

POPs Monitoring Strategy and Related Activities by the Ministry of the Environment, Japan in 2005

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The number of industrially produced chemical substances is estimated to be in the tens of thousands. Chemical substances have become indispensable in our daily lives, but they may also affect human health and the ecosystem, depending on the method employed for their production, use and disposal. Indeed, dioxins, PCBs, endocrine disruptors and other substances have caused serious social problems.

In Article 16 of Stockholm Convention for the global elimination of Persistent Organic Pollutants (POPs), it is written that "comparable monitoring data" reported by the Parties will be used for the "effectiveness evaluation of the Convention". A detailed evaluation scheme will be decided by the Conference of the Parties, but various technical aspects of this POPs monitoring were discussed by the international experts at UNEP Chemical's workshop on the development of Global POPs Monitoring held in Geneva in March 2003, and the guidance documents for the monitoring were prepared based on the results of the workshop.

The Ministry of the Environment (MOE), Government of Japan, has been conducting successive investigations on the persistence of chemical substances including major POPs in Japan in the general environment since 1974 and has published the results in "Chemicals in the Environment." The newest one is "Chemicals in the Environment 2004" which compiles the results of environmental surveys of FY2003. We hope that those concerned with this issue will utilize this report and that the information provided will be helpful for the protection of human health and environment.

Originally a conventional GC/ECD method had been employed for the analysis of organochlorine chemicals (OCs) in biological samples. Then a GC/MS (low resolution) was introduced for OCs analysis in sediments and water, and GC/high resolution(HR)-MS method was introduced for dioxins analysis from around 1990. Due to general decline of POPs levels in the environment, the number of ND (not detected = less than detection limits) data had been increasing, and it became difficult to extract trends from the monitoring data. So in 2002, MoE decided to reorganize the environmental monitoring framework in order to respond to the request of POPs convention, and re-started POPs monitoring by using more sensitive GC/HR-MS method for the analysis of nine POPs chemicals (dioxins and furans have already been monitored by the method; toxaphene is analyzed by GC/negative ionization-MS). The purpose of this reorganization is to reveal present POPs levels in Japan as a basis to judge the effectiveness of the measures/countermeasures taken by the Government for POPs convention.

Briefly the results of the previous POPs monitoring based on conventional analytical methods for more than two decades are summarized as follows;

- 1) Dioxin levels (including furans and co-PCBs) in the air decreased to one fifth in average from 1997 to 2001. The decrease coincides well with the decrease of estimated national emission inventory (one fourth from 1997 to 2001).
- 2) The dioxin levels in the air tend to be higher in densely populated areas than rural / remote areas.
- 3) The dioxin levels in water decreased to half from 1998 to 2001, while the estimated emission inventory decreased to one third during the period.
- 4) The dioxin levels in sediments and soils did not show clear decreasing trends during the period between 1998 and 2001.
- 5) PCB levels in fishes (sea bass) in Tokyo Bay and Osaka Bay tended to be higher than fishes in other places. They showed large variance from year to year but showed no clear temporal trends during a quarter of century.
- 6) HCB, Aldrin and Endrin were not detected in many of the biological samples in recent years. Dieldrin was

detected only in limited numbers of samples, including mussels and sediments.

7) DDTs were detected in many biological samples. The dominant compound, *p,p'*-DDE, showed general decreasing trends in fishes and bivalves in Western Part of Japan while the clear temporal trends could not be observed in those in Eastern Japan.

8) Chlordane levels were relatively higher in fishes caught in Tokyo and Osaka Bays than in other coastal region. They showed general decreasing trends in recent years. Their levels in sediments also tend to be higher in coastal environment in densely populated areas.

9) Heptachlor was detected in only limited number of samples while mirex and toxaphene were not detected.

Briefly the FY2003 Monitoring Investigation are summarized as follows;

1. Purpose of the survey

The purpose of this survey is to conduct on an annual basis the monitoring of target substances included in the POPs Treaty and other substances that may be candidates for target substances of the Treaty; highly persistent substances for which environmental standards are not yet established and a grasp of their annual environmental status is required among Class 1 & 2 Specified Chemical Substances and Designated Chemical Substances specified in the Chemical Substances Control Law in Japan.

2. Surveyed substances

In the FY2003 Monitoring Investigation following 11 substances (groups) totaling 40 substance-media, which had been discussed and selected from among the priority substances and media at the FY2003 Expert Group on Substance Selection for the Comprehensive Survey of Chemical Substances on Environmental Safety, were surveyed. Among them, PCBs, HCB, aldrin, dieldrin, endrin, DDTs, chlordanes, heptachlor, toxaphene, and mirex are included in the target substances of the POPs Treaty. Monitoring of *trans*-heptachlor epoxide, *cis*-heptachlor epoxide, toxaphene (3 isomers), mirex, γ -HCH, δ -HCH (all media of substances mentioned above), DBT, DPT, MPT, tetrabromobisphenol A (bottom sediment and wildflie), α -HCH, and β -HCH (air) were started in FY2003.

3. Method of assessment

The General Inspection Survey was reexamined in FY2001 and the system of the survey was modified in FY2002. Thus, continuity of the survey has been studied, comparing the target substances, survey areas and quantitation limits before and after the modification in FY2002. Subsequently, change of the residual levels of each substance was evaluated based on the results of continuity investigation. In the FY2003 survey, change of the levels of each substance was also evaluated based on the assessment policy of FY2002.

[The policy of FY2002 assessment]

Monitoring Investigation has been conducted for a long period of time, during which many changes and modifications have been made. Consequently it is difficult to treat the data obtained during the initial years with the survey results in recent years as consecutive values. However, it might be possible to assess the surveyed values with continuity if they are limited to certain periods. The tendency of the survey results during a certain period of time is first assessed for each substance and medium. Next, the tendency of the total period as a whole was assessed.

4. Outline of the FY2003 survey results

In this survey 2 substances of heptachlor (*cis*-heptachlor epoxide, *trans*-heptachlor epoxide), 3 substances of toxaphene (Parlar-26, Parlar-50, Parlar-62), mirex, 2 substances of HCHs (γ -HCH, δ -HCH), 3 substances of organotin compounds (monophenyltin compound, dibutyltin compound, diphenyltin compound) and tetrabromobisphenol A were added as target substances. The FY2003 survey was conducted, as in the FY2002 survey, with high sensitivity analytical methods. Consequently, all POPs, except toxaphene in surface water and bottom sediment, were detected in all of the surveyed substances and media.

MoE also conducted efforts to support implementation of POPs convention and establishment of regional framework for the convention. MoE hosted the 1st and the 2nd Workshops on POPs monitoring in East Asian countries in December 2002 and 2003, respectively. The workshop was intended as a forum for the discussion and information exchange on POPs monitoring among countries in the region, and the proceedings of the 1st workshop was distributed at the UNEP Chemicals workshop in Geneva, and also at INC-7 in Geneva. In January 2005, we had a technical meeting with experts from several countries in Japan, and agreed to conduct sampling in three countries: Republic of Korea, Viet Nam, and Indonesia. The project is now in trial phase, and we manage with air sampling in above countries.

We continue to provide technical support for sampling, support the analysis of samples collected in the region by offering training for POPs analysis and contribute to data validation.

