INVENTORY OF MERCURY SUPPLY, USE, AND TRADE IN THE UNITED STATES 2023 REPORT

Office of Chemical Safety and Pollution Prevention
Reporting Year 2021

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Background

Mercury is a naturally occurring element that originates in the earth's crust and exists as elemental mercury or mercury compounds. Elemental mercury (CASRN 7439-97-6) is a shiny, silver-white metal that is liquid at room temperature. Mercury does not degrade, cannot be destroyed, and is a persistent and bioaccumulative toxicant. Emitted elemental mercury can be transported in the atmosphere on local, regional, and global scales as it cycles through air, land, and water.[1] Some of the emitted elemental mercury following deposition and transformation into divalent mercury can be biotransformed into methylmercury.[2] Methylmercury can bioaccumulate and biomagnify in fish, and thus can be consumed by humans, as well as marine mammals.[3]

Mercury compounds are formed when elemental mercury reacts with another substance, either in nature or intentionally by humans. The U.S. Environmental Protection Agency (EPA) Toxic Substances Control Act (TSCA) Chemical Substance Inventory lists 38 mercury compounds as commercially available in the United States (see *Appendix B* of this report).[4] Since the publication of the 2020 report, 31 mercury compounds have been listed as "inactive" under the Chemical Substance Inventory.[5]

Global Agreement on Mercury

The United States is a Party to the Minamata Convention on Mercury (Minamata Convention), which entered into force on August 16, 2017. The objective of the Convention is to protect human health and the environment from the adverse health effects of mercury.[6] As of January 2023, there are 128 signatory countries and 116 countries that have approved, accepted, ratified, or acceded to the Convention. The Convention includes a number of provisions to reduce exposure to mercury, including a prohibition on new mercury mines and the phase-out of existing ones, and the phase-out and phase-down of mercury use in a number of specified products and processes. Some articles of the Convention pertain only to elemental mercury while others apply to mercury compounds as well. As discussed in the mercury inventory reporting rule, EPA uses the collected information from the mercury inventory to assist in the United States' national reporting for the Minamata Convention.[7]

U.S. Laws Affecting Supply and Trade of Elemental Mercury and Mercury Compounds

Prior to the enactment of the Mercury Export Ban Act of 2008 (MEBA), elemental mercury was exported from the United States. In passing MEBA, Congress expressed concern about the use of

[1] EPA. Basic Information about Mercury. (No date). Available at https://www.epa.gov/mercury/basic-information-about-mercury.
[2] Ibid.
[3] EPA. How People are Exposed to Mercury. (No date). Available at https://www.epa.gov/mercury/how-people-are-exposed-mercury.
[4] EPA. TSCA Chemical Substance Inventory. Available at https://www.epa.gov/tsca-inventory.
[5] "Toxic Substances Control Act Inventory Notification (Active-Inactive) Requirements." 82 Fed. Reg. 37520 (August 11, 2017).
[6] UNEP. Minamata Convention on Mercury. Available at http://www.mercuryconvention.org.
[7] "Reporting Requirements for TSCA Mercury Inventory: Mercury." 83 Fed. Reg. 20054 (June 27, 2018).

U.S. mercury in dispersive practices involving mercury in other countries and the impacts of global mercury releases on the United States.[8] Beginning in 2013, the law prohibited exports of elemental mercury (with very limited exceptions),[9] provided for long-term management and storage of elemental mercury in the United States,[10] and prevented the sale, distribution, or transfer of elemental mercury held by U.S. federal agencies.[11] While the export of pure elemental mercury is illegal, the export of elemental mercury-added products (including those containing elemental mercury) is generally not prohibited, except if the intent of the export is to recover elemental mercury for resale or reuse.[12] In 2016, the Frank R. Lautenberg Chemical Safety for the 21st Century Act (Lautenberg Act) expanded the export ban to include five mercury compounds: mercury (I) chloride or calomel; mercury (II) oxide; mercury (II) sulfate; mercury (II) nitrate; and cinnabar or mercury sulfide.[13] That ban took effect on January 1, 2020.

The Lautenberg Act also directed that "[n]ot later than April 1, 2017, and every 3 years thereafter, the Administrator shall carry out and publish in the Federal Register an inventory of mercury supply, use, and trade in the United States."[14] To assist in the preparation of the inventory, EPA was also directed to promulgate a rule by June 22, 2018 to establish reporting requirements applicable to persons who manufacture mercury or mercury-added products or who otherwise intentionally uses mercury in a manufacturing process.[15] Accordingly, the Agency promulgated a rule, *Mercury; Reporting Requirements for the TSCA Mercury Inventory* (83 FR 30054, 40 CFR 713, June 27, 2018), which provides the reporting requirements, process, and schedule for persons who manufacture mercury or mercury-added products or who otherwise intentionally use mercury in a manufacturing process (see also 40 CFR Part 713). In administering this mercury inventory, the Agency will "identify any manufacturing processes or products that intentionally add mercury; and . . . recommend actions, including proposed revisions of Federal law or regulations, to achieve further reductions in mercury use."[16]

On November 8, 2021, EPA published a final rule to implement an order issued by the U.S. Court of Appeals for the 2nd Circuit, on June 5, 2020.[17] The 2nd Circuit vacated the exemption at 40 CFR 713.7(b)(2) for persons who import pre-assembled products that contain a mercury-added component. That rule effectuated the vacatur ordered by the 2nd Circuit and made necessary

[8] Mercury Export Ban Act of 2008. Pub. L. No. 110-414 (2008).
[9] 15 U.S.C. § 2611(c)(1). MEBA authorizes EPA to provide limited essential use exemptions by rule for the export of no more than 10 metric tons of elemental mercury under specified conditions. Section 4(c)(4)(A) of the Act provides seven specific findings EPA must make to grant an essential use exemption from the export ban. Requests for an essential use exemption would only be granted through notice-and-comment rulemaking. The exemption must contain terms and conditions that minimize export and ensure that conditions for granting the exemption are met. No exemption shall last longer than three years or exempt more than ten metric tons of mercury.
[10] 42 U.S.C. § 6939f(a)(2).
[11] 15 U.S.C. § 2605(f).
[12] See https://www.epa.gov/mercury/questions-and-answers-mercury-export-ban-act-meba-2008.
[13] 15 U.S.C. § 2611(c)(7)(A)(i)-(v). Please note: TSCA section 12(c)(7) uses the term "mercury sulphide," which is an alternative spelling of "mercury sulfide." Throughout this report, EPA is using "mercury sulfide" to be consistent with how the chemical substance is listed in the TSCA Chemical Substance Inventory.
[14] 15 U.S.C. § 2607(b)(10)(B).
[15] 15 U.S.C. § 2607(b)(10)(D)(i).
[16] 15 U.S.C. § 2607(b)(10)(C).
[17] "Response to Vacatur of Certain Provisions of the Mercury Inventory Reporting Rule" 86 Fed. Reg. 61708 (November 8, 2021).

amendments to corresponding text in 40 CFR 713.7(b). As a result, the 2023 and future reports will include data on quantities of mercury, as well as other information required to be reported, in imported, pre-assembled products.

According to these statutory requirements, and assisted by the mercury inventory reporting requirements rule, EPA has prepared and published inventory reports in 2017 and 2020.[18]

[18] See https://www.epa.gov/mercury/reporting-requirements-mercury-inventory-toxic-substances-control-act#rule-history.

Introduction to the Inventory of Mercury Supply, Use, and Trade

The U.S. Environmental Protection Agency prepared this national inventory report of supply, use, and trade of mercury as directed by the Lautenberg Act, which defines "mercury" as "elemental mercury" or "a mercury compound."[19] Based on the information collected, the Agency, as appropriate, will identify any manufacturing processes or products that intentionally add mercury and recommend actions to achieve further reductions in mercury use as required by TSCA (see *Conclusion and Data Interpretation* section).

In 2017, EPA released its initial mercury inventory report,[20] which was a compilation of publicly available data on commodity mercury and was published prior to the promulgation of the mercury inventory reporting rule and establishment of the electronic reporting application. The initial mercury inventory fulfilled the statutory requirement and deadline to publish on or before April 1, 2017, but the information and data were notably limited in applicability for many aspects of supply, use, and trade and, in some cases, were from outdated sources. The Agency also derived information from other federal and state programs, including EPA's Chemical Data Reporting (CDR) program, the Interstate Mercury Education and Reduction Clearinghouse (IMERC) Mercury-added Products Database, and the U.S. International Trade Commission (ITC), as well as other publicly available sources, and industry responses to EPA subpoenas.

On March 30, 2020, EPA published the first triennial report[21] on the supply, use, and trade of mercury in the United States supported by the Agency's mercury inventory reporting rule. Based on the information collected under the mercury inventory reporting rule, the 2020 Mercury Inventory Report identified any manufacturing processes or products that intentionally added mercury. In December 2020, EPA updated the totals reported in its March 2020 Inventory of Mercury Supply, Use, and Trade in the United States 2020 Report. Consistent with EPA's goals to ensure that all persons required to report are aware of the new reporting requirements and that the mercury inventory accurately describes the supply, use, and trade of mercury in the United States, EPA accepted late submissions from a number of reporters and conducted outreach to additional potential reporters, some of whom were either determined to not need to report or have subsequently submitted data to the Agency. EPA did not re-issue the 2020 report; however, the Agency incorporated additional data from five new reporters into its mercury reporting database and made available the updated 2020 totals for supply, use, and trade available in a summary table.[22]

[19] 15 U.S.C. § 2607(b)(10)(A).
[20] "Mercury; Initial Inventory Report of Supply, Use, and Trade" 82 Fed. Reg. 15522 (March 29, 2017). See also https://www.regulations.gov/document?D=EPA-HQ-OPPT-2017-0127-0002.
[21] "Inventory of Mercury Supply, Use, and Trade in the United States 2020 Report; Notice of Availability" 85 Fed. Reg. 18574 (April 2, 2020). See also https://www.regulations.gov/document/EPA-HQ-OPPT-2017-0127-0004.
[22] EPA. Updated Totals for the Inventory of Mercury Supply, Use, and Trade in the United States 2020 Report. December 2020. Available at https://www.epa.gov/sites/default/files/2021-01/documents/updated_mercury_inventory_totals_december_2020.pdf.

This 2023 report is the second report under the Lautenberg Act. The deadline for reporting mercury information to EPA was July 1, 2022, for reporting activities that occurred in the calendar year 2021.

As set forth in the mercury inventory reporting rule, EPA expected to supplement certain data elements with information reported to CDR and IMERC, as necessary, in order to avoid duplicative reporting. For the 2021 reporting year, EPA accessed CDR 2019 principal reporting year volumes when a MER application submission signified that the reporter had reported equivalent data during the overlapping CDR reporting period. However, IMERC has not published an updated database since 2018. Therefore, the Agency was not able to cross reference or supplement certain data elements for this 2023 report.

Reporting Requirements

The reporting requirements for supply, use, and trade of mercury are categorized based on the following terms: manufacture, import, use, distribution in commerce, storage, and export (refer to the explanation of key terms in Appendix A). Reporters are required to report the amounts of mercury in pounds (lbs.) used in such activities with the purpose of obtaining an immediate or eventual commercial advantage[23] during a designated reporting year. Reporters are also required to identify specific mercury compounds, mercury-added products, manufacturing processes, and how mercury is used in manufacturing processes, as applicable, from preselected lists. For certain activities, reporters are required to provide additional, contextual data (e.g., North American Industry Classification System (NAICS) codes for mercury or mercury-added products distributed in commerce). For purposes of this report, the reporting activities are described as follows:

1. Imported mercury
2. Mercury manufactured in the United States
3. Imported products (including certain assembled products)
4. Products made in the United States (including certain assembled products)
5. Mercury used in a manufacturing process other than for manufacturing mercury-added products or mercury compounds (hereafter referred to as "use in a manufacturing process")

Generally, under each reporting activity, EPA collected the following information in support of this inventory report:

- Amount of mercury manufactured, imported, stored, used, sold, or exported;
- Types of products made;
- Types of manufacturing processes and how mercury was functionally used;
- Business sectors, or industries, to which mercury or mercury-added products were sold;
- Country of origin of imported mercury or mercury-added products; and

[23] The Agency incorporated existing TSCA-defined terms "with the purpose of obtaining an immediate or eventual commercial advantage" (see 15 U.S.C. § 2607(f) and 40 CFR 704.3) to be consistent with the statutory mandate at 15 U.S.C. § 2607(b)(10)(C)(i) to "identify any manufacturing processes or products that intentionally add mercury." In addition, the Agency interprets "commercial advantage" to extend to benefits beyond profits, such as not incurring additional operational costs by continuing to use mercury rather than use non-mercury substances or technologies. Thus, to be required to report to the mercury inventory, persons must intentionally engage in activities that introduce mercury into supply, use, and trade in the United States with the purpose of obtaining an immediate or eventual commercial advantage.

- Destination country for exported mercury (mercury compounds only)[24] or mercury-added products.

Information Not Required to Be Reported

TSCA requires EPA to publish a national inventory of mercury supply, use, and trade. The focus of this report is on the data provided directly to EPA by those entities subject to the reporting requirements. As described in the mercury inventory reporting rule, EPA determined that certain activities are beyond the scope of the rulemaking (see list below and 40 CFR 713.7) and, therefore, are not reported to the Agency. This includes amounts of mercury involved in the following activities and circumstances:

- An activity that is not for an immediate or eventual commercial advantage;
- The manufacture or import of mercury that exists only as an impurity;
- Activities by companies, organizations, and/or individuals engaged only in the generation, handling, or management of mercury-containing waste, unless mercury is recovered to be used in commerce; and
- Mercury that is present during a manufacturing process, but was not intentionally added to the product or process (e.g., mercury in equipment or tools).

In other instances, reporting requirements were designed to prevent the duplication of information submitted to other programs.[25] In such cases, Agency anticipated coordinating with IMERC to ensure the completeness of products-related data in the mercury inventory.

Overview of Information by Reporting Activity and Type of Reporter

EPA received a total of 105 individual submissions for reporting year 2021. EPA's reporting application allows for reporters to provide information on multiple reporting activities within one submission. As a result, a total of 124 activities were reported among the 105 individual submissions. Figure 1 below illustrates the breakdown of the five reporting activities and the percent of reports received for each activity from the 124 activities indicated in the 105 individual submissions.

[24] See https://www.epa.gov/mercury/questions-and-answers-mercury-export-ban-act-meba-2008. See also discussion of mercury export prohibitions in *U.S. Laws Affecting Supply and Trade of Elemental Mercury and Mercury Compounds* and *Exported Mercury* sections.

[25] Reporting requirements are different for submitters that report under the Interstate Mercury Education and Reduction Clearinghouse or EPA's Chemical Data Reporting program. The legal requirements for persons who must report can be found at 40 CFR 713.7.

Figure 1. Percent of Reporters Per Reporting Activity

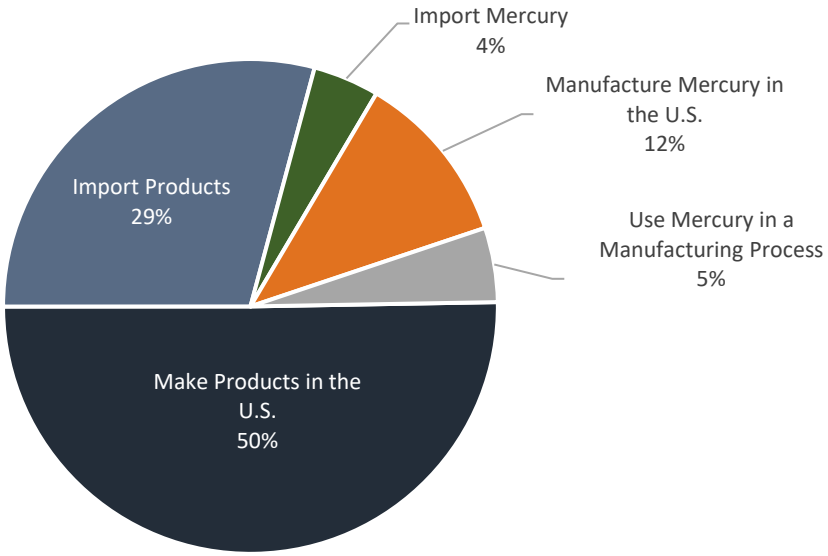


Table 1 presents a culmination of data based on three types of reporters: (1) those who manufacture or import mercury; (2) those who manufacture or import mercury-added products; and (3) those who otherwise use mercury in a manufacturing process. Values are provided for elemental mercury, mercury compounds, and the two combined for the total amount of mercury. For each type of reporter and mercury, the table indicates the number of reporters, the amount of mercury either manufactured, imported, or used, as applicable, the amount of mercury stored, the amount mercury distributed in commerce, and the amount of mercury exported.

Table 1. Overview of Mercury Information Received Based on Type of Reporters

	Type of Reporter	Reported Activities	Amount (lbs.)			
			Mfr'd/ Imp'd/ Used[b]	Stored[c]	Distributed	Exported[d]
Elemental Mercury	Manufacturer or Importer	12	148,921[e]	229,083	54,499	0
	Product Manufacturer or Importer	51	27,276	141,438	18,670	2,131
	Use in a Manufacturing Process	2	359,100	1,897	N/A	N/A
Mercury Compound	Manufacturer or Importer	10	77,797[e]	169,846	45	77,889[e]
	Product Manufacturer or Importer	43	1,979	77,797	292	962
	Use in a Manufacturing Process	7	485	1,014	N/A	N/A
Total[f]	Manufacturer or Importer	22	226,718[e]	398,929	54,544	77,889[e]
	Product Manufacturer or Importer	94	29,255	219,235	18,922	3,093
	Use in a Manufacturing Process	9	359,585	2,911	N/A	N/A

[a]Some submissions contain multiple reporting activities, thus the total number of reported activities (124) is greater than the total number of individual submissions received in the MER application (105).

[b]Based on type of reporter, this refers to the amount of mercury manufactured and imported, the amount in manufactured and imported products, or the amount used in a manufacturing process.

[c]Product manufacturers and importers are not required to provide information on stored mercury.

[d]It is illegal to export elemental mercury and certain mercury compounds. Processors are not required to provide amounts of mercury exported in mercury-added products because it is considered an unintended impurity.

[e]Includes CDR 2019 principal reporting year volumes.

[f]A combined total for elemental mercury and mercury compounds is provided as a snapshot of "mercury supply, use, and trade in the United States" (15 U.S.C. § 2607(10)(A) and (B)).

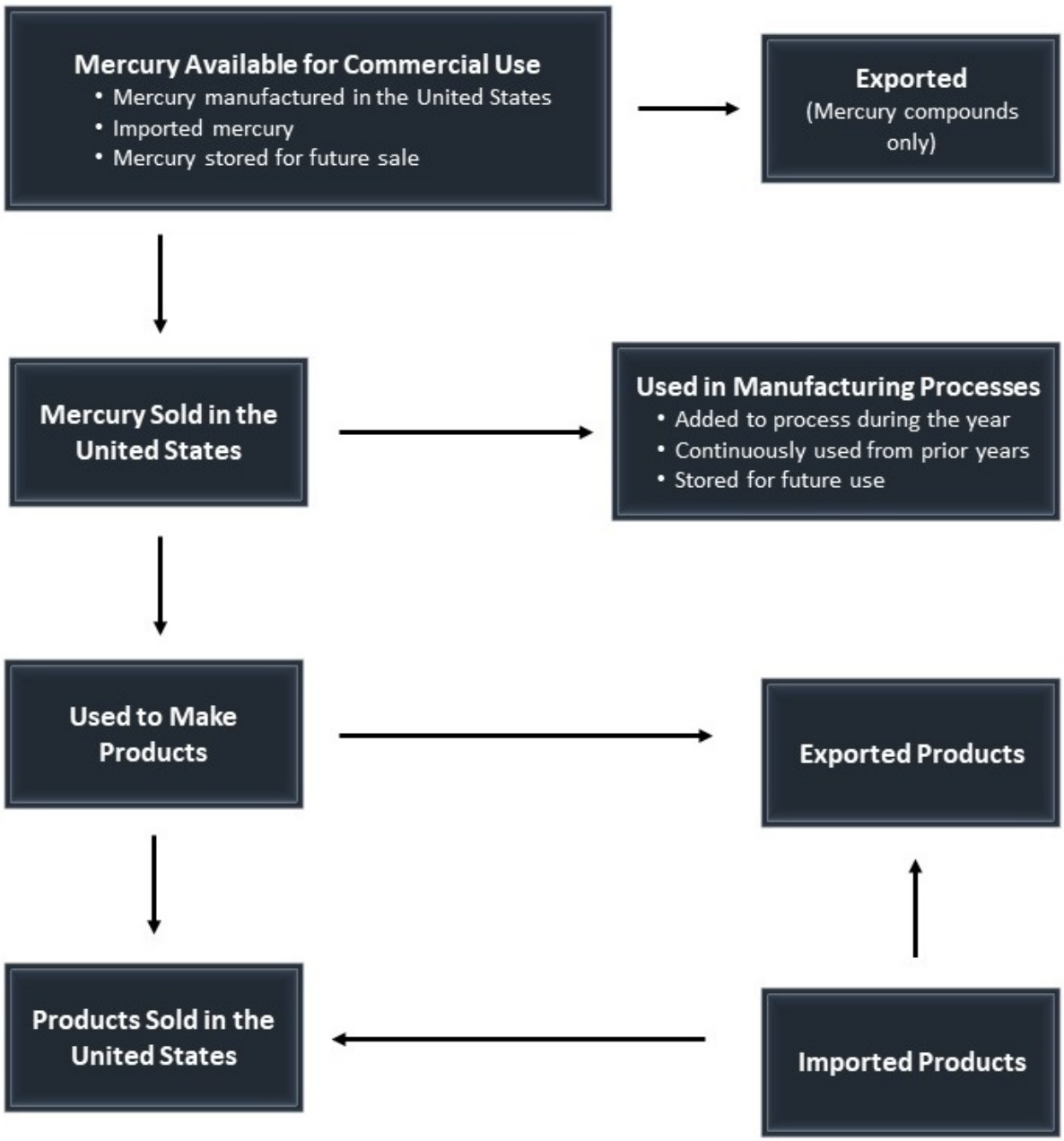
The diagram of the U.S. mercury market in Figure 2 provides the overall context for the commercial activities detailed in the inventory and how those activities relate to one another. Figure 2 includes sources of commodity mercury and shows the way it moves in the economy. From initial production ("manufacturing") and import, mercury can be stored, distributed domestically, or, in the case of mercury compounds, exported. Once distributed, such mercury can be used by manufacturers of products or by processors in other manufacturing processes. Products can be distributed in the United States or exported. In some cases, mercury remains in use in a product until it becomes waste (e.g., dental amalgam). In other cases, a manufacturing process may use a quantity of mercury on a continuous basis from year to year. For example, facilities producing chlorine keep elemental mercury in use year after year and add a much smaller amount to the

reservoir of continuously used elemental mercury during any given year to replace losses.[26] This explains why the reported amounts of elemental mercury used in manufacturing processes are substantial.

Because of the ways that amounts of mercury can be accounted for in supply, use, and trade phases, there are instances where there could be overlap. For example, the same mercury can be manufactured, stored, distributed in the United States, and used within the same year. In some cases, mercury can be manufactured in one year and distributed in the next. In others, as mentioned above in the case of chlor-alkali production, the use of a quantity of mercury could be considered to be essentially static, which would frustrate an attempt to capture the total flow of mercury through supply, use, and trade as a linear illustration. Therefore, Figure 2 captures a snapshot of 2021 data based on the three groups of reporters: (1) those who manufacture or import mercury; (2) those who manufacture or import mercury-added products; and (3) those who otherwise use mercury in a manufacturing process.

[26] Chlor-Alkali Industry 2008 Mercury Use and Emissions in the United States—Twelfth Annual Report (August 2009). Available at https://archive.epa.gov/region5/mercury/web/pdf/12thcl2report.pdf.

Figure 2. U.S. Mercury Market



Data Limitations

EPA notes that information submitted to the EPA's reporting application is subject to submitter error, notwithstanding the self-certified accuracy of that information.[27] For each submission, the Agency manually calculated and transferred the numbers to the appropriate reporting activity. In other instances, EPA directly contacted the reporters to request amended submissions when the data provided appeared inaccurate. EPA also notes that a few reporters submitted their 2021 mercury activities late. The Agency contacted these reporters directly and was able to integrate their information into this report.

In addition, EPA learned during a previous information collection effort that companies working with mercury operate differently from one another and may account for mercury flow in different ways. Therefore, as expected, the inventory does not show that the overall amounts of mercury imported and manufactured equal the amounts of mercury used, distributed, and exported.

Updates for Submitting Data

The MER application was designed to accurately capture the supply, use, and trade of mercury, while collecting data in such a way as not only to allow for flexibility in the terms used by reporters (e.g., manually typed entries to "other" data fields), but also to allow for the relevant provision of, and processes regarding, confidential business information (CBI). As a result, in a few limited cases certain reporting activities relevant to supply, use, and trade may seemingly lack a detailed account of specific quantities and its uses. In such instances, EPA lists contextual information (e.g., sub-categories of products, countries of origin or destination, or NAICS codes) with a generalized description of a reporting activity and/or total amount of mercury.

In February 2022, EPA announced the release of the updated MER application and compliance guide for calendar year 2021 data reporting. The update to the MER application included a drop-down year list to allow users to report for previous reporting years and to make the system easier for EPA to maintain. Additionally, the compliance guide was updated to reflect the new requirement to report pre-assembled products that contain mercury-added components.

[27] To assist in reporting to the mercury inventory, EPA provided outreach materials (see https://www.epa.gov/mercury/resources-mercury-inventory-reporting-rule), including a compliance guide (see https://www.epa.gov/sites/production/files/2019-05/documents/reporting_requirements_for_the_mercury_inventory_final.pdf), and conducted webinars to explain the reporting requirements in general and how to use the MER application (see https://www.epa.gov/mercury/webinars-mercury-inventory-reporting-rule-0).

Organization of Inventory – Mercury Supply, Use, and Trade

Following this introduction, the inventory is presented in three sections: supply, use, and trade. Each section discusses both elemental mercury and mercury compounds. In this report, the term "mercury" used alone means both elemental mercury and mercury compounds. The five reporting activities (imported mercury, mercury manufactured in the United States, imported products, products made in the United States, and mercury used in a manufacturing process) are integrated with other data to help provide context to the national mercury inventory.

EPA recognizes that the categories of data can be defined in different ways (see Appendix A for a detailed explanation of key terms). For the purposes of this inventory report, domestic manufacture and storage of mercury are considered supply because they are the sources of mercury that can enter the market for sale. Mercury that was sold (distributed) in the United States could be considered either: (1) supply of mercury (because it was supplied to purchasers); (2) use of mercury (because sales information helps to illustrate use of mercury and mercury-added products); or (3) trade of mercury (because sales are a measure of domestic commerce). In this inventory, sale of mercury is categorized as use along with the manufacture and sale of mercury-added products, and the intentional use of mercury in a manufacturing process. As explained in the final rule, EPA requires contextual information on distribution, storage, and export in support of the mercury inventory. For the purpose of this report, distribution is discussed under use of mercury because the Agency is viewing the sale of mercury and mercury-added products through the lens of the purchaser, who uses the mercury or mercury-added products. In this way, the distribution of the supplied mercury is similar to the economic term of demand.

Trade in this inventory refers to international trade (*i.e.*, imports and exports). As with distribution of mercury, there is more than one category in which to place imports. Imported commodity mercury could be considered part of supply (because the mercury can enter the domestic market for sale), but because trade is defined as international trade for this report, imported commodity mercury is placed in the section on trade, along with mercury exports. In this inventory, trade also includes import and export of mercury-added products. Overall, this organization of supply, use, and trade parallels the presentation of information in EPA's 2017 and 2020 inventory reports.

Supply	Manufacture (or production) and storage of mercury in the United States
Use	Sale of mercury throughout the United States, manufacture and sale of mercury-added products, and use of mercury in a manufacturing process
Trade	Import and export of mercury and mercury-added products

Table 2 provides a summary of the amount of elemental mercury, mercury compounds, and total mercury for each reporting activity and contextual detail (e.g., amount stored, distributed, and exported) as it pertains to supply, use, and trade.

Table 2. Summary of Supply, Use, and Trade of Mercury in 2021

Supply, Use, and Trade of Mercury		Elemental Mercury (lbs.)	Mercury Compounds (lbs.)	Total[a] (lbs.)
Supply	Mercury Manufactured in the United States	148,921[b]	77,797[b]	226,718[b]
	Stored On-site (max) for Mercury Manufacturers	229,083	169,846	398,929
	Stored On-site (max) for Use in a Manufacturing Process	1,897	1,014	2,911
	Stored Off-site (max)	0	0	0
Use	Mercury Sold in the United States	54,499	45	54,544
	Products Made in the United States	27,276	1,979	29,255
	Products Sold in the United States	18,670	252	18,922
	Mercury Used in a Manufacturing Process	359,100	485	359,585
Trade	Imported Mercury	41,863[b]	26,928[b]	68,791[b]
	Imported Products	1,573	7,229	8,802
	Exported Mercury	0	77,889[b]	77,789[b]
	Exported Products	2,131	962	3,093

[a]A combined total for elemental mercury and mercury compounds is provided as a snapshot of "mercury supply, use, and trade in the United States" (15 U.S.C. § 2607(10)(A) and (B)).

[b]Includes CDR 2019 principal reporting year volumes.

Finally, the inventory report will discuss, where relevant, aspects of supply, use, and trade related to international and domestic obligations. As described in the *Background* section, such topics include the Minamata Convention (e.g., "mercury-added products" and "manufacturing processes in which mercury or mercury compounds are used"), as well as MEBA and the Lautenberg Act amendments, which prohibit the export of elemental mercury and certain mercury compounds, respectively.

In some contexts, amounts of mercury in supply, use, and trade are reported in kilograms and metric tons. For reader convenience, the following conversions are offered:

1 kilogram = 2.205 pounds
1 metric ton = 2,205 pounds

Supply of Mercury

EPA included in mercury supply the domestic manufacture (or production) and storage of mercury for commercial use. Elemental mercury is no longer intentionally mined in the United States but

is produced as both a byproduct of mining and processing of other metal ores and when mercury waste is recycled.[28] Mercury compounds are generally produced by the chemical manufacturing industry. Stored mercury that is available for commercial use is part of supply, regardless of whether it was manufactured or imported. The inventory does not include waste,[29] such as discarded excess elemental mercury, industrial waste containing mercury, or contaminated soil. When mercury waste is recycled, elemental mercury is recovered and can be sold; this pure mercury is considered "manufactured" and reportable. Due to an excess of supply, some privately held, pure elemental mercury is in long-term storage and by law cannot be placed in commerce.[30] In addition, the U.S. Departments of Defense and Energy store thousands of tons of elemental mercury, which are unable to be placed for sale on either the United States or global market and are not contributing to the available domestic or global mercury supply.[31] This inventory report does not include any of the elemental mercury held by the U.S. federal agencies in such long-term storage.[32]

Table 3. Supply of Mercury in the United States (2021)

Supply of Mercury	Elemental Mercury (lbs.)		Mercury Compounds (lbs.)		Total[a] (lbs.)	
Reporting Year	**2021**	**2018**	**2021**	**2018**	**2021**	**2018**
Manufactured in the United States	148,921[b]	98,892	77,797[b]	219	226,718[b]	99,111
Stored On-site (max)[c]	230,980	179,300	170,860	1,411	401,840	180,711
Stored Off-site (max)	0	0	0	185	0	185

[a]A combined total for elemental mercury and mercury compounds is provided as a snapshot of "mercury supply, use, and trade in the United States" (15 U.S.C. § 2607(10)(A) and (B)).

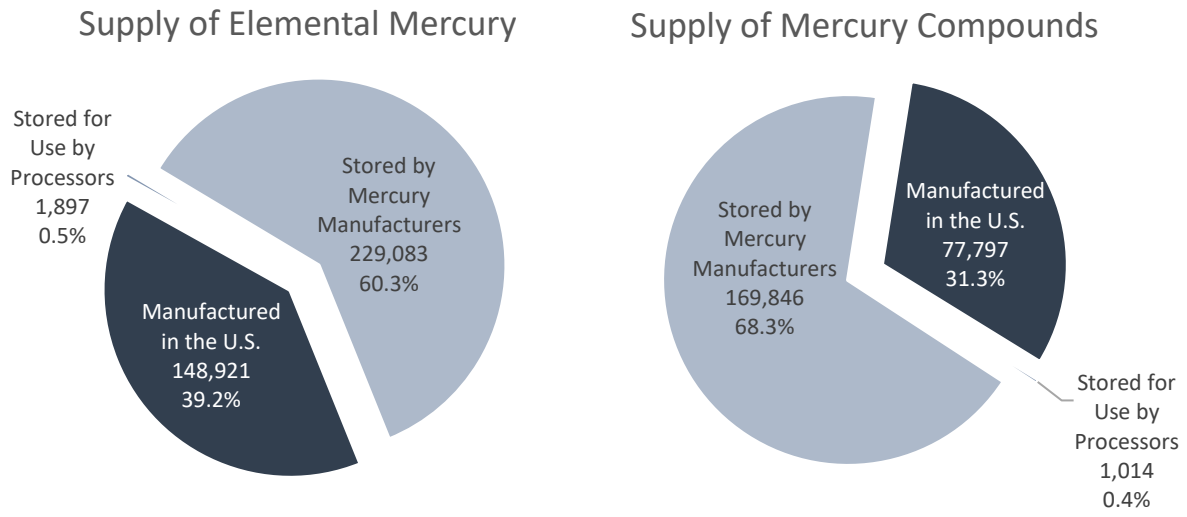
[b]Includes CDR 2019 principal reporting year volumes.

[c]For purposes of comparison to 2018 data, the amounts from Table 2 for "Stored On-site (max) for Mercury Manufacturers" and "Stored On-site (max) for Use in a Manufacturing Process" are combined.

The pie charts in Figure 3 show how much elemental mercury and mercury compounds are stored by processors, stored by manufactures, and produced by manufactures in the United States.

[28] United States Geological Survey. Mercury Mineral Commodity Data Sheet 2019. Available at https://www.usgs.gov/media/files/mercury-mcs-2019-data-sheet.
[29] 15 U.S.C. § 2607(b)(10)(D)(iii).
[30] 42 U.S.C. § 6939(f).
[31] 15 U.S.C. § 2605(f).
[32] EPA determined that elemental mercury waste, whether generated from mining or another process, that is being stored (or accumulated on-site and destined for storage) for eventual transfer to the DOE long-term mercury storage facility, should, in accordance with TSCA section 8(10)(D)(iii), not be subject to the reporting requirements because it is waste. If any person manufactures elemental mercury, including recovery from waste or as a byproduct from mining or any other activity, and has not made the decision to store it for transfer to the DOE storage facility or to otherwise handle it as waste, then that person must report that mercury. The Agency considers such mercury to be a commodity, not waste, and, therefore, part of the U.S. mercury supply.

Figure 3. Amount (lbs.) of Mercury Supplied and Stored by Type of Reporter



Mercury Manufactured in the United States

In 2021, a total of 226,718 lbs. of mercury were manufactured in the United States, including 148,921 lbs. of elemental mercury and 77,797 lbs. of mercury compounds.

In 2015, the Agency gathered information from facilities engaged in large-scale domestic recycling of elemental mercury in the years 2010 and 2013. In 2013, a total of 171,581 lbs. was reported for the manufacture of elemental mercury, as compared to the 98,892 lbs. reported by persons subject to the mercury inventory reporting rule in 2018. In 2021, the total amount of elemental mercury reported for the manufacture of elemental mercury was 148,921 lbs. Thus, while the amount of elemental mercury manufactured in the United States increased between 2018 and 2021, there remains an overall decrease of 22,660 lbs. (>13 percent) from the data collected in 2015.

The types of mercury compounds made in the United States are identified in Table 4 below;[33] however, specific amounts of manufactured, distributed, and exported mercury compounds cannot be determined due to the listing of multiple compounds within the submission forms.

[33] A list of mercury compounds identified as "[m]ercury for which information must be reported" can be found at 40 CFR 713.5(b). See also Appendix B.

Table 4. List of Mercury Compounds Made in the United States (2021)

CASRN	Mercury Compounds
1344-48-5	Mercury sulfide (HgS)
6283-24-5	Mercury, (acetato-.kappa.O)(4-aminophenyl)
29870-72-2	Cadmium mercury telluride ((Cd,Hg)Te)

For purposes of the mercury inventory reporting rule, the MER application, and the inventory report, EPA describes mercury compounds as they are listed in the TSCA Chemical Substance Inventory. In some contexts, mercury compounds may be more familiar as described by their International Union of Pure and Applied Chemistry (IUPAC) name, which may be found via the PubChem chemistry database of the National Institutes of Health (see https://pubchem.ncbi.nlm.nih.gov/).

Stored Mercury

Mercury storage, either on-site or off-site, was reported by manufacturers, importers, and processors of mercury. Those who store mercury as waste or manufacture or import mercury-added products are not required to report mercury storage.[34] The manufacturing processes for which mercury was stored include chlorine production and quality control testing and analysis.

Mercury Stored On-Site

In total, the maximum amount of mercury stored onsite in the United States at any given time during 2021, as reported by manufacturers, importers, and processors of mercury, was 401,840 lbs. The maximum amount of elemental mercury stored was 230,980 lbs. and the maximum amount of mercury compounds stored was 170,860 lbs.

Mercury Stored Off-Site

Mercury was not reported as stored off-site in 2021.

[34] 40 CFR 713.9.

Use of Mercury

Use of mercury includes the sale of mercury in the United States, the manufacture and sale of mercury-added products, and the intentional use of mercury in manufacturing processes. For the purpose of this report, distribution is discussed under use of mercury because the Agency is viewing the sale of mercury and mercury-added products through the lens of the purchaser, who uses the mercury or mercury-added products. In this way, the distribution of the supplied mercury is similar to the economic term of demand. To avoid counting the same mercury twice, the amounts of mercury used for these four activities are not totaled.

Table 5. Use of Mercury in the United States (2021)

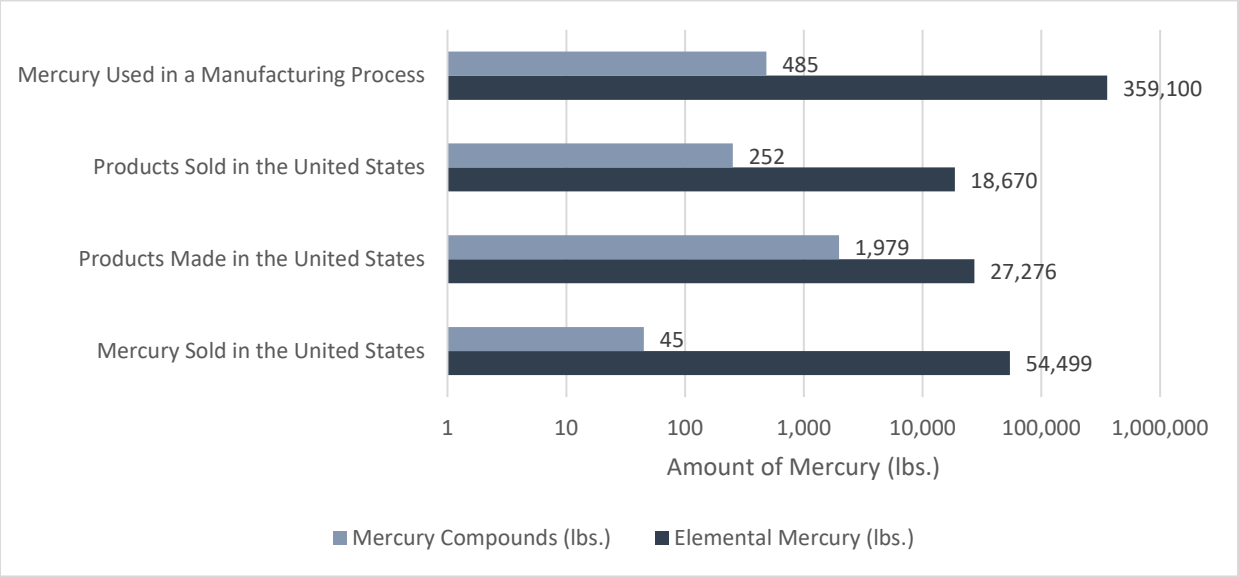
Use of Mercury	Elemental Mercury (lbs.)		Mercury Compounds (lbs.)		Total[a] (lbs.)	
Reporting Year	**2021**	**2018**	**2021**	**2018**	**2021**	**2018**
Mercury Sold in the United States	54,499	72,103	45	1,393	54,544	73,496
Products Made in the United States	27,276	35,295	1,979	1,907	29,255	37,202
Products Sold in the United States	18,670	18,831	252	442	18,922	20,273
Mercury Used in a Manufacturing Process	359,100	540,538	485	34	359,585	540,572

[a]A combined total for elemental mercury and mercury compounds is provided as a snapshot of "mercury supply, use, and trade in the United States" (15 U.S.C. § 2607(10)(A) and (B)).

Comparing data from the 2018 and 2021 reporting years shows overall decreases for the following categories:

- *Total mercury sold in the United States* *-18,952 lbs.* *(>26 percent)*
- *Total mercury used in products made in the United States* *-7,947 lbs.* *(>21 percent)*
- *Total mercury used in products sold in the United States* *-1,351 lbs.* *(>6 percent)*
- *Total mercury used in a manufacturing process* *-180,987 lbs.* *(>33 percent)*

Figure 4. Amount of Mercury Used by Activity in 2021[35]



Mercury Sold in the United States

Elemental mercury and mercury compounds that are manufactured or imported into the United States are sold, or distributed, throughout the United States (see *Trade of Mercury* section for more information on import and export of mercury. In 2021, 54,499 lbs. of elemental mercury and 45 lbs. of mercury compounds were distributed nationwide, totaling 54,544 lbs. of distributed mercury (Table 5; Figure 4). According to reporters, elemental mercury and mercury compounds were distributed to a variety of industries, which were identified by NAICS code.

Elemental mercury was distributed to the following industries:

- All Other Miscellaneous Chemical Product and Preparation Manufacturing (325998)
- Secondary Smelting, Refining, and Alloying of Nonferrous Metal (except Copper and Aluminum) (331492)
- All Other Miscellaneous Electrical Equipment and Component Manufacturing (335999)
- Aircraft Manufacturing (336411)
- Analytical Laboratory Instrument Manufacturing (334516)
- Commercial, Industrial, and Institutional Electric Lighting Fixture Manufacturing (335122)
- Dental Equipment and Supplies Manufacturing (339114)
- Other Basic Inorganic Chemical Manufacturing (325180)
- Search, Detection, Navigation, Guidance, Aeronautical, and Nautical System and Instrument Manufacturing (334511)
- Testing Laboratories (541380)

Mercury compounds were distributed to the following industries:

- All Other Basic Organic Chemical Manufacturing (325119)

[35] As a note to readers, figures in this document are reported in a logarithmic scale to account for a wide range in mercury quantities. See *Explanation of Key Terms* section for additional information on logarithmic scales.

- Biological Product (Except Diagnostic) Manufacturing (325114)
- Colleges, Universities, And Professional Schools (611310)
- Diagnostic Imaging Centers (622110)
- General Medical and Surgical Hospitals (622110)
- Medical Laboratories (621511)
- Other Chemical and Allied Products Merchant Wholesalers (424690)
- Pharmaceutical Preparation Manufacturing (541710)
- Process, Physical Distribution, And Logistics Consulting Services (541614)
- Research and Development in Physical, Engineering, and Life Sciences (541380)
- Testing Laboratories (541380)

Products Made in the United States

In total, 29,255 lbs. of mercury were used for the domestic manufacture of mercury-added products in 2021. Of this total, 27,276 lbs. of elemental mercury were used to manufacture elemental mercury-added products, and 1,979 lbs. of mercury compounds were used to manufacture mercury compound-added products (Table 5; Figure 4). The types of mercury-added products manufactured in the United States are identified in Table 6 for elemental mercury and Table 7 for mercury compounds.[36] For each product category, the amount of mercury used, distributed, and exported in products is provided. EPA identified "products that intentionally add mercury" [37] and in the *Conclusion and Data Interpretation* section noted those products that it was unaware of prior to receiving the 2021 reporting data.

Through the information submitted under the mercury inventory reporting rule, EPA has learned of the following uses of mercury in mercury-added products that the Agency was unaware of prior to receiving submissions for the 2021 reporting year:

• Colorimetric gas detection tubes and CMS chips
• Digital caliper
• Digital multimeter
• Gardening tools
• Glassware
• Mass flow controllers
• Tire of a wheel kit for an engine pump
• Voltammetry and TOC

[36] A list of mercury-added products identified as "[s]pecific requirements for which information must be reported." can be found at 40 CFR 713.11(b). See also Appendix C.
[37] 15 U.S.C. § 2607(b)(10)(C).

Table 6. List of Products Made in the United States and Amount of Elemental Mercury Used, Distributed, and Exported

Products Made in the United States – Elemental Mercury			
Product Category and Subcategory	**Amount in Products (lbs.)**		
	Used	**Distributed**	**Exported**
Dental Amalgam	**7,995**	**710**	**152**
Lighting, Lamps, and Bulbs	**162**	**0**	**16**
Linear Fluorescent			
Formulated Products	**3**	**1**	**1**
Certified Reference Material for Testing and Quality Control Purposes Only			
Switches, Relays, Sensors, and Valves	**19,116**	**17,390**	**1,882**
Contact Relay			
Displacement Relay			
Float Switch			
Tilt Switch			
Total	**27,276**	**18,101**	**2,051**

Table 7. List of Products Made in the United States and Amount of Mercury Compounds Used, Distributed, and Exported

Products Made in the United States – Mercury Compounds			
Product Category and Subcategory	**Amount in Products (lbs.)**		
	Used	**Distributed**	**Exported**
Formulated Products	**1,955**	**268**	**866**
Animal Vaccines			
Certified Reference Material for Testing and Quality Control Purposes Only			
In Vitro Diagnostics			
Pharmaceuticals			
Preservative (Vaccine Usage)			
Preservative (Non-Vaccine Usage)			
Reagents			
Testing Kits			
Lighting, Lamps, and Bulbs	**23**	**0**	**2**
High Pressure Sodium			
Metal Halide			
Miscellaneous/Novelty	**1**	**0**	**1**
Infrared Sensors			
Total	**1,979**	**268**	**869**

Figures 5 and 6 provide visual representations of the amounts of elemental mercury and mercury compounds used to make products in the United States.

Figure 5. Amount (lbs.) of Total Elemental Mercury Used to Make Products by Category

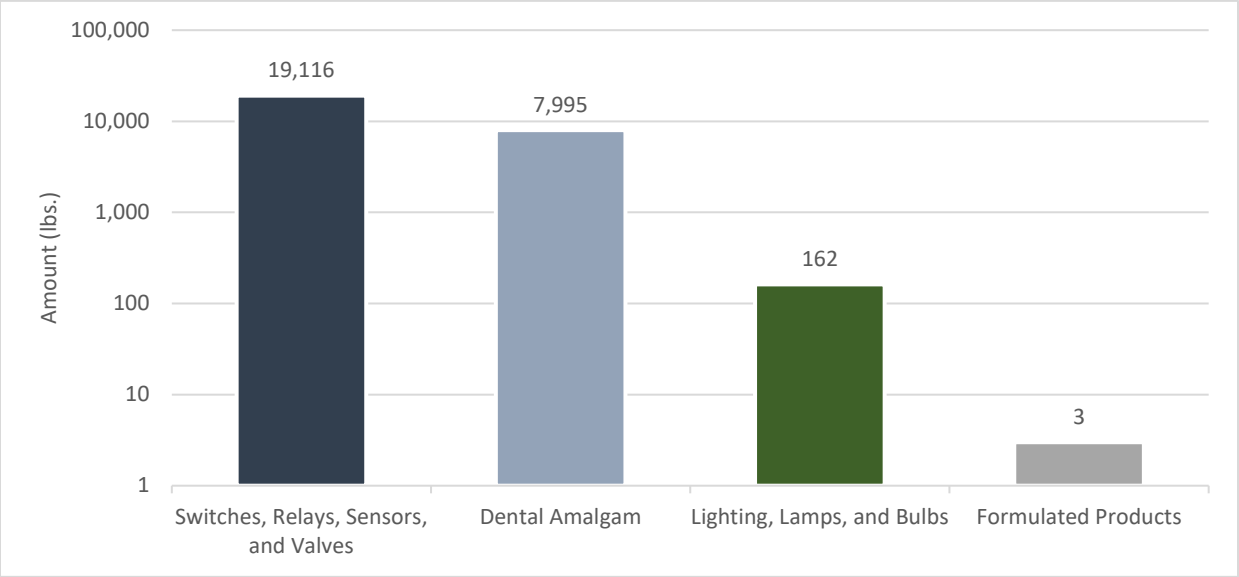
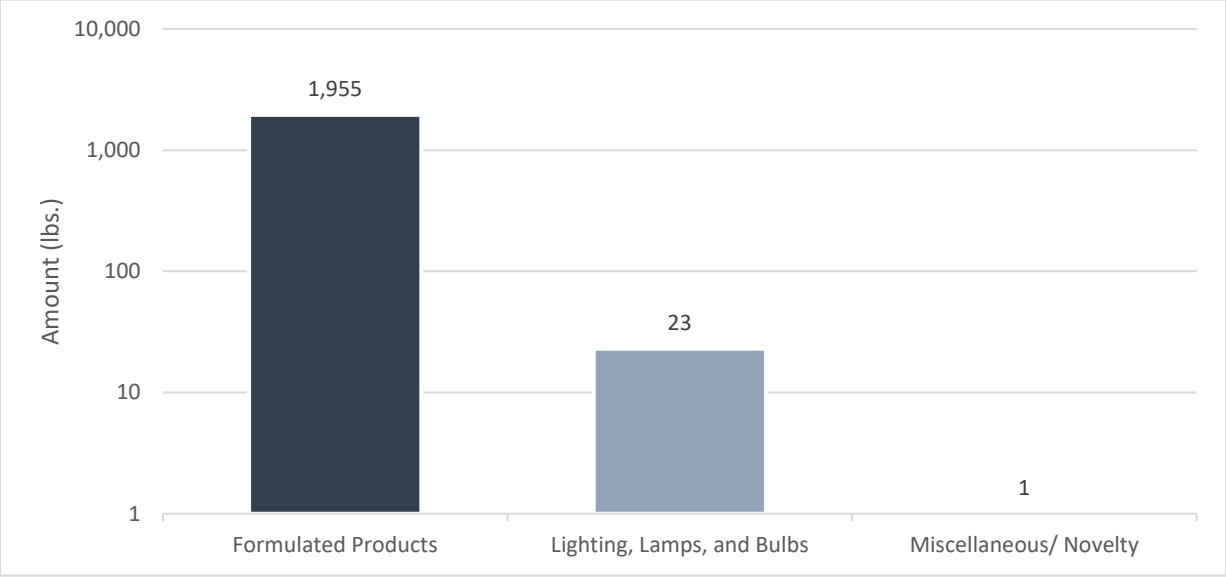


Figure 6. Amount (lbs.) of Total Mercury Compounds Used to Make Products by Category



Products Sold in the United States

Mercury-added products are sold, or distributed, throughout the United States by both product manufacturers and importers (see *Trade of Mercury* section for more information on imported mercury-added products).

In 2021, the total amount of mercury distributed in mercury-added products in the United States was 18,922 lbs. Those products contained 18,670 lbs. of elemental mercury and 252 lbs. of mercury compounds. Specific amounts of mercury for each product are not required to be reported by the rule;[38] however, analysis of the reported information indicates that lighting products were reported by the greatest number of persons reporting for mercury-added product distributed in the United States. The lists of categories and sub-categories of mercury-added products sold in the United States are presented in Tables 8 and 9.[39] The number of reporters and the NAICS codes to which elemental mercury-added products and mercury compound-added products were distributed in the United States are presented in Tables 10 and 11.

[38] 40 CFR 713.9.

[39] A list of mercury-added products identified as "[s]pecific requirements for which information must be reported." can be found at 40 CFR 713.11(b). See also Appendix C.

Table 8. List of Products Sold in the United States in 2021 – Elemental Mercury

Elemental Mercury-Added Products	
Product Category	**Product Subcategory**
Batteries	Manganese oxide
Dental Amalgam	
Formulated Products	Certified Reference Material for Testing and Quality Control Purposes Only
	Preservative
	Reagents
Lighting, Lamps, and Bulbs	Cold Cathode Fluorescent
	Compact Fluorescent
	External Electrode Fluorescent
	Mercury Vapor
	High Pressure Sodium
	Linear Fluorescent
	Mercury Short Arc
	Mercury Vapor
	Metal Halide
	U-Tube and Circular Fluorescent
	UV and Germicidal
Switches, Relays, Sensors, and Valves	Contact Relay
	Displacement Relay
	Float Switch
	Solenoid Valve
	Thermocouple
	Tilt Switch
	Wiring
Miscellaneous/Novelty	Air Cylinders
	Connector Pins
	Catalyst, Porosity Testing
	Display for Car Radio
	Electronic Displays
	Gear Assemblies
	Mass Flow Controllers
	Motors
	Printed Circuit Boards
	Pumps and Flow Meters

Table 9. List of Products Sold in the United States in 2021 – Mercury Compounds

Mercury Compound-Added Products	
Product Category	**Product Subcategory**
Batteries	Alkaline and Zinc Manganese
	Button Cell, Alkaline
Formulated Products	Animal Vaccines
	Certified Reference Material for Testing and Quality Control Purposes Only
	In Vitro Diagnostics
	Pharmaceuticals
	Preservatives (Vaccination Usage)
	Reagents (Catalysts, Buffers, Fixatives)
Lighting, Lamps, and Bulbs	Cold Cathode Fluorescent
	Compact Fluorescent
	Halogen Heat Lamps
	High Pressure Sodium
	Linear Fluorescent
	Mercury Short Arc
	Mercury Vapor
	Metal Halide
	Solar Pathway Lighting
	U-Tube and Circular Fluorescent
	UVB Bulb
	UV and Germicidal
Measuring Instruments	Digital Caliper
	Digital Multimeter
	Colorimetric Gas Detection Tubes and CMS Chips
Miscellaneous/Novelty	Display Module
	Glassware
	Infrared Sensors
	Projectors, Projector Lamps, LCD Modules
	Reference Electrode
	Tire of a Wheel Kit for an Engine Pump
	Triband Phosphor Fluorescent Lamps in Scanners

Table 10. Distribution of Mercury-Added Products by Industry – Elemental Mercury

Industries that Purchased U.S. Manufactured and Imported Elemental Mercury-Added Products	
Industry Sector	**Number Reported**
Accommodation and Food Services	2
Administrative and Support and Waste Management and Remediation Services	1
Agriculture, Forestry, Fishing and Hunting	1
Arts, Entertainment, and Recreation	5
Construction	10
Educational Services	3
Health Care and Social Assistance	4
Manufacturing	57
Other Services (except Public Administration)	9
Public Administration	6
Professional, Scientific, and Technical Services	15
Real Estate and Rental and Leasing	1
Retail Trade	21
Transportation and Warehousing	9
Utilities	3
Wholesale Trade	8

Table 11. Distribution of Mercury-Added Products by Industry - Mercury Compounds

Industries that Purchased U.S. Manufactured and Imported Mercury Compound-Added Products	
Industry Sector	**Number Reported**
Accommodation and Food Services	5
Agriculture, Forestry, Fishing and Hunting	7
Arts, Entertainment, and Recreation	5
Construction	4
Educational Services	8
Health Care and Social Assistance	18
Information	4
Manufacturing	51
Mining	1
Other Services (except Public Administration)	3
Professional, Scientific, and Technical Services	16
Public Administration	4
Real Estate and Rental and Leasing	2
Retail Trade	25
Transportation and Warehousing	1
Utilities	1
Wholesale Trade	26

Mercury Used in Manufacturing Processes

The otherwise intentional use of mercury in a manufacturing process means to use mercury to manufacture anything other than a mercury-added product or a mercury compound. Examples include the use of mercury as a catalyst, cathode, reactant, or reagent. In 2021, 359,100 lbs. of elemental mercury were used in manufacturing processes, the bulk of which was in continuous use, and 485 lbs. of mercury compounds were used. Thus, a total of 359,585 lbs. of mercury were used in manufacturing processes in 2021 (Table 5; Figure 4).

In a manufacturing process, mercury performs a specific function and is used for a particular purpose. For elemental mercury and mercury compounds, Tables 12 and 13 respectively list the types of manufacturing processes, how mercury was functionally used, and the industries, if any, to which end products of that manufacturing process were distributed in the United States.[40] In some cases, end products that result from these manufacturing processes may contain trace amounts of mercury but are not considered mercury-added products. No exports were reported by these processors.

[40] Lists applicable to manufacturing processes for which mercury is otherwise intentionally used identified as "[s]pecific requirements for which information must be reported." can be found at 40 CFR 713.11(c). See also Appendix D.

Table 12. Manufacturing Processes that Used Elemental Mercury in 2021

Use of Elemental Mercury in Manufacturing Processes		
Manufacturing Process	**Functional Use**	**Industry of Distribution**
Chlorine Production (e.g., mercury-cell chlor-alkali process)	Cathode	All Other Basic Inorganic Chemical Manufacturing
Bonding Weld Head	Catalyst	**Not reported*
Porosity Testing	Catalyst	**Not reported*
Quality Analysis	Density Measurement of Tungsten Bars and Quality Testing for Respirators	**Not reported*

Table 13. Manufacturing Processes that Used Mercury Compounds in 2021

Use of Mercury Compounds in Manufacturing Processes		
Manufacturing Process	**Functional Use**	**Industry of Distribution**
Polyurethane/Plastic Production	**Not reported*	Plastics Material and Resin Manufacturing; All Other Plastics Product Manufacturing; and 19 others
Laboratory Test	Catalyst	All Other Miscellaneous Chemical Product and Preparation Manufacturing
Vaccine Production	Reagent, Preservative	Biological Product (Except Diagnostic) Manufacturing
Formulated Products	Catalyst, Reagent, Preservative	Biological Product (Except Diagnostic) Manufacturing; Veterinary Services
Animal Vaccine Production	Preservative	Veterinary Services
Pharmaceutical Manufacture and Lab QC	Reagent	**Not reported*

The Minamata Convention identifies the following manufacturing processes in which elemental mercury or mercury compounds are used:

- Chlor-alkali production
- Acetaldehyde production in which elemental mercury or mercury compounds are used as a catalyst
- Vinyl chloride monomer production
- Sodium or potassium methylate or ethylate
- Production of polyurethane using mercury containing catalysts

In developing the mercury inventory reporting requirements, the Agency incorporated these processes in "[s]pecific requirements for which information must be reported" at 40 CFR 713.11(c). [41] These processes are subject to be phased out in those countries that are party to the Minamata Convention, beginning in 2018. With one exception, the processes identified in the Convention have ceased to be used in the United States for several years.

Based on a review of the data submitted during the 2021 reporting period and comparison to the manufacturing processes listed in the Minamata Convention, there are two processes from the above list identified as actively practiced in the United States:

• Chlor-alkali production (labelled as "Chlorine production (e.g., mercury-cell chlor-alkali process)" in the mercury inventory reporting rule and the MER application).

• Production of polyurethane using mercury containing catalysts. This use was not observed in the 2018 reporting year.

EPA identified "manufacturing processes . . . that intentionally add mercury" [42] in the box below and in the *Conclusion and Data Interpretation* section that it was unaware of prior receiving the 2021 reporting data.

Through the information submitted under the mercury inventory reporting rule, EPA has learned of the following uses of mercury in manufacturing processes that the Agency was unaware of prior to receiving submissions for the 2021 reporting year:

• The "quality testing for respirators" aspect of "density measurement of tungsten bars and quality testing for respirators"

[41] Per public comments received (see Response to Comments (RIN 2070-AK22; Final Rule); EPA-HQ-OPPT-2017-0421-0102), EPA removed the term "Vinyl chloride monomer production" from the options of categories of manufacturing processes for which mercury may be intentionally used. See also Appendix D.
[42] 15 U.S.C. § 2607(b)(10)(C).

Trade of Mercury

Elemental mercury and mercury compounds are commodities that are bought and sold worldwide, although the United States prohibits the export of certain mercury (see *Exported Mercury* below). Mercury-added products in which elemental mercury or mercury compounds are used are also imported to and exported from the United States. As noted earlier, trade in this inventory refers to international rather than domestic commerce. Therefore, imported commodity mercury is placed in the section on trade, along with mercury exports.

Table 14. U.S. Trade of Mercury and Mercury-Added Products (2021)

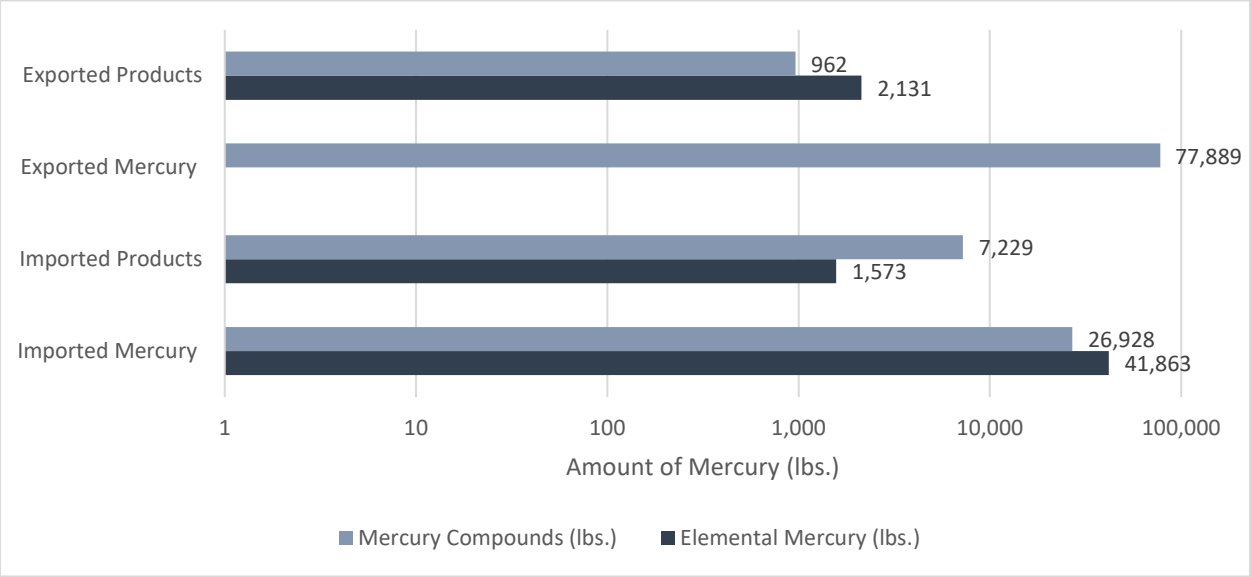
Trade of Mercury	Elemental Mercury (lbs.)		Mercury Compounds (lbs.)		Total[a] (lbs.)	
Reporting Year	**2021**	**2018**	**2021**	**2018**	**2021**	**2018**
Imported Mercury	41,863[b]	0	26,928[b]	248	68,791[b]	248
Imported Products	1,573	1,552	7,229	1,459	8,802	3,011
Exported Mercury	0	0	77,889[b]	148	77,889[b]	148
Exported Products	2,131	6,893	962	2,053	3,093	8,946

[a]A combined total for elemental mercury and mercury compounds is provided as a snapshot of "mercury supply, use, and trade in the United States" (15 U.S.C. § 2607(10)(A) and (B)).

[b]Includes CDR 2019 principal reporting year volumes.

On November 8, 2021, EPA published a final rule to implement an order issued by the U.S. Court of Appeals for the 2nd Circuit, on June 5, 2020. The 2nd Circuit vacated the exemption at 40 CFR 713.7(b)(2) for persons who import pre-assembled products that contain a mercury-added component. That rule effectuated the vacatur ordered by the 2nd Circuit and made necessary amendments to corresponding text in 40 CFR 713.7(b). As a result, the 2023 and future reports will include data on quantities of mercury, as well as other information required to be reported, in imported, pre-assembled products. The increase in the amount of mercury compounds in imported products in Table 14 is attributed to the expanded scope of the reporting requirements.

Figure 7. Amount of Mercury Traded in 2021[43]



Imported Mercury

A total of 41,863 lbs. of elemental mercury was imported in 2021 from three countries: Canada, Malaysia, and the United Kingdom, while an aggregated total of 26,928 lbs. of 16 mercury compounds were imported from five countries: Germany, India, Israel, Mexico , and Switzerland (see Appendix E). The specific mercury compounds imported into the United States are identified in Table 15 below.[44]

[43] As a note to readers, figures in this document are reported in a logarithmic scale to account for a wide range in mercury quantities. See *Explanation of Key Terms* section for additional information on logarithmic scales.
[44] A list of mercury compounds identified as "[m]ercury for which information must be reported" can be found at 40 CFR 713.5(b). See also Appendix B.

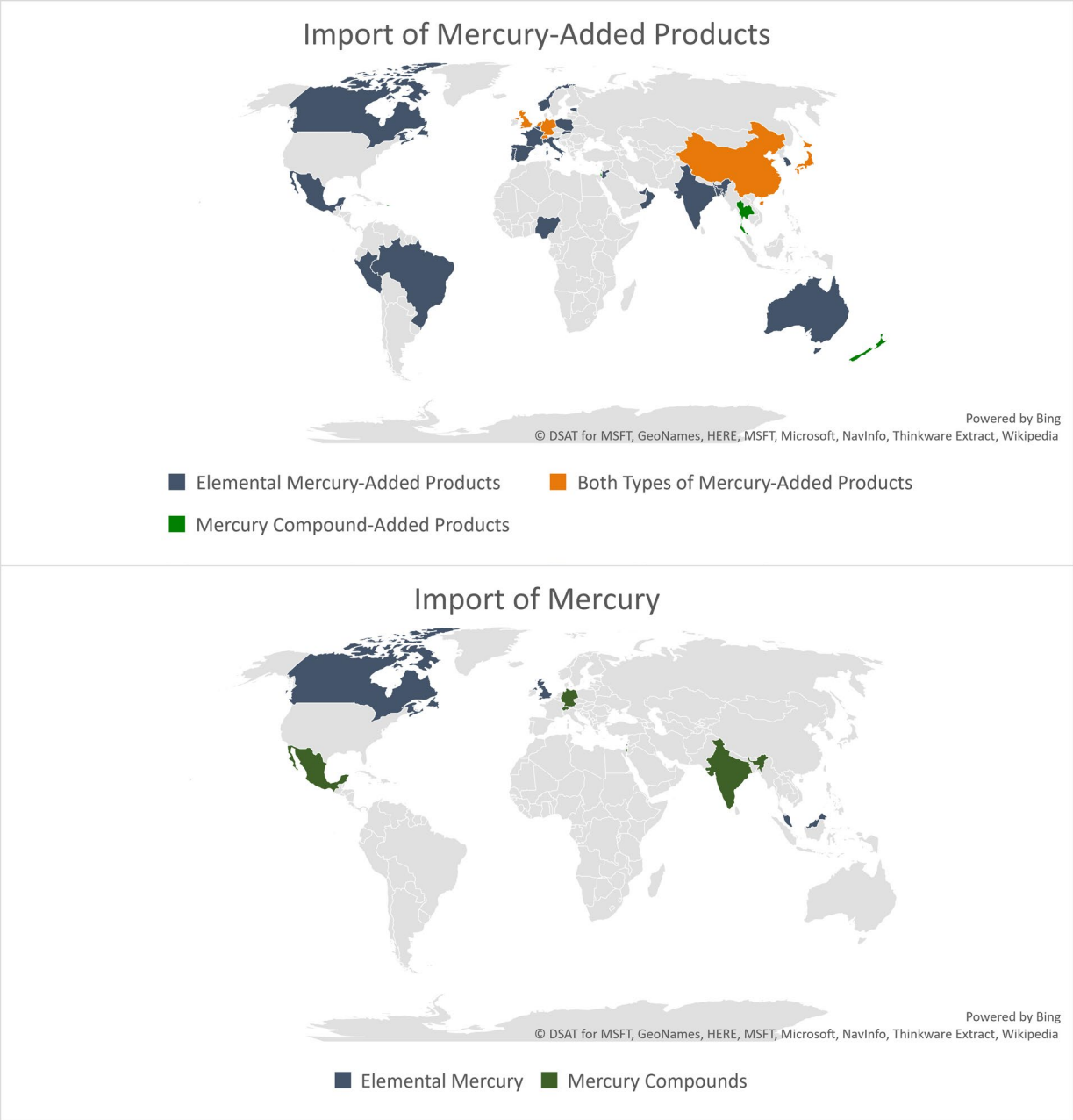
Table 15. Imported Mercury Compounds

CASRN	Mercury Compound
54-64-8	Mercurate(1-), ethyl[2-(mercapto-.kappa.S)benzoato(2-).kappa.O]-, sodium (1:1)
59-85-8	Mercurate(1-), (4-carboxylatophenyl)chloro-, hydrogen
62-38-4	Mercury, (acetato-.kappa.O)phenyl-
129-16-8	Mercurochrome Practical Grade
138-85-2	Mercurate(1-), (4-carboxylatophenyl)hydroxy-, sodium (1:1)
21908-53-2	Mercury oxide(HgO)
592-85-8	Thiocyanic acid, mercury(2+) salt (2:1)
1344-48-5	Mercury sulfide (HgS)
1600-27-7	Acetic acid, mercury(2+) salt (2:1)
7487-94-7	Mercury chloride (HgCl2)
7774-29-0	Mercury iodide (HgI_2)
7783-34-8	Mercury(II) nitrate monohydrate
7783-35-9	Sulfuric acid, mercury(2+) salt (1:1)
7789-47-1	Mercury bromide (HgBr2)
8003-05-2	Basic phenylmercury nitrate
145889-57-2	4,5,-Dimethyl-3-6-dioctyloxy-o-phenylene-bis(mercurytrifluoroacetate)

Imported Products

In 2021, the United States imported mercury-added products from the following 32 counties: Australia, Bangladesh, Belgium, Belize, Brazil, Canada, China, Estonia, France, Germany, India, Italy, Japan, Jordan, the Republic of Korea, Mexico, the Netherlands, Nigeria, Norway, Oman, New Zealand, Peru, Poland, Portugal, Singapore, Slovakia, Slovenia, Spain, Switzerland, Taiwan, the United Arab Emirates, and the United Kingdom (Figure 8).

Figure 8. Map of Countries of Origin of U.S. Imported Mercury-Added Products in 2021



The total amount of elemental mercury imported into the United States in mercury-added products was 1,573 lbs., while the total amount of mercury compounds in imported mercury-added products was 7,229 lbs. Thus, the total amount of mercury imported into the United States in mercury-added products was 8,802 lbs. for reporting year 2021 (Table 14; Figure 7). The types of imported mercury-added products are listed by category and subcategory in Tables 16 and 17 for elemental mercury and mercury compounds, respectively. Where available, values are provided for each product category; however, some reporters imported multiple products and the amount of mercury per product category is not available. Therefore, a combined total amount imported for multiple products is depicted.

Table 16. List of Products Imported into the United States and Amount of Elemental Mercury Used, Distributed, and Exported

Imported Products – Elemental Mercury			
Product Category and Subcategory	**Amount in Products (lbs.)**		
	Used	**Distributed**	**Exported**
Batteries	**3**	**1**	**1**
Lithium Ion			
Manganese Dioxide			
Lighting, Lamps, and Bulbs	**831**	**475**	**76**
Cold Cathode Fluorescent			
Compact Fluorescent			
External Electrode Fluorescent			
High Pressure Sodium			
Linear Fluorescent			
Mercury Vapor			
Metal Halide			
Mercury Short Arc			
U-Tube and Circular Fluorescent			
UV and Germicidal			
Formulated Products	**163**	**121**	**1**
Preservative			
Reagent			
Miscellaneous/Novelty	**3**	**0**	**1**
Electronic Displays			
Standard Kit			
Vehicles			
Other Imported Products Combined[a]	**573**	**1**	**1**
Total	**1,573**	**598**	**80**

[a]Some reporters indicated imported products under multiple product categories including lighting, switches, measuring instruments, and miscellaneous products; the amounts for each category are not discernible, therefore a combined total is provided.

Table 17. List of Products Imported into the United States and Amount of Mercury Compounds Used, Distributed, and Exported

Imported Products – Mercury Compounds			
Product Category and Subcategory	**Amount in Products (lbs.)**		
	Used	**Distributed**	**Exported**
Batteries	**2**	**2**	**0**
Alkaline and Zinc Manganese			
Button Cell, Alkaline			
Formulated Products	**245**	**93**	**108**
Preservative (Vaccine Usage)			
Pharmaceuticals			
Reagents			
Garden Tools			
Lighting, Lamps, and Bulbs	**653**	**34**	**11**
Cold Cathode Fluorescent			
Compact Fluorescent			
Halogen Heat Lamps			
Linear Fluorescent			
Mercury Short Arc			
Mercury Vapor			
Metal Halide			
U-Tube and Circular Fluorescent			
UV and Germicidal			
Replacement Lamps for Curing UV Links			
LED Printed Circuit Board			
Solar Pathway Lighting			
Xenon Electric Discharge			
Measuring Instruments	**2**	**2**	**1**
Colorimetric Gas Detection Tubes and CMS Chips			
Miscellaneous/Novelty	**14**	**13**	**1**
Projectors, Projector Lamps, and LCD Modules			
Glassware			
Reference Electrode			
Other Imported Products Combined[a]	**6,313**	**0**	**0**
Total	**7,229**	**144**	**121**

[a]Reporters indicated imported products under multiple product categories including lighting, formulated products, measuring instruments, and miscellaneous products; the amounts for each category are not discernible, therefore a combined total is provided.

Exported Mercury

Under the Mercury Export Ban Act of 2008, it is illegal to export elemental mercury from the United States[45] and effective January 1, 2020, five mercury compounds are, like elemental mercury, also prohibited from export.[46] Those compounds are:

- Mercury (I) chloride or calomel (CASRN 10112–91–1)
- Mercury (II) oxide (CASRN 21908–53–2)
- Mercury (II) sulfate (CASRN 7783–35–9)
- Mercury (II) nitrate (CASRN 10045–94–0)
- Cinnabar or mercury sulfide (CASRN 1344–48–5)

For the 2021 reporting year, an aggregated total of 77,889 pounds of 16 mercury compounds were exported from the United States (Table 14; Table 18). Specific amounts of each exported mercury compound cannot be differentiated due to the listing of multiple compounds within the submission forms. However, based on reports, most of the mercury compounds that are made in and imported into the United States are also exported. The specific mercury compounds exported from the United States are identified in Table 18 below.[47]

[45] 15 U.S.C. 2611(c)(1).

[46] 15 U.S.C. 2611(c)(7)(A)(i)–(v). However, the statute provides an exception to the export prohibition for export of listed mercury compounds to member countries of the Organization for Economic Co-operation and Development for environmentally sound disposal, on the condition that no mercury or mercury compounds so exported are to be recovered, recycled, or reclaimed for use, or directly reused, after such export. 15 U.S.C. 2611(c)(7)(D). Currently the United States is only able to export such waste to Canada in accordance with Article 11 of the Basel Convention. The statute also provides that EPA, on determining that exporting any additional mercury compound for the purpose of regenerating elemental mercury is technically feasible, may add by rule such mercury compound to the published list (15 U.S.C. 2611(c)(7)(A)(vi)). In addition, any person may petition EPA to issue a rule to add a mercury compound to this published list (15 U.S.C. 2611(c)(7)(C)).

[47] A list of mercury compounds identified as "[m]ercury for which information must be reported" can be found at 40 CFR 713.5(b). See also Appendix B.

Table 18. Mercury Compounds Exported from the United States in 2021

CASRN	Mercury Compound
54-64-8	Mercurate(1-), ethyl[2-(mercapto-.kappa.S)benzoato(2-).kappa.O]-, sodium (1:1)
59-85-8	Mercurate(1-), (4-carboxylatophenyl)chloro-, hydrogen
62-38-4	Mercury, (acetato-.kappa.O)phenyl-
138-85-2	Mercurate(1-), (4-carboxylatophenyl)hydroxy-, sodium (1:1)
129-16-8	Merbromin
592-85-8	Thiocyanic acid, mercury(2+) salt (2:1)
1344-48-5	Mercury sulfide (HgS)
1600-27-7	Acetic acid, mercury(2+) salt (2:1)
21908-53-2	Mercury oxide (HgO)
7783-35-9	Sulfuric acid, mercury(2+) salt (1:1)
7783-34-8	Mercury(II) nitrate monohydrate
7487-94-7	Mercury chloride (HgCl2)
7774-29-0	Mercury iodide (HgI_2)
7789-47-1	Mercury bromide (HgBr2)
8003-05-2	Basic phenylmercury nitrate
145889-57-2	4,5,-Dimethyl-3-6-dioctyloxy-o-phenylene-bis(mercurytrifluoroacetate)

Exported Products

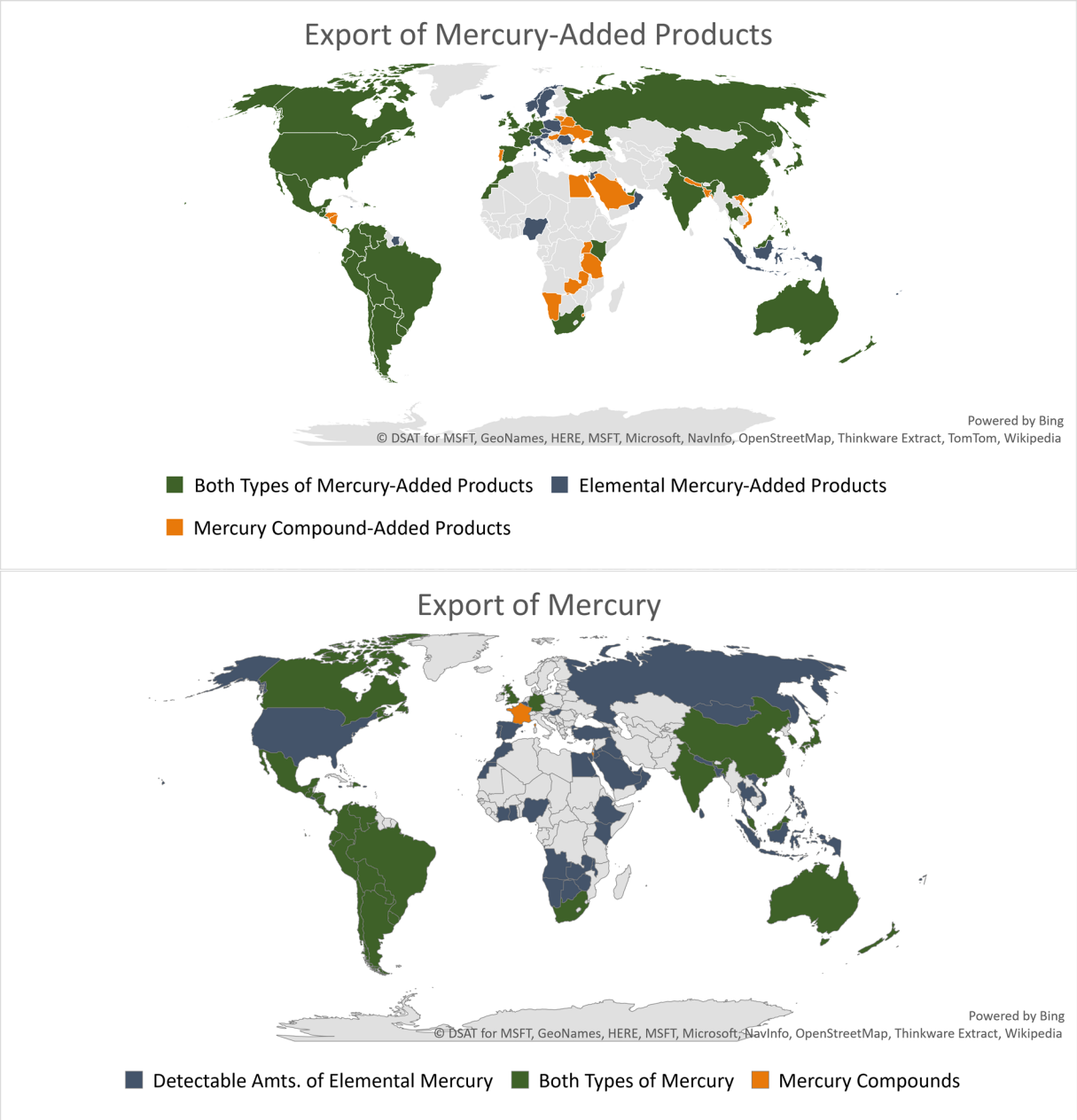
While the export of pure elemental mercury is illegal, the export of elemental mercury-added products (including those containing elemental mercury) is generally not prohibited. Therefore, mercury-added products generally may be exported from the United States after first being manufactured domestically or imported, except if the intent of the export is to recover elemental mercury for resale or reuse. [48] The United States exports mercury-added products to 91 countries, which are depicted in the map in Figure 9, as well as in Appendix E.

While there were overall decreases in the amount of mercury used in the domestic manufacture, sale, and export of mercury-added products, there were increases in the amount of elemental mercury and mercury compounds in imported mercury-added products. This increase was expected and likely due to November 2021 amendments to the reporting rule that removed the exemption at 40 CFR 713.7(b)(2) for persons who import pre-assembled products that contain a mercury-added component. Notable decreases were observed for mercury used to manufacture switches, relays sensors, and valves (decrease >20 percent) and dental amalgam (decrease >56 percent).[49] In addition, the categories of batteries, measuring devices, and other/miscellaneous products reported totals of <0.1 metric ton for the amount of mercury in domestically manufactured and imported products.

[48] See https://www.epa.gov/mercury/questions-and-answers-mercury-export-ban-act-meba-2008.

[49] Percentage reductions were calculated by comparing numbers in the 2020 and 2023 Mercury Inventory Reports.

Figure 9. Map of Countries to Where U.S. Exported Mercury-Added Products in 2021



In total, for reporting year 2021, 3,093 lbs. of mercury were exported in mercury-added products. Elemental mercury used in mercury-added products that were exported from the United States totaled 2,131 lbs. Mercury compounds used in mercury-added products that were exported from the United States totaled 962 lbs. (Table 14). The types of exported mercury-added products are listed by category and subcategory in Tables 19 and 20 for elemental mercury and mercury compounds respectively.

Table 19. List of Products Exported from the United States and Amount of Elemental Mercury Used, Distributed, and Exported

Products Exported from the United States – Elemental Mercury			
Product Category and Subcategory	**Amount in Products (lbs.)**		
	Used	**Distributed**	**Exported**
Dental Amalgam	**710**	**710**	**152**
Lighting, Lamps, and Bulbs	**833**	**469**	**92**
Compact Fluorescent			
External electrode fluorescent			
High Pressure Sodium			
Linear Fluorescent			
Mercury Vapor			
Metal Halide			
Mercury Short Arc			
U-Tube and Circular Fluorescent			
Formulated Products	**4**	**2**	**2**
Certified Reference Material for Testing and Quality Control Purposes Only			
Reagents			
Batteries	**1**	**1**	**1**
Manganese Oxide			
Miscellaneous/Novelty	**1**	**0**	**1**
Electronic Displays			
Switches, Relays, Sensors, and Valves	**15,307**	**13,551**	**1,882**
Displacement Relay			
Float Switch			
Contact Relay			
Tilt Switch			
Combined Exported Products[a]	**1**	**0**	**1**
Total	**16,857**	**14,733**	**2,131**

[a]Some reporters indicated exported products under multiple product categories; the amounts for each category are not discernible, therefore a combined total is provided.

Table 20. List of Products Exported from the United States and Amount of Mercury Compounds Used, Distributed, and Exported

Products Exported from the United States – Mercury Compounds			
Product Category and Subcategory	**Amount in Products (lbs.)**		
	Used	**Distributed**	**Exported**
Formulated Products	**2,069**	**200**	**946**
Preservative			
In Vitro Diagnostics			
Pharmaceuticals			
Reagents			
Animal Vaccines			
Certified Reference Material for Testing and Quality Control Purposes Only			
Lighting, Lamps, and Bulbs	**637**	**0**	**13**
Cold Cathode Fluorescent			
Compact Fluorescent			
High Pressure Sodium			
Mercury Short Arc			
Mercury Vapor			
Metal Halide			
U-Tube and Circular Fluorescent			
UV and Germicidal			
Miscellaneous/Novelty	**2**	**0**	**2**
Infrared Sensors			
Projectors, Projector Lamps, and LCD Modules			
Measuring Instruments	**1**	**1**	**1**
Colorimetric Gas Detection Tubes and CMS Chips			
Total	**2,709**	**201**	**962**

Conclusion and Data Interpretation

The Lautenberg Act requires EPA to "identify any manufacturing processes or products that intentionally add mercury; and . . . recommend actions, including proposed revisions of Federal law or regulations, to achieve further reductions in mercury use."[50]

Identified Manufacturing Processes and Products

When developing the reporting requirements for the mercury inventory, EPA identified products and manufacturing processes via analysis of accumulated Agency resources and programs, as well as a review of other federal, state, and international materials.

There were notable increases in the amount of domestic manufacture and import of elemental mercury and mercury compounds, as well as the export of mercury compounds (see Tables 3 and 14). In regard to such exports, the Agency reviewed and determined that the shipments consisted of mercury compounds and hazardous waste that was characteristically toxic for mercury from the United States to Canada for long-term disposal. Conversely, there were notable decreases in the amount of elemental mercury and mercury compounds sold in the United States, and elemental mercury used in manufacturing processes (see Table 5).

While there were overall decreases in the amount of mercury used in the domestic manufacture, sale, and export of mercury-added products, there were increases in the amount of elemental mercury and mercury compounds in imported mercury-added products (see Tables 5 and 14). This increase was expected and likely due to November 2021 amendments to the reporting rule that removed the exemption at 40 CFR 713.7(b)(2) for persons who import pre-assembled products that contain a mercury-added component. Notable decreases were observed for mercury used to manufacture switches, relays sensors, and valves (decrease >20 percent) and dental amalgam (decrease >56 percent).[51] In addition, the categories of batteries, measuring devices, and other/miscellaneous products reported totals of <0.1 metric ton for the amount of mercury in domestically manufactured and imported products.

Through the information submitted under the mercury inventory reporting rule, EPA has learned of the following uses of mercury that the Agency was unaware of prior to receiving submissions for the 2021 reporting year:

Manufacturing Processes

- The "quality testing for respirators" aspect of "density measurement of tungsten bars and quality testing for respirators"

Products

- Colorimetric gas detection tubes and CMS chips
- Digital caliper
- Digital multimeter

[50] 15 U.S.C. § 2607(b)(10)(C).

[51] Percentage reductions were calculated by comparing numbers in the 2020 and 2023 Mercury Inventory Reports.

- Gardening tools
- Glassware
- Mass flow controllers
- Tire of a wheel kit for an engine pump
- Voltammetry and TOC

When compared with such "new" products, it was also observed that certain types of products reported in 2018 were not reported in 2021. Such products include flow meters, hydrometers, hygrometers, psychrometers, mercury analyzers, thermometers, pressure switches, temperature switches, and thermostats. Similarly, there were notable decreases in the number of mercury compounds manufactured and imported in the United States. A total of 11 mercury compounds reported in 2018 were not reported in 2021. However, four compounds were reported for manufacture and import in 2021 that were not previously observed: mercury sulfide (HgS) (CASRN 1344-48-5); cadmium mercury telluride ((Cd,Hg)Te) (CASRN 29870-72-2); mercury oxide (HgO) (CASRN 21908-53-2); and mercury chloride (HgCl2) (CASRN 7487-94-7).

In addition, the Agency received submissions indicating the use of mercury in manufacturing processes for the production of polyurethane, which was not observed in the 2018 reporting year.[52] Conversely, there was a significant decrease in the amount of mercury used in manufacturing processes (decrease >33 percent). This decline in usage is likely due to the closure of one of the few remaining chlorine production facilities that used a mercury-cell chlor-alkali process.

Finally, reporters for certain categories of products, including lighting, lamps, and bulbs, along with formulated products, continued to provide optional feedback stating that many times the reportable amounts of mercury used in products were below the one-pound minimum value in the MER application. This point, and others above, informed the following recommended actions.

Recommended Actions

As noted in the previous section, after identifying processes and products that intentionally add mercury, EPA is to make recommendations for actions to further reduce mercury use. EPA will carefully consider the reporting results in light of such factors as quantities of use and availability of safer, cost-effective alternatives. In addition, EPA will continue to implement U.S. obligations under the Minamata Convention on Mercury and to participate in the UNEP Global Mercury Partnership, both of which are designed to reduce the adverse effects of mercury. At a future time, the Agency may recommend legal or regulatory actions, as appropriate and in accordance with the statute.

In addition, based on information received, as well as feedback from reporters, the Agency is considering actions that would enhance the administration of the mercury inventory and the MER application:

- Comparing lists of manufacturing processes and products from 2018 and 2021 reporting years and identifying uses that could be determined to be not ongoing. The Agency has

[52] As noted in earlier sections, complete lists of mercury-added products and manufacturing processes known at the time of the publication of the rule that established reporting requirements for the mercury inventory are listed at 40 CFR 713.11(b) and (c). These lists are also available for reference in Appendices B and C, respectively.

regulatory tools that can establish notification requirements for companies that initiate manufacturing (including importing) or processing mercury for such a "new" use.

- Conducting further analysis on:
    - The use of mercury in the production polyurethane, which was not observed in the 2018 reporting year.
    - The increases in the amount of the domestic production and import of elemental mercury and mercury compounds.
    - Manufacturing processes and products that EPA was unaware of prior to receiving submissions for the 2021 reporting year.
- Allowing submitters to report the manufacture (*i.e.*, retorting/recycling), import, or export of mercury for purposes of long-term waste management and/or disposal. There is currently no commercial capacity for disposal of high-concentration mercury hazardous waste. Management options in the United States for high concentration mercury wastes of all types are limited. Despite the Department of Energy's efforts to open and operate a long-term storage facility for elemental mercury, no such facility is currently available. Allowing submitters to specify types of products and compounds applicable to each mercury activity they conduct (e.g., storage, distribution in commerce and export), in addition to manufacture and import.
- Allowing submitters to specify amounts of mercury down to the gram (g). Currently, reporters can only submit a one pound (1 lb.) minimum weight for certain products and compounds, vastly overestimating the amount of mercury in any given category for small quantities.
- Allowing submitters to notify and certify the cessation of manufacturing, use, import, export, and sale of mercury and/or mercury-added products.

Appendix A: Explanation of Key Terms

The explanations below pertain only to certain key terms as used in this document. The U.S. Environmental Protection Agency (EPA) is providing explanations of terms in simplified informal language to improve the readability of this mercury inventory report.[53] To see the formal, legal definitions of some of these terms, EPA recommends consulting section 2 of the Toxic Substances Control Act (TSCA),[54] the mercury inventory reporting rule,[55] and particular citations provided below. In addition, the explanations in this report were developed to apply to key terms as they are used in this mercury inventory report and may vary from definitions for the same terms used elsewhere by EPA. Examples of such terms are: "component," "import," "manufacture," and "mercury-added product."

Assembled product is a product that was manufactured with the inclusion of a component that is a mercury-added product. An example is a watch containing a mercury-added battery.

CASRN is the Chemical Abstracts Service Registry Number.

Commercial advantage refers to activities undertaken intentionally to create an immediate or eventual benefit (e.g., sale of goods, generation of profits, reduction of costs, etc.). If a company manufactures mercury or a mercury-added product, then uses it rather than placing it in commerce, it is considered to result in a commercial advantage.[56]

Component refers to a mercury-added product that is installed as part of the manufacture of an assembled product.

Distribute in commerce means selling or transferring mercury or mercury-added products within the United States.[57] Sales or transfers to another country are categorized separately here as exports.

Elemental mercury is a shiny, silver-white metal that is liquid at room temperature; its CASRN is 7439-97-6. The Harmonized Tariff Schedule Code for mercury is 2805.40.00.

Export means to determine and control the sending of mercury and mercury-added products for a destination outside of the customs territory of the United States.[58] In this report, exports are categorized as trade and considered separately from distribution in commerce, which here encompasses only domestic activities.

Import means to bring mercury, mercury added products, and assembled products into the customs territory of the United States.[59] In this report, imports will be considered separately from other

[53] Note: These explanations are not legally-binding on EPA.
[54] 15 U.S.C. § 2601 et seq.
[55] EPA. "Reporting Requirements for TSCA Mercury Inventory: Mercury." 83 Fed. Reg. 20054 (June 27, 2018).
[56] See 40 CFR 704.3 for definition in the context of manufacturing, importing, and processing "for commercial purposes."
[57] See 15 U.S.C. § 2602(5).
[58] See 40 CFR 707.63(b).
[59] See 15 U.S.C. § 2602(9).

manufacture, which here encompasses only domestic production. While import is part of the statutory definition of manufacture, import is categorized separately from other manufacture in this mercury import report and the Mercury Electronic Reporting (MER or reporting) application, in order to more effectively distinguish between activities that constitute mercury supply, use, and trade for purposes of TSCA section 8(b)(10)(B). In this report, import is categorized as trade.

Impurity refers to mercury that is present unintentionally in a final product of a manufacturing process.

Logarithmic scale is a non-linear scale, which means that distances between certain values are not the same as would be a linear scale. These non-linear scales are easier to visualize for data containing a range of values. For example, in a linear scale, the distance between a value of 10 and 11 are equal to the distance between 11 and 12. In a non-linear scale, this distance is not equal. Rather, each interval is increased by a factor of the base, which for this report, is a base of ten (e.g., 1, 10, 100, 1,000, 10,000, and so on). As a note to readers, some figures in this document are reported in a logarithmic scale to account for a wide range in mercury quantities. Readers should be aware of this scale when comparing different factors and values.

Manufacture means to produce.[60] The manufacture of elemental mercury occurs through secondary production (recovery). Materials from which elemental mercury is recovered include byproducts from mining or mineral processing, residuals from air pollution control, industrial waste, contaminated media, discarded products, and other materials. Other terms for recovery of elemental mercury include reclamation, retorting, distillation, separation, and purification. Recovered elemental mercury may be either a commodity or a waste. If it is a waste, elemental mercury is not reported in EPA's reporting application. A mercury compound is generally produced as a commercial chemical product (see also "mercury-added product"). In this report and in the MER application, import will be categorized as a separate activity from other manufacture, in order to more effectively distinguish between activities that constitute mercury supply, use, and trade for purposes of TSCA section 8(b)(10)(B).

MER is the Mercury Electronic Reporting application where information is submitted to EPA directly by persons who must report under the mercury inventory reporting rule.

Mercury means elemental mercury and mercury compounds.[61] The term "mercury" also includes mixtures that include mercury and/or mercury compounds. An example of a mercury mixture is dental amalgam, a mixture of mercury with other metals such as silver. An example of a mercury compound mixture is a vaccine that contains the mercury-compound, thimerosal, which is used as a preservative.

Mercury-added product is an item to which mercury is intentionally added when a product is manufactured. The mercury remains present in the final product for a particular purpose. The final mercury-added product can be a formulated product such as a vaccine or an article such as a fluorescent light bulb, thermostats, or dental amalgam capsules. In regard to a component and an

[60] See 15 U.S.C. § 2602(9).
[61] See 15 U.S.C. § 2607(b)(10)(A).

assembled product, the Agency views the inclusion of a mercury-added product that is a component within an assembled product differently from the act of intentionally inserting mercury (i.e., chemical substance) into the component itself.[62] As a result, the Agency does not require information to be reported on the manufacture (including import) of assembled products that include a component that is a mercury-added product.[63]

Mercury compound is formed when elemental mercury reacts with another substance, either in nature or intentionally by humans.[64]

NAICS refers to the North American Industry Classification System, which is the standard used by Federal statistical agencies in classifying business establishments for the purpose of collecting, analyzing, and publishing statistical data related to the U.S. business economy.[65]

Otherwise intentionally use mercury in a manufacturing process means to use mercury to manufacture anything other than a mercury-added product or a mercury compound. General examples are use of mercury as a catalyst, cathode, reactant, or reagent, and as a specific example, mercury-cell diaphragms are used in the chlorine production process. Otherwise intentional use of mercury in a manufacturing process does not include the use of tools or equipment that contain mercury nor the installation of a component that contains mercury as part of the manufacture of an assembled product.

Person is used in this report consistent with its use in TSCA and refers to any individual, firm, company, corporation, joint venture, partnership, sole proprietorship, association, or any other business entity; any state or political subdivision thereof; any municipality; any interstate body; and any department, agency, or instrumentality of the federal government.[66]

Processor is a manufacturer who uses mercury in a process other than making a mercury-added product (e.g., using elemental mercury as catalyst to make final product in which any remaining mercury has no functional purpose).

Reporting activity refers to any commercial activity involving mercury that must be reported to EPA under the mercury inventory reporting rule (e.g., intentionally using mercury to manufacture a product). EPA divided reporting activities into the following five categories: import of mercury, manufacture of mercury in the United States, import of mercury-added products, manufacture of mercury-added products in the United States, and use of mercury in a manufacturing process.

Reporter is a person (i.e., manufacturer, processor, or importer) that submitted information through EPA's reporting application, as required by the mercury inventory reporting rule.

Supply are the sources of mercury that can enter the market for sale which, for the purposes of this inventory report, include domestically manufactured and stored mercury (see box on page 11). In

[62] "Reporting Requirements for TSCA Mercury Inventory: Mercury." 83 Fed. Reg. 20054 (June 27, 2018).
[63] See 40 CFR 713.7(b).
[64] See 40 CFR 713.5.
[65] See https://www.census.gov/naics/.
[66] See 40 CFR 704.3

this report and in the MER application, import is categorized as a separate activity from other manufacture in order to more effectively distinguish between activities that constitute mercury supply, use, and trade for purposes of TSCA section 8(b)(10)(B).

Trade means the international import and export of mercury, mercury compounds, and mercury-added products (see box on page 11). In this report and in the MER application, import is categorized as a separate activity from other manufacture and domestic distribution is categorized as a separate activity from other distribution in order to more effectively distinguish between activities that constitute mercury supply, use, and trade for purposes of TSCA section 8(b)(10)(B). Limiting the category of trade to international transactions is consistent with the organization of the 2015 EPA Report to Congress on Mercury Global Supply and Trade.

Use of mercury for this inventory includes domestic distribution or sale of mercury and mercury-added products and the intentional use of mercury to manufacture products or in a manufacturing process (see box on page 11). In this report and in the MER application, domestic distribution is categorized as a separate activity from other distribution in order to more effectively distinguish between activities that constitute mercury supply, use, and trade for purposes of TSCA section 8(b)(10)(B). More specifically, distribution is discussed under use of mercury because the Agency is viewing the sale of mercury and mercury-added products through the lens of the purchaser, who uses the mercury or mercury-added products. In this way, the distribution of the supplied mercury is similar to the economic term of demand.

Appendix B: List of Mercury Compounds in the TSCA Chemical Substance Inventory

CASRN	Active Mercury Compounds
10045-94-0	Nitric acid, mercury(2+) salt (2:1).
100-57-2	Mercury, hydroxyphenyl-.
10112-91-1	Mercury chloride (Hg2Cl2).
10124-48-8	Mercury amide chloride (Hg(NH2)Cl).
103-27-5	Mercury, phenyl(propanoato-.kappa.O)-.
10415-75-5	Nitric acid, mercury(1+) salt (1:1).
104-60-9	Mercury, (9-octadecenoato-.kappa.O)phenyl-.
1191-80-6	9-Octadecenoic acid (9Z)-, mercury(2+) salt (2:1).
12068-90-5	Mercury telluride (HgTe).
13302-00-6	Mercury, (2-ethylhexanoato-.kappa.O)phenyl-.
1335-31-5	Mercury cyanide oxide (Hg2(CN)2O).
1344-48-5	Mercury sulfide (HgS).
1345-09-1	Cadmium mercury sulfide.
1600-27-7	Acetic acid, mercury(2+) salt (2:1).
20601-83-6	Mercury selenide (HgSe).
21908-53-2	Mercury oxide (HgO).
26545-49-3	Mercury, (neodecanoato-.kappa.O)phenyl-.
33770-60-4	Mercury, [3,6-dichloro-4,5-di(hydroxy-.kappa.O)-3,5cyclohexadiene-1,2-dionato(2-)]-.
3570-80-7	Mercury, bis(acetato-.kappa.O)[.mu.-(3’,6’-dihydroxy-3oxospiro[isobenzofuran-1(3H),9’-[9H]xanthene]-2’,7’diyl)]di-.
54-64-8	Mercurate(1-), ethyl[2-(mercapto-.kappa.S)benzoato(2-).kappa.O]-, sodium (1:1).
55-68-5	Mercury, (nitrato-.kappa.O)phenyl-.
592-04-1	Mercury cyanide (Hg(CN)2).
592-85-8	Thiocyanic acid, mercury(2+) salt (2:1).
593-74-8	Mercury, dimethyl-.
62-38-4	Mercury, (acetato-.kappa.O)phenyl-.
62638-02-2	Cyclohexanebutanoic acid, mercury(2+) salt (2:1).
628-86-4	Mercury, bis(fulminato-.kappa.C)-.
63325-16-6	Mercurate(2-), tetraiodo-, (T-4)-, hydrogen, compd. with 5-iodo-2-pyridinamine (1:2:2).
7439-97-6	Mercury.
7487-94-7	Mercury chloride (HgCl2).
7546-30-7	Mercury chloride (HgCl).
7616-83-3	Perchloric acid, mercury(2+) salt (2:1).

7774-29-0	Mercury iodide (HgI2).
7783-33-7	Mercurate(2-), tetraiodo-, potassium (1:2), (T-4)-.
7783-35-9	Sulfuric acid, mercury(2+) salt (1:1).
7783-39-3	Mercury fluoride (HgF2).
7789-47-1	Mercury bromide (HgBr2).
94070-93-6	Mercury, [.mu.-[(oxydi-2,1-ethanediyl 1,2benzenedicarboxylato-.kappa.O2)(2-)]]diphenyldi-.

CASRN	Inactive Mercury Compounds
13170-76-8	Hexanoic acid, 2-ethyl-, mercury(2+) salt (2:1).
13876-85-2	Mercurate(2-), tetraiodo-, copper(1+) (1:2), (T-4)-.
138-85-2	Mercurate(1-), (4-carboxylatophenyl)hydroxy-, sodium (1:1).
141-51-5	Mercury, iodo(iodomethyl)-.
14783-59-6	Mercury, bis[(2-phenyldiazenecarbothioic acid-.kappa.S) 2-phenylhydrazidato-.kappa.N2]-, (T-4)-.
15385-58-7	Mercury, dibromodi-, (Hg-Hg).
15785-93-0	Mercury, chloro[4-[(2,4-dinitrophenyl)amino]phenyl]-.
15829-53-5	Mercury oxide (Hg2O).
1785-43-9	Mercury, chloro(ethanethiolato)-.
19447-62-2	Mercury, (acetato-.kappa.O)[4-[2-[4-(dimethylamino)phenyl]diazenyl]phenyl]-.
20582-71-2	Mercurate(2-), tetrachloro-, potassium (1:2), (T-4)-.
22450-90-4	Mercury(1+), amminephenyl-, acetate (1:1).
24579-90-6	Mercury, chloro(2-hydroxy-5-nitrophenyl)-.
24806-32-4	Mercury, [.mu.-[2-dodecylbutanedioato(2-).kappa.O1:.kappa.O4]]diphenyldi-.
27685-51-4	Cobaltate(2-), tetrakis(thiocyanato-.kappa.N)-, mercury(2+) (1:1), (T-4)-.
29870-72-2	Cadmium mercury telluride ((Cd,Hg)Te).
3294-57-3	Mercury, phenyl(trichloromethyl)-.
537-64-4	Mercury, bis(4-methylphenyl)-.
539-43-5	Mercury, chloro(4-methylphenyl)-.
56724-82-4	Mercury, phenyl[(2-phenyldiazenecarbothioic acid.kappa.S) 2-phenylhydrazidato-.kappa.N2]-.
587-85-9	Mercury, diphenyl-.
59-85-8	Mercurate(1-), (4-carboxylatophenyl)chloro-, hydrogen.
623-07-4	Mercury, chloro(4-hydroxyphenyl)-.
627-44-1	Mercury, diethyl-.
6283-24-5	Mercury, (acetato-.kappa.O)(4-aminophenyl)-.
629-35-6	Mercury, dibutyl-.
63468-53-1	Mercury, (acetato-.kappa.O)(2-hydroxy-5-nitrophenyl)-.
63549-47-3	Mercury, bis(acetato-.kappa.O)(benzenamine)-.
68201-97-8	Mercury, (acetato-.kappa.O)diamminephenyl-, (T-4)-.

72379-35-2	Mercurate(1-), triiodo-, hydrogen, compd. with 3-methyl2(3H)-benzothiazolimine (1:1:1).
90-03-9	Mercury, chloro(2-hydroxyphenyl)-.

Appendix C: Categories and Subcategories of Mercury-Added Products

Category	Subcategory
Batteries	—Button cell, silver. —Button cell, zinc-air. —Button cell, alkaline. —Stacked button cell batteries. —Manganese oxide. —Silver oxide. —Mercuric oxide, non-button cell. —Button cell, mercuric oxide. —Button cell, zinc carbon. —Other [Manufacturer(s) specifies].
Dental amalgam	[No subcategories].
Formulated products (includes uses in cosmetics, pesticides, and laboratory chemicals)	—Skin-lightening creams. —Lotions. —Soaps and sanitizers. —Bath oils and salts. —Topical antiseptics. —Preservatives (*e.g.,* for use in vaccines and eye-area cosmetics when no preservative alternatives are available). —Pharmaceuticals (including prescription and over-the-counter drug products). —Cleaning products (not registered as pesticides under the Federal Insecticide, Fungicide, and Rodenticide Act). —Pesticides. —Paints. —Dyes. —Reagents (*e.g.,* catalysts, buffers, fixatives). —Other [Manufacturer(s) specifies].
Lighting, lamps, bulbs	—Linear fluorescent. —Compact fluorescent. —U-tube and circular fluorescent. —Cold cathode fluorescent. —External electrode fluorescent. —Mercury vapor. —Metal halide. —High pressure sodium. —Mercury short arc. —Neon. —Other [Manufacturer(s) specifies].
Measuring instruments	—Barometer. —Fever thermometer. —Flow meter. —Hydrometer. —Hygrometer/psychrometer. —Manometer. —Non-fever thermometer. —Pyrometer. —Sphygmomanometer. —Other [Manufacturer(s) specifies].
Pump seals	[No subcategories].
Switches, relays, sensors, valves	—Tilt switch. —Vibration switch. —Float switch. —Pressure switch. —Temperature switch. —Displacement relay. —Wetted reed relay. —Contact relay. —Flame sensor. —Thermostat. —Other [Manufacturer(s) specifies use].
Miscellaneous/novelty mercury-added products	—Wheel weights. —Wheel rotation balancers/stabilizers. —Firearm recoil suppressors. —Carburetor synchronizers. —Joint support/shock absorption bands. —Other [Manufacturer(s) specifies].

Note: The mercury-added product categories and sub-categories reflect the list of such products known at the time of the promulgation of the mercury inventory reporting rule. See 83 Fed. Reg. 20054 (June 27, 2018) and 40 CFR 713.11(b).

Appendix D: Manufacturing Processes for which Mercury is Otherwise Intentionally Used and Relevant Function Uses

Manufacturing Process
Chlorine production (*e.g.*, mercury-cell chlor-alkali process)
Acetaldehyde production
Sodium/potassium methylate/ethylate production.
Polyurethane/plastic production
Other [Manufacturer(s) specifies process]
Functional Use
Catalyst
Cathode
Reactant
Reagent
Other [Manufacturer(s) specifies use]

Note: The manufacturing processes and relevant function uses reflect the list of such products known at the time of the promulgation of the mercury inventory reporting rule. See 83 Fed. Reg. 20054 (June 27, 2018) and 40 CFR 713.11(c).

Appendix E: Countries of Origin and Destination of Imported and Exported Mercury and Mercury-Added Products

	Imported				Exported*			
	Elemental Mercury	Mercury Compounds	Elemental Mercury-Added Products	Mercury Compound-Added Products	Mercury Compounds	Elemental Mercury-Added Products	Mercury Compound-Added Products	Detectable Amounts of Elemental Mercury
Angola								x
Argentina					x	x	x	x
Aruba						x		
Australia			x		x	x	x	x
Austria						x		
Bahamas						x		x
Bahrain								x
Bangladesh			x				x	x
Barbados					x	x		
Belarus							x	
Belgium			x			x	x	x
Belize			x					
Bermuda						x		
Bolivia					x	x	x	x
Botswana								x
Brazil			x		x	x	x	x
Brunei Darussalam						x		

	Imported				Exported*			
	Elemental Mercury	Mercury Compounds	Elemental Mercury-Added Products	Mercury Compound-Added Products	Mercury Compounds	Elemental Mercury-Added Products	Mercury Compound-Added Products	Detectable Amounts of Elemental Mercury
Canada	x		x		x	x	x	x
Chile					x	x	x	x
China			x	x	x	x	x	x
Colombia					x	x	x	x
Costa Rica					x	x	x	x
Cote D'Ivoire								x
Czech Republic						x		
Denmark						x	x	
Dominican Republic					x	x	x	x
Ecuador					x	x	x	x
Egypt							x	x
El Salvador						x	x	x
Estonia			x					
Ethiopia								x
Fiji						x		x
France			x		x	x	x	
Germany		X	x	x	x	x	x	x
Ghana								x
Guatemala					x	x	x	x
Honduras					x		x	x
Hungary							x	x

	Imported				Exported*			
	Elemental Mercury	Mercury Compounds	Elemental Mercury-Added Products	Mercury Compound-Added Products	Mercury Compounds	Elemental Mercury-Added Products	Mercury Compound-Added Products	Detectable Amounts of Elemental Mercury
Iceland						x		
India		X	x		x	x	x	x
Indonesia						x		x
Ireland						x	x	
Iraq								x
Israel		X		x	x	x	x	
Italy			x			x		
Jamaica						x		x
Japan			x	x	x	x	x	x
Jordan			x			x		x
Kenya						x	x	x
Korea, Republic			x		x	x	x	x
Kuwait							x	x
Lithuania							x	
Malaysia	x				x	x	x	x
Malawi								x
Mauritius								x
Mexico		X	x		x	x	x	x
Mongolia								x
Morocco						x	x	x
Namibia							x	x
Netherlands			x	x		x	x	

	Imported				Exported*			
	Elemental Mercury	Mercury Compounds	Elemental Mercury-Added Products	Mercury Compound-Added Products	Mercury Compounds	Elemental Mercury-Added Products	Mercury Compound-Added Products	Detectable Amounts of Elemental Mercury
Nepal							x	x
New Zealand				x	x	x	x	x
Nicaragua					x		x	x
Nigeria			x			x		x
Norway			x			x		
Oman			x			x		x
Panama					x	x	x	x
Paraguay					x	x	x	x
Peru			x		x	x	x	x
Philippines						x	x	x
Poland			x			x		
Portugal			x				x	x
Qatar						x		x
Romania						x		
Russia						x	x	x
Saint Kitts and Nevis						x		
Saudi Arabia							x	x
Singapore			x	x	x	x	x	x
Slovakia			x					
Slovenia			x					
South Africa					x	x	x	x

	Imported				Exported*			
	Elemental Mercury	Mercury Compounds	Elemental Mercury-Added Products	Mercury Compound-Added Products	Mercury Compounds	Elemental Mercury-Added Products	Mercury Compound-Added Products	Detectable Amounts of Elemental Mercury
Spain			x			x	x	x
Sri Lanka								x
Suriname						x		
Swaziland							x	
Sweden						X		
Switzerland		X	x	x		X		
Taiwan			x		x	X	x	x
Tanzania							x	
Thailand				x		X	x	x
Trinidad And Tobago					x	X		x
Turkey						X	x	x
Uganda							x	
Ukraine							x	
United Arab Emirates			x			X	x	x
United Kingdom	x		x	x	x	X	x	x
Uruguay					x	x	x	x
Uzbekistan						x		
Venezuela					x	x	x	x
Vietnam							x	x

	Imported				Exported*			
	Elemental Mercury	Mercury Compounds	Elemental Mercury-Added Products	Mercury Compound-Added Products	Mercury Compounds	Elemental Mercury-Added Products	Mercury Compound-Added Products	Detectable Amounts of Elemental Mercury
Zambia							x	x
Zimbabwe								x

*Elemental mercury is not exported from the United States.