

*Technical Background  
Report to the  
Global Atmospheric Mercury  
Assessment*



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## Introduction

At its meeting in 2007, the United Nations Environment Programme (UNEP) Governing Council requested the Executive Director to prepare a report, drawing on, among other things, ongoing work in other forums addressing:

*(a) Best available data on mercury atmospheric emissions and trends including where possible an analysis by country, region and sector, including a consideration of factors driving such trends and applicable regulatory mechanisms;*

*(b) Current results from modeling on a global scale and from other information sources on the contribution of regional emissions to deposition which may result in adverse effects and the potential benefits from reducing such emissions, taking into account the efforts of the Fate and Transport partnership established under the United Nations Environment Programme mercury programme.*

(UNEP GC Decision 24/3)

UNEP cooperated with the Arctic Monitoring and Assessment Programme (AMAP) working group under the Arctic Council to develop a report responding to this request, with the AMAP Secretariat engaged to coordinate the work process. UNEP Chemicals Branch/DTIE has been responsible for the work from UNEP's side. The work includes a summary report for policymakers, 'Global Atmospheric Mercury Assessment: Sources, Emissions and Transport', and a detailed technical background report (this report). The technical background report forms the basis for the summary report to the Governing Council and for parts of the AMAP assessment.

The Arctic Monitoring and Assessment Programme has produced two assessments of heavy metals (including mercury) in the Arctic (AMAP, 1998, 2005) and is currently in the process of preparing an updated assessment of mercury in the Arctic to be delivered to the Arctic Council in 2011. As part of the assessment, a new global inventory of anthropogenic mercury emissions to air should be prepared to update that produced in 2002 (Pacyna et al., 2006). AMAP should also undertake new modeling studies, using the updated inventory, to investigate atmospheric transport of mercury.

AMAP is mandated through the Arctic Council to support the activities under UNEP and other international organizations concerning mercury and persistent organic pollutants. The AMAP Working Group therefore agreed to fast-track its proposed work on mercury emissions and atmospheric transport in order that, in addition to contributing to the 2011 AMAP mercury assessment, it could also provide input to UNEP's 2008 *Global Atmospheric Mercury Assessment* Report, and to the UN ECE LRTAP Hemispheric Transport of Air Pollutants group that would be preparing a separate report on mercury atmospheric transport in 2010.

The report has been prepared by expert groups engaged by AMAP and UNEP. Information submitted by Governments, intergovernmental and non-governmental organizations and available scientific information have been used in preparing the report. It has also made use of information compiled by the UNEP Global Mercury Partnership (Mercury Air Transport and Fate Research partnership area), in particular in relation to natural sources of mercury and mercury emissions from artisanal and small-scale gold mining.

The report has two main parts. Part A addresses mercury emissions to air, updating the global anthropogenic mercury emissions inventory for the (nominal) year of 2005, and presents three emissions scenario inventories for the year 2020. It also covers the work undertaken to geospatially distribute these inventories (within a  $0.5 \times 0.5$  degree global grid) to facilitate

their use as input to atmospheric transport models. The inventory activities expand those conducted in the past by including a first attempt to quantify (at a global scale) emissions associated with intentional use of mercury in products, and their associated entry into waste streams. Part B describes the current state of knowledge concerning atmospheric transport of mercury, with a focus on modeling approaches that can be used to investigate mercury atmospheric transport and fate, source-receptor relationships, and possible effects of changes in emissions. The emissions inventory and modeling components both include a discussion of uncertainties. The estimated ranges of uncertainties associated with current and past inventory estimates are presented so that trends in emissions can be evaluated in an appropriate manner. The information sources used in the preparation of this document are fully-referenced.

# Part A: Global Emissions of Mercury to the Atmosphere

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