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Ad hoc open-ended working group to prepare for the intergovernmental negotiating committee on mercury
Bangkok, 19–23 October 2009
Item 5 of the provisional agenda*

Report on activities under the United Nations Environment Programme mercury programme

Updating the study of mercury emissions prepared by the United Nations Environment Programme

Note by the secretariat

1. By paragraph 36 of its decision 25/5, the Governing Council of the United Nations Environment Programme (UNEP) requested the Executive Director, in consultation with Governments, to update the 2008 report entitled "Global Atmospheric Mercury Assessment: Sources, Emissions and Transport" for consideration by the Governing Council/Global Ministerial Environment Forum at its twenty-seventh session.

2. UNEP will require the assistance of Governments and others to do so. Requests for information will be circulated early in 2010.

3. As part of the 2008 report, experts identified a number of data and information gaps. These are presented in the annex to the present note for the working group's information. Any data that can be provided to fill these gaps would be greatly appreciated.

Recommendations

4. The working group may wish to consider the information gaps identified when developing and submitting information for inclusion in the updated report.

* UNEP(DTIE)/Hg/WG.Prep/1/1.

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Annex

Gaps in knowledge and steps for improvement

1. As part of the process of producing the emissions study for the Governing Council at its twenty-fifth session, UNEP identified a number of areas in which there were gaps in the current knowledge and some steps that would improve the level of knowledge and the process for gathering it.

Current emissions

2. There are emissions that are currently poorly quantified or where varying inventory estimates require further comparison to resolve differences. These include:

(a) Estimates for emissions from artisanal and small-scale gold mining, in addition to the eventual fate of such emissions;

(b) Emissions for the non-ferrous metals sector;

(c) Emissions from mercury consumption in the manufacture of vinyl chloride monomer;

(d) Emissions from the production and use of dental amalgam;

(e) Emissions from biomass burning.

3. Improvements can be made in the accuracy and completeness of the inventory estimates through the efforts described below:

At the country level:

(a) Producing organized measurements focused on improving the quality of emission factors for major source categories and particularly for fossil fuel combustion in large combustion plants (over 350 MWel), waste incinerators, non-ferrous metal smelters, cement kilns and iron and steel foundries. These measurements may include:

(i) Mercury concentrations in flue gases before and after the application of emission control equipment;

(ii) Mercury content in raw materials, such as coal, oil, natural gas, ores and limestone and various wastes, including hazardous, hospital, industrial and municipal wastes.

(b) Gathering more complete information and reporting such to UNEP. The toolkit for identification and quantification of mercury releases should be employed and more accurate data and information should be provided concerning:

(i) Industrial technologies for the production of energy and industrial goods, such as chlor-alkali, ferrous and non-ferrous metals and cement;

(ii) Type and efficiency of mercury emission control measures;

(iii) Changes of industrial technologies and emission control measures over time;

(iv) Changes in various uses of mercury, particularly in chlor-alkali plants and vinyl chloride monomer, among others.

(c) Gathering and reporting information needed for the spatial distribution of mercury emissions with a focus on:

(i) Geographical location of major point sources, emission quantities, geometric height of the source and temperature of the flue gases;

(ii) Chemical and physical speciation of emitted mercury.

At the international level:

(d) Improving the accuracy and completeness of emission factor data available in emission factor guidebooks by including information from individual countries;

(e) Improving information on statistical data for consumption of raw materials and production of industrial goods together with major fuel types and industrial technologies;

(f) Improving existing toolkits by gathering information available from various decision support systems, such as that developed within European Union projects to support implementation of the relevant European legislation.

Improvement of information on future emissions

4. Significantly improved information is necessary for predicting mercury emissions in the future. Information presented in the emissions report should be regarded as a first step towards achieving mercury emission scenarios. The development of scenarios for future emissions can be improved through the following efforts:

At the country level:

(a) Improving information on economic indices describing the future development of economies in individual countries, such as indices of industrial production growth, use of fuels for electricity and heat production;

(b) Improving and making available information on national plans for:

(i) Use of mercury in various industrial and commercial sectors;

(ii) Change of fuel types and amounts to meet future energy plans in individual countries;

(iii) Change of industrial technologies to meet future energy and industrial goods demands in individual countries;

(iv) Change of emission control technology types and mercury control efficiencies in individual countries.

At the international level:

(c) Improving information on targets of emission reductions under various international conventions, emission reduction agreements and protocols to develop emission scenarios for various regions and the planet as a whole;

(d) Gathering information on emission scenarios for other pollutants relevant for the development of mercury emission scenarios, e.g., for greenhouse gases and acid rain generation agents. This information should be analysed with the purpose of using it in the development of mercury emission scenarios;

(e) Improving information on historical trends of mercury emissions in various geographical regions to assess indicators for the development of emission scenarios, particularly for sources, such as artisanal gold production and other uses of mercury in commerce.

Atmospheric fate and transport of mercury

5. Gaps were identified in the atmospheric fate and transport of mercury, including the application of models to investigate the mercury cycle, atmospheric transport and source-receptor relationships. The needs to fill the knowledge gaps identified are for:

(a) Improved identification of key chemical processes; for example to resolve questions concerning reactions involving O3 + Hg, OH + Hg and Hg + Br, both in gas and aqueous phase; and to answer questions concerning the further fate of the initially formed intermediates and their possible reduction reactions, to solve questions concerning the chemical lifetime of gaseous elemental mercury in the atmosphere;

(b) Improved information on seasonal variation in emissions and better differentiation between gaseous elemental mercury, reactive gaseous mercury and total particulate mercury;

(c) Improved information on natural emissions and, in particular, re-emissions;

(d) Identification of the actual compounds that make up primary emitted reactive gaseous mercury and total particulate mercury and photochemically-formed reactive gaseous mercury and total particulate mercury. Kinetic data, particularly for formed products, is also required;

(e) Improved data for determining phase transition, including Henry's law constants for reactive gaseous mercury species and their temperature dependence using the Clausius-Clapeyron equation;

(f) Improved data to determine deposition velocities for gaseous elemental mercury, reactive gaseous mercury and total particulate mercury to vegetation and other surfaces;

(g) Improved information on heterogeneous chemistry, including surface oxidation of gaseous elemental mercury and surface reduction of reactive gaseous mercury and total particulate mercury;

(h) Improved information on atmospheric mercury and its fate in the tropics, where hydrology, soils and vegetation, productivity and rates of biogeochemical cycling are vastly different to temperate or polar environments where most of the high-calibre research has been undertaken.