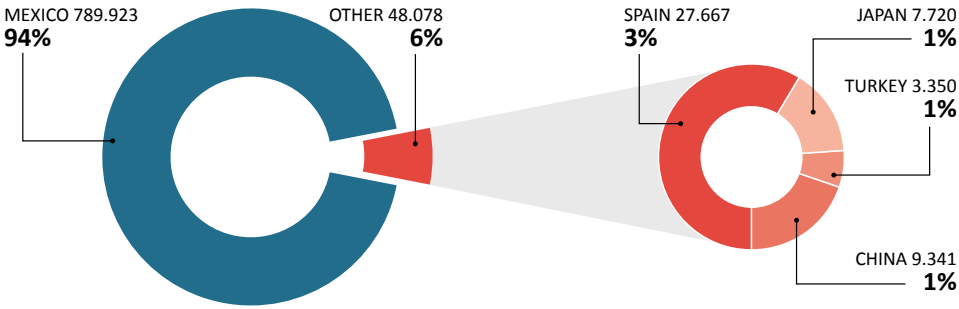


Table 29 Weight, value and duties of mercury imports the importing country, 2010-2018. Source: INE (2019)

COUNTRY (ORIGIN FOR THE IMPORTS)	GROSS WEIGHT (KG)	FOB VALUE ($US)	CIF VALUE ($US)	DUTIES (BS)
Chile	68	4,227	4,540	1,605
China	9,341	257,673	265,378	92,351
Spain	27,667	795,108	818,629	284,899
United States	5	337	446	155
Hong Kong	1	10	38	13
India	8,189	147,688	164,397	57,209
Japan	7,720	178,825	181,740	63,246
Mexico	789,923	20,014,781	21,150,794	119,391
Peru	4	229	238	83
Switzerland	1	41	46	16
Turkey	3,350	69,689	77,745	27,056
TOTAL	**846,269**	**21,468,608**	**22,663,991**	**646,024**

Figure 29 Weight, value, and duties of mercury imports by the importing country, 2010-2018. Source: INE (2019)



BACK TO CONTENT

Annex 7. Photographic Record

Photo 1 Chejepampa Fair at the border with Peru (Landmark 17), purchase/sale and exchange of products, including gold (2019).

Photo 2 Hardware stores where mercury is commercialized, Guanay - La Paz (2019) (2019).

Photo 3 Wholesaler of mercury in Guanay - La Paz, in the “delta play” zone near the bridge (2019).

Photo 4 Dredgers in the Kaka River (2019).

Photo 5 Hardware store that sells and distributes mercury in Mapiri - La Paz (2019).

Photo 6 Gold panner in charge of identifying mineralized structures in a gold deposit, San Ramon - Santa Cruz (2019).

Photo 7 Gravimetric concentration plant, San Ramon - Santa Cruz (2019).

Photo 8 Gold deposit in Santa Cruz (2019).

Photo 9 Concentration of amalgamated gold.

Photo 10 One kg container of “El Español” mercury and a retort burner equipment.

Photo 11 Purification pool to obtain amalgamated gold.

Photo 12 Small gold concentration plant in San Ramón - Santa Cruz.

BACK TO CONTENT

Photo 13 Retort burner equipment.

Photo 14 Rafts that operate in the extraction of alluvial gold in the Beni river - Beni (2019).

Photo 15 15 MWM engine of 4-cylinders with coupling pads for a 6 x 6 dredge pump (2019).

Photo 16 Gutter with carpet for the concentration of alluvial gold in a raft in the Beni river - Beni (2019).

Photo 17 Post-amalgamation secondary gutter to recover fine gold and mercury, Beni (2019).

Photo 18 Group of rafts of the ASOBAL Cooperative, Madre de Dios river - Beni (2019).

Photo 19 Carpets of the Main gutter in the raft, Beni (2019).

Photo 20 Burning equipment for amalgamated gold - retort (2019).

Photo 21 Port for rafts in the Madre de Dios river, Riberalta - Beni (2019).

Photo 22 Chinese raft paralyzed near Riberalta-Beni (2019).

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THE BUSINESS OF MERCURY IN BOLIVIA

A STUDY ABOUT THE COMMERCIALIZATION OF MERCURY FOR GOLD MINING IN BOLIVIA

This study seeks to generate knowledge concerning the commercialization of mercury for gold mining in Bolivia and its link with commercialization chains to or from other countries in the region. It is part of a set of investigations in different countries about the commercialization of mercury within the framework of the SRJS Mercury Governance program of the International Union for Conservation of Nature Netherlands (IUCN NL), which in the case of Bolivia has the Centro de Documentacion e Información Bolivian (CEDIB) as its investigative counterpart.

The object of the research focuses on mercury trading for gold mining since this is the primary use given to this element and since this activity is the main activity responsible for mercury emissions in Bolivia.

ISBN: 978-9917-9966-4-4

CEDIB
Centro de Documentación e Información Bolivia

IUCN | National Committee of The Netherlands

MISEREOR
IHR HILFSWERK