environmental investigation agency

TRAFFICKERS LEAVE NO STONE UNTURNED

What the largest exposed mercury smuggling operation tells us about gold, the shortcomings of the Minamata Convention on Mercury, and the convergence of crimes in Latin America.

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ABOUT EIA

The Environmental Investigation Agency (EIA) is an award-winning nonprofit, internationally renowned for its use of pioneer and innovative investigative techniques. For over three decades, EIA has exposed environmental crimes around the world, amplified frontline voices, and made the emergence of more equitable and sustainable management of the world's natural resources possible. Our organization has confronted the world's most pressing environmental problems, instigated systematic changes in global markets, supported communities' fights, and promoted precautionary policies that protect the natural world from oppressive, neo-colonialist, and unfair exploitation. This report was produced by EIA US.

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Active mercury mines with colossal cinnabar tailings in the Sierra Gorda UNESCO Biosphere Reserve in Queretaro (Mexico).

EXECUTIVE SUMMARY

An unprecedented investigation by the Environmental Investigation Agency (EIA), which led to one of the largest reported seizures of mercury in the world and the largest by an Amazonian country, exposes large scale mercury trafficking from Mexico to Bolivia, Colombia, and Peru in violation of national laws and the Minamata Convention on Mercury.

More than seven years after the Convention took effect in Mexico, primary mercury mining production is spinning out of control, with bursts of activity driven by mercury prices, increased violence, and an alleged recent takeover of productive mines by a drug cartel. According to EIA's findings, the traffickers exposed in this report are responsible for the largest illegal flows of mercury ever documented, conservatively amounting to 200 tons of mercury smuggled from the mercury mines in Mexico (state of Queretaro) to the gold mines in Bolivia, Colombia, and Peru between April 2019 and June 2025. According to traffickers, gold miners' demand for mercury has driven the sophisticated operation and made it profitable.

Between April 2019 and June 2025, EIA conservatively estimates that a minimum of US$8billion worth of illegal gold has been produced through the use of the trafficked mercury exposed in this report.

Mercury is one of the ten most deadly chemical substances in the world, one that, once extracted from the earth and refined, is nearly indestructible. Its profound and growing impact on human lives, human rights, and ecosystems has been described by the UN Special Rapporteur on toxics and human rights who alerted the UN General Assembly.

The vast majority of artisanal and small-scale gold miners in South America, often illegal, rely on the daily use of mercury. As one of them explained to EIA investigators, "There is no gold without mercury." Mercury is used by artisanal and small-scale gold miners to facilitate the separation and capture of gold particles from sand and other substrate from which the precious metal is extracted. The gold is subsequently separated from the mercury by a burning process during which the mercury evaporates. In the process, mercury is released by gold miners in the air, in the water, and/or in the soil.

Artisanal and small-scale gold mining (ASGM) is the single largest source of mercury pollution globally, accounting for about 40 percent of all anthropogenic mercury emissions into the atmosphere. Communities in South America, particularly those in the Amazon, that have suffered from the spread of illegal gold mining have been the first victims of mercury contamination and the destruction of their forests and rivers.

High gold prices, which have spurred the expansion of illegal ASGM into the rainforests of South America and in particular the Amazon, are driving skyrocketing prices paid by miners to mercury traffickers and leading to the prospect of very quick return on investment for smuggling operations. EIA's findings indicate an average difference of at least 400 percent in the price paid for mercury at the gold mines in Colombia and Peru compared to Mexico (based on data gathered from February 2023 to June 2025).

As of May 2025, sources from the Queretaro mines told investigators that a new "mercury fever" was hitting the region since the beginning of 2025, triggered by the record high prices (US$330 per kilogram of mercury) offered by mercury traffickers, as a consequence of skyrocketing gold prices.

The profits from the illegal trade in mercury and gold, according to EIA's research, are supporting armed groups in Colombia and Mexico, and fueling some of the most destructive Amazonian gold rush in Madre de Dios, Peru. The trade and use of primary mercury for gold production is a violation of the Minamata Convention.

EIA's findings shed light on the current shortcoming of the Minamata Convention and its implementation in Mexico, which in practice allows mercury mining for a "grace period" that extends until 2032. While reports by Mexico to the Convention appear to indicate a phase-out of the production under control, EIA's research supports a different conclusion. Mercury production and smuggling from Mexico remains considerable. The traffickers identified in this report alone have on average smuggled 30 tons of primary mercury annually from Mexico from 2019 to 2024.

Investigators also witnessed armed individuals and built fortifications on the access road to the Cristo Vive, La Fe, El Mono, and La Peña mines, including gates, observation towers adorned with cameras and barbed wire, seemingly further evidence of the alleged takeover by the Mexican organized crime syndicate named Jalisco New Generation Cartel, a group frequently recognized as the most dangerous criminal organization in Mexico.

The mercury-gold-drug trifecta is under consolidation across the Latin American continent, catalyzed by the production of mercury in Mexico.

As traffickers explained to EIA investigators, the artisanal mercury mining sector in Mexico is both highly resilient and elastic depending on the price paid to producers. When prices are low, mercury production remains dormant, miners stop going to the mines and look for more lucrative jobs. This temporary drawdown can create the false impression that the sector is "dead" and production is phasing-down. As soon as the price paid to producers increases, workers go back to the mercury mines, which are almost instantly reactivated.

The gold-mercury-drug trifecta trafficking is under consolidation across the continent. Investigative results are clear: until mercury mines are no longer in operation, traffickers will leave no stone unturned to smuggle the metal. It is urgent and vital to phase out the production of mercury, which is taking lives at both ends of its toxic supply chain.

Mercury should be treated as what it is: a highly toxic catalyst of convergent crimes including human rights violations, arms trafficking, drug trafficking, and illegal natural resource extraction. Allowing the continued production of mercury in Mexico until 2032 - with its attendant deadly effects on natural ecosystems and people - will in practice create deadly lasting effects for generations in Mexico and accross Latin America, including Bolivia, Colombia, and Peru.

EIA recommends:

- **Immediate actions by Mexican authorities to regain control of mercury mine territories in Queretaro and investigate the trafficking network exposed in the report;**
- **Accelerated closure of the mercury mines in Mexico, with an effective phase-out achieved by the end of 2025, accompanied by effective and just socio-economic transition of the historic mining communities;**
- **Increased strategic collaboration among Latin America authorities focused on intelligence gathering and exchanging to combat mercury smuggling, leveraging Artificial Intelligence-powered trade monitoring;**
- **Leveraging the 6th Conference of the Parties in 2025, amend the Minamata Convention on Mercury in order to address salient gaps and shortcomings including removing ASGM as "allowable use", ban the international trade of all mercury to prevent its diversion to ASGM, and drastically shorten the grace period given to primary mercury extraction around the world.**

Peruvian authorities identified and stopped 4 tons of Mexican mercury on its way to Bolivia.

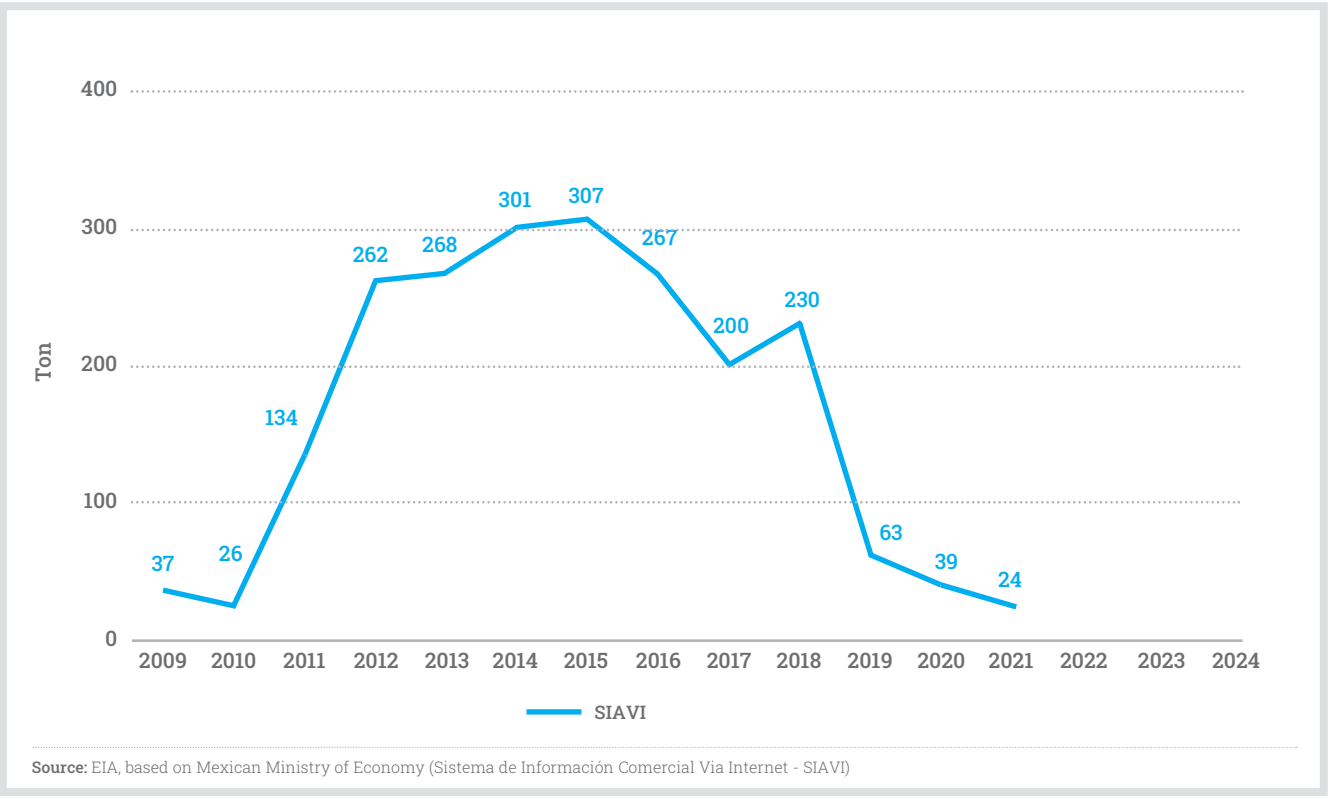
THE SHADOW MERCURY TRADE FROM MEXICO

Mercury Mining Revival

While Mexico has a long pre-Columbian history of mercury mining and trade,[1] the sector as we know it today was not economically viable from the 1970s up to the early 2010s, when mercury prices started to rise.[2]

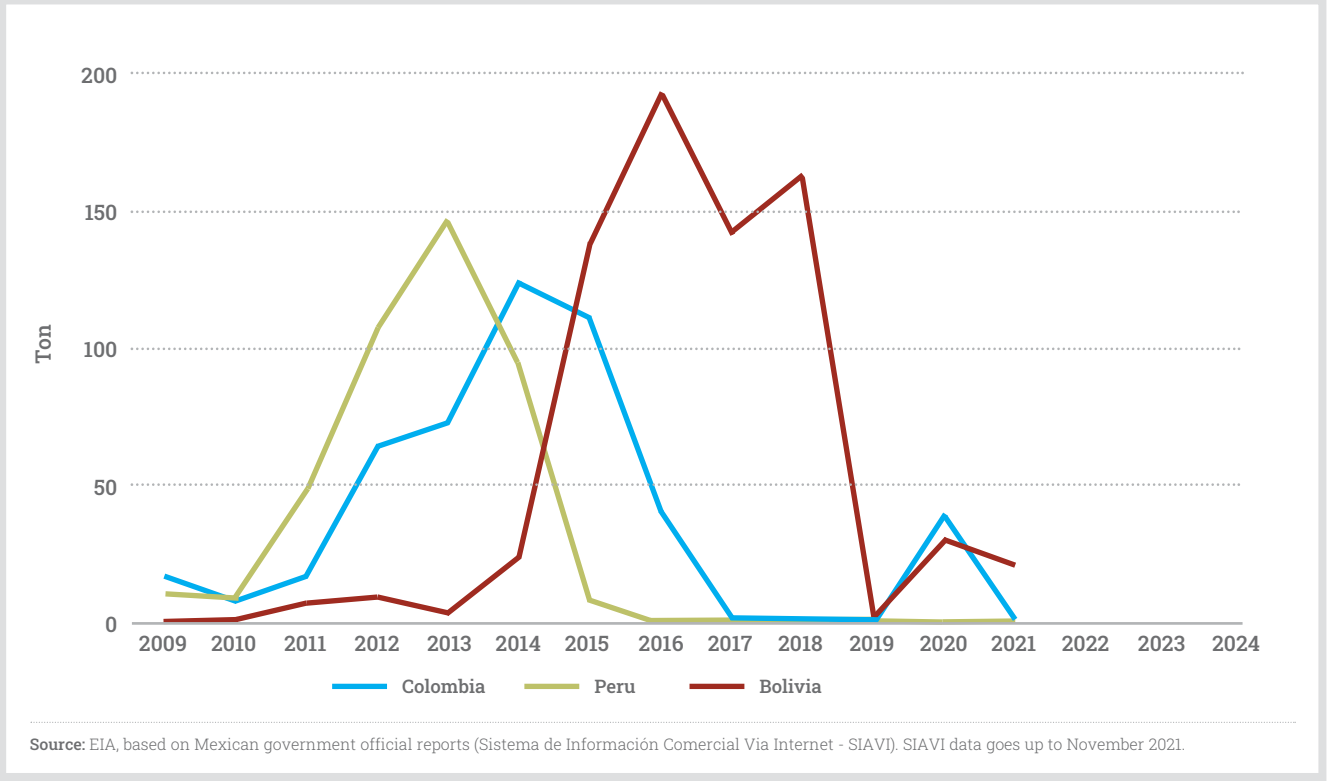
Starting in 2010, international demand drove a rapid increase in mercury production in Mexico. As shown in Figure 1, Mexico's declared exports rose from 26 tons in 2010 to 301 tons in 2014.[3] The higher price offered for Mexican mercury on international markets encouraged some individuals to specialize in collecting and stocking mercury from artisanal mines before trading and exporting consolidated volumes of liquid mercury to a few importing countries.[4] Several of the mines that had closed in the 1970s reopened given the higher price being paid to miners. During that period, in Queretaro alone more than 1,000 miners were reportedly involved in the mercury mining sector with an annual production of nearly 300 tons.[5] As a consequence of the export ban implemented in the European Union in 2011 and the United States (U.S.) in 2013, Mexico quickly became one of the main global suppliers of mercury, alongside China, Indonesia and the Kyrgyz Republic.[6] Mexico emerged as one of the largest sources of mercury production in the world, with 38 of the 54 anthropogenic sources of mercury identified in the world located in the country.[7]

An important trend is the speed at which production shifted in Mexico from a lethargic state to a highly productive one, in the span of a year or less (Figure 1). As traffickers explained to EIA investigators, the artisanal mercury mining sector in Mexico is both highly resilient and elastic depending on the international price of mercury which influences the price paid to producers.[8] When prices are low, mercury production is dormant, and miners stop going to the mines and look for other jobs. This temporary drawdown can create the false impression that the sector is "dead." When prices



Source: EIA, based on Mexican Ministry of Economy (Sistema de Información Comercial Via Internet - SIAVI)

Figure 1
Total reported exports of mercury from Mexico, by weight.



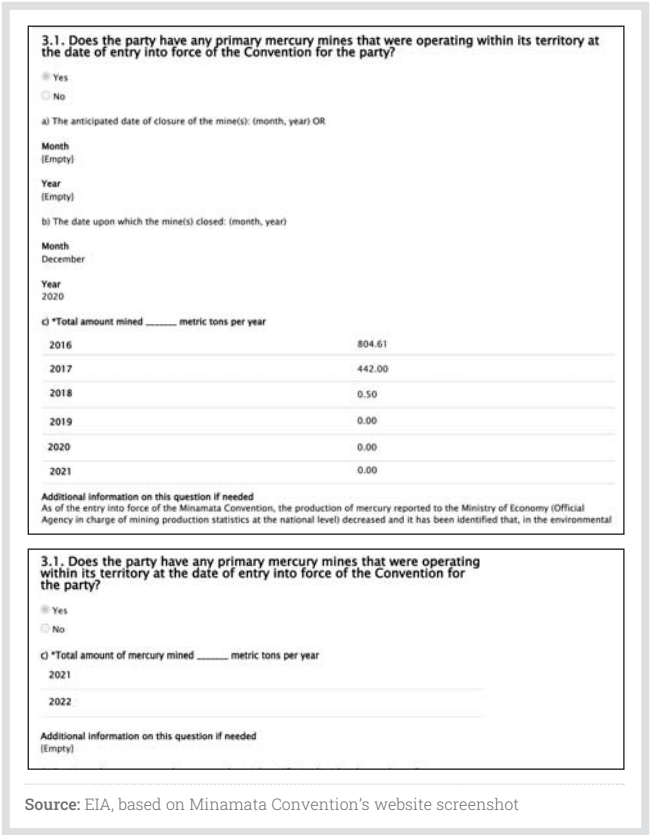
Source: EIA, based on Mexican government official reports (Sistema de Información Comercial Via Internet - SIAVI). SIAVI data goes up to November 2021.

Figure 2
Main destinations of Mexican mercury exports, as reported by Mexico, by weight.

are high, however, the increased price paid to producers generates an immediate response with a reactivation of mines to which workers return.

Mexican exporters, traffickers, and traders who have been involved in the mercury sector since the beginning of 2010s or even earlier told EIA investigators that the industry's comeback has principally been driven by export to Latin American countries. Multiple sources explained that domestic use of primary mercury produced in Mexico has been marginal. As a trader who has followed the sector for over 30 years put it, "all the mercury we extract from earth in Mexico is going abroad, we don't use it here [Mexico]."[9]

EIA analysis indicates that, according to declared exports from Mexico, the principal destinations for Mexican mercury over the past decade are Bolivia, Peru and Colombia (Figure 2). From 2009 to 2021, Mexico declared the export of 740 tons of mercury to Bolivia, 429 tons to Peru, and 466 tons to Colombia. According to several traffickers, in these countries Mexican mercury has mostly - if not exclusively - been used for Artisanal and Small-Scale Gold Mining (ASGM). This appears to confirm the reported nexus between high gold prices, increased ASGM, and increased import of mercury in Latin America,[10] which has driven increased export and production in Mexico.



3.1. Does the party have any primary mercury mines that were operating within its territory at the date of entry into force of the Convention for the party?

Yes
No

a) The anticipated date of closure of the mine(s): (month, year) OR

Month
(Empty)

Year
(Empty)

b) The date upon which the mine(s) closed: (month, year)

Month
December

Year
2020

c) *Total amount mined _____ metric tons per year

2016	804.61
2017	442.00
2018	0.50
2019	0.00
2020	0.00
2021	0.00

Additional information on this question if needed
As of the entry into force of the Minamata Convention, the production of mercury reported to the Ministry of Economy (Official Agency in charge of mining production statistics at the national level) decreased and it has been identified that, in the environmental

3.1. Does the party have any primary mercury mines that were operating within its territory at the date of entry into force of the Convention for the party?

Yes
No

c) *Total amount of mercury mined _____ metric tons per year

2021	
2022	

Additional information on this question if needed
(Empty)

Source: EIA, based on Minamata Convention's website screenshot

Figure 3
Mexico's official national report to the Minamata Convention on Mercury from 2021 (top) and 2023 (bottom).[16]

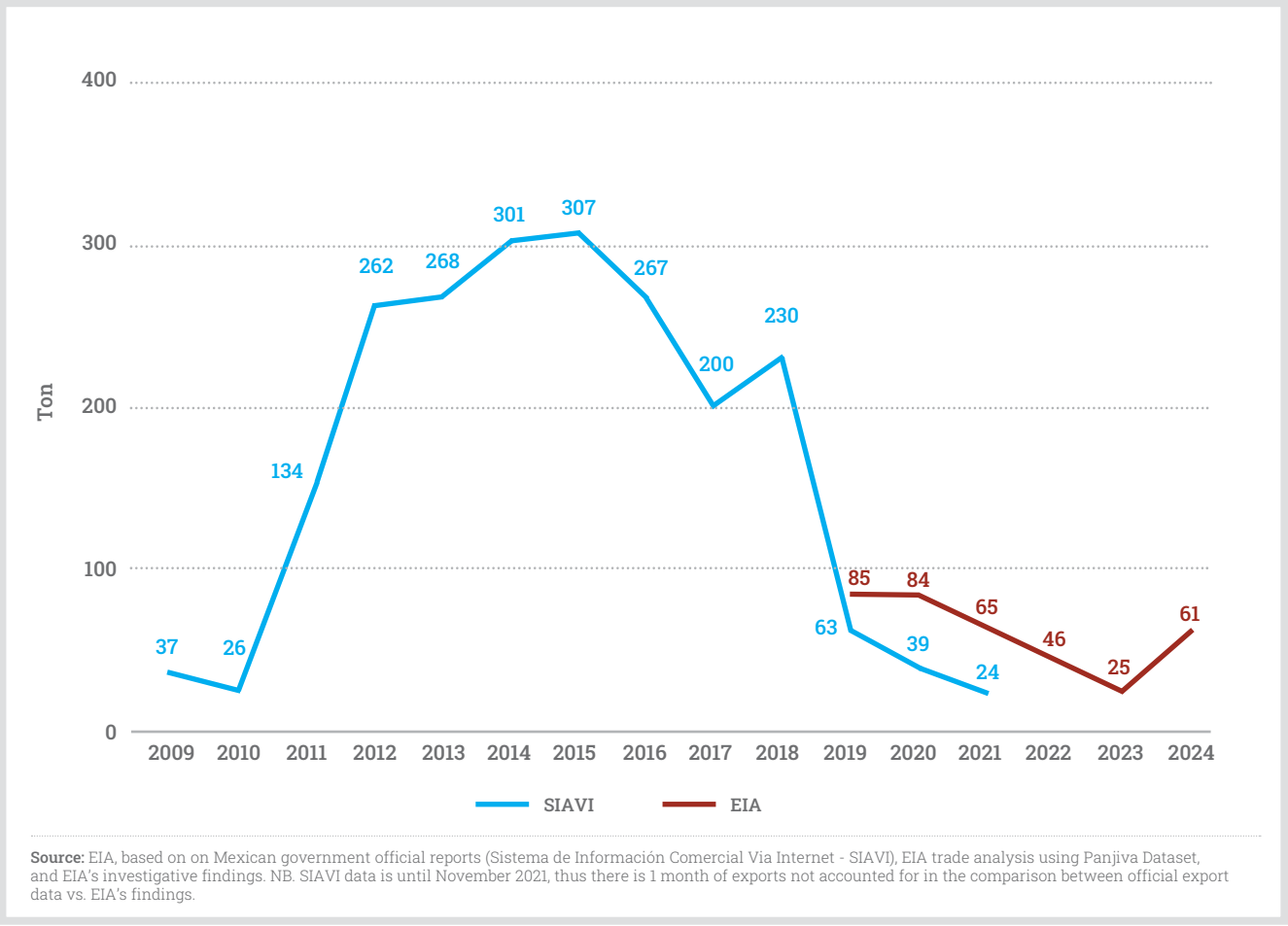
Beyond Official Data: Discrepancies and Cover-Up of Primary Mercury Mining in Mexico

The characteristic inverted U-curve of mercury exports from Mexico (Figure 1) seemingly tells a simple story about the positive impact of the implementation of the Minamata Convention on Mercury in Mexico since 2017, when the Convention took effect in the country. A closer look at official Mexican data and declarations raises several questions about the current situation of mercury mining in Mexico, the seeming lack of public transparency associated with the trade of mercury, and the validity of the Mexican declarations to the international convention.

Following the promulgation of the Minamata Convention in Mexico in October 2017,[11] the country reported to the Convention that its national production fell from 442 tons in 2017, to 0.5 tons in 2018, before reaching zero three years in a row in 2019, 2020, and 2021 (Figure 3).[12] Mexico also reported that the mines that were operating within its territory at the date of entry into force of the Convention were closed by December 2020 (Figure 3).[13] According to this official reporting, Mexico would have been almost free of primary mercury mining in 2018 and totally free from 2019. The official declaration was apparently amended in June 2022 by Mexico, which added "As of the entry into force of the Minamata Convention, the production of mercury reported to the Ministry of Economy (Official Agency in charge of mining production statistics at the national level) decreased and it has been identified that, in the environmental monitoring campaigns carried out that mercury production persists in various parts of the country, particularly in the Sierra Gorda of the state of Queretaro."[14] The amendment was added by Mexico a few weeks before the release of a series of news articles, published in Spanish and English, which exposed the persistence of mercury mining in the Sierra Gorda.[15]

In its 2023 report to the Minamata Convention (Figure 3), Mexico indicates the existence of primary mercury mines, however the fields "total amount of mercury mined" in 2021 and 2022 are left blank.

Data from the Ministry of Economy, publicly available via the Commercial Information System Via Internet (Sistema de Información Comercial Via Internet - SIAVI), shows that the country has exported a significant quantity of mercury in 2018 (230 tons), 2019 (63 tons), 2020 (39 tons) and 2021 (24 tons) (Figure 1). Multiple traders and traffickers who spoke to EIA investigators unanimously explained that, for the period 2018-2023, the mercury exported from Mexico is almost certainly only primary mercury mined in Mexico. While the information available about the status of the mercury sector in Mexico in the mid to late 2000s - before the revival of commercial mercury mining in the country - makes reference to diverse sources of mercury including reprocessing of spent silver mining tailings from the



Source: EIA, based on on Mexican government official reports (Sistema de Información Comercial Via Internet - SIAVI), EIA trade analysis using Panjiva Dataset, and EIA's investigative findings. NB. SIAVI data is until November 2021, thus there is 1 month of exports not accounted for in the comparison between official export data vs. EIA's findings.

Figure 4
Mercury exports from Mexico: official data vs EIA's findings, by weight.

"There is no gold without mercury."

Amazonian illegal gold miner.

Spanish colonial era, chlor-alkali stocks, and imports,[17] EIA analysts could not find any sizable and current source of mercury in Mexico destined for export that was not primary mercury mined in Mexico.

UN Comtrade records show Mexican mercury exports only through 2020, with no data reported for 2021-2024, whereas SIAVI data extend through November 2021. By contrast, other commodities-such as copper concentrates, automobiles, crude oil, and natural gas - continue to be reported by Mexico to UN Comtrade up to 2024, underscoring that the disappearance of mercury data after 2020 (in UN Comtrade) and after November 2021 (in SIAVI) is specific to this sector rather than a systemic data outage.

When EIA's findings regarding the persistent production of mercury in Mexico and smuggling to Latin America are factored into the export figure (see section below for the details on traffickers' modus operandi), actual production of mercury in Mexico and exports from 2019 to 2024 are significantly higher than what official reports indicate (Figure 4). For 2019–2021, where SIAVI data exist, the gap grows from about 34% in 2019 to 115% in 2020 and roughly 170% in 2021 (average gap ~106% for 2019-2021). Official data cease after November 2021, so estimates for 2022-2024 rely solely on investigative evidence; EIA's findings suggest on average ~36 t of unreported exports per year in that later period.

EIA's findings cast a new light on the mercury sector in Mexico. While the sector and the production of primary mercury appears to have shrunk from 2017 to 2023 it is nowhere near what the country has officially reported to the Minamata Convention. As the following section will demonstrate, primary mercury mining persists as the principal source of exports, official or unreported, to Latin American countries where it is used by ASGM in breach of the Convention.

FROM MINE TO MINE: MERCURY HARMS ACROSS LATIN AMERICA

Mercury is an element that cannot be destroyed and poses a global threat to human and environmental health.[18] Once extracted mercury is introduced into the environment it can take hundreds of years to make its way to places where it is no longer harmful to the environment, such as silt in the bottom of the ocean. The World Health Organisation lists mercury in the top 10 chemicals of major public health concern; acute or chronic exposure to mercury can be fatal.[19] The UN Special Rapporteur on toxics and human rights recently alerted: "The contribution of mercury releases and emissions of mercury from the small-scale gold mining sector has continued to grow with grave consequences for millions of miners, vulnerable women and children, indigenous peoples, ecosystems and aquatic life. There is a growing flow of mercury into the rainforests of the Amazon basin, the villages and rivers of Indonesia, the gold mining towns along the banks of Lake Victoria in Kenya, Uganda and the United Republic of Tanzania, and many other locations."[20] EIA's investigation connects the deadly impacts of mercury in three different countries: Mexico, Colombia, and Peru.

Mexican Mercury Mines

In Mexico, the main source of concern related to mercury is the production of metal through artisanal mining and rudimentary processing. Mexico's history of mercury production began at least two millennia before European colonization; liquid mercury was found in a chamber beneath one of the oldest pyramids in the ancient city of Teotihuacan.[21] The richest mercury deposits are found in the central Mexican states, such as Nuevo Mercurio in Zacatecas, Sierra Gorda in Queretaro, and the High Plateau in San Luis Potosí.[22]

According to EIA's findings, mercury smuggled to Colombia and Peru is coming from Queretaro state (Figure 5), where approximately 19 mines were reportedly in operation as of 2020, with a total annual production estimated to up to 100 tons, from what would be the second largest mercury reserve in the world.[23]

Figure 5
Entrance of an active mercury mine in Queretaro, Mexico.

BOX 1.

SIERRA GORDA BIOSPHERE RESERVE: ONE OF THE MOST DIVERSE PROTECTED AREAS WHERE MERCURY IS MINED DAILY

The Sierra Gorda Biosphere Reserve is one of a kind. It was created in 1997 by a presidential decree as a result of a citizen-led effort, and it is to this date the only Mexican reserve whose creation was a product of social initiative.[32] The reserve is reportedly one of the most biodiverse protected areas in the country.[33] A total of 2,308 plant, 343 bird, 110 mammal, and 134 reptile and amphibian species have been documented in the reserve, as well as 800 species of butterfly, accounting for a third of all butterfly species found in Mexico.[34]

Figure 6
One of the most active mercury mines in Queretaro, located inside the Sierra Gorda Biosphere Reserve.

Figure 7
Mercury mining in Mexico relies on rudimentary techniques and equipment.

Figure 8
Abandoned waste heaps are a source of contamination.

Figure 9
The contaminated Exotraz river, inside of Sierra Gorda Biosphere Reserve.

Contrary to other deposits, mercury mining in Mexico relies on low-technology operations.[24] Mine workforces frequently come from impoverished communities, with daily incomes of US$1-3, in regions where the unemployment rate is extremely high, where often the only available jobs are in the mercury mines (Figure 6).[25] In Queretaro, between 700 and 1,000 people are reportedly living directly from mercury mining and over 4,000 people benefit indirectly from mercury production.[26] The state is the principal producer of primary mercury in the country.

An important portion of the mercury mines in Queretaro are located within the United Nations Educational, Scientific and Cultural Organization (UNESCO) Sierra Gorda Biosphere Reserve (Box 1, Figure 6).[27] Their legal status is ambiguous. On one hand, several of them pre-dated the creation of the reserve in 1997 and its designation as biosphere reserve in 2001, and some miners have mining titles that were granted before the creation of the reserve.[28] On the other hand, many mines have operated for years in breach of Mexican environmental, safety, health, and labor regulations.[29] Many miners have worked clandestinely in mines whose operation was not authorized.[30] This led to the - temporary - closure of several mines by Mexican authorities over the past years.[31]

Given the rudimentary nature of the extraction, an estimated 20-25 percent of the mined mercury is reportedly not recovered, either remaining in the ore due to inefficient crushing or lost to the environment as vapor leaks during processing (Figure 7).[35] Abandoned waste heaps that are the results of decades of processing operations are now an integral part of the landscape of the biosphere reserve, with contaminants that are dispersed via air and water over an area up to 100 square kilometers (Figure 8).[36] As a result of years of exploitation, the mercury mining areas are heavily polluted: residential soils have mercury concentrations up to 150 times higher than the Mexican guideline) and main rivers' sediments have concentrations up to 1,400 times higher than the Mexican guideline.[37]

Urinary mercury analysis shows critical levels of contamination of the local population.[38] In June 2015, the intoxication of almost an entire town due to exposure to heavy metals was reported in a municipality in Queretaro, with a majority of the victims aged between 5 and 14 years old.[39] The nearby contaminated river, which victims used as their daily source of drinking water, is also used by 17 downstream communities (Figure 9).

Mercury-Enabled Gold Mines in Latin America

While mercury mining is the principal cause of mercury contamination in Mexico, in Colombia and Peru mercury contamination is driven by artisanal gold mining. ASGM accounts for about 40 percent of all anthropogenic mercury emissions to the atmosphere, with most ASGM sector-related mercury emissions coming from the burning of mercury-gold amalgam.[40] The sector is now the single largest source of mercury pollution globally.[41] Notably, every mercury trafficker who spoke to EIA investigators explained that, to their knowledge, ASGM is the driver for the vast majority if not the entirety of mercury trafficking across Latin America.

Mercury is used by artisanal and small-scale gold miners to facilitate the separation and capture of gold particles from sand and other substrate from which the precious metal is extracted.[42] When combined, gold and mercury bind together forming an amalgamate that miners can easily retrieve (Figure 10). The gold is subsequently separated from the mercury by a burning process during which the mercury evaporates, leaving a raw gold "pancake" (Figure 11).

During this process, a significant fraction of the mercury used to catch the gold is released in the environment, either into the water supply or into the air following evaporation. While the use of equipment such as retorts could theoretically limit the release of evaporated mercury into the atmosphere, in practice multiple field studies have shown that artisanal gold miners do not frequently or reliably use this equipment (Figure 12).[43] EIA field research, based on multiple conversations with gold miners engaging in illegal activities as well as gold and mercury traders, indicates that mercury loss is between 1 and 2 grams per gram of retrieved gold.[44] This number is consistent with results published in multiple academic studies.[45] An illegal gold and mercury trafficker explained to EIA investigators the limited use miners make of the retort and the necessity for miners to regularly buy "fresh mercury," explaining that "[t]hey [gold miners] buy it every month. Big barges can buy up to 50 kilograms and small ones from two to five kilograms."

The vast majority of illegal artisanal gold mining depends on the use of mercury. As a trafficker explained to EIA investigators: "there is no gold without mercury."[46] (Figure 13).

The disastrous impacts of gold extraction on vulnerable communities and ecosystems in Latin America has been widely reported. Across the region, ASGM has driven brutal land rights violations, as well as conflicts with and within Indigenous communities.[47] Artisanal gold mining has impacted both the food sovereignty and security of Indigenous Peoples and local communities.[48] Because of the ubiquitous use of mercury, human poisoning and contamination have been reported in Brazil, Bolivia, Colombia, Ecuador, and Peru.[49] ASGM has also led to the proliferation of convergent crimes such as sex trafficking, child abuse, and arms and drugs trafficking.[50] A growing body of reporting has explored the nexus between narco traffickers and gold production, in particular in Brazil, Colombia, and Peru.[51] Unbridled illegal gold production has led to the accelerated destruction of rivers across Latin America, as well as deforestation of vital riparian forests.[52] Scars of ravaged riverbeds and illegal deforestation will live in forest landscapes for decades, even when the gold mining production is over (Figure 14).

Because of the harms of illegal gold mining and its dependence on mercury, limiting, controlling, and stopping the trade and use of mercury has become a priority for frontline communities, civil society, and governments across Latin America.

Figure 10
Gold-mercury amalgamate in the hand of an illegal miner in the Amazon.

Figure 11
Burning of the mercury-gold amalgam and release of mercury vapors in the Amazon.

Figure 12
Sparsely used retort in the Amazon.

Figure 13
Illegal gold miners often buy small quantities of mercury to meet their needs.

Figure 14
River bed destruction and deforestation left after illegal gold mining in Madre de Dios, Peru.

The Munduruku people of the Brazilian Amazon have taken the initiative of monitoring their territories

THE TWO-FRONT WAR AGAINST MERCURY

In January 2013, an intergovernmental negotiating committee agreed on the text of the Convention on Mercury, and in October 2013 the Convention was signed by 128 countries.[53] The treaty came into effect in August 2017.[54] The Minamata Convention is a global treaty with the goal of protecting human health and the environment from the anthropogenic release of mercury.[55] Its raison d'etre is to reduce the amount of anthropogenic mercury pollution being released into the environment. However, EIA's research indicates that the current "golden loophole" represents a direct obstacle to the achievement of the Convention's stated goal.

Minamata Convention on Mercury's Flaw By Design

The number one source of mercury pollution from air emissions is no longer from coal-fired power plants but from gold mining. ASGM accounts for about 40 percent of all anthropogenic mercury emissions to the atmosphere, with most ASGM sector-related mercury emissions coming from the burning of mercury-gold amalgam.[56] Despite its contribution to addressing global mercury contamination, the Convention has addressed the ASGM-driven mercury supply chain and associated trade in a flawed by design and ineffective way, since mercury is allowed to be used by gold miners as long as it is not primary mined mercury (coming for instance from recycling).

Despite the high mercury pollution emissions, the gold mining and trading sector succeeded in securing the continued use of mercury in gold mining during the negotiations that led to the adoption of the Minamata Convention.[57] In fact, ASGM is currently approved as a "use allowed" under the Convention (Article 2.k) and therefore Parties are allowed to trade mercury for this purpose, under certain conditions. This loophole enables the international trade of mercury for ASGM.

Article 3, Paragraph 4 of the Convention states that "Each Party shall only allow primary mercury mining that was being conducted within its territory at the date of entry into force of the Convention for a period of up to fifteen years after that date. During this period, mercury from such mining shall only be used in manufacturing of mercury-added products in accordance with Article 4."[58] ASGM is not included among the allowed uses of Article 4 (see Annex A, Part II of the Convention) and therefore primary mined mercury is not allowed to be used for ASGM. In other words, when proven, production and trade of primary mined mercury destined to ASGM is a violation of the international convention. In practice, the absence of any tracking mechanism drastically hinters the effectiveness of the provision.

In order to implement the Convention and mitigate mercury's deadly effects, Colombia, Mexico, and Peru have taken and implemented measures to limit mercury production, transport, and use, as described in the following paragraphs.

Battle Against the Use of Mercury in Gold Mining Regions of Colombia and Peru

While multiple voices have argued that artisanal mining is a historic livelihood for certain communities and that the informality of the sector should be seen as a problem shared by the miners and the regulating authorities, the fact remains that ASGM in Latin America often drives convergent crimes, as presented in the next section.

Peru

Peru signed the Minamata Convention in October 2013.[59] The National Superintendence of Customs and Tax Administration (Superintendencia Nacional de Aduanas y de Administración Tributaria - SUNAT) immediately implemented control mechanisms on the mercury trade as an audited chemical product, establishing a registry system for suppliers and consumers, tax routes, and an information exchange for importers and exporters.[60] In November 2015, Peru ratified the Convention, becoming the 21st future Party to the international treaty.[61] Peru banned mercury imports in most cases, allowing rare exceptions if those using it presented guarantees that it would be managed safely.[62] The country followed up with the implementation of a series of regulations on chemical use in artisanal mining.[63]

These controls led to a sharp reduction of mercury reportedly imported into Peru and the ban resulted in bringing the declared import down to zero, as presented in Figure 3. Although SUNAT aims to control the use of mercury in gold mining through a special registry of authorized mercury users, individuals affiliated with mercury importers have reportedly marketed mercury to unauthorized third-party buyers in spite of the national ban on such transactions.[64] It also appears that several entities on the list of licensed mercury users have documented histories of alleged illegal mining.[65]

In order to meet the mercury trafficking challenge, the Peruvian government launched the military- and police-led "Operation Mercury" in February 2019. The operation led, according to third-party analysis, to a significant reduction of deforestation without triggering leakage - via displacement of illegal miners - over into neighboring regions.[66] Despite these encouraging results, multiple recent reports have exposed the continued smuggling of mercury from illegal mines in Bolivia to Peru.[67] Close to half of Peru's mercury imports reportedly end up in Madre de Dios where artisanal gold miners use between 44 and 50 metric tons of mercury each year.[68]

Colombia

Following the lead of Peru, Colombia signed the Minamata Convention in November 2013 and ratified it in August 2019. The country banned the use of mercury in all mineral extraction activities in July 2018.[69] The process to guarantee the non-use of mercury by the Colombian legal system includes several steps. The Superintendence of Industry and Commerce developed a form to control the import of mercury, while the Ministry of Transport created a control strategy for the disposal of the element. On their side, environmental authorities put into action a plan to monitor and control the flow of mercury into the country, and impose penalties on those that import it illegally.[70]

In July 2018, the government committed to entirely prohibiting the industrial use of mercury by July 2023.[71] This commitment turned into reality with Law 1658, which established the progressive reduction of mercury until its total eradication over a period of 5 years. Since July 2023, the use of mercury in all industrial and productive processes has been totally prohibited throughout Colombia. The prohibition extends to the use, import, and export from the national territory.[72]

Despite these efforts, Colombia has struggled for decades with high levels of mercury pollution. As former Colombian president César Gaviria stated, "Mercury must be treated, as it was in the 1980s, just like the chemicals used to make cocaine. Of the 1,150 water sources that cross the country, 232 pass through mercury zones. [...] Colombia produces 58 tons of gold, and 86% is illegal. It is not only a matter of prohibiting its use, but also of accompanying half a million miners in the transition to formality."[73]

With the recent national ban on mercury, Colombian authorities have intensified their efforts to curb trafficking of the liquid metal, launching multiple operations, leading to the destruction of equipment used for illegal mining and seizure of mercury.[74] As a result of these seizures, Colombia has reportedly developed the first safe stockpile of mercury in Latin America.[75] As the authorities fight an uphill battle against fragmented mercury trafficking networks - with average seizures no larger than 20 kilograms of mercury - they keep raising the question: "who is introducing mercury into Colombia?"[76]

Primary Mercury Production in Mexican Mines: Commitment and Reality

Like Peru and Colombia, Mexico signed the Minamata Convention in October 2013.[77] The country ratified the Convention in September 2015 and it entered into effect in August 2017.[78] The Convention requires its signatories to control supply and trade, phase out products, and process reductions according to a 15-year maximum "grace period" timeline.[79] In particular, Parties with existing mercury mines, like Mexico, have the obligation to not open new mines from the date the Convention comes into effect in the country, and to phase out existing ones within 15 years. Thus, while under the Minamata Convention new primary mercury mining has been prohibited in Mexico since 2017, mercury production from existing mines is allowed until 2032.

The Mexican government has publicly committed on multiple occasions to implement the Minamata Convention.[80] Yet while Mexico's reports to the Convention paint a picture of declining primary mercury production due in part to the expiration of the remaining mercury mine licenses in December 2020, these official documents fail to address what previous reporting and EIA's investigation have demonstrated to be significant ongoing primary mining.

Mexico's national strategy under the Convention includes several components, including one targeting

the issue of mercury mining.[81] Yet while the presence of active mercury mines is acknowledged, the central role of these mines in the national production of multiple tons of primary mercury every year is not a salient feature of the official documents and reports produced by Mexico since 2017 related to the implementation of the Convention, including the "Strategic points to advance the implementation of the Minamata Convention" or the updated national inventory of mercury emissions and releases.[82] In the first short national report to the Minamata Convention (2019), Mexico mentions the production of 804.6 tons of mercury produced in 2017 and then states that, as of 2019, "4 mines corresponding to 2 mining concessions have a current authorization, however, these authorizations expire this year (November and December 2020). It should be noted that these four mines were authorized before the entry into force of the Minamata Convention."[83] As mentioned above, the existence of active mercury mines was subsequently omitted by Mexico in its first full national report to the Minamata Convention (in 2021), then amended in June 2022 (see previous section).

The phasing out of pre-Convention mercury mines has revolved around two components. First, authorities have taken steps to prevent the renewal of existing mining authorization, in particular via non renewal of the Environmental Impact Statement (Manifestación de Impacto Ambiental - MIA) granted by the SEMARNAT.[84] Authorities have closed - at least temporarily - one mine that was operating without proper licensing.[85] As part of the broad mining law reforms, adopted in May 2023, mercury mining licenses can no longer be granted or renewed.[86] Second, Mexico has launched a program, led by the UNEP and supported by the Global Environment Facility (GEF), to foster the economic and social transition of 19 communities in Queretaro toward a mercury-free future.[87]

Figure 15
Recently built observation tower and gate on the access way to some of the most productive mercury mines in Queretaro.

However, EIA's findings indicate that the impact of the policies and projects focused on phasing out primary mercury production in Mexico have, to date, been limited. Multiple field investigations and interviews carried out in some of the most active and productive mines in Queretaro - including mines near Camargo, La Plazuela, and Bucarelli - indicate that mercury is being extracted daily. Several mines have, as of the last quarter of 2023, an exceptionally high level of activity, according to miners who spoke with investigators. Several miners who spoke with investigators said they have heard about the international convention, and the government's intention to close the mines and transition the regional economy away from mercury. According to them, this has not actually changed their daily life and they don't believe it will in the coming years.[88]

Moreover, EIA's investigation indicates that the mercury mining sector in Queretaro, far from a progressive decline towards being phased out, is maintaining a high level of activity and indeed spinning out of control. Miners told investigators that mercury robbery is on the surge in the region: one ton was allegedly stolen from a mine in mid-2023, which led to a violent military operation. EIA investigators also witnessed the recent fortifications built around the main access road to a cluster of five mines located in the Sierra Gorda Biosphere Reserve, namely Cristo Vive, La Fe, La Peña, El Mono, and La Perla. Gates, road checkpoints, observation towers equipped with cameras, and barbed wires appeared in recent months and were "inaugurated" in December 2023 (Figure 15). As they kept enquiring about the new infrastructure, investigators received a clear threat: a throats-slitting gesture accompanied by "go away" words from one of the individuals located at the gate. Investigators were then followed during the rest of the day by a truck. Miners from another community carefully explained that the mines around La Plazuela are now controlled by the extremely violent Mexican organized crime organization named New Generation Jalisco Cartel and that the level of production has soared to an "almost industrial level." According to several sources, in several of the mines around La Plazuela, liquid mercury is not extracted from the stones locally in rudimentary stoves, as is reportedly the case everywhere else, but rather that cinnabar - the ore from which mercury is later extracted - is trucked away in bags from the mines.

MERCURY SMUGGLING SCHEME

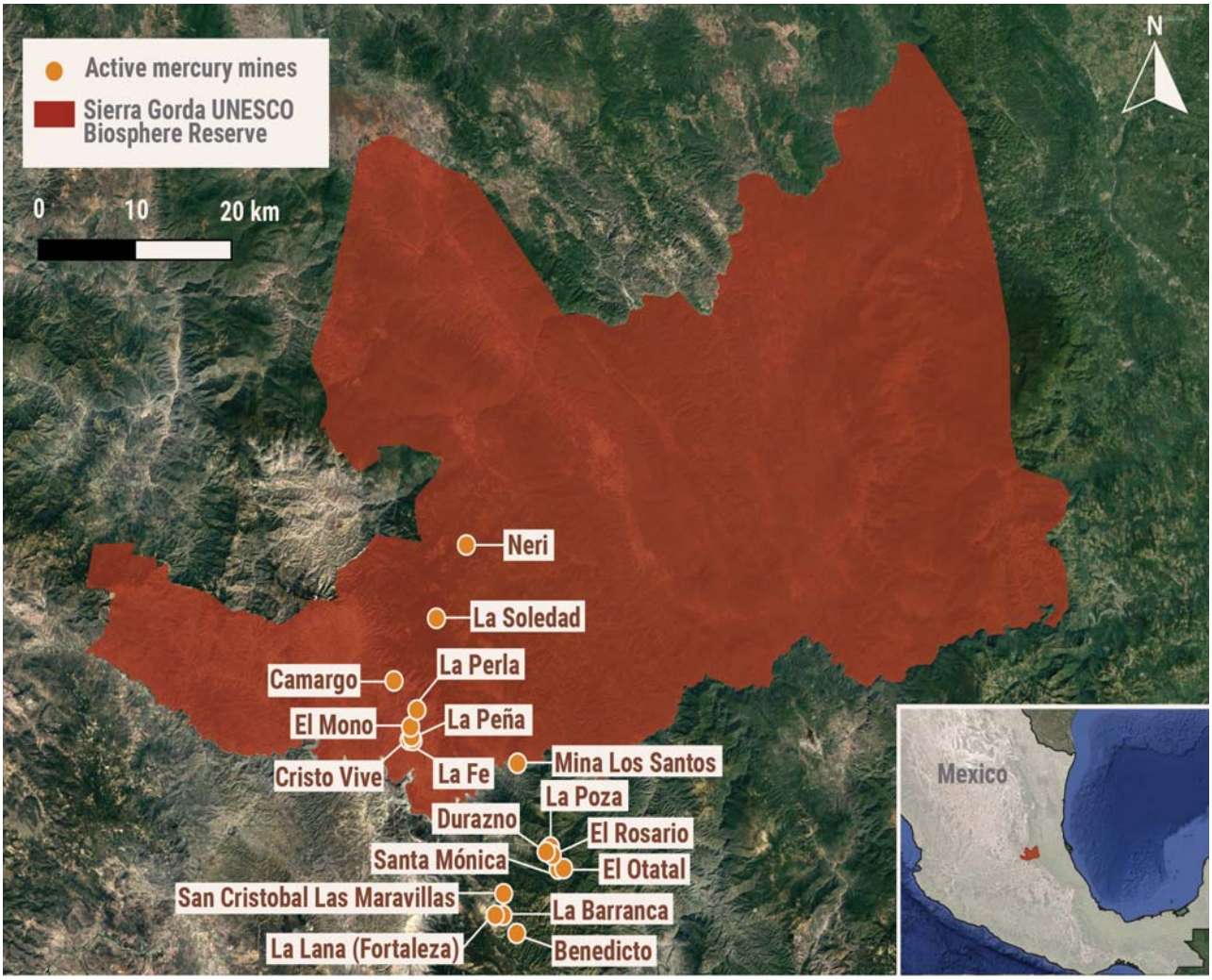
In order to circumvent the mercury import ban in Colombia and Peru and export controls in Mexico, traffickers have exported misdeclared bags of mercury-rich gravels, rather than hidden recipients containing purified liquid mercury, which is the way mercury has been reportedly smuggled across Latin America for the past 10 years.[89] Details of these operations and their key protagonists are presented in the following paragraphs. EIA's findings indicate that traffickers are keenly aware of the high risks associated with their mercury-smuggling operations. As one trafficker explained to investigators in order to justify all the precautions they are taking: "it is a crime to commercialize mercury… it's like trafficking cocaine, to give you an idea."[90]

Extraction

Cinnabar is the most common source of ore for refining elemental liquid mercury, with its characteristic bright pink to darker red incrustation of mercury sulfide (HgS) (Figure 16).[91]

Based on the information received by traffickers and official Mexican data, EIA investigators identified several mines in Queretaro (Figure 17) from where the cinnabar stones are likely being extracted, before being processed into liquid mercury via the rudimentary technique and equipment described above (Figure 7). Several of the mines are located within the Sierra Gorda Biosphere

Figure 16
Cinnabar with mercury sulfide incrustation, as presented by trafficker



Source: EIA

Figure 17
Maps of the potential mines from where cinnabar is being extracted in Mexico before being smuggled across Latin America

Reserve and have reportedly contributed to the contamination of the Exotraz river that led to the poisoning of an entire local community. Several of the mines are also part of the cluster of mines which have allegedly recently fallen under control of the Jalisco New Generation Cartel (see previous section).

According to EIA's investigation, the head of the trafficking network is Juan José Zamorano Dávila. Zamorano, a Mexican citizen exposed in a previous investigation on mercury, oversees the purchase of liquid mercury from miners, the dissimulation of the liquid mercury in gravel-filled bags, its illegal transport to Mexican ports, and its misdeclared shipment under a cover good description (Figure 18). Zamorano told EIA investigators he has been involved for more than 10 years in mercury smuggling, from Mexico first to Panama (as a hub for transhipment to Latin American countries), then India, and now to Bolivia, Colombia,

"It is a crime to commercialize mercury… it's like trafficking cocaine, to give you an idea."

Mercury trafficker exposed by EIA

and Peru, with possibilities to extend in the near future to Ecuador. Zamorano's brother, introduced as "Joel," was presented as a partner of the operation (Figure 19). Zamorano's current partner, Alejandra Pulido Briseño, is a former National Action Party (Partido de Acción Nacional - PAN) politician elected as a Puebla state

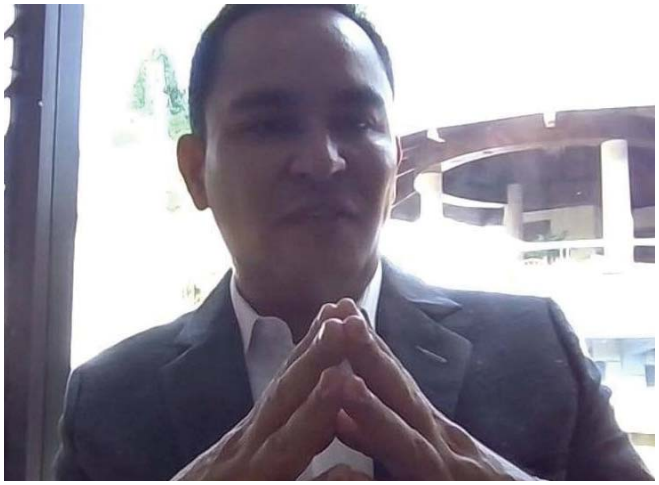


Figure 18
Juan José Zamorano Dávila, the head of the mercury trafficking network

Figure 19
Zamorano and one of his business partners, his brother

Figure 20
Zamorano's partner, a former politician for the PAN

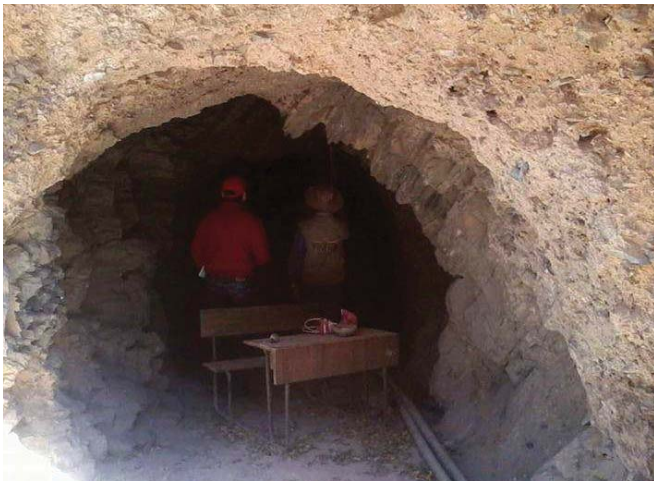


Figure 21
Entrance to a Zamorano-controlled mine

Figure 22
A miner inspects mercury ore

Figure 23
Transport and selection of mercury ore

Figure 24
Car crash exposing the mercury-laden gravel filled bags

deputy and Mexican federal deputy, and who has also worked for the governments of Queretaro and Puebla states.[92] According to EIA's findings, Pulido is aware of the overall smuggling operations and the role of Zamorano (Figure 20).

Traffickers told EIA investigators that more than 20 people are on average working in each of the mines in order to extract what they described as mercury-rich ore along very deep and steep corridors (Figure 21, 22, and 23). A total of 4 tons of liquid mercury is allegedly being added to bags containing gravel in order to hide the presence of the toxic liquid metal. The bags containing the gravel and the liquid mercury are then loaded into a 20-foot container, and covered up by dozens of identical bags filled with regular gravel; the total load of the container usually reaches 20 tons. Once fully loaded the container is transported, usually during the night, to the port. According to Zamorano, the containers are shipped from the ports of Manzanillo (on the Pacific Ocean) or Veracruz (on the Atlantic Ocean). As shown in Figures 24, the heavy load has led to accidents, with bags full of mercury-laden material strewn all over the crash scene.

Export

The import and export process is critically important for the overall operation. As Zamorano explained to EIA investigators: "So far no-one has been able to detect our scheme." The main reason for this is that traffickers misdeclare the shipments from Mexico as "construction material" or "decorative stones." Zamorano told investigators that customs authorities have inspected the suspicious shipment of stones and even used X-ray

Figure 25
Messages exchanged between Zamorano and his customs agent, during a customs inspection

without uncovering the operation. This is confirmed by an exchange of messages, to which EIA investigators have obtained access, between Zamorano and his customs agent related to an inspection of the shipment by Mexican authorities in June 2023 (Figure 25). EIA analysts have identified a total of 50 shipments exported from Mexico likely containing mercury-laden material, from April 2019 to June 2025. Of those shipments, 37 were destined to Peru, 10 to Colombia and three to Bolivia. According to EIA's analysis this would represent a total of approximately 200 tons of smuggled mercury.

Import and Processing

EIA investigators were told by traffickers that once the shipment arrives in the country of destination, the bags with regular gravel are discarded and the bags containing the liquid mercury are loaded into trucks and transported to a processing facility. Hidden processing facilities identified during this investigation are located in Arequipa (Peru) and Medellin (Colombia). Zamorano is working with a dedicated partner in each country, who is responsible for the importing, transporting, processing, and distribution of the liquid mercury (Figure 26). The Peruvian partner, named Christian Estunded Castillo Melendez, who is the representative of the company - C & K Pukaray E.I.R.L. - used for the import in Peru, told EIA investigators he has been involved in mercury smuggling in Peru and between Peru and Bolivia for many years. His brother, named Frank Harold Castillo Melendez, was involved in a mercury smuggling operation exposed by Peruvian authorities in April 2015.

Figure 26
Zamorano's partner in Colombia (left) and Peru (right)

Figure 27
Processing of mercury-laden gravel, filtering (left) and washing (right)

Figure 28
Second phase of extraction by combustion

Smugglers told EIA investigators that each 20-ft container shipment of mercury-rich gravel yields between 3.5 and 4 tons of liquid mercury. After a processing technique that involves filtering and washing, the purified liquid mercury is poured into receptacles ready to be transported across the country (in Peru and Colombia) or across borders (to Bolivia), sometimes using the common mercury flasks that weigh 34.5 kilograms each. (Figure 27).

According to traffickers the filtering-washing process will allow the retrieval of roughly 90 percent of the mercury present in the Mexican mercury-laden material. They explained that the remaining 10 percent will be extracted by burning the residues from the first processing phase, usually in a hidden facility located in a remote rural area (Figure 28).

THE MERCURY-GOLD NEXUS AND RELATED CONVERGENT CRIMES

Traffickers have strategically located hidden mercury processing facilities in order to discreetly provide tens of tons of mercury to some of the most active areas for illegal gold mining in Latin America. According to traffickers, 100 percent of the mercury they have illegally transported out of Mexico has been used for ASGM.

In Colombia, mercury trafficking, gold trafficking, and armed groups' territorial control have converged. Zamorano's Colombian partner told EIA's investigators that he sells all his mercury to armed groups, via their chosen intermediaries. He explained that he cannot sell the mercury directly to the gold miners because the mining areas are controlled by armed groups who oversee the trade of mercury and gold. He confirmed that the Revolutionary Armed Forces of Colombia (FARC) are one of these groups, among others. He specifically mentioned Caucasia and Santa Fé as trading hubs for mercury, with final destinations in forest areas up to 7 hours away from Medellin, likely in the Amazon and Pacific regions of Colombia.

EIA investigators documented mercury-enabled illegal gold mining in the Pacific region of Antioquia, in a zone controlled by two armed groups at war with each other: AGC (Autodefensas Gaitanistas de Colombia) and ELN (Ejército de Liberación Nacional) (Figure 29). As EIA investigators learned, all economic activities, in particular illegal ones, are tightly controlled and authorized by armed groups who have become the de facto regional rulers.

In Peru, the smuggled mercury from Mexico takes a similar path. Zamorano's partner told EIA investigators that he distributes the processed mercury to the principal gold mining areas and personally delivers approximately 1.5 tons of mercury every month to Madre de Dios.

Figure 29
Mercury-dependent illegal gold mine in an armed group-controlled territory in Colombia

Source: Alejandro Saldivar

CONCLUSION AND RECOMMENDATIONS

Mercury contamination is a crude reality of mining in Latin America, both in the mercury producing countries, like Mexico, and in the gold mining countries, like Colombia and Peru where mercury is consumed. At both ends of the supply chain, communities are being poisoned and ecosystems are being contaminated, with effects that could last for decades.

More than six years after the Minamata Convention took effect in Mexico, the dire problems associated with the mercury mining sector are escalating. At the time of writing, the top producing mines in the country, located in Queretaro, are in full operation with a level of activity primarily driven by the price paid to miners by traders/exporters. Violence is on the rise and fortifications are being built around key mines. The Jalisco New Generation Cartel has allegedly taken control of a cluster of mines, from which a remarkably high volume of mercury is being produced weekly.

EIA's investigation exposes how approximately 200 tons of mercury from Queretaro have been smuggled across Latin America for years, and is currently traded illegally to Colombia and Peru, where it enables illegal small scale gold mining in some of the most threatened forested areas in the region. In Colombia, EIA investigators learned that the mercury trade is managed by armed groups who control critical illegal gold mining areas.

The Minamata Convention on Mercury is an international agreement which aims to protect human health and the environment from emissions and releases of mercury. EIA's unprecedented investigation shows that despite its strengths, the Convention and its implementation have major shortcomings that drastically limit its current impact and make its goals out of reach in the near future.

In order to win the battle against mercury and the convergent crimes it enables, including illegal gold mining, drug trafficking, and armed insurrections, EIA recommends:

- Immediate actions by Mexican authorities to regain control of mercury mine territories in Queretaro and investigate the trafficking network exposed in the report;
- Accelerated closure of the mercury mines in Mexico, with an effective phase-out achieved by the end of 2025, accompanied by effective and just socio-economic transition of the historic mining communities;
- Increased strategic collaboration among Latin America authorities focused on intelligence gathering and exchanging to combat mercury smuggling, leveraging Artificial Intelligence-powered trade monitoring;
- Ban the international trade of all mercury to prevent its diversion for ASGM, leveraging the 6th Conference of the Parties of the Minamata Convention on Mercury in 2025 to decisively advance the process.
- Amend the Minamata Convention on Mercury to remove ASGM as "allowable use" of mercury.

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