Fact Sheets

Mercury Monitoring on Open Dumping Sites and Open Burning

Technical Background

UN environment programme

1972-2022

1992-2022
IETC 30th anniversary

International Environmental Technology Centre (IETC)
Economy Division
United Nations Environment Programme (UNEP)

This project was funded by Government of Japan.

Dandora Landfill site ©UNEP

Introduction

Open dumping is one of the traditional and normal waste disposal operations because at least 3 billion people worldwide still lack access to controlled waste disposal sites. Waste disposal in low and lower-middle income countries is often in the form of uncontrolled dumpsites with open burning. While open burning contributes to a reduction of the volume of waste on open dumping sites, it causes emitting toxins, such as dioxins and furans as well as mercury and other hazardousness. Pollution cost caused by environmentally unsound management, including open dumping and burning of waste is about USD 215 billion annually. We should not continue environmentally unsound management of waste to prevent human health and the environment.

The Conference of the Parties (COP) to the Minamata Convention at its first session in 2017 adopted the decision on mercury emissions related to the open burning of waste (MC-1/14). Based on the decision, UNEP conducted the project activity on mercury monitoring on open dumping sites and open burning of Nkol Fouzlou and Bafia landfill sites in Cameroon, Bantar Gebang landfill site in Indonesia, Dandora landfill site in Kenya, Htein Pin landfill site in Myanmar and Gosa landfill site in Nigeria with the financial and technical support from the Ministry of the Environment, the Government of Japan (MOEJ).

These fact sheets provide a technical background of Mercury Monitoring on Open Dumping Sites and Open Burning conducted by UNEP-IETC and MOEJ. All information and data were quoted from the project reports on Demonstration of Mercury Monitoring Survey in Developing Countries for Survey and Analysis of Mercury Monitoring Status in Neighboring Countries and Capacity Strengthening Supports produced by MOEJ.

Htein Bin Landfill site ©UNEP

Monitoring and analytical methods

1. Mercury in ambient air

Ambient mercury concentration was analyzed at/around waste management facilities/waste burning sites as part of the demonstration by using the portable mercury analyzer. In addition, ambient air sampling was conducted by the gold amalgam trap method, the Japanese standard method. The numbers of samples that were used for data analysis were 9 for Nkol Fouzlou and Bafia (Cameroon), 10 for Bantar Gebang (Indonesia), 10 for Dandora (Kanya), 10 for Htein Pin (Myanmar) and 7 for Gosa (Nigeria). Note that the smallest and highest data were removed as outliers in the data. The box and whisker plot indicates the first quartile at the 25th percentile, the median and the third quartile at 75th percentile with the minimum and maximum data which were used for analysis.

2. Mercury in emission flux

Mercury flux emitted from the surface of waste disposal sites at the unit area in unit time was analyzed by the portable mercury analyzer on sites. The numbers of samples that were used for data analysis were 2 for Nkol Fouzlou and Bafia (Cameroon), 3 for Bantar Gebang (Indonesia), 3 for Dandora (Kanya), 3 for Htein Pin (Myanmar) and 3 for Gosa (Nigeria).

3. Mercury in water

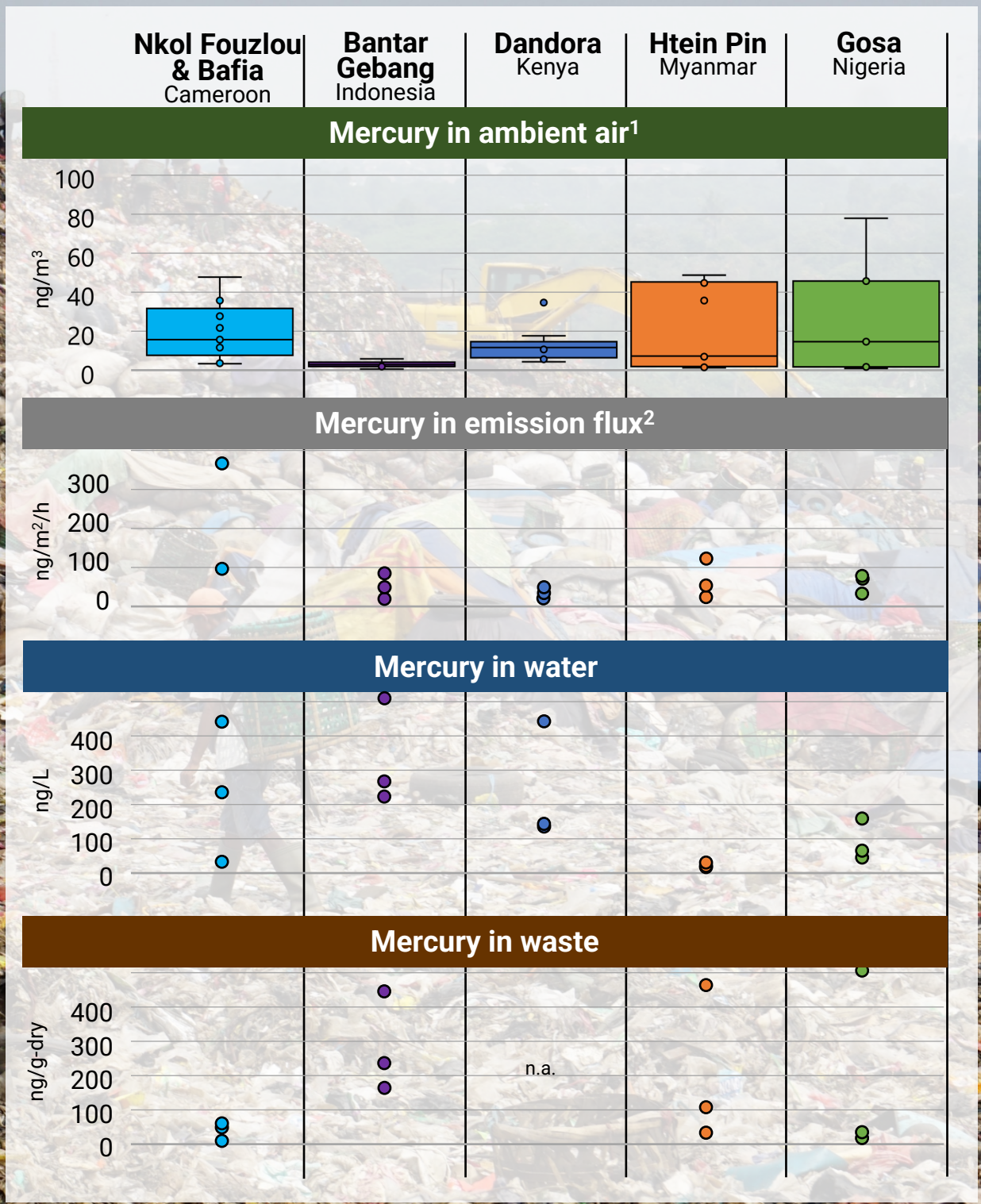
Sample of leachate water from the monitoring sites were collected randomly, and total mercury in samples were analyzed. The numbers of samples that were used for data analysis were 3 (leachate) for Nkol Fouzlou and Bafia, 3 (raw water tank, aeration tank and final storage tank) for Bantar Gebang (Indonesia), 3 (leachate and river flowing leachate for Dandora (Kanya), 3 (leachate) for Htein Pin (Myanmar) and 3 (leachate) for Gosa (Nigeria).

4. Mercury in waste

Sample of leachate water from the monitoring sites were collected randomly, and total mercury in samples was analyzed. The samples were mainly composed of food waste, papers, plastics, cloth, textile, plant, non-combustibles, such as metals glasses, etc. and others, and mercury-added products were not found in the samples. The numbers of samples that were used for data analysis were 3 each for Nkol Fouzlou and Bafia (Cameroon), Bantar Gebang (Indonesia), Htein Pin (Myanmar) and Gosa (Nigeria). Although the waste samples were collected at Dandora (Kenya), the import of the samples to Japan was not possible and data was not available.

Htein Bin Landfill site ©UNEP

Results



1: Median on mercury in ambient air were 17.00 ng/m^3 for Nkol Fouzlou snd Bafia, 4.25 ng/m^3 for Bantar Gebang, 13.00 ng/m^3 for Dandora, 8.65 ng/m^3 for Htein Pin and 16.00 ng/m^3 for Gosa. When sampling and monitoring at each site were conducted, open burning was being occurred only at the Dandora Landfill site.
2: Mercury monitoring in ambient air and emissions flux were conducted on waste dumped on the site less covered by soil.

Bantar Gebang Landfill site ©UNEP

Findings

1. Mercury in ambient air

Mercury in ambient air: Mercury emission levels were detected between 2 - 79 ng/m^3 on the 5 landfill sites. The results survey were lower than the guideline value for ambient air for the workplace environment by the WHO Europe (1 µg/m^3 inside rooms and 200 ng/m^3 for long-term tolerable inhalation exposure). Although mercury emissions from the landfill sites are low, such a low concentration of mercury is emitted all the time.

2. Mercury in emission flux

Mercury levels in flux emission were detected between 20 - 370 ng/m^2/h on the 5 landfill sites. Landfill sites were covered by various kinds of wastes, such as plastics, which led to the difficulty of identifying the cause of mercury emission from the landfill sites. One possibility is that waste which was dumped before and located at the deep waste layer would be a source to emit mercury.

3. Mercury in water

Mercury levels in water such as leachate were detected between 6 - 510 ng/L. Those results are below Japan's effluent standard of 5,000 ng/L. The total mercury release from the facilities could not be calculated as the total water effluents were unknown. It can be, however, assumed that the mercury impacts to neighbors are not likely as the leachate in the facility is already low.

4. Mercury in waste

Mercury levels in waste were detected between 7 - 530 ng/g. Mercury-added products as waste, such as florescent lamps, had not been found in the samples collected on the sites during the surveys; however, mercury would become from waste mixed with various wastes and would be absorbed from mercury once emitted from waste.

It is important to continue mercury monitoring relating to waste, in particular open dumping and open burning since all mercury we use ends up at landfill sites if we do not implement environmentally sound management of mercury waste pursuant to the Minamata Convention.

Dandora Landfill site ©UNEP

Nkol Fouzlou , Cameroon[3]

Established	1994
Area	560,000 m^2
Waste disposal / day	1,000 tonnes
Waste pickers	80
Survey date	February 2019

3: Background information of the open dumping site in Bafia is not available.

Bantar Gebang, Indonesia

Established	1989
Area	1,100,000 m^2
Waste disposal / day	7,000 tonnes
Waste pickers	6,000
Survey date	July 2018

Htein Pin, Myanmar

Established	2001
Area	61,000 m^2
Waste disposal / day	1,300 tonnes
Waste pickers	100
Survey date	January 2019

Dandora, Kenya

Established	1980's
Area	121,000 m^2
Waste disposal / day	2,000 tonnes
Waste pickers	6,000
Survey date	November 2019

Gosa, Nigeriaz

Established	1982
Area	908,000 m^2
Waste disposal / day	1,000 tonnes
Waste pickers	1,000
Survey date	January 2020

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