



PROJECT REPORT

Project name: Monitoring mercury in the air in Armenia, using Lumex

Implementing organization: *Armenian Women for Health and Healthy Environment (AWHHE) NGO, Armenia*

Project timeframe: 1 May – 15 August 2012

Financial support by: The European Environmental Bureau (EEB) / Zero Mercury Working Group (ZMWG)

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Executive Summary

AWHHE is member of the Zero Mercury Working Group (ZMWG), an international coalition of 98 public interest environmental and health non-governmental organizations from 54 countries from around the world formed in 2005 by the European Environmental Bureau (EEB) and the Mercury Policy Project. ZMWG strives for zero supply, demand, and emissions of mercury from all anthropogenic sources, with the goal of reducing mercury in the global environment to a minimum. **Our** mission is to advocate and support the adoption and implementation of a legally binding instrument which contains mandatory obligations to eliminate where feasible, and otherwise minimize, the global supply and trade of mercury, the global demand for mercury, anthropogenic releases of mercury to the environment, and human and wildlife exposure to mercury.

Mercury is toxic in all its forms, as a potent neurotoxin, but it is particularly dangerous for pregnant women and children. Once released into the environment, mercury becomes part of biogeochemical cycle contaminating soil, air, groundwater and surface water where it accumulates and moves up the food chain. Toxic mercury poses the greatest risk to the health of young women, children and developing fetuses, as even small amounts of mercury exposure has been linked to developmental disorders and learning disabilities. Breathing the polluted air is among the most common ways for exposure to this toxic chemical.

In May-August 2012, AWHHE implemented the Monitoring Mercury in the Air project in Armenia as part of international EEB/ZMWG supported projects with the use of a portable mercury monitoring instrument a Lumex provided by EEB/ZMWG. In Armenia, the instrument was used to measure mercury vapour concentration in ambient air within different project sites such as: the Yerevan dumpsite, the electrical lamp factory in Yerevan, the Makur Yerkat smelter, together with hospitals and dental clinics in Abovyan, Kotayk province including in residential quarters in the capital Yerevan and two provinces – Kotayk and Gegharkunik.

Armenia lacks information on the current status of mercury contamination and possible environmental and health hazards related to mercury. For the first time, the project allowed to gather and analyze information on mercury exposure in some potential hotspots in Armenia.

The air measurement results at 9 sites across Yerevan and the provinces of Kotayk and Gegharkunik showed that some tests exceeded the threshold that the Ministry of Health considers safe (300 ng/ m³) and a number of sites had mercury levels close to the threshold considered safe. While generally the testing revealed that the levels of mercury in the air are within the permissible range, it was particularly disturbing to see the high levels of mercury vapor in the air near the Makur Yerkat Smelter of Yerevan.

The measurements were taken right at the fence outside the territory of the smelter and the average of 500 ng/m³, was recorded, with single measurements as high as 1500 ng/m³. Another concern is the long-time habit of urban residents to keep the old mercury containing lamps, batteries and other such non-segregated waste in the basements of their apartment buildings: the project registered an alarming level of up to 1400 ng/m³ in one of such basements where broken lamps were found.

The results were disseminated through a press release, a fact sheet, and a meeting with the National SAICM Focal Point, from the Government of Armenia. It was agreed to organize follow-up activities after INC5 with a broader participation of interested stakeholders.

Project Report

AWHHE's background on mercury work

AWHHE is the National NGO SAICM Focal Point in Armenia. As an active member of the ZMWG, AWHHE participated in the INC1 and INC2 (participation to INC3 was cancelled due to delays in the visa process). AWHHE participation in the CEE Regional Meeting in Lodz as well as in INC4 in Punta del Este was supported by ZMWG. AWHHE also participated in the Zero Mercury Working Group strategy meetings held in Brussels in September 2011, April 2012 and October 2012).

In 2010-2011, AWHHE led and participated in the project "Mercury in Skin lightening creams in EECCA – Armenia, Georgia and Belarus" to explore the issue of the content of mercury in cosmetic products, particularly, in Armenia, Belarus and Georgia. The project was implemented with support of European Environmental Bureau/ZMWG via UNEP by Armenian Women for Health and Healthy Environment NGO (Armenia), Centre for Environmental Solutions (Belarus) and Georgian Environmental and Biological Monitoring Association (Georgia). The study provided information on the legislation in force and the market of cosmetics in all three countries.

Armenia: the problem of mercury

- Armenia lacks information on current status of mercury contamination and possible environmental and health hazards related to mercury.
- Mercury is a dangerous substance present in the landfills and waste dumps. Waste treatment and recycling facilities for mercury and mercury added product disposal does not exist in Armenia. Therefore, the domestic waste, waste of the medical institutions/facilities and industrial waste is dumped together. There is no organized waste collection from industrial or other sources.
- Yerevan's share of national industrial production is approximately 50%. Manufactures include chemicals, primary metals, machinery, rubber products, plastics, textiles, alcoholic beverages and processed food. Among the large plants are Nairit chemical and rubber plant, Rusal Armenal aluminium foil mill, Makur Yerkat copper-molybdenum smelter, and Grand Sun electrical lamp production factory. The project primarily focused on the following possible mercury pollution sources in Yerevan: Makur Yerkat Copper-Molybdenum Smelter, Grand Sun Electrical Lamps Factory and Nubarashen Waste Landfill.
- Lake Sevan is a unique source of drinking water and center of fish breeding. Tailing at gold mine in Sotq village, Gegharkunik province was singled out as a possible source of mercury contamination as the mine is located just on the shores of the lake.
- Monitoring of the waste sites is not carried out. The danger of mercury leakage into the air, soil and water is extremely high. National monitoring system lacks precise measurement of mercury pollution.
- Monitoring of mercury levels in the hospitals and dental clinics is not carried out.
- The awareness on the impact of mercury contamination in Armenia is low and consequently the concern over environmental and health threats due to mercury contamination is inadequate.

Armenia: relevant policy background

International level: Armenia was actively involved in the work of the INCs. Armenian delegation represented by the National SAICM Focal Point, Ministry of Nature Protection, participated at the INCs 1, 2 and 3; participation at INC4 was cancelled due to logistical problems. NGO sector was represented by AWHHE at INCs 1, 2 and 4.

Country level: As Armenia has not adopted yet the National “Law on Chemicals”, the regulation of chemicals management, including wastes is currently regulated by a number of fragmented laws and by-laws under a general umbrella of chemical conventions that Armenia is party to. A number of Inter-agency/ Inter-ministerial commissions were established with the involvement of representatives from Ministries and Agencies: Ministry of Nature Protection, Ministry of Health, Ministry of Agriculture, Ministry of Economy, Ministry of Finance, Republic of Armenia Police, the National Security Service, Customs State Committee, the national Academy of Sciences, Scientific research institutes, as well as non-governmental organizations (including AWHHE). The role of these committees is development and implementation of national implementation plans for the international chemical treaties that Armenia is party to. There is no special committee on mercury yet, however, working groups are being created as a follow up to the INCs.

Mercury Monitoring in Armenia

Unfortunately, in Armenia there are no institutionalized assessment and monitoring mechanisms for the levels of mercury so it is not possible to effectively monitor potential pollution sources. The existing monitoring system for air, soil and water pollution does not include data on mercury.

The only existing data on mercury pollution in Armenia refer back to 1990. For example, according to the data of 1990, soil in selected parts of the capital Yerevan contains mercury in concentration 5 MPC with the permissible level of 2.1 mg/kg (ref. Report of the Institute of Geographical Sciences of the National Academy of Sciences of Armenia, 1990). There are a number of causes for mercury contamination, e.g. agricultural land may be contaminated with mercury due to use of Hg containing pesticides, another example is mercury as waste from the ore processing plants, another reason is improper management of solid waste including medical waste. Research carried out by the Center for Ecological-Noosphere Studies of the National Academy of Sciences (Ecocenter, 2006) in the southern town of Kajaran where copper-molybdenum mining and ore processing is the main industry, identified increased levels of mercury (up to 40 times the norm) in the soil and local spring water as well as in agricultural products. According to recent studies of the above Center (2012), high level of mercury concentration was detected in the mulberry trees growing in Yerevan.

For the first time, this project allowed us to measure the level of mercury in the air in some areas of Armenia.

Project objectives

- With the use of Lumex, gather and analyze information on potential mercury contamination in the identified sites in Yerevan and Kotayk province (note: province of Gegharkunik where lake Sevan is located, was added to the project sites)
- Raise public awareness of health and environmental hazards due to mercury, using the results of testing

<i>Project sites:</i>	Notes
Yerevan city dumpsite and the Nubarashen dumpsite	Planned, measurement taken
territory of the currently operating Yerevan Electrical Lamps Factory	Planned, measurement taken
Neighbourhood of Makur Yerkat smelter, Yerevan	Added, measurement taken
hospitals and dental clinics in Abovyan, Kotayk province, and in Yerevan (total up to four)	Up to four planned, three sites actually visited: - Medesy Dental Clinic, private, Yerevan - Dental Clinic of Haybusak University, private,

	Yerevan - Kotayk province: State Dental Clinic of Abovyan town
Gegharkunik province: tailing at gold mining site near village of Sotk at lake Sevan as well as baseline level in rural area	Added to originally planned sites (thus, one more province, Gegharkunik, added)
Alikhanyan Street, Yerevan, territory of Yerevan Physics Institute	Added to originally planned sites as baseline in the city (green area)
Alikhanyan Street, Yerevan, residential area, basements and apartments of residents	Added, to measure the level of mercury in air in the basements where old utilized items including lamps and broken equipment are often stored
Komitas Avenue, Yerevan	Added, as baseline in the city at heavy traffic hours
Laser Technological Systems (LATES) Ltd.	Added, measurement was taken in the scientific laboratories where mercury containing equipment is used

Project results vs. expected outcomes

<i>Expected outcome</i>	<i>Actual result</i>
a summary report on the outcomes of mercury testing (Lumex)	Completed as planned
a mini poster as material display at INC 4 exhibition booth	A fact sheet was produced by INC5, due to delay in start date of Lumex measurements
meeting with national delegation to the INC4	Completed; also AWHHE representative participated at INC4 (with ZMWG support)
a press release to present the results of testing	Completed, jointly with EEB/ZMWG
a round table discussion with participation of NGOs, academia, and national delegation to the INC4 on the results of the mercury testing	A working meeting was organized instead with the national delegate to INC5 with a view to have a wider discussion following INC5
update AWHHE website and connect to ZMWG one to reflect the project outcomes; photos (events, testing)	Completed: www.awhhe.am

Protocol on Lumex testing (for testing mercury vapour in air)

1. The Lumex was used from mid-May until mid-July, the delay was due to technical problems with the Lumex machine (details of problems and solution below).
2. With the utilization of the Lumex, 7 potentially hazardous sites were tested for mercury vapour in the air: Yerevan city dumpsite; Yerevan Electrical Lamps Factory (Grand Sun); Nubarashen landfill at about 50 km from Yerevan in the Ararat valley, 3 dental clinics (two private ones in Yerevan and one state-run in Abovyan, Kotayk region), and tailing(?) storage at Sotk gold mine, Gegharkunik region. In addition, measurements were taken near the Makur Yerkat Smelter and in the laboratory of laser physics in Yerevan. Two baseline measurements were taken in Yerevan city- one in the green area at the territory of the National Physics Institute and the other in one of the busiest streets at heavy traffic hour.
3. Special provisions for quality assurance were made. All sampling activities were documented according to a site-specific plan on pre-printed sampling worksheets, the results were entered electronically on Excel worksheets. The following items were documented: project name; date and time of sample; background air results; calibration

verification results; sample location; name of person performing air sampling/ analysis; temperature; mercury result; and any special considerations or sampling conditions. For background monitoring, Kestrel 4500 Pocket Weather Tracker was used (provided by EEB/ZMWG).

Problems with Lumex machine and solutions:

Problem	Solution
Some parameters of the analyzer needed correcting	Rebooting with guidance from Moscow Lumex center (via e-mail)
Some problems with power supply – liquid crystal display (LCD) monitor could not connect to the Personal Computer (PC)	1. AWHHE contacted a specialist from the National Scientific Laboratory of the Yerevan Physics Institute. Their expert, Electronics Group Leader, fixed the problem 2. After this it was possible to follow instructions from Moscow Lumex center and LCD was connected to PC, tests were done and shared with the center 3. In addition, the expert from the Yerevan Physics Institute did test and on-stream trial: baseline in AWHHE office was taken (average at 3 ng/m ³), then air from mouth of some colleagues with old amalgam fillings was tested (average above 20 ng/m ³) and finally, a mercury thermometer was broken and air tested (above 1000 ng/m ³)
On the job training to take actual tests	AWHHE staff trained in use of Lumex by EEB/ZMWG shared knowledge with her colleague, an medical doctor, who did actual testing; in addition, the expert from the Yerevan Physics Institute assisted with the first baseline test and field test (on-stream)

Problems encountered at the sites and solutions found:

<i>Problem</i>	<i>Solution</i>
at the Yerevan City Dumpsite waste is not segregated	efforts were made to identify areas where bulbs are being aggregated and placed into waste bins, dumpsters, trash receptacles; however, such segregation was not identified, everything is dumped chaotically
measuring at dental clinics: difficulties accessing the sites	1. official access granted by the Ministry of Health 2. unfortunately, it was not possible to access a benevolent clinic that might be using amalgam coming as aid from countries where amalgam is still used in some cases
Measuring in the territory of Yerevan Lamp Factory: no official access was granted to the Factory itself	The Factory management ensured that mercury containing lamps were no longer produced; the project measured the level of mercury in the territory outside the Factory, just next to the fenced area

Analysis of results (summary):

1. Baseline level of mercury in air in Yerevan was identified. Two types of locations were measured: one as baseline for parts of the city with heavy traffic and one in the green zone area. The average values of concentration in the heavy traffic area (measured at traffic hour) ranged between 2 and 3 ng/m³; the average values of concentration in the green zone ranged between 1 and 2 ng/m³. This is comparable with the data of Central European cities where the concentrations may reach up to 2.5 ng/ m³ (EMEP; 1999).¹

¹ *Ambient Air Pollution by Mercury (Hg). Position Paper.* 17 October 2001, the European Commission

2. Baseline level of mercury in air for Kotayk and Gegharkunik provinces was measured: the range was from 0 to 1 ng/m³ in rural areas and up to 2 ng/m³ in the town of Abovyan.
3. The Yerevan “Grand Sun” electrical lamps factory: the factory functions on the premises of an old Soviet-style factory that produced lamps based on mercury technologies. Currently, no mercury containing lamps are produced. So, the site may be contaminated with waste and other related residues of old production. The territory just next to the fenced area of the Yerevan Electrical Lamp Factory was measured for concentrations of mercury in ambient air. Although the Factory no longer produces mercury containing electrical lamps, there was anecdotal evidence referring to the air pollution due to the dumpsite of old broken lamps on the territory of the Factory, outside the building. Since no access was granted either to the building of the Factory, or the territory inside the fenced area, the measurement was taken just at the fence. The weather conditions at the time of measurement were as follows: air temperature + 32.5 °C; wind velocity 1.2 m/sec; relative humidity of air 36.7%; pressure 875.9 mb. The ambient air concentration of mercury ranged from 2 to 6 ng/m³. This is comparable with the data of Central European urban areas where the concentrations are usually higher in some contaminated places and vary between 5 to 15 ng/m³ (IPCS, 1991) and even higher (Dizdarevic, 2001).²
4. Makur Yerkat Smelter (copper-molybdenum), Yerevan: the site was added to the originally planned ones. Armenia is rich in mines particularly with copper and molybdenum. The data on the presence of cinnabar in the ore used by Makur Yerkat copper-molybdenum smelter is controversial. The smelter is the leading enterprise in Yerevan processing copper-molybdenum ore concentrates extracted from Kajaran and other mines in the South of Armenia. The major pathways for mercury releases during initial processing for copper and molybdenum include air, water, soil, wastes/residues, and eventually certain products. Following the purchase of the Makur Yerkat smelter by the German Cronimet Metals Group (75% of the stocks), production levels have significantly increased. However, the plant is not equipped with demercurization technologies. The measurements were taken at just at the fence outside the territory of the smelter (average 500 ng/m³, single measurement going up to 1500 ng/m³) and at the distance of 1500 m from the fence (average 30 ng/m³).
5. Dental clinics in Yerevan and Abovyan: measurements were taken in urban dental clinics in Yerevan and Abovyan (Kotayk province). In addition to measurements, unofficial information was gathered from different dentists on whether they use mercury containing fillings. The informal conversations revealed that mercury was not used in the Soviet times when although not officially forbidden, the practice was discouraged. Some dentists acknowledged bringing dental amalgam from the visits to the US in the 1990s, but currently the dental material is supplied by professional companies and none of them brings in mercury containing material due to no demand. There is though anecdotal evidence that one of the Yerevan children's clinics operated by a US charity is using dental amalgam coming as medical aid from the US to this clinic, however, the project personnel was not allowed inside the clinic to take measurements (the clinic was closed for summer vacations). The results obtained in the national and private dental clinics in Yerevan and Abovyan revealed that although the mercury concentrations in the ambient air were well below permissible levels, the level of mercury concentration inside the medical rooms and in corridors was considerably higher compared to the background air pollution data. The most significant difference against the background of 0 to

² ibis

2 ng/m³ (Kotayk province) was registered in Abovyan clinic where the level inside the patient room ranged from 8 to 15 ng/m³.

6. Nubarashen city dumpsite and landfill: The Nubarashen landfill is Armenia's largest waste disposal site and is located just outside the capital city of Yerevan. It receives almost all of the solid waste produced in Yerevan and its suburbs, which is about 340 tons per day, or 102,000 tons per year. The site has accumulated over 7.5 million tons of domestic waste over 50 years. In addition, in the 1990s chaotic dumping of industrial waste appeared on the bank of the river Hrazdan in Yerevan where among other mercury containing old equipment, luminescent lamps containing mercury were being dumped up until now. Waste recycling facilities do not exist. The domestic and industrial waste is dumped together. There is no organized waste collection from industrial sources. Monitoring of the waste sites is not carried out. Leakage of hazardous materials, including mercury waste, into the air, soil and water is extremely high.
7. Nubarashen Burial Site of banned and obsolete Persistent Organic Pollutants (POPs): In 1982 (before the collapse of the Soviet Union) more than 500 tons of obsolete and banned pesticides were buried in the site which is just next to Yerevan. The activation of the landslide in 2010 in the adjacent area of the burial site resulted in the movement of the entire soil layer of the burial site and new cracks / crumbling in the soil. This was aggravated by an illegal excavation of the site. Further activation of landslides can seriously threaten the contamination of water of the nearby area of the burial site and the trans-boundary waters. The pesticides buried in the site contained different toxic compounds like phosphor, chlorine, arsenic, mercury. The measurements showed no significant increase in the level of mercury in the air (up to 7 ng/m³), however, no measurement has ever been taken in the soil or water in the burial site.
8. Tailing at gold mine in Sotg village, Gegharkunik region: while the background level for mercury measured from 0 to 1 ng/m³, the measurement at the tailing storage site was up to 11 ng/m³. The possible mercury contamination in the soil and water at the tailing storage may therefore be of concern. The possibility for the fish in Lake Sevan and in the fisheries to be contaminated with mercury is high due to factors such as the pollution of the water resources with industrial and domestic waste and natural processes leading to bioaccumulation of mercury in fish.
9. Laser Technological Systems (LATES) Ltd., office space rented in the building of Yerevan State University: the site was added due to concerns raised by the scientists working in the research group. The measurements were taken in the rooms where mercury containing equipment and waste (broken equipment) were present. The result showed an average of 400 ng/m³, with single measurements going up to 1400 ng/m³.
10. Alikhanyan Street, Yerevan, residential area (basements and apartments): the measurements in this residential area was taken following a concern raised by one of AWHHE staff who noted that often non-segregated waste and old broken electrical and other equipment is stored in the basements of big apartment buildings. In the building where such measurement was taken, the staff noticed a pile of old broken luminescent lamps. The result was an alarming level of up to 1400 ng/m³ in the basement while the air inside the apartment on the first floor measured around 4 ng/m³

Dissemination of results

- A press release produced jointly by AWHHE and EEB/ZMWG.
- The preliminary results on sampling analysis presented to the INC 5 Delegation.
- AWHHE website updated accordingly, pictures taken during the project.
- A fact sheet created summarizing main results.

DETAILED MEASUREMENTS REPORT

Determination of air pollution by mercury using the Lumex instrument

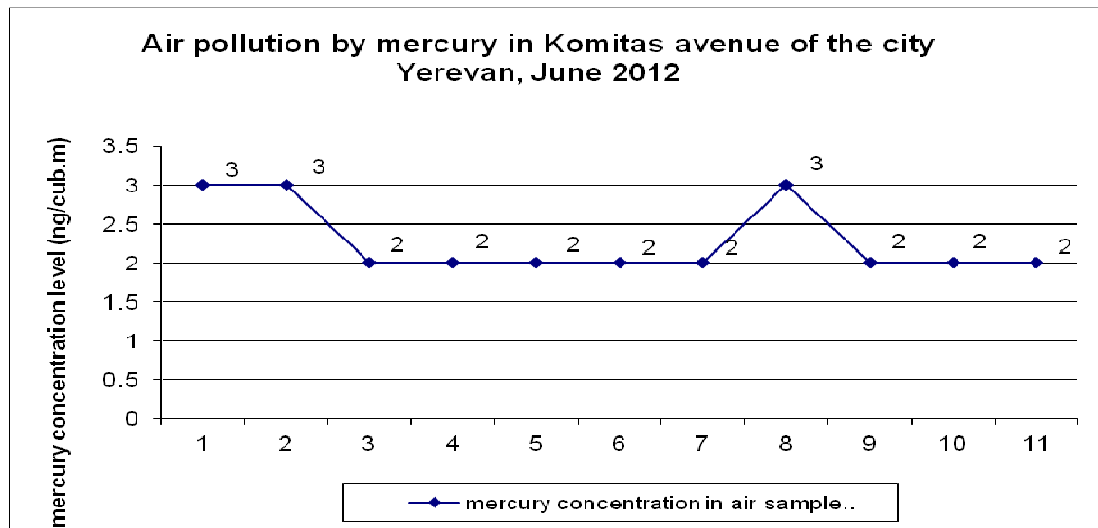
1. Baseline level of mercury in air in Yerevan was identified. The average values of concentration in the heavy traffic area ranged between 2 and 3 ng/m³;

Sampling site 6 Komitas ave., c. Yerevan
Sampling date 15.06.2012
Hour 14:30
Researcher's name, surname Qnarik Grigoryan
Weather parameters

Air temperature	32,8	°C
Wind velocity	1,4	m/sec
Air relative humidity	36,4	%
Pressure	875,4	mb

Mercury pollution level (ng/cub.m)

3	3	2	2	2	2	2	3	2	2	2
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The average values of concentration in the green zone ranged between 1 and 2 ng/m³.

Sampling site 2 Alikhanyan St. c. Yerevan
Sampling date 15.06.2012
Hour 14:50
Researcher's name, surname Qnarik Grigoryan

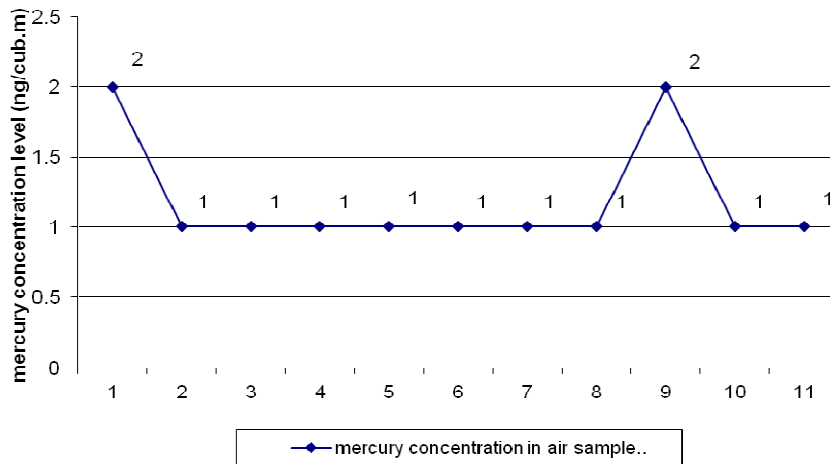
Weather parameters

Air temperature	32,1	°C
Wind velocity	1,0	m/sec
Air relative humidity	36,9	%
Pressure	875,5	mb

Background air pollution indicators
 Mercury pollution level (ng/cub.m)

0	0	1	0	2	0	1	1	2	1	1
2	1	1	1	1	1	1	1	2	1	1

Air pollution by mercury in St. Alikhanyan, c. Yerevan,
 June 2012



- Baseline level of mercury in the air for Kotayk and Gegharkunik provinces ranged from 0 to 1 ng/m³ in rural areas and up to 2 ng/m³ in the town of Abovyan (ref. background measurements in Sotq village, Gegharkunik province, and town of Abovyan, Kotayk province, in the charts below).
- The territory just next to the fenced area of the Yerevan Electrical Lamp Factory was measured for concentrations of mercury in ambient air. The ambient air concentration of mercury ranged from 2 to 6 ng/m³.

Sampling site
Sampling date
Hour
Researcher's name, surname
Weather parameters

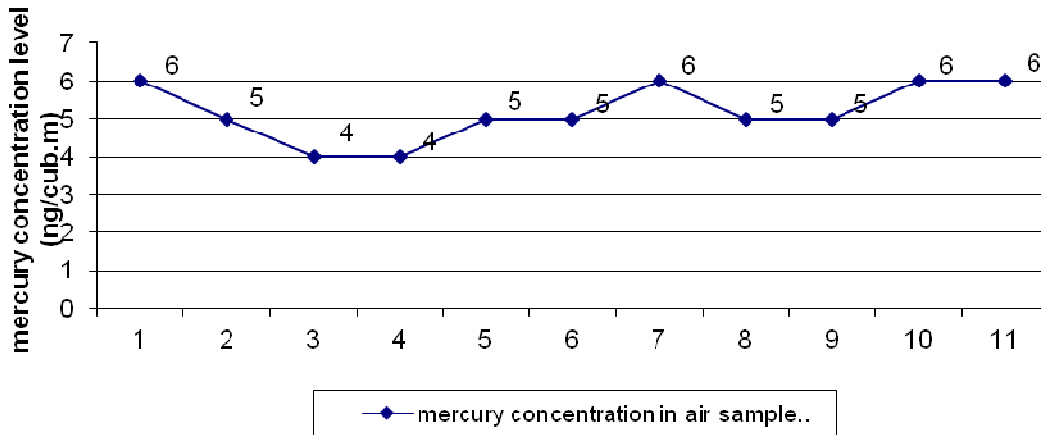
**Adjacent area of Electric Lamps
 Factory**
 15.06.2012
 13:40
 Qnarik Grigoryan

Air temperature	32,5	°C
Wind velocity	1,2	m/sec
Air relative humidity	36,7	%
Pressure	875,9	mb

Background air pollution indicators
 Mercury pollution level (ng/cub.m)
 Mercury pollution level (ng/cub.m)
 Mercury pollution level (ng/cub.m)

0	0	1	0	2	0	1	1	2	1	1
6	5	4	4	5	5	6	5	5	6	6
2	3	4	3	4	3	4	4	3	3	3
4	3	4	3	4	4	4	3	3	4	4

Air pollution by mercury in the adjacent area of Electric Lamps Factory, c. Yerevan, June 2012



4. Makur Yerkat Smelter (copper-molybdenum), Yerevan:



Weather parameters

At the fence outside the territory of the smelter: average 500 ng/m³, single measurement going up to 1500 ng/m³.
 At a distance of 1500 m from the fence: average 30 ng/m³. Such high levels were registered at the time of active operation at the plant. Measurement taken on a day when the plant was “silent” showed up to 7 ng/m³.

Sampling site Maqur Yerkat plant
Sampling date 28.08.2012
Hour 14:00
Researcher Qnarik Grigoryan

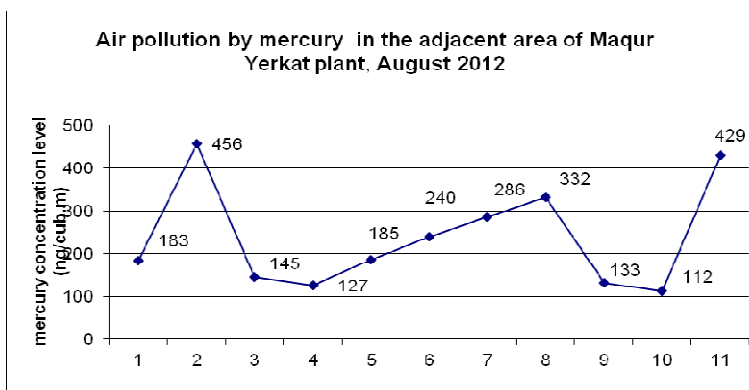
Air temperature 35.0 °C
 Wind velocity 0.0 m/sec
 Air relative humidity 35.3%
 Pressure 895.3 mb

distance: at the fence

Background air pollution indicators	4	6	6	5	5	4	3	6	5	4	
Mercury pollution level (ng/cub.m)	183	456	145	127	185	240	286	332	133	112	429

Distance: 1 km from fence

Mercury pollution level (ng/cub.m)	35	30	29	31	30	28	37	35	30	29	28
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5. Dental clinics: measurements were taken in urban dental clinics in Yerevan and Abovyan (Kotayk province).

Medesy Dental Clinic, Yerevan



The most significant difference against the background of 0 to 2 ng/m³ (Kotayk province) was registered in Abovyan clinic where the level inside the patient room ranged from 8 to 15 ng/m³.

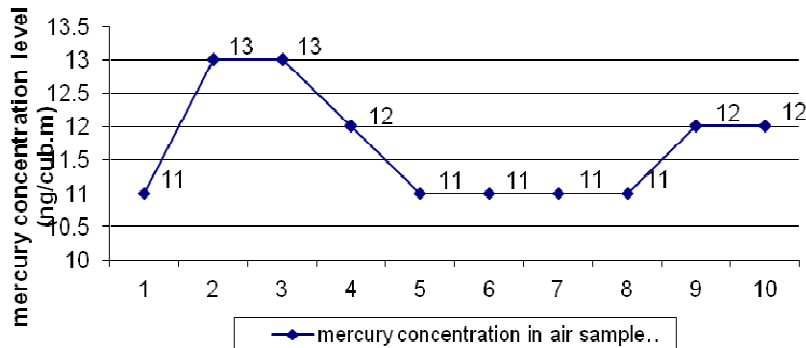


Sampling site No 2 Dental Clinic, c. Abovyan, Kotayk province
Sampling date 2.07.2012
Hour 16:00
Researcher's name, surname Qnarik Grigoryan
Weather parameters

	1		2		3	
Air temperature	27.1	°C	26.9	°C	26.5	°C
Wind velocity	0.3	m/sec	0.0	m/sec	0.4	m/sec
Air relative humidity	40.0	%	42.1	%	40.1	%
Pressure	853.3	mb	853.1	mb	853.1	mb

Background air pollution indicators	2	2	0	0	1	1	0	1	1	1
Mercury pollution level (ng/cub.m)	15	15	14	14	13	13	12	11	11	10
Mercury pollution level (ng/cub.m)	11	13	13	12	11	11	11	11	12	12
Mercury pollution level (ng/cub.m)	10	11	11	11	10	10	10	9	9	8

Air pollution by mercury in No 2 Dental Clinic, c. Abovyan, Kotayk province, June 2012



Dental Clinic, Abovyan town, Kotayk province



The measurement results in Medesy Dental Clinic (private) and dental clinic of the Stomatology Department of Haybusak University in Yerevan are shown below:

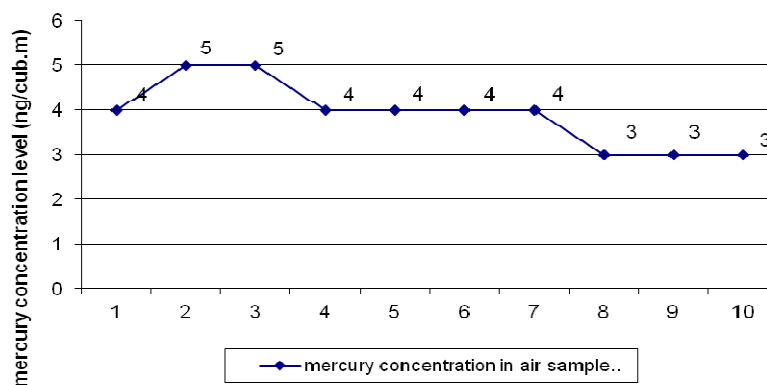
Sampling site Medesy Dental Clinic, c. Yerevan
Sampling date 20.07.2012
Hour 16:30
Researcher's name, surname Qnarik Grigoryan
Weather parameters

Air temperature	28.5	°C
Wind velocity	0.0	m/sec
Air relative humidity	41	%
Pressure	886	mb

Background air pollution indicators
 Mercury pollution level (ng/cub.m)

0	1	1	0	1	1	0	0	1	0
4	5	5	4	4	4	4	3	3	3

Air pollution by mercury in Medesy Dental Clinic, c. Yerevan, July 2012



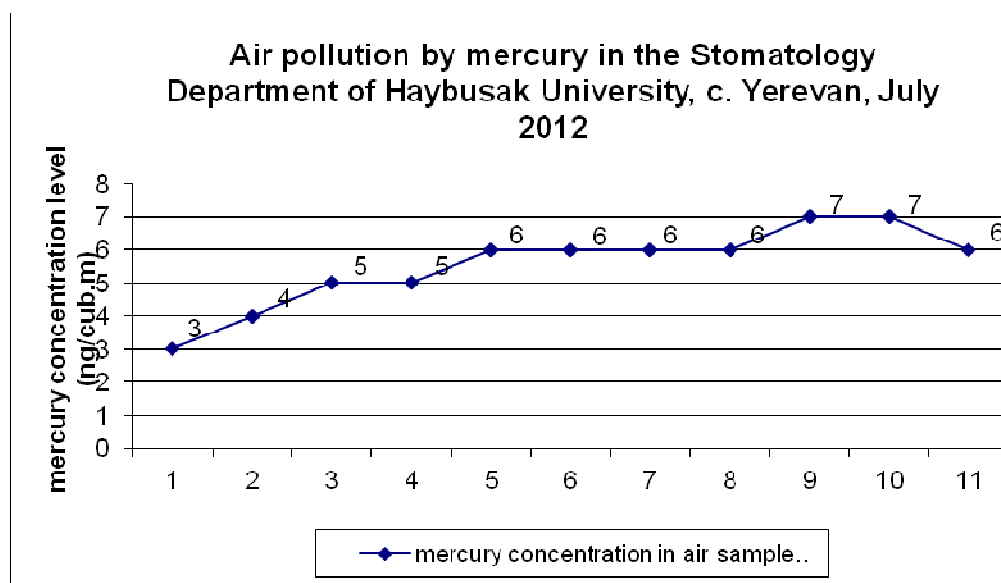
Sampling site Stomatology Department of Haybusak University, c. Yerevan
Sampling date 20.07.2012
Hour 16:00
Researcher's name, surname Qnarik Grigoryan

Weather parameters

Air temperature	31.2	°C
Wind velocity	0.0	m/sec
Air relative humidity	44.2	%
Pressure	890.7	mb

Background air pollution indicators
 Mercury pollution level (ng/cub.m)

0	0	1	1	1	0	0	1	1	1	0
3	4	5	5	6	6	6	6	7	7	6



6. Nubarashen city dumpsite and landfill: The measurement of mercury in the air revealed alarming levels of up to 218 ng/m³.

Nubarashen City Dumpsite

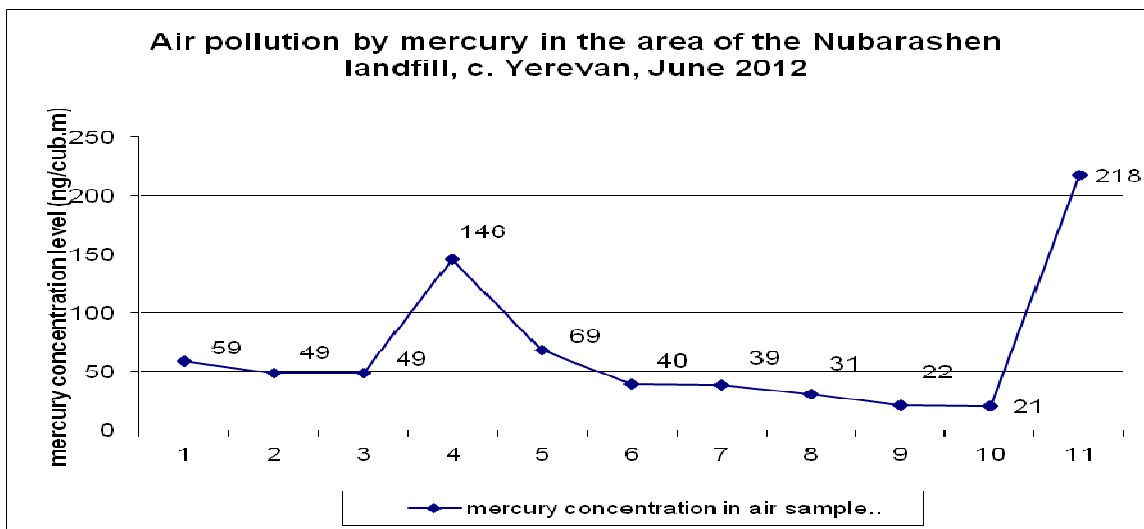
Sampling site Nubarashen landfill, c. Yerevan
Sampling date 22.06.2012
Hour 13:00
Researcher's name, surname Qnarik Grigoryan

Weather parameters

Air temperature	27.4	°C
Wind velocity	1.4	m/sec
Air relative humidity	39.6	%
Pressure	880.2	mb

Background air pollution indicators
 Mercury pollution level (ng/cub.m)
 Mercury pollution level (ng/cub.m)
 Mercury pollution level (ng/cub.m)

2	1	0	0	0	1	1	0	0	0	1
9	11	9	15	14	15	9	13	14	15	15
68	30	28	49	28	78	82	59	64	60	62
59	49	49	146	69	40	39	31	22	21	218



7. Nubarashen Burial Site of banned and obsolete POPs: The measurements showed no significant increase in the level of mercury in the air (up to 7 ng/m³), however, no measurement has ever been taken in the soil or water in the burial site.



Sampling site Burial site of obsolete and banned pesticides, c. Yerevan
Sampling date 27.026.2012
Hour 17:00
Researcher's name, surname Qnarik Grigoryan

Weather parameters

Air temperature	25,1	°C
Wind velocity	4.5	m/sec
Air relative humidity	46	%
Pressure	855.3	mb

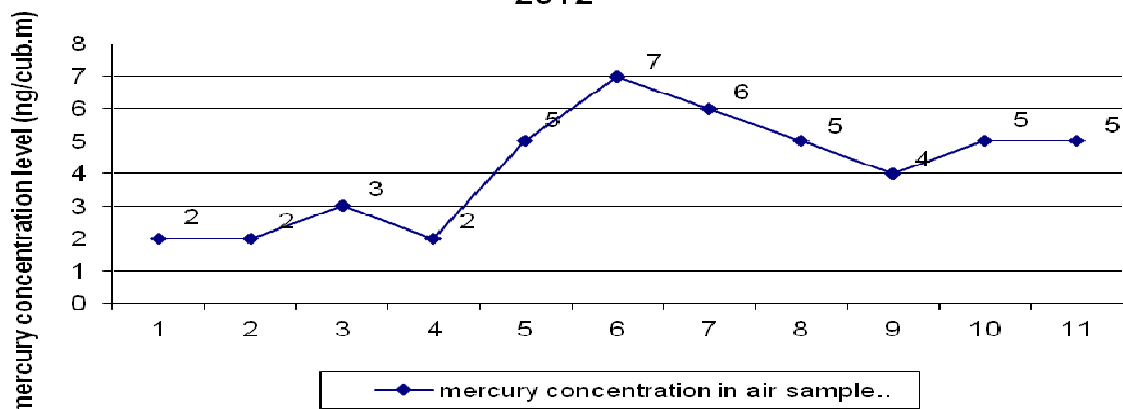
Background air pollution indicators

Mercury pollution level (ng/cub.m)

Mercury pollution level (ng/cub.m)

0	1	2	1	1	2	2	1	1	1	1
0	0	1	1	0	1	1	0	1	1	1
2	2	3	2	5	7	6	5	4	5	5

Air pollution by mercury in the area of the burial site of obsolete and banned pesticides of Yerevan, June 2012



8. Tailing at gold mine in Sotq village, Gegharkunik province: while the background level measured from 0 to 1 ng/m³, the measurement at the tailing was up to 11 ng/m³.



Sampling site

Sampling date

Hour

Researcher's name, surname

Weather parameters

Former tailing dump of Sotq gold mine

18.06.2012

14:45

Qnarik Grigoryan

Air temperature	16,7	°C
Wind velocity	0,6	m/sec
Air relative humidity	51.8	%
Pressure	789,5	mb

Background air pollution indicators

Mercury pollution level (ng/cub.m)

Mercury pollution level (ng/cub.m)

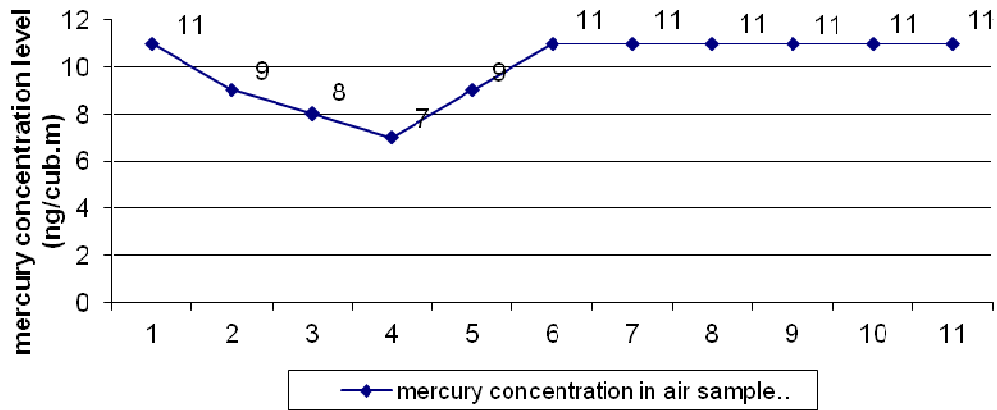
Mercury pollution level (ng/cub.m)

Mercury pollution level (ng/cub.m)

Mercury pollution level (ng/cub.m)

0	0	1	0	0	0	1	1	0	0	0
1	2	2	3	3	3	2	3	3	2	3
4	5	5	5	6	7	6	7	5	7	7
8	7	8	7	8	8	8	8	7	8	8
11	9	8	7	9	11	11	11	11	11	11

Air pollution by mercury in the area of the former tailing dump of Sotq gold mine, Gegharkunik province, June 2012



9. Laser Technological Systems (LATES) Ltd., office space rented in the building of Yerevan State University: The result showed an average of 350 ng/m³, with single measurements going up to 1400 ng/m³.



Sampling site LATES
Sampling date 24.08.2012
Hour 13:20
Researcher's name, surname Qnarik Grigoryan
Weather parameters

Air temperature	28.9	°C
Wind velocity	0	m/sec
Air relative humidity	41.9	%
Pressure	898.6	mb

Background air pollution indicators (ng/cub.m)

Hg pollution, room 1
 Hg pollution, room 2
 Hg pollution, room 3

	0	1	3	8	6	8	11	5	3	4	5
Hg pollution, room 1	108	165	315	351	377	291	258	236	248	244	143
Hg pollution, room 2	159	160	158	164	164	167	174	180	186	194	190
Hg pollution, room 3	327	115	123	203	109	190	154	170	186	191	192

10. Alikhanyan Street, Yerevan, residential area (basements and apartments): The result was an alarming level of up to 1470 ng/m³ in the basement while the air inside the apartment on the first floor measured round 4 ng/m³.



Short case summary:

The residents sometimes keep discarded products that



have come out of the use in the basements before disposal. AWHHE measured levels of mercury in one of the residential areas of Yerevan, at 3 Alikhanyan Street. Background mercury pollution near the building varied within 0-2 ng/m³ level. On the top of the staircases to the basements, mercury air pollution was 2 ng/m³; down the stairs the mercury level increased to 6 ng/m³ reaching the maximum level of 150 ng/m³ at the cellar doors.

At the opening of the cellar door, the measurement reached 240 ng/m³. Inside the cellar, the level increased reaching 1470 ng/m³ at the shelves where broken fluorescent lamps were found, kept there for a number of years. The residents were surprised to find out that the fluorescent lamps were the source of air pollution. Although the level of mercury in the 2nd floor apartments was low (2-3 ng/m³), presumably due to good isolation, the polluted air could easily enter the apartment through the open door or windows while “airing” the rooms. It could also come up through the floor. The children in this building could be at risk of mercury poisoning.



Annex: Abbreviations

AWHHE	Armenian Women for Health and Healthy Environment NGO
EEB	European Environmental Bureau
EECCA	Eastern Europe, Caucasus and Central Asia
EMEP	The Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe
INC	International Negotiating Committee
MPC	Maximum Permissible Concentration
POPs	Persistent Organic Pollutants
SAICM	Strategic Approach to Integrated Chemicals Management
UNEP	United Nations Environment Programme
ZMWG	Zero Mercury Working Group