

Contaminated site: Vlora Mercury Hot Spot in Albania

IPEN Mercury-Free Campaign Report

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Introduction

In 2009, the Governing Council of the United Nations Environment Programme (UNEP GC) decided to develop a global legally binding instrument on mercury to reduce risks to human health and the environment (UNEP GC25/5). The UNEP GC noted that mercury is a substance of global concern due to its long-range transport, persistence, ability to bioaccumulate, and toxicity. Its conclusions were based in part on the 2002 UNEP Global Mercury Assessment which noted that mercury is present in fish all over the globe at levels that adversely affect humans and wildlife. (UNEP 2002)

This report focuses on an abandoned chlor-alkali and PVC plant in Vlora, Albania. The chlor-alkali industry produces chlorine gas and alkali (sodium hydroxide) by a process that applies electrolysis to saltwater. Some chlor-alkali plants use a mercury-cell process in which mercury is used as the electrolysis cathode. This occurred at the Vlora facility. Mercury-cell chlor-alkali plants consume large quantities of mercury and are very polluting. A single mercury-cell plant may contain hundreds of tons of elemental mercury for use in production and may have even more mercury in its warehouses to replenish lost mercury. In the case of Vlora, the former chlor-alkali factory dumped directly into the Bay and was abandoned in 1992 leaving a grossly contaminated site.

We examined levels of mercury in fish caught in the near Vlora Bay to confirm whether this contaminated site resulted in food source contamination of fish. In addition, since local mercury releases become global problems due to long range transport we considered how the draft treaty text will address contaminated sites such as Vlora.

Materials and methods

Eden Center conducted fish sampling of cod (11 samples) and mullet (3 samples) in collaboration with local fisherman using protocols developed by the Biodiversity Research Institute (BRI 2011). BRI measured mercury levels (total mercury content = THg) in fish samples in their laboratory in Gorham, Maine, USA. Eden Center characterized the site and provided information about its history and presumptive mercury sources.

Results and discussion

Vlora Bay is part of the Adriatic Sea and located in the southwestern part of Albania. The former chlor-alkali and PVC plant in Vlora (known as the Soda PVC plant) is the most significant source of mercury contamination in Vlora Bay. The plant started operation in 1967 and used a mercury cell process to produce caustic soda and PVC. At its peak, the plant produced 24,000 tonnes of calcinate soda, 15,000 tonnes of caustic soda, and 10,000 tonnes of PVC. Soda PVC Plant discharged its waste directly into Vlora Bay and also dumped polluted sludge on a site near the seashore. The plant was closed in 1992 and its buildings have been completely destroyed since that time. However, the dumped sludge remains near the shore with no precautions taken to prevent further contamination of the Bay or nearby residents. In

2002, an identification mission of UNEP/MAP (GEF Project GF/ME/6030-00-08) identified this area as a “hot spot” after a soil sample found mercury levels greater than 10,000 ppm in the area of the former plant - 1,000 times greater than typical EU thresholds.

Vlora Bay is an important fishing area and fish from the area are distributed to all cities in Albania. For this study, two fish species were sampled: mullet (*M. surmuletus*) and cod (*Merluccius merluccius*). Table 1 shows the levels of mercury (Hg) in each type of fish.

Table 1: Mercury content of fish sampled in Vlora Bay

	Sample Size	Hg Mean(ppm, ww)	St Dev	Min Hg (ppm)	Max Hg (ppm)	Reference dose ^a (ppm)	Fraction over Ref. Dose	Limit ^b (ppm)
All fish samples	14	0.285	0.227	0.112	0.961	0.22	50%	0.5
Cod fish	11	0.195	0.076	0.112	0.343	0.22	36%	0.5
Mullet fish	3	0.617	0.309	0.365	0.961	0.22	100%	0.5

Abbreviations: Hg, mercury; ppm, parts per million or mg/kg; ww, wet weight; min, minimum; max, maximum

Table 1 shows that average mercury levels in mullet are 2.8 times higher than the US EPA reference dose of 0.22 ppm. The maximum mercury values observed in mullet are more than four times higher than the reference dose. Two of the mullet samples also exceeded the EU limit (data not shown). Four of the cod samples also exceeded the reference dose as indicated by for example the maximum mercury value. Other studies have also found high mercury levels in fish in this area. In the 1990s, mercury levels of 0.14 ppm - 3.39 ppm were found in small sharks (*Galeus melastomus*) from the Adriatic sea (Storelli, Ceci et al. 1998).

Other studies have found mercury contamination associated with the abandoned chlor-alkalki facility in Vlora. For example, Mankolli, Proko (Jazexhiu) et al. (2008) found high mercury levels in plant species at the site and concluded that “...the area presented in the survey requires urgent intervention by means of mid and long term projects, because of the high content of Hg. This area with the high Hg content becomes a cause not only for environmental pollution, but also pollution in animal and human beings...”.

Contaminated sites and the mercury treaty

The Vlora site provokes questions about how the mercury treaty might mandate actions to eliminate mercury pollution of the environment and fish from this contaminated site. As stated by UNEP in Global Mercury Assessment “Highly contaminated industrial sites and abandoned mining operations continue to release mercury.” The report is even more specific

^a Figure derived from the reference dose used as U.S. EPA consumption guidelines for fish (0.2 mg.kg⁻¹ methylmercury) based on the presumption that methylmercury counts for 90% of THg levels, limit value used by Canada is similar . Japan and/or UK use 0.3 reference dose. Source: US EPA (2001). Water Quality Criterion for the Protection of Human Health: Methylmercury. Final. EPA-823-R-01-001, Office of Science and Technology, Office of Water, U.S. Environmental Protection Agency Washington, DC: 303.

^b Limit for mercury in fish issued by EU: European Commission (2001). Commission Regulation (EC) No 466/2001 of 8 March 2001 setting maximum levels for certain contaminants in foodstuffs (Text with EEA relevance). European Commission. Official Journal of the European Communities. EC 466/2001: L 77/71-13. Several other countries use the same limit value UNEP (2002). Global Mercury Assessment. Geneva, Switzerland, UNEP: 258.

in another: „ Contaminated sediments at the bottom of surface waters can serve as an important mercury reservoir, with sediment-bound mercury recycling back into the aquatic ecosystem for decades or longer.“ (UNEP 2002). Contaminated sites also contribute to re-mobilization and re-emissions of mercury, a significant source and pathway of mercury air emissions (Pirrone, Cinnirella et al. 2010); (UNEP Chemicals Branch 2008).

The current treaty text (UNEP (DTIE) 2012) does not require the cleanup of contaminated sites and leaves the matter to voluntary action.^c Considering the lack of action since the Vlora factory closed in 1992, voluntary action to address the Vlora site seems unlikely. In addition, the current treaty text provides no guidance on a health-protective value that defines waste as hazardous (UNEP (DTIE) 2012).^d In the case of Vlora and other contaminated sites, this would be helpful to insure protection of human health and environment from toxic mercury wastes. To prevent similar problems in the future, it would be helpful for the treaty to require the minimization and prevention of generating mercury-containing waste, but the current text does not do this (UNEP (DTIE) 2012).^e Finally, to address the Vlora site and other priority sites like it, funding will be needed by developing and transition countries. However, since the treaty links compliance with funding and since action on contaminated sites is not obligatory, it is likely that no funding will be available through the treaty’s financial mechanism to address Vlora or other similar contaminated sites.

To prevent continuous mercury pollution of sea ecosystems and fish serving as food for the local community and tourists in Vlora it is necessary to prevent further releases from the contaminated area and wastes into the sea. Until this problem is addressed, mercury will continue to contaminate both the local area and contribute to global mercury pollution.

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^c UNEP(DTIE)/Hg/INC.5/3; Article 14 para 1 “Each Party shall endeavour to develop appropriate strategies for identifying and assessing sites contaminated by mercury or mercury compounds.”

^dUNEP(DTIE)/Hg/INC.5/3; Article 14 para 1 “Each Party shall endeavour to develop appropriate strategies for identifying and assessing sites contaminated by mercury or mercury compounds.”

^eUNEP(DTIE)/Hg/INC.5/3; Not present in Article 13 on Wastes

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