



MERCURY SITUATION REPORT IN KAZAKHSTAN 2017

Public Fund «The Center «Cooperation for Sustainable Development»

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Executive summary

1. Introduction

The problem of mercury pollution is very relevant for Kazakhstan. There are historical foci of mercury pollution on the territory of Kazakhstan. Mercury reaches the environment as a result of industrial processes and active usage in products in the country.

The population living in areas of historical pollution, workers of industrial enterprises, as well as the population that widely uses mercury-containing products, belongs to the most vulnerable groups. These groups need prompt measures by the state to minimize the impact of mercury, including restoring contaminated areas, reducing mercury emissions from production, introducing a mercury-containing waste collection system, and raising awareness of the hazardous effects of mercury and methods for the safe handling of mercury-containing products and waste.

Currently, Kazakhstan has not ratified or signed the Minamata Convention on Mercury. In this regard, the preparation of this review on the mercury situation in the country is very important for the government bodies, enterprises, non-governmental organizations to assess the current situation and develop recommendations for solving the mercury pollution problems in Kazakhstan.

This report was prepared by the Public Fund "The Center" Cooperation for Sustainable Development" on the basis of its own research, data of authorized bodies and agencies of the Republic of Kazakhstan, as well as the results of previously implemented projects.

"The Center" Cooperation for Sustainable Development is an NGO, which actively works in the field of chemical safety in Kazakhstan, including the direction of mercury pollution. The Center participates in the development of legislative and regulatory documents on mercury and mercury-containing wastes, awareness of the hazardous effects of mercury, the training of various target groups on the issues of the safe handling of mercury, interaction with enterprises for establishing a management system for mercury-containing products and wastes in enterprises and other areas.

This report consists of ten sections on

- Sources of mercury pollution;
- Levels of mercury pollution;
- Imports and exports;
- Mercury added products in the market;
- Human Exposure to Mercury;
- ASGM;
- Possible damage caused by mercury;
- Storage;
- Mercury wastes;

- Recommendations from a public interest NGO perspective, on reducing and eliminating human sources of mercury in Kazakhstan.

2. Sources of mercury pollution

The main sources of mercury pollution in Kazakhstan include the following:

- 1) Contaminated areas;
- 2) Production of mercury as a by-product in the mining of non-ferrous metals;
- 3) Emissions of mercury from industrial processes;
- 4) Mercury-containing products;
- 5) Mercury-containing wastes.

The areas of mercury pollution in Kazakhstan include the territories in the Karaganda and Pavlodar regions.

In the Karaganda region, the territory adjacent to the Nura River near the city of Temirtau belongs to the area of historical mercury pollution. In the 1950s in Temirtau, a synthetic rubber production plant began to operate and mercury was used as the catalyst. In the period from 1950 to 1997, a significant amount of mercury was released into the Nura River and the surrounding area by the enterprise. The project did not provide for purification technologies and facilities, except for mercury settlers, from which the wastes were released directly into the river. Sludge, accumulated in the settlers, was dumped into the Zhaur swamp. Part of the contaminated soil was transported to old ash dumps, also located on the bank of the Nura River. Thus, mercury pollution was spread to a large area of the Karaganda region. According to some reports, mercury released into the environment during the operation of the synthetic rubber production plant is estimated at about 1300 tons¹.

In the Pavlodar region, the areas of historical pollution include the territory of the Pavlodar chemical plant and the evaporation ponds of Balkyldak Lake. For several decades Pavlodar chemical plant (for caustic soda production with the use of mercury cathodes during electrolysis) dumped mercury-containing wastes into the adjacent territory of the plant. Due to imperfections in the technological process, when manufacturing each ton of products, almost one and a half kilograms of dangerous metallic mercury was lost. Balkyldak Lake is located on the right bank of the Irtysh River, north of the Pavlodar city and since 1973 is a settler-evaporator of waste waters of the Pavlodar chemical plant. Mercury - containing water was discharged in this settler with an area of 18 km². According to some reports, releases of mercury in the environment during the operation of chemical production in Pavlodar is estimated at approximately 2,300 tons².

¹ Materials of the joint project of the Government of the RK / UNDP / GEF "Updating of the National Implementation Plan, Integration of Persistent Organic Pollutants Management in the National Planning and Sound Management of Medical Wastes in Kazakhstan"

² Materials of the joint project of the Government of the RK / UNDP / GEF "Updating of the National Implementation Plan, Integration of Persistent Organic Pollutants Management in the National Planning and Sound Management of Medical Wastes in Kazakhstan"

Over the past decades, several mercury pollution clearance projects have been implemented, but the level of mercury pollution in these areas remains significant.

The production of mercury as a by-product in the mining of non-ferrous metals is one of the most important routes for mercury release into the environment in Kazakhstan. According to the Ministry for Investments and Development of the Republic of Kazakhstan, mercury is not extracted as the main component on the territory of Kazakhstan. However, it is an associated component of polymetallic ores deposits such as Zhayrem, Ushkatyn 1, Ushkatyn 3, Abyz, Karagaili, Bestobe, Barytic hill lot in the Karaganda region, Grekhovskoe, Artemevskoe in the East-Kazakhstan region. Some deposits obtain commodity products of various species with the associated mercury, depending on the content of pure mercury.

Unintentional emissions of mercury from industrial processes are another source of mercury pollution in Kazakhstan. The main unintentional sources of mercury emissions in the country include coal combustion at coal-fired power plants and incineration of wastes. Mercury-containing products and wastes are another measurable source of mercury pollution.

The most common types of mercury-containing products in Kazakhstan are mercury-containing energy-saving lamps, medical thermometers, mercury switches and batteries.

For the moment, there is no balanced well-run system for collecting mercury-containing wastes generated by the population of Kazakhstan. End of life mercury-containing products are disposed in solid domestic waste (SDW) landfills, where mercury easily reaches the soil, water and air. In such a way sources of mercury pollution are formed.

3. Levels of mercury pollution

In 2015-2016 in Kazakhstan, an inventory of mercury emissions to the environment was conducted in the Republic of Kazakhstan. The inventory was carried out within the framework of the joint project of the Government of the RK / UNDP / GEF - "Updating of the National Implementation Plan, Integration of Persistent Organic Pollutants Management in the National Planning and Sound Management of Medical Wastes in Kazakhstan". The inventory was carried out according to the Guidance for Level 1 of inventory - "Methodology for the Determination and Quantification of Mercury Emissions to the Environment", prepared by UNEP (version 1.2, April 2013).

As a result of the inventory, it was revealed that there are 16 categories of mercury emissions to the environment in 2014 in Kazakhstan. The total emissions of mercury into the environment (yield) in 2014 were 577,000 kg (Annex 1)³.

³ National inventory of mercury emissions in Kazakhstan, a joint project of the Government of the Republic of Kazakhstan / UNDP / GEF "Updating of the National Implementation Plan, Integration of Persistent Organic Pollutants Management in the National Planning and Sound Management of Medical Wastes in Kazakhstan"

Based on the results of the inventory, the main category of mercury emissions to the environment has been identified. It's the production of primary metal, which accounts for 97% of the total share of emissions. It is also possible to distinguish the following two categories: "Combustion of coal and its other utilizations" and "Application and disposition of mercury-containing products", accounting for 2% and 1% of emissions, respectively.

According to the National Inventory of Mercury Emissions in Kazakhstan, the calculated mercury emissions by environmental compartments were also presented (Figure 3.1).

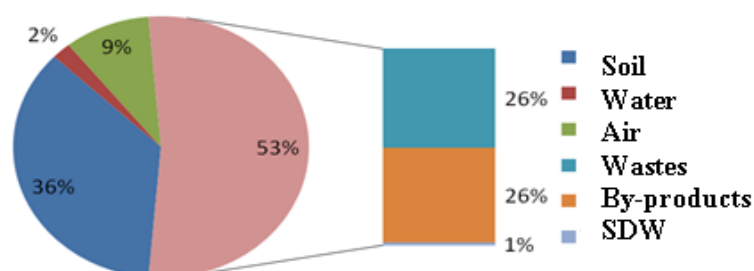


Figure 3.1 - Results of the inventory of mercury in Kazakhstan

Analysis of mercury emissions by environmental compartments shows that soil accounts for 35.8%, water- for 2.1% and atmospheric air - for 9.4% of the total mercury emissions. The remaining 52.7% fall on production of wastes (26.5%), by-products and impurities (25.6%) and solid domestic wastes (0.5%).

It is also important to pay attention to data on the national consumption of a wide range of consumer products, as well as products in which the addition of mercury is a key aspect for their functionality. According to the National Inventory of Mercury in Kazakhstan, mercury emissions from this category in 2014 is valued at 3.4 tons. However, it should be noted that in Kazakhstan there are no precise data on the quantity of products containing mercury, therefore, approximate values were taken in the estimation (Table 2).

Table 3.2 - Data on the volume of mercury emissions in products for 2014 y.

No	Name of mercury-containing products	Total volume of mercury emissions, kg
1.	Amalgam for dental fillings	0
2.	Mercury thermometers	710
3.	Mercury-containing light sources	79
4.	Mercury batteries	137
5.	Paints with mercury-containing stabilizers	0
6.	Creams for bleaching the skin and soap with the content of mercury elements	No data
7.	Other products	0

The data analysis shows that mercury thermometers, mercury-containing light sources, including fluorescent lamps (bilateral), compact fluorescent lamps (unilateral) and others; as well as mercury batteries are the primary subcategories of mercury-containing products' consumption. In addition, the zero indicators in Table 2 are due to the fact that amalgam fillings are not applied in the Republic of Kazakhstan according to the answer of the NGO *United Kazakhstan Association of Dentists*. Also, according to the representative of the *Alina Paint* enterprise, mercury is not applied in the production of their paint and varnish products.

Human research and regular scientific studies of soil, water and air in order to determine mercury pollution levels in Kazakhstan are not provided. There are several programs for monitoring mercury in areas of historical pollution, as well as studies of water, soil, air and human tissues, carried out within the framework of projects, including international ones.

RSE "Kazhydromet" annually publishes an information bulletin on the state of the Nura River basin's surrounding environment. The information bulletin includes the results of observations on hydrobiological and hydrochemical indicators provided at 25 hydrochemical stations of the Nura River basin, as well as the results of a quantitative analysis of the mercury content in commercial fish tissues.

According to "Kazhydromet" data for the 2017 y., the average total mercury in different sections of the Nura River was of 8.7 mg/l, what exceeds the MPC of mercury for fishery waters in almost 9 times. Monitoring of the soil conditions revealed that the greatest content of mercury was observed at the place of wastewater outlet into the Nura River by the plants of JSC "ArcelorMittal Temirtau" and JSC TEMC. This value varies in the range of 0.19-69.7 g /t (with the previously mentioned MPC of 2.1 g/t). At a distance from the place of the combined discharge of waste waters in the direction of the Nura River, the mercury content in the soil and bottom sediments decreases, but remains high enough. For example, in a kilometer distance from the place of the highest concentration, this indicator varies from 0.35 to 54.2 g/t.

In order to monitor the environmental state of the nature in Pavlodar region, exposed to mercury pollution, a network of observation wells and points for observing the change in mercury content in underground and surface waters, in air and in soils was created. This work is carried out by the Department of Land Management, Environment and Water Resources of Pavlodar region.

The results of measuring the concentration of mercury vapour at the points of atmospheric air measurement showed an excess of MPC in 14 of the 17 samples, with a maximum exceeding in 186.6 times (mercury concentration of 0.056 mg / dm³, at MPC of mercury in the atmospheric air of populated areas of 0, 0003 mg / dm³). The average content of mercury vapor in 2017 in the air at different sites, including the landfill of the mercury-containing wastes, as well as the area around Balkyldak Lake, was of 0.0035 mg/m³, which is approximately 12 times higher than the maximum permissible concentration. Studies of the concentration of mercury in the soil showed no exceedence of the MPC for 12 samples taken in different territories. The average content of mercury in soil samples at different sampling points in the Pavlodar region reached 0.03 g/t, what

is an excellent indicator and does not reveal an excess of MPC of mercury in the soil, taking into account that maximum permissible concentration is 2.1 g/t,. The results of surface waters analysis of the Balkyldak reservoir showed an exceedance of the MPC in 8 of the 8 samples and the maximum excess was in 7.6 times (mercury concentration of 0.0038 mg/dm³, at MPC of mercury in water bodies for domestic, drinking and cultural water consumption and in water reservoirs of 0.0005 mg/dm³).

According to the animal health division of the Pavlodar city, the high concentration of mercury in Balkyldak Lake caused genetic changes among the inhabitants of Balkyldak: - crusians, burbots and carps. 36% of the fishes change the external form and possess pug-shaped oral cavity, scales and eyes bulging⁴.

And also according to the results of the Global Report Mercury in Women of Child-bearing Age in 25 countries, there is an increased amount of mercury in the bodies of women living on the territories of historical mercury pollution. Thus, in Karaganda, of the women sampled 19% had mercury concentration in hair higher than 1 ppm and 31% were higher than 0.58 ppm. In Pavlodar, an excess of the threshold of 0.58 ppm was registered in 13 % of women, while 1 ppm level was not detected. It should be noted that mercury levels above 1 mg/kg (1 ppm) can provide brain damage, a decrease in IQ and damage to the kidneys and heart. While the damage to the fetal nervous system can begin at mercury levels above 0.58 mg/kg⁵.

In 2015-2016 years, within the framework of the project "Updating of the National Implementation Plan, Integration of Persistent Organic Pollutants Management in the National Planning and Sound Management of Medical Wastes in Kazakhstan", research was conducted in order to determine the level of mercury pollution of the environment and mercury content in water, soil, fish and human hair in Kostanay, Balkhash and Ust-Kamenogorsk.

According to the research, at two points (in the cities of Balkhash and Ust-Kamenogorsk), the mercury level was exceeded by 1.4-1.5 times (Balkhash - 500 m from BMMC, Ust-Kamenogorsk - st. Rabochaya /st.Bazhova). Places of mercury excess locate in industrial areas of the studied populated areas, what indicates that industrial facilities can influence the level of mercury pollution of the environment.

In Lake Balkhash, two sites, out of ten selected sites, show exceedance of MPC (0.01 mg/dm³) in 2 and 5 times. Mercury was not detected in the samples in Kostanay and Ust-Kamenogorsk.

Ichthyological selection was carried out in the Lake Balkhash (Balkhash town), the Tobol River (Kostanay) and the Irtys River (city of Ust-Kamenogorsk). The results of the study showed that:

⁴<https://pavlodartoday.com/obshhestvo/pavlodarskie-speczialisty-i-byilkylake-%C2%AB36-ryiby-imeyut-mopsovidnyu-formu%C2%BB>

⁵ GLOBAL REPORT MERCURY IN WOMEN OF CHILD-BEARING AGE IN 25 COUNTRIES, 2017
<http://ipen.org/site/mercury-women-child-bearing-age-25-countries>

- the mercury content in the tissues of commercial fish of all three water reservoirs does not exceed the maximum permissible concentrations;
- the highest average values of mercury levels were recorded in fish caught in the Lake Balkhash, the smallest - in the Irtysh river;
- the highest values of the mercury level in the cut of fish species were recorded in pike perch caught in the Lake Balkhash and pike caught in the Tobol river;
- there is a direct dependence of fish age on the content of mercury in its tissues: the older the fish is, the higher is the level of mercury in its body.

Thus, the results of the national inventory and the studies on mercury content in soil, water, air and human tissues emphasize significant levels of mercury content and it can lead to negative effects on the environment and human health.

4. Imports and exports

An analysis of the statistical information of the Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan was done in order to assess the exported / imported mercury and mercury-containing products in Kazakhstan.

To regulate the export and import of goods in the Customs Union, including Kazakhstan, an international classifier is used - The Eurasian Economic Union's Commodity Nomenclature of Foreign Economic Activity (EAEU CN of FEA). The classifier of EAEU CN of FEA codes is a classifier of goods used by customs declarants and customs inspectors when carrying out customs operations. The rates of import and export duties depend on the CN of FEA code of a good. Each good, including mercury and its compounds, allowed for export and import into the territory of Kazakhstan, is assigned the CN of FEA code.

Data for 2014-2016 years and for 2018 y. were considered for the analysis of exports/imports of mercury and mercury-containing products. As a result, information on mercury compounds and mercury-containing products that were imported into Kazakhstan, as exported from Kazakhstan (Table 4.1 and 4.2, respectively) was found.

Table 4.1 - Official data on imports and exports of mercury in Kazakhstan for 2014-2016 years

№	Name	CN of FEA code	Imports		Exports	
			Yes/No	Amount, tons	Yes/No	Amount, tons

1.	Mercury-filled or sodium lamps and metal-halide lamps	8539322001	Yes	27,1	Yes	0,1
2.	Fluorescent gas-discharge lamps with a double-ended thermal cathode	8539311000	Yes	98,3	Yes	0,1
3.	Other fluorescent gas-discharge lamps with a thermal cathode	8539319000	Yes	942,3	Yes	11,4
4.	Other mercury	2805409000	Yes	No data	No	0

According to the data given in Table 4.1, in the period from 2014 to 2016, mercury-filled or sodium lamps, fluorescent gas-discharge lamps with a double-ended thermal cathode and other fluorescent gas-discharge lamps with a thermal cathode were imported by Kazakhstan and exported from Kazakhstan. Other mercury was only imported and there is no data on its amount.

Table 4.2 - Official data on the import and export of mercury in Kazakhstan for 2018 y.

№	Name	CN of FEA code	Import		Export	
			Yes/No	Amount, tons	Yes/No	Amount, tons
1.	Inorganic or organic mercury compounds, except amalgams	2852100002	Yes	No data	No	0
2.	Oxide-mercury primary cells and primary batteries	8506300000	Yes	No data	No	0
3.	Mercury-filled or sodium lamps and metal-halide lamps	8539322001	Yes	31	Yes	No data
4.	Inorganic or organic mercury compounds of definite or non-definite chemical composition, except amalgam of a definite chemical composition and others	2852100008	Yes	No data	No	0
5.	Mercury-filled lamps	8539322001	Yes	13,4	No	0

According to the official statistics in 2018 (Table 4.2), inorganic and organic mercury compounds, oxide-mercury primary cells and primary batteries, and also sodium and metal-halide lamps in the amount of 31 tons, as well as mercury-filled lamps in the amount of 13.4 tons were imported in Kazakhstan. Products exported from Kazakhstan in 2018 are mercury-filled or sodium lamps (data on the amount are not specified).

The search on import and export of mercury was also conducted in the databank of official international trade statistics «UN Comtrade Database» for 2016-2017 years. The search was

carried out according to the HS code - the international harmonized system for the goods coding. For mercury, the HS code is 280540.

So, in 2017 Kazakhstan imported mercury in the amount of 635 kg; at different times in 2016-2017 years mercury was imported and exported and data on the amount are absent. Thus, according to the statistical data, supply and trade of mercury and mercury-containing products in Kazakhstan are confirmed.

5. Mercury added products in the market

The most common mercury-containing products that are in circulation in Kazakhstan and easily accessible to the public: thermometers, mercury-containing lamps, batteries and cosmetics.

When measuring the average range temperatures in Kazakhstan, mercury thermometers have traditionally been used among the population. At the same time, more and more medical institutions are opting for alternative measuring devices that do not contain mercury. Taking into account that one medical thermometer contains from 0.5 to 3 g of mercury, this group of products is the most dangerous in terms of impact on human health.

Today mercury-containing light sources have firmly carved their own niche in Kazakhstan. With the adoption of the Law of the Republic of Kazakhstan "On Energy Saving and Energy Efficiency Improvement" in 2012, which introduced a stagewise prohibition on the production and sale of incandescent electric lamps, the population began to use widely energy saving lamps. The technical regulation of the Eurasian Economic Union TR EAEU 037/2016 "On the Restriction of the Use of Hazardous Substances in Electrical and Radioelectronic Products" allow mercury content of 2.5 to 40 mg per lamp, depending on its type, power and dimensions. Unfortunately, often, the life of lamps is unjustifiably short, what leads to the formation of mercury-containing wastes and mercury emissions into the environment.

Mercury has found another application in chemical sources of current, which are also widely used in Kazakhstan. In particular, batteries containing mercury oxide have a high specific power and a flat discharge voltage characteristic. Such batteries contain up to 40 wt. % of mercury.

At the same time, mercury finds its application in the manufacture of cosmetics. On the basis of the technical regulation of the Customs Union "On the Safety of Perfumery and Cosmetic Products", only the products for eye make-up and for removing eye make-up can consist of such chemicals as thiomersal and phenylmercuric salts. The maximum concentration of mercury in the products should not exceed 0.007%. Despite the requirement of the legislation of the Republic of Kazakhstan to limit the concentration of mercury in cosmetics, as well as to disclose information on the content of hazardous substances in products, manufacturers and suppliers of cosmetics in Kazakhstan do not provide this information, what misleads the population of the country.

According to the data on the national inventory of mercury in Kazakhstan, mentioned above, the estimated mercury input to society through mercury-containing products in 2014 was 926 kilograms (Table 5.1).

Table 5.1 Estimated mercury input to society through mercury-containing products for 2014

№	Product	Economic activity rates		The estimated mercury input, kg of Hg/year
		Amount of items sold	Units	
1.	Thermometers	127816	Items/year	710
2.	Mercury-containing light sources	6 769 674	Items/year	79
3.	Mercury-containing batteries	110	Tons/year	137
4.	Cosmetics	No data	Tons/year	No data

The greatest mercury emissions are caused by thermometers with the estimated mercury input of 76.6%. The influence of mercury batteries is also quite high and equals to 14.7%. Mercury-containing light sources, despite their wide application, contribute only 8% to the total input of mercury to society among three most common types of mercury-containing products in Kazakhstan.

It should be noted that the value of the mercury input to the society through the products is very approximate, since there is no exact data on the mercury content in the goods, and it is not possible to estimate the mercury content in cosmetics.

Based on the data presented, it is obvious that the population of Kazakhstan is exposed to the mercury, contained in the products. This impact is exacerbated by the absence in Kazakhstan of the widespread collection and transfer to the disposal of mercury-containing wastes generated by the population.

At the large industrial enterprises, as a rule, there is a system for collecting and transferring of mercury-containing wastes for processing to specialized enterprises. However, the population most often throws out the spent mercury-containing products to unauthorized landfills and landfills of solid domestic wastes as part of the jointly collected wastes. In some cities separate collection of mercury-containing wastes from the population is introduced on the initiative of non-governmental organizations and local executive bodies. Separately collected wastes are transferred to specialized enterprises for their further processing. However, the percentage of separate collection and processing of mercury-containing wastes from the population in Kazakhstan remains very low.

6. Human Exposure to Mercury

The most common forms of mercury exposure in Kazakhstan are: consumption of water and products with high concentrations of mercury (fish, meat, vegetables, fruits, etc.), inhalation of mercury vapours, exposure to skin and penetration through the placenta to the fetus.

Based on the analysis of mercury pollution sources and data on mercury monitoring in the environment (see section 3), it is possible to identify the most vulnerable groups of people exposed to mercury in the country. They are:

1. The population living near places of historical mercury pollution;
2. Workers of the fields where mercury is mined as a by-product;
3. Workers of enterprises where unintentional mercury emissions take place;
4. The population using mercury-containing products, especially women using cosmetics;
5. The population consuming fish whose habitat was contaminated with mercury;

The influence of mercury on humans can be caused by an elementary form of mercury (or metallic), inorganic (at work sites) and organic (during consumption of products).

At the same time, according to the response of the National Centre of Labour Hygiene and Occupational Diseases, a study on the effects of mercury on human health in Kazakhstan has not been conducted.

7. ASGM

According to official data of the Ministry for Investments and Development of the Republic of Kazakhstan, amalgamation technology is not used for gold mining in Kazakhstan.

During the implementation of the project of the Government of the RK/ UNDP /GEF - "Updating of the National Implementation Plan, Integration of Persistent Organic Pollutants Management in the National Planning and Sound Management of Medical Wastes in Kazakhstan", where mercury was one of the components and also during seminars and discussions with various interested groups, there was no information on handicraft and small-scale gold mining.

Based on this, it can be concluded that in Kazakhstan this activity is not available.

8. Possible damage caused by mercury

To date, it is obvious that mercury is causing an appreciable harm to human health and the environment of Kazakhstan. Historical pollution areas and industrial processes are the main threats of mercury.

Thus, the Global Monitoring data mentioned in Section 3 of this review, indicate that there is an exceedance of threshold levels for mercury in hair of child-bearing age women in the Pavlodar and Karaganda regions, what confirms the damage to women's health and, consequently, to children carried in the womb.

The damage of mercury to the environment is confirmed by studies of fish in the Pavlodar region, also mentioned in Section 3 of this review.

It isn't possible to assess the damage of mercury inflicted on workers at enterprises. As it has been noted above, there is no special studies on the health effects of mercury on workers in Kazakhstan. At the same time, it should be noted that nervous system lesions, especially, polyneuropathy (ICD 10: G62.2), neurosis-like conditions (ICD 10: G90.9), encephalopathy (ICD 10: G92) can be related to hazardous chemicals' influence, including mercury. These diseases are included in the List of occupational diseases and poisonings approved by the Order of the Minister of National Economy of the Republic of Kazakhstan of June 23, 2015 № 440. However, there is no statistics on occupational diseases associated with mercury exposure.

According to the Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan⁶, in recent years, there has been an increase in the incidence diseases of the population. In 2016, the average number of newly registered diseases per 100 000 people was 56 771.2, what is 9% more than in 2014. At the same time, the Pavlodar region has the largest number of diseases in the country. In 2016, 75,703.4 diseases per 100,000 inhabitants were registered here. Impact of mercury can be one of the reasons for the high incidence in the Pavlodar region.

9. Storage

Storage of mercury and its compounds at enterprises of the Republic of Kazakhstan is carried out under the provisions of Sanitary Rules and Norms 1.10.083-94 "Sanitary rules when working with mercury, its compounds and devices with mercury filling". In accordance with this document, mercury should be stored in specially equipped and designed warehouses. Warehouses should prevent mercury contamination of air, and the walls of the warehouse should be coated with mercury-proof coatings.

Nowadays, specialized enterprises for the mercury-containing wastes processing and also industrial enterprises extract mercury from wastes and store it in sealed containers. There are no special mercury storage sites in Kazakhstan.

According to data obtained during the survey of specialized enterprises for the mercury-containing wastes processing for 2017, about 46 tons of mercury were stored in the territory of 8 enterprises among all provided the data.

10. Mercury wastes

The classification of mercury-containing wastes in Kazakhstan is established in National Standard of the Republic of Kazakhstan ST RK 1513-2006 "Resource Saving. Waste management. Classification and methods of mercury-containing wastes processing. Basic provisions". This standard identifies four groups of mercury-containing wastes:

- 1) Contaminated metallic mercury (mass fraction of 95% or more);

⁶ Incidence of the population by regions, 2014-2016 years <http://stat.gov.kz/getImage?id=ESTAT082744>

- 2) Wastes with a mercury (mass fraction of 50% or more);
- 3) Mercury-containing wastes (mass fraction of 0.026-50%);
- 4) Wastes containing mercury or its compounds (mass fraction from 0.00021% to 0.026%).

According to the National Standard of the Republic of Kazakhstan ST RK1513, wastes with a mass fraction of mercury or its compounds of less than 0.00021% are not related to mercury-containing wastes (MCW) and there are no any restrictions on these wastes management related to the presence of mercury in them. Thus, the threshold level for mercury content in MCW in Kazakhstan is 0.00021%.

In Kazakhstan, the nomenclature of mercury-containing wastes mainly includes spent mercury-containing products. Large amounts of mercury-containing wastes are generated by large-scale enterprises using significant amounts of lamps, batteries, switches and other products containing mercury. Also, mercury-containing wastes are generated from the population after the loss of consumer properties of mercury-containing products.

A system of waste collection and transfer for further processing is established, as a rule, at most industrial enterprises and public bodies, the operating outcome of which is mercury-containing wastes.

This standard also establishes a classification of mercury-containing wastes processing methods:

- Amalgamation;
- High - temperature roasting;
- Thermal methods;
- Chemical and metallurgical methods.

However, presently, enterprises of Kazakhstan use two methods of processing: demercurization and immobilization.

Nowadays Kazakhstan is aware of the activities of 24 enterprises that are capable of mercury-containing wastes processing. The list of companies with the indication of the region in which they operate and the method of processing applied are presented in Annex 2.

Thus, it may be noted the presence in Kazakhstan of legislative requirements for the mercury-containing wastes management, as well as a developed infrastructure for the collection and processing of mercury-containing wastes.

11. Recommendations, from a public interest, NGO perspective, on reducing and eliminating human sources of mercury in Kazakhstan

Based on the analysis of the current situation on mercury management in Kazakhstan and existing problems, the following recommendations, that might be of interest from the point of view of NGOs, can be highlighted:

1. Development of a Strategy for the prevention and minimization of mercury pollution in the Republic of Kazakhstan and acceleration of the Minamata Convention on Mercury ratification process;
2. Development and improvement of the legislative framework for regulating the use, storage, transportation and processing of mercury, mercury-containing wastes and products;
3. Tightening control by public bodies over implementation of the requirements of legislation related to mercury in Kazakhstan;
4. Improvement of methods for determining the mercury content in environmental components, different types of mercury-containing products and increasing laboratory capacity in this sphere;
5. Creation of an inventory of mercury emissions and releases from relevant sources or the integration of these sections into the existing reporting system on pollutants in Kazakhstan;
6. Taking measures against cleaning up of mercury contaminated areas and preventing further pollution of the environment;
7. Organization of the widespread system of mercury-containing wastes collection from the population;
8. Taking measures against minimizing the impact of mercury on human health in areas of historical mercury contamination, including the assessment of risks to human health and the environment, and the implementation of training and prevention programs on the impact of mercury in the workplaces, improving the quality of medical services for prevention, treatment and care for people affected by mercury;
9. Reinforcing of the international and regional partnership on measures to solve problems related to mercury and also information exchange;
10. Strengthening of informing and awareness of the population on questions related to the mercury pollution in Kazakhstan and the necessary security measures.

Summary of the results of the inventory of mercury for 2014 y.

Source Category	Calculated mercury emissions, standard estimates, kg of Hg / year							Percentage of total emissions
	Air	Water	Soil	By-products and impurities	Domestic wastes	Special treatment / waste management sector	Total mercury input	
Combustion of coal and its other utilizations	9 313,4	0,0	0,0	0,0	0,0	941,9	10 255	2%
Combustion of other natural fuels and biomass	935,8	0,0	0,0	0,0	0,0	0,0	936	0%
Oil and gas recovery	331,8	472,3	0,0	638,4	0,0	752,3	2 195	0%
Production of primary metal (except gold production with the amalgamation process)	42 414,4	11 349,4	205 403,9	146 869,7	1 467,6	151 092,6	558 598	97%
Production of other materials	599,9	0,0	0,0	200,0	0,0	0,0	800	0%
Application and disposition of other products	744,3	440,9	921,6	0,0	1 072,6	215,3	3 395	1%
Production of reduced metals	0,0	0,0	0,0	0,0	0,0	0,0	0	0%
Incineration and open burning of wastes	2,4	0,0	0,0	0,0	0,0	0,3	3	0%
Waste disposal	151,2	1,5	0,0	-	-	-	153	0%
Illegal discharge of domestic wastes	?	?	?	?	?	?	0	0%
System for collection and discharge / treatment of waste waters	0,0	3 036,5	0,0	0,0	337,4	0,0	337	0%
Crematoria and cemeteries	0,0	0,0	327,2	0,0	0,0	0,0	327	0%
TOTAL	54 490	12 260	206 650	147 710	2 880	153 000	577 000	100%

**Specialized enterprises for the collection and processing of mercury-containing wastes
in Kazakhstan**

№	Name of organization	Regional scope	Activity	Processing method
1	LLP "Zhasyl zher ST"	Akmola region, North Kazakhstan region	collection and processing	immobilization
2	LLP "Metallostroybaza"	Akmola region	collection	
3	LLP "Absolut-M"	Akmola region	collection	
4	LLP "Eko-Garant"	Akmola region	collection	
5	TOO "West Dala"	Atyrau region	collection and processing	immobilization
6	LLP "East Kazakhstan Regional Ecological Center of Demercurization"	East Kazakhstan region	collection and processing	immobilization
7	LLP "EkoKom Innovation"	East Kazakhstan region	collection	
8	JSC "Talap"	West Kazakhstan region	collection and processing	immobilization
9	LLP firm "Chisty dom"	Karaganda region	collection and processing	immobilization
10	LLP "PROMOTHOD KAZAKHSTAN"	Karaganda region, Astana city	collection and processing	immobilization
11	LLP "Innovation"	Karaganda region	collection and processing	immobilization
12	LLP "Salem.kz"	Kostanay region, North Kazakhstan region	collection and processing	immobilization
13	LLP "EKOSFERA+K"	Kostanay region, Aktobe region	collection and processing	immobilization
14	LLP «Eko-N Service»	Kyzylorda region	collection and processing	immobilization
15	LLP "MAEC-Kazatomprom"	Mangystau region	processing	demercurization
16	LLP «Eco - Operating»	Mangystau region	collection and processing	demercurization
17	LLP "ElectroTransReelto"	Pavlodar region	processing	no data
18	LLP «NTP KazekotehAstana»	Astana city	collection and processing	demercurization
19	ST "Mercury safety"	Astana city, Kostanay region	collection and processing	immobilization

20	LLP "Synap Plus"	Almaty city, Almaty region, Jambyl region, South Kazakhstan region	processing	demercurization
21	LLP «Eco Almaty»	Almaty city, Almaty region	collection and processing	demercurization
22	LLP "PromTechnoResourceKZ"	Almaty city, North Kazakhstan region	collection and processing	
23	LLP «Elean.kz» (Official representative of LLP "PromTechnoResourceKZ")	North Kazakhstan region	collection	
24	LLP "BKK and K"	Aktobe region	collection	