



XA0404115

TITLE: QUANTITATIVE EVALUATION OF ENVIRONMENTAL FACTORS INFLUENCING THE DYNAMICS OF MERCURY IN THE AQUATIC SYSTEMS

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HIGHLIGHTS AND ACHIEVEMENTS:

1. Analytical Procedures for Mercury Determination:

The development of a combined mercury extraction – speciation technique for total mercury and methylmercury determination in various biological and environmental media have been established to study and evaluate environmental factors influencing the dynamics of mercury in aquatic systems.

Comparability studies of the results from the conventional and radiochemical techniques were planned for the 1st year of the CRP. Validation of the radiochemical method will be undertaken during the current CRP because of constraints in obtaining the appropriate radiotracers. The use of radiotracer techniques will be undertaken to investigate the generation and distribution of methylmercury in the river water – sediment systems using ^{203}Hg .

The improved conventional analytical procedure uses the cold vapor atomic absorption spectrometry for the determination of total mercury in biological and environmental samples. For methylmercury determination, samples are analyzed using combined techniques of dithizone extraction and gas chromatography with electron capture detection.

2. Technical collaboration with CRP members and other countries:

The NIMD which has been designated as a WHO Collaborating Center for Study on the Health Effects of Organic Mercury has provided technical and scientific assistance to developing countries including three CRP members (Tanzania, Philippines, Slovenia, Indonesia, Brazil, Vietnam and China).

The collaborative work with Tanzania focused on the environmental transformation of mercury released from gold mining operations. The dispersion and transformation of mercury in gold mining fields in the Lake Victoria was investigated through field and laboratory studies. River sediment, gold ore tailing, fish and lichens were analyzed for their mercury levels. The presence of the mercury gradient in the lichens surrounding the mine connotes that lichens could be used as a suitable bio-indicators for the assessment of atmospheric mercury pollution.

Health research studies on the human exposure to mercury in mining operations in the Philippines were undertaken in collaboration with NIMD. Fifty-three volunteers were

evaluated for mercury exposure through the determination of mercury levels in blood, hair and urine. Environmental samples such as air, water, sediment and fish were analyzed for total mercury.

3. The 6th international Conference on Mercury as a Global Pollutant(6th ICMGP):

Results/findings of the collaborative research studies undertaken by the NIMD were presented during the 6th ICMGP, including works done with local counterparts and three CRP members (Tanzania, Philippines, Slovenia)

4. Publications:

A research paper on the collaborative research work done with Tanzania was recently published in an international scientific journal.

5. Programme of work for 2001-2002:

The programme of work for the next CRP will focus on the following research outputs:

- Definition of physico-chemical variables in transformation studies (methylation, demethylation and reduction) in aquatic systems.
- Evaluation of relevant factors influencing mercury methylation and partitioning in ecosystems.
- Validation and application of combined extraction – speciation techniques for the measurement of mercury fluxes in water-sediment systems.
- Evaluation of human exposure to mercury using bio-indicators.
- Comparative studies on the effects of salinity on mercury transformation and partitioning.
- Comparison of results for mercury methylation and distribution in aquatic systems using radiochemical and conventional analytical techniques.