

The Fifth Senior Technical Managers' Meeting
of the Acid Deposition Monitoring Network
in East Asia
28-30 September 2004, Niigata, Japan

REPORT OF THE MEETING

I. Introduction

1. The Fifth Senior Technical Managers' (STM) Meeting of the Acid Deposition Monitoring Network in East Asia (EANET) was held in Niigata, Japan on 28–30 September 2004. The Acid Deposition and Oxidant Research Center (ADORC) as the Network Center for EANET organized the meeting, in collaboration with United Nations Environment Programme Regional Resource Centre for Asia and the Pacific (UNEP RRC.AP) serving as the Secretariat for EANET, and in cooperation with the Ministry of Foreign Affairs and the Ministry of the Environment of Japan, Niigata Prefecture and Niigata City.
2. The Meeting was attended by senior technical managers from eleven participating countries, namely, Cambodia, China, Indonesia, Japan, Lao P.D.R, Malaysia, Mongolia, Philippines, Russia, Thailand and Viet Nam, who are responsible for technical issues on EANET activities in each country. The Republic of Korea could not send its representative. The representative of Myanmar attended the meeting as an observer.
3. The Meeting was also attended by experts from Japanese universities, research institutes, local governments and relevant bodies as resource persons. Researchers of relevant institutes in Niigata were invited as observers to the Meeting.
4. The list of participants is attached as Annex.

II. Opening of the Meeting (Agenda Item 1)

5. The session was opened by the Secretariat of EANET, Dr. Jiang Wei, Coordinator delivered the opening address.
6. Dr. Tsumugu Totsuka, Director General of ADORC, made the introduction of the Meeting organization.

III. Election of the officers (Agenda Item 2)

7. Ms. Veronika Ginzburg from Russia and Mr. Zheng Haohao from China were elected as co-chairpersons of the Meeting.

IV. Adoption of the agenda (Agenda Item 3)

8. The Meeting adopted the agenda as proposed by the Network Center (NC).

V. Review of the recent scientific and technical activities of EANET (Agenda Item 4)

9. NC presented a brief report on the scientific and technical activities of EANET since the Fourth Session of the STM Meeting. The progress and important achievements of EANET were introduced. The necessity of closer coordination was pointed out for the submission of monitoring data and technical assistance.
10. NC introduced the overview of the questionnaire survey on the national training activities in the participating countries in 2003 including the contents of the training.
11. Ms. Adelaida Roman, Programme Officer of the EANET Secretariat, made a presentation on outcomes of the First Session of the Working Group for Future Development of EANET (WGFD) held on 19-20 August 2004. The contents of draft Terms of Reference and draft Work Plan of WGFD were introduced as well as reporting on performance of the Secretariat and NC. The discussion on the draft Work Program and Budget for EANET in 2005 was overviewed with special emphasis to preparation of the first periodic report on the state of acid deposition in East Asia and topics on EANET budget.

VI. Overview of the EANET activities of the participating countries presented by the Network Center and the participating countries (Agenda Item 5)

12. NC presented an overview of national monitoring plans in the participating countries based on the information for 2003. Lao PDR reported the first national monitoring plan.
13. The participating countries made presentations on the EANET monitoring activities in their individual country. Major discussions on this topic included the following:

The importance of promotion of public awareness for the EANET activities, monitoring activities on the acid deposition and its effect on environment was expressed by almost all

the presenters.

i. Cambodia

- It was appreciated for Cambodia to implement and show the first monitoring data for EANET.
- For implementing the activities such as air quality monitoring, survey of acid deposition and promotion of public awareness, Cambodia encountered some constraints like human resource, financial support and analytical equipment.
- It was recommended to use photos in order to give information about the location of monitoring site.

ii. China

- Overview of EANET monitoring activities in China was presented. National annual workshop and training programs in China were also presented.
- China introduced that start of filter-pack monitoring in Zhuhai and Xiamen was decided at the annual workshop in March 2004. NC was requested to support Chinese filter-pack monitoring from technical aspect.
- The possibility to establish a new EANET monitoring site among some candidate monitoring sites was clarified.

iii. Indonesia

- The activities of members of national network on acid deposition in Indonesia were introduced with remark on changing the name of EMC. The development of new monitoring sites in Eastern part of Indonesia was pointed as one of the activities of National Center. Also 3 monitoring sites are proposed for soil and vegetation monitoring. The brief information on other monitoring sites in North Sumatra, North Sulawesi and Central Kalimantan was presented.
- It was clarified that the sampling of wet deposition with bulk samplers is performed on the daily basis by trained personal of local authorities. This bulk sampling measurement was established according to the national program to support environmental researches by relevant monitoring data.
- The soil and vegetation monitoring data were submitted to EMC for consideration. After that the data are supposed to be sent to NC soon.

iv. Japan

- Japan introduced the national acid deposition survey conducted since 1983 and the long-term monitoring plan launched from 2003 as well as the national monitoring plan for EANET.
- In particular, Lake Ijira was introduced as a site where a sharp peak of Al discharge

from soil into the river was observed around 1995 in the study of the data obtained in the 20-year survey. The Ministry of the Environment of Japan plans to convey an intensive research in order to examine the cause of the phenomenon by applying catchment analysis if the budget is approved.

v. Lao P.D.R.

- It was appreciated that wet deposition monitoring was started in October 2003 at the interim monitoring site at Science Technology and Environment Agency (STEA). Precipitation amount, pH and EC had been monitored on daily basis.
- Lao PDR requested assistance from NC, EANET secretariat, the participating countries of EANET and other international organizations to implement its monitoring activities due to some constraints on human resources, financial supports and analytical equipments.
- It was pointed out that the duplicate analysis should be recommended as the first step of QA/QC activities.
- The readiness to implement the public awareness activities in cooperation with EANET was expressed.

vi. Malaysia

- Danum Valley was added to the wet and dry deposition monitoring as remote site in 2004. It was clarified that inland aquatic environment monitoring at the Danum Valley was planned and soil and vegetation monitoring is being explored.
- Inland aquatic environment monitoring will start as experimental basis in Semenyih Dam near Petaling Jaya from 2004 and in Danum Valley from 2005.
- In Tanah Rata, SO₂, NO_x, CO and O₃ monitoring using a set of automatic monitors was started in April 2004 and PM₁₀ monitoring using TEOM system began in December 2003.
- It was reported that the data of organic acid in rainwater were reported to NC from 2003.
- Filter Pack stand and holder were upgraded in 2004 for long term monitoring.
- Seasonal variation of SO₂ monitored by passive sampler was discussed.
- The public awareness and training activities in Malaysia continued to be conducted.
- Expert from Malaysia will attend the individual training course of ADORC.

vii. Mongolia

- Overview of EANET monitoring activities in Mongolia was presented. Capacity building and public awareness activities were also presented.
- It was introduced that soil monitoring in Mongolia will be started based on the experiences of the joint study with NC on plant sensitivity to acid deposition.

- Some difficulties and problems were also introduced, such as lack of necessary equipment, problems on repairing equipment, monitoring in winter season, and so on.

viii. Philippines

- It was confirmed that wet sampler and filter pack monitoring system were operated successfully after some repair.
- Current research activity, monitoring of six lakes in San Pablo Laguna, was explained.
- Many training activities were planned and carried out in 2003 and 2004.
- It was clarified that Pandin Lake will be nominated in EANET as a monitoring site for inland aquatic environment in the Philippines, since Mojicap Lake no longer meets the EANET criteria.

ix. Russia

- It was clarified that a new monitoring site for inland aquatic environment, Pereemnaya River, started to operate in 2004.
- It was commented that soil, vegetation and inland aquatic monitoring programmes were planned to start at Primorskaya site in 2005.
- National training activities, which include a number of individual and group training courses, were introduced.
- It was explained that acid deposition brochure was prepared and printed in 2004 in the framework of the joint project with Joetsu Environmental Science Center.
- It was informed that disclosed Russian EANET site's monitoring data are included in National Review on the State of Background Environment since 2001.

x. Thailand

- Thailand changed the sampling strategy of the filter pack method to conduct continuous sampling following the recommendation by NC.
- In Patumthani site, dry deposition monitoring by filter pack method was started in 2004.
- Crosscheck among different laboratories is done by means of the inter-laboratory comparison projects of EANET.

xi. Viet Nam

- The national monitoring network on acid deposition has been established and 24 stations with rainwater sampler, automatic monitors, etc. are operated in the network. The National Monitoring Plan for EANET will be revised after approval of the government of Viet Nam. The revised plan includes addition of new

monitoring sites in the south and central Viet Nam.

- Wet deposition monitoring is carried out by weekly sampling in the EANET monitoring sites such as Hanoi and Hoa Binh, but the monitoring is done by 10-day sampling in the national network. It was stressed that harmonization should be considered when national monitoring sites would be designated as EANET monitoring sites based on the discussion on this issue in SAC3 in 2003.
- It was clarified that candidates for new monitoring sites on soil/vegetation and inland aquatic environment were proposed in the revised National Monitoring Plan.
- NC recommended that Viet Nam would submit the O₃ and PM₁₀ data monitored in Hanoi as the data of dry deposition monitoring.

14. As an observer, representative of Myanmar commented that information on environmental monitoring activities was presented earlier together with institutional situation on the environmental management. He expressed his thanks for possibility to update his knowledge on EANET progress.

VII. Consideration of a preliminary draft data report on the acid deposition monitoring in 2003 (Agenda Item 6)

15. NC presented a preliminary draft data report on the acid deposition in the East Asian Region, 2003. It was informed that Korea did not submit the monitoring data in 2003 before STM5. Major explanation and discussions on this topic included the following:

- i. Wet deposition monitoring data
 - NC explained that the format of tables for data from individual sites was changed.
 - Two monitoring sites, Ochiishi-Japan and Vientiane-Lao P.D.R., were added from 2003.
 - It was suggested that NC should add the note to the figure of R1 and R2 when additional ions were measured.
 - It was pointed out that the deadline of preparing draft Data Report would be 20th October.
- ii. Dry deposition (air concentration) monitoring data
 - The procedure on calculation of detection limit for particulate components measured by Filter Pack method was explained. The evaluated values of 3 for each component are presented in draft Data Report as the reference.
- iii. Soil and vegetation monitoring data

- The survey was carried out as appropriate according to the EANET Technical Manual in most sites but there are still some subjects to be improved. As one of the subjects, it was stressed that soil samples should be collected by fixed depth.
 - Tree decline was observed in Lake Ijira, Japan, where specific phenomena such as decrease of soil pH and inflow-river water pH were reported. NC explained that implication between the tree decline and the phenomena was not verified. It was also announced that a Japanese expert would make a presentation on this issue in the First Scientific Workshop on Evaluation of the State of Acid Deposition in East Asia, which would be held in October 1, in conjunction with STM5.
 - Soil type by the FAO/UNESCO or comparable classification systems has not been reported in some monitoring sites. It was pointed out that monitored soil should be classified by using appropriate international taxonomy.
- iv. Inland aquatic environment monitoring data
- It was suggested that the seasonal variation of ion concentration of River Krestovka in Russia should be evaluated.
 - It was required that all mandatory parameters of inland aquatic environment monitoring should be measured.
 - It was stressed that the properties including photograph and information of monitoring lakes/rivers should be reported to NC.
 - It was requested that the lakes of low alkalinity and EC should be selected as inland aquatic monitoring site.
16. NC presented a progress on a detailed mechanism of the procedures on data and information disclosure to invite comments by the participants. Major explanation and discussions on this topic included the following:
- Disclosed verified data and information could be provided upon the request by sending CD as the first step.
 - Information on dissemination of disclosed data on CD will be announced at the EANET website by the end of 2004 together with registration form for request.
 - The distribution of disclosed data through download from EANET website was suggested as the second step and could be available after completeness of technical tasks and establishment of registration system.
 - Requested data should be available for non-commercial use only. However, further consideration is required for clarification how to classify and distinguish the non-commercial purpose of data use.

VIII. Consideration of preliminary draft reports on inter-laboratory comparison projects in 2003 (Agenda Item 7)

17. NC presented preliminary draft reports on inter-laboratory comparison projects on wet deposition, soil, and inland aquatic environment in 2003. Major discussion on this topic are as follows:

- It was commented that training is important to improve monitoring data quality and suggested that the result of QA/QC activity should be compared with previous years. NC responded that the suggestion will be considered.
 - It was clarified that NC could not inform the laboratories on the actual values of concentration in samples until all of analytical results have been received and verified by NC. Participating laboratories were requested to conduct analysis as soon as possible after receiving of samples and submit the results before March 15, 2005. Because many laboratories submitted their results after mentioned deadline, even till August, NC had limited time to prepare Inter-laboratory comparison reports for consideration at STM5 and to investigate data and corresponding information in detail.
 - To improve a coordination with participating countries in this field, the following were suggested:
NC would consider a possibility to send samples of inter-laboratory comparison projects earlier than last year;
the participating laboratories should make efforts to submit a whole set of requested data as soon as they are prepared even before the established deadline;
NC would inform participating laboratories on prepared values of concentrations after the receiving and verification of the whole set of analytical results and information.
- i. Project on wet deposition in 2003
- If a laboratory reports flagged data, NC should clarify the reason referring to the data submitted in the previous years from the same laboratory to improve data quality.
 - The discussion is expected to be continued on the application of the Youden diagram approach to data examination.
- ii. Project on soil in 2003
- It was pointed out that the inter-laboratories precision of this project was clearly

improved compared with the previous projects because of the standardization of the analytical/reporting procedures.

iii. Project on inland aquatic environment in 2003

- It was pointed out that the artificial sample should be measured as soon as possible after arriving at the laboratory for obtaining reliable data of NH_4^+ because the sample was not sterilized.
- The standard deviation of CI was lower than that of the artificial sample for wet deposition monitoring. As a possible explanation, it was suggested that the concentration was higher in the sample for inland aquatic environment than in the sample for wet deposition.
- NC requested the participating countries to submit the calibration curves and chromatograms for measurement of the sample.

. Information on principal international inter-laboratory comparison projects

- It was clarified that NC participates in three comparison projects: NADP (USGS), WMO (QS/SAC Americas) and EMEP (CCC). However for the time being NC does not intend to invite laboratories outside of EANET to participate in EANET QA/QC project.
- It was suggested that several DQOs should be set up in the future taking into account the experiences of previous QA/QC activities.
- WMO, NADP and EMEP distribute the diluted sample for the project. In EANET, it was clarified that the concentrated sample can be used as a reference material because many laboratories want to get the condensed sample as a test sample

18. NC made a presentation on the results of Questionnaire Survey on Participation in International Inter-laboratory Comparison, which had been sent to the participating countries in July 2004. NC was requested to assist the participating countries when they apply to the international inter-laboratory comparison projects.

19. NC made a presentation on the QA/QC activities on filter pack method in EANET. NC implemented two test studies, filter stability test and addition and recovery test. And taking the results of these tests into account, NC prepared the preliminary plan of 1st inter-laboratory comparison survey. NC clarified that transportation test had been done and the result will be reported on STM6 and SAC5 in 2005.

- NC explained the number of analyzed filter: 3 filters were analyzed on every analysis.

- NC clarified that the spiked amount was decided taking the average of air concentration of EANET in 2002 into account.

IX. Consideration of improvement of the monitoring methodologies (Agenda Item 8)

20. NC reported the issues to be discussed on dry deposition monitoring. Major discussion on this topic included the following:

i. Priority chemical species

- It was suggested that Na^+ should be also included in the list of proposed priority chemical species because it could be used to calculate nss-SO_4^{2-} and nss-Ca^{2+} as the indicator of sea salts.
- Passive sampler could be applied to NO_2 monitoring in rural and remote areas.
- The availability to monitor proposed priority chemical species was clarified.
- It was introduced that the first session of WGFD held on 19-20 August 2004 emphasized the importance of extension of the monitoring activities for some air quality indicators such as ozone and sulfur dioxide.

ii. Size of particulate matter

- It was pointed out that fine particle sampling such as $\text{PM}_{2.5}$ only was not suitable for acid deposition monitoring because $\text{PM}_{2.5}$ was measured generally for the purpose of health problem. Acidic substances in coarse particles should not be ignored for acid deposition monitoring.

iii. QA/QC for dry deposition monitoring

- It was suggested that a secondary standard ozone generator calibrated by the Standard Reference Photometer could circulate among EANET sites in order to implement inter-calibration for O_3 monitoring.

iv. Unit

- Merit and demerit were discussed to use each unit. The following were pointed out but need further discussion.
- As for gas, ppb is widely used and it doesn't depend on temperature and pressure.
- As for particulate matter, generally its mass was measured after sampling therefore $\mu\text{g}/\text{m}^3$ is accustomed. PM could not use nmol/m^3 because of unknown components.
- Molar unit is based on the SI (System International) unit. It could be applied to both gaseous and particulate components and to comparison with wet deposition components.

v. Filter pack method

- It was emphasized that flow rate of the 4-stage filter pack method could be increased to 2 L/min in the case of non detected concentrations according to the Technical Document for Filter Pack Method in East Asia.

21. NC made a presentation on activities in line with the Strategy Paper for Future Direction of Soil and Vegetation Monitoring of EANET. Major discussion on this topic included the following:

- Task Force of Soil and Vegetation Monitoring is preparing the sub-manual on forest vegetation monitoring as one of the activities, and the monitoring on lichens as a bio-indicator is included as one of possible contents of the sub-manual. It was introduced that some EANET participating countries such as Thailand, Russia and Japan had experiences on lichens monitoring for assessment of air pollution/acid deposition.

22. NC made a presentation on evaluation of overall precision on wet deposition monitoring based on the research performed at the Niigata-Maki national monitoring station.

X. Consideration of the research activities on acid deposition (Agenda Item 9)

23. NC introduced the on-going research activities on acid deposition, that are a joint research project with Russia on evaluation of atmospheric environment in East Siberia and Primorsky Region, a joint research project with Thailand on dry deposition flux, a joint research project with Mongolia on plant sensitivity to acid deposition, and collaboration with existing initiatives on developing emission inventory and numerical modeling. Major discussion on this topic included the following:

- i. Joint project with Russia on evaluation of atmospheric environment in East Siberia and Primorsky Region
 - Mongolian participant was interested in the results of air mass trajectory analysis because the study area was located in the border area between Russia and Mongolia.
 - Relationship between air mass trajectory and air concentration was discussed.
- ii. Joint project with Thailand on dry deposition
 - Uncertainties of SO₂ deposition velocities were explained.
 - Indication of exact range of observed SO₂ deposition velocities was requested.

- Diurnal variation of O₃ deposition velocity especially in nighttime was discussed.
- iii. Joint project with Mongolia on plant sensitivities
- The results show that a few sensitive herbaceous species to SO₂ and O₃ were found by exposure test in the controlled condition, and root/shoot (R/S) ratio of one sensitive species decreased by exposure to both pollutants. NC explained that they had not measured the R/S ratio of this species in the field but the survey for this indicator plant should be carried out in the near future.
 - It was clarified that mean concentration of O₃ for two weeks was measured by using the passive sampler in the Bogdkhan Mountain. An expert suggested that concentration of O₃ in daytime would be significantly higher in summer season.
 - NC introduced European experiences on evaluation of O₃ effects. Specific symptoms of O₃ injury were identified and might be separated from other effects such as fungal infection and SO₂. The sub-manual of ICP Forests suggested monitoring design such as number of trees/leaves systematically for the observation.
- iv. Collaboration with existing initiatives on emission inventories and numerical modeling
- Collaboration with MICS-Asia was mainly introduced. The details can be obtained on the website maintained by NC.
 - Preliminary analysis of MICS-Asia was presented and model performance was discussed.
 - It was clarified that collaboration between MICS-Asia and joint research project with Russia would be an interesting issue.
 - EANET data will be used to validate model performance.
 - It was clarified that modeling teams ought to use the emission inventory which was prepared for MICS-Asia.
 - It was suggested that clarification for the details of each model and input data is important.
 - Regarding including development of emission inventory into research activities of EANET, NC explained that the necessity of correspondent elaboration of scope of EANET activities and relevant documents could be considered and discussed by IG, SAC and WGFD. The successful results of MISC-Asia Phase II will promote the progress in this field and NC will start consideration on related technical and organizing problems.
24. NC presented a draft proposal for future research activities of highest priority to be conducted for relatively shorter period. The development of plan how to prepare the first periodic report and a draft program on research activities for 5 years to be included into

5-year Medium Term Plan was suggested as the further steps toward elaboration of these research activities. Major recommendation on this topic included the following:

- The proposal on development and publication of QA/QC report of EANET was done with reference to similar publication in EMEP program;
- It was clarified that research activities in EANET are suggested to be conducted internationally under the cooperation among participating countries and NC. It was also pointed out that each participating country may suggest their proposal for research taking into account the objectives of EANET and suggested direction of research activities;
- The explanation on the definition of highest priority research was done based on previous documents of STM and SAC meetings.

XI. Other issues (Agenda Item 10)

25. Dr. Hajime Akimoto made a presentation on “Distribution of acid rain and ozone in East Asia”. Distribution of simulated rainwater pH and ozone concentration in East Asia were introduced. Moreover, exposure index of ozone for vegetation by means of AOT40 and SUM06 were also introduced. He suggested that air quality monitoring of ozone and aerosols and modeling activities should be included in the EANET activities for its future development taking into account the linkage of air pollution and climate change issue and the mitigation policy issue, respectively. The pH simulation results were mainly discussed.
26. Dr. Hiromasa Ueda made a presentation on “Change of air quality and secondary environmental acidification caused by eruption of Miyake volcano”. Impact of the volcanic gas on the air quality evaluated by the model simulation was introduced. The availability of assessment using model simulation together with monitoring results was emphasized.

XII. Visit to a facility relevant to acid deposition

27. The participants visited Shinden Refuse Incineration Center of Niigata City.

XIII. Wrap-up of the Meeting (Agenda Item 11)

28. This report was considered and adopted.

XIV. Closing of the Meeting (Agenda Item 12)

29. The Meeting was officially closed.

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Annex

List of Participants

30 September 2004

PARTICIPANTS

CAMBODIA

Mr. Sreng Sophal
Vice Chief of Office
Department of Environmental Pollution Control
Ministry of Environment
No. 48, Samdech Preah Sihanouk Avenue
Tonle Bassac, Chamkarmon, Phnom Penh
Cambodia
Tel: +855-12-961-119
Fax: +855-23-212-540
E-mail: srengsophal@yahoo.com

CHINA

Mr. Zheng Haohao
Engineer, Ambient Air Monitoring
China National Environmental Monitoring Center
No.1 Yuhuinanlu, Beisihuangdonglu
Chaoyang district, Beijing
China, 100029
Tel: +86-10-84643879
Fax: +86-10-84650863
E-mail: zh hao@sepa.gov.cn

INDONESIA

Dr. Esrom Hamonangan
Air Quality Laboratory
Environmental Impact Management Facility
SARPEDAL-KHM
Kawasan Puspipitel-Serpong, Jl. Raya Puspipitel
Serpong, Tangerang, Banten 15314
Indonesia
Tel: +62-21-756-3114
Fax: +62-21-7563115
E-mail: birjing1@hotmail.com

JAPAN

Ms. Keiko Segawa
Deputy Director
Global Environment Issues Division
Global Environment Bureau
Ministry of the Environment
1-2-2 Kasumigaseki, Chiyoda-ku, Tokyo
100-8975, Japan
Tel: +81-3-5521-8246
Fax: +81-3-3581-3348
E-mail: KEIKO_SEGAWA@env.go.jp

Mr. Rokuro Maeda
Atmospheric Environment Division Observations
Department
Japan Meteorological Agency (JMA)
1-3-4 Otemachi, Chiyoda-ku, Tokyo 100-8122

Japan
Tel: +81-3-3212-8341
Fax: +81-3-3211-4640
E-mail: roku.maeda@met.kishou.go.jp

LAO PDR

Ms. Sisouphanh Luangrath
Director
Environment Quality Monitoring Center
Environment Research Institute
Science Technology and Environment Agency
P.O. Box 2279, Vientiane
Lao PDR
Tel: +856-21-219003
Fax: +856-21-213472
E-mail: sisouphanht@hotmail.com

MALAYSIA

Mr. Lim Sze Fook
Director, Environmental Studies Division
Malaysian Meteorological Service
Environment Division, 7th Floor
Headquarters, Malaysian Meteorological Service
Jalan Sultan, 46667 Petaling Jaya, Selangor
Malaysia
Tel: +60-3-79678067
Fax: +60-3-79578046
E-mail: lsf@kjc.gov.my

MONGOLIA

Ms. Bulgan Tumendemberel
Chief Engineer
Central Laboratory of Environmental Monitoring
P.O. Box-150, Ulaanbaatar-36
Mongolia
Tel: +976-11-341818
Fax: +976-11-460777
E-mail: clem@mongol.net
bnbn@magicnet.mn

PHILIPPINES

Ms. Leonita Diano Baetiong
Chief, Laboratory Services Section
Research and Development Division
Environmental Management Bureau
Department of Environment and Natural
Resources (DENR)
DENR Compound, Visayas Avenue
Diliman, Quezon City
Philippines
Tel: +632-4264339
Fax: +632-4264340
E-mail: ldbaetiong@yahoo.com

RUSSIA

Ms. Veronika Ginzburg
 Researcher, Background Monitoring Department
 Institute of Global Climate and Ecology
 Roshydromet and RAS
 Glebovskaya 20-B, 107258 Moscow
 Russia
 Tel: +7-903-7128767
 Fax: +7-095-1600831
 E-mail: ofm@mail.ru
 RUS-EANET@yandex.ru

THAILAND

Mr. Phunsak Theramongkol
 Chief, Ambient Air Quality Division
 Pollution Control Department
 92 Soi Phaholyothin 7, Phaholyothin Rd.
 Sam Sen Nai, Phayathai, Bangkok 10400
 Thailand
 Tel: +66-2-298-2399
 Fax: +66-2-298-2392
 E-mail: phunsak.t@pcd.go.th

Dr. Hathairatana Garivait
 Environmentalist
 Environmental Research and Training Centre
 Department of Environmental Quality Promotion
 Technopolis, Amphoe Klong Luang
 Pathumthani 12120
 Thailand
 Tel: +66-2-577-4182
 Fax: +66-2-577-1138
 E-mail: garivah@deqp.go.th
 hathairatana@yahoo.com

VIET NAM

Dr. Dung Kien Nguyen
 Deputy Director, Environment Research Center
 Institute of Meteorology and Hydrology
 62 Nguyen Chi Thanh Avenue, Dong Da, Ha Noi
 Viet Nam
 Tel: +84-4-8359540
 Fax: +84-4-8355993
 E-mail: kiendung@vkttv.edu.vn
 nguyenkilendung@yahoo.com

Observer Country**MYANMAR**

Mr. Tin Ngwe
 Deputy Director
 Department of Meteorology and Hydrology,

Government
 Kaba-aye Pagoda Road, Mayangon 11061,
 Yangon
 Myanmar
 Tel: +95-1-665669
 Fax: +95-1-665944/665704
 E-mail: dg.dmh@mptmail.net.mm

Resource Persons

Dr. Hajime Akimoto
 Program Director
 Frontier Research System for Global Change
 Japan Agency for Marine-Earth Science and
 Technology (JAMSTEC)
 3173-25 Showa-machi, Kanazawa-ku
 Yokohama 236-0001
 Japan
 Tel: +81-45-778-5710
 Fax: +81-45-778-5496
 E-mail: akimoto@jamstec.go.jp

Dr. Haruo Fukuhara
 Professor
 Faculty of Education and Human Sciences
 Niigata University
 2-8050 Ikarashi, Niigata 950-2181
 Japan
 Tel: +81-25-262-7155
 Fax: +81-25-262-7155
 E-mail: fukuhara@ed.niigata-u.ac.jp

Dr. Tomoyuki Hakamata
 Advisor
 Hamamatsu Photonics K.K.
 Tsukuba Res. Lab., 5-9-2 Tokodai, Tsukuba
 Ibaragi 300-2635
 Japan
 Tel: +81-29-847-5161
 Fax: +81-29-847-5266
 E-mail: hakamata@hpk.trc-net.co.jp

Dr. Hiroshi Hara
 Professor, Field Science Center
 Tokyo University of Agriculture and Technology
 3-5-8 Saiwaicho, Fuchu, Tokyo 183-8509
 Japan
 Tel: +81-42-367-5818
 +81-426-76-9933
 Fax: +81-42-367-5818
 +81-426-76-9933
 E-mail: harahrs@cc.tuat.ac.jp

Dr. Tsunehiko Otoshi
 Professor
 Tohoku University of Community Service and
 Science

3-5-1 Iimoriyama, Sakata, Yamagata 998-8580
Japan
Tel: +81-234-41-1252
Fax: +81-234-41-1180
E-mail: otoshi@koeki-u.ac.jp

Dr. Hiromasa Ueda
Professor, Disaster Prevention Research Institute
Kyoto University
Gokasho, Uji, Kyoto 611-0011, Japan
Tel: +81-774-38-4160
Fax: +81-774-38-4158
E-mail: ueda@storm.dpri.kyoto-u.ac.jp

Municipal Experts

Mr. Izumi Noguchi
Researcher
Hokkaido Institute of Environmental Sciences
Kita-19 Nishi-12, Kita-ku, Sapporo
Hokkaido 060-0819
Japan
Tel: +81-11-747-3554
Fax: +81-11-747-3254
E-mail: izumi@hokkaido-ies.go.jp

Mr. Tomohiro Inoue
Senior Researcher
Chiba Prefectural Environmental Research Center
1-8-8 Iwasaki-nishi, Ichihara, Chiba 290-0046
Japan
Tel: +81-436-21-6371
Fax: +81-436-21-6810
E-mail: t.inue7@ma.pref.chiba.jp

Dr. Norio Fukuzaki
Chief, Information and Investigation Section
Niigata Prefectural Institute of Public Health and
Environmental Sciences
314-1 Sowa, Niigata 950-2144
Japan
Tel: +81-25-263-9412
Fax: +81-25-263-9410
E-mail: hokanken@mub.biglobe.ne.jp

Dr. Susumu Kato
Senior Researcher
Public Health and Environment Research
Division
Mie Prefectural Science and Technology
3690-1 Sakura, Yokkaichi, Mie 512-1211
Japan
Tel: +81-593-29-2926
Fax: +81-593-29-2924
E-mail: katous01@pref.mie.jp

Dr. Mitsuhiro Matsumoto
Technical Manager
Nara Prefectural Institute for Hygiene and

Environment
57-6 Ohmori-cho, Nara 630-8131, Japan
Tel: +81-742-20-2882
Fax: +81-742-27-0634
E-mail: m.matsumoto@ihe.pref.nara.jp

Mr. Hideaki Tsuzuki
Supervisor (planning)
Kyoto Prefectural Institute of Hygienic and
Environmental Sciences
395 Murakami-cho, Fushimi, Kyoto 612-8369
Japan
Tel: +81-75-621-4067
Fax: +81-75-621-4067
E-mail: h-tsuzuki48@mail.pref.kyoto.jp

Dr. Yoshinori Nishikawa
Senior Research Scientist
Environmental Pollution Control Center
Osaka Prefecture
1-3-62 Nakamichi, Higashinari-ku
Osaka 537-0025
Japan
Tel: +81-6-6972-1321 (ext.334)
Fax: +81-6-6972-7665
E-mail: nisikawa@mbox.epcc.pref.osaka.jp

Dr. Toshio Kawaraya
Senior Tutor
The University of Wales Validated Postgraduate
Learning Environmental Programme in Japan
5-12-6 Tedzukayama, Nara 631-0062
Japan
Tel: +81-742-48-5230
Fax: +81-742-48-5230
E-mail: kawaraya@kcn.ne.jp

Dr. Masahide Aikawa
Senior Researcher
Hyogo Prefectural Institute of Public Health and
Environmental Sciences
3-1-27 Yukihiro-cho, Suma-ku, Kobe
Hyogo 654-0037
Japan
Tel: +81-78-735-6930
Fax: +81-78-735-7817
E-mail: Masahide_Aikawa@pref.hyogo.jp

Dr. Akira Utsunomiya
Head, Environmental Science Division
Fukuoka Institute of Health and Environmental
Sciences
39 Mukaisano, Dazaifu, Fukuoka 818-0135
Japan
Tel: +81-92-921-9940
Fax: +81-92-928-1203
E-mail: utsunomiya@fihes.pref.fukuoka.jp

Japan International Cooperation Agency

(JICA)

Environmental Management Team I
 Group II (Environmental Management)
 Global Environment Department
 Shinjuku Maynds Tower Bldg., 7F
 2-1-1, Yoyogi, Shibuya-ku, Tokyo 151-8558
 Japan
 Tel: +81-3-5352-5254
 Fax: +81-3-5352-5348

Mr. Eiji Iwasaki
 Team Director
 E-mail: Iwasaki.Eiji@jica.go.jp

Ms. Izumi Tsuchihata
 Staff
 E-mail: Tsuchihata.Izumi@jica.go.jp

**Japan Environmental Technology
 Association (JETA)**

Mr. Yasuo Toyazaki
 Director
 Kimoto Electric Co., Ltd
 3-1 Funahashi-cho, Tennoji-ku, Osaka 543-0024
 Japan
 Tel: +81-6-6768-3401
 Fax: +81-6-6764-7040
 E-mail: toyazaki@kimoto-electric.co.jp

Mr. Ryoza Goto
 Manager, Research Group, R&D Center
 DKK-TOA Corporation
 4-13-14 Kichijoji-kitamachi, Musashino
 Tokyo 180-8630
 Japan
 Tel: +81-422-53-5113
 Fax: +81-422-51-8704
 E-mail: r-goto@toadkk.co.jp

Niigata Prefecture

Environmental Management Division
 Department of Civic and Environmental Affairs
 Niigata Prefectural Government
 4-1 Shinko-cho, Niigata 951-8570
 Japan
 Fax: +81-25-280-5166

Mr. Shinichi Yamamoto
 Director
 Tel: +81-25-280-5153
 E-mail: u0301601@mail.pref.niigata.jp

Mr. Yoshio Mizushima
 Deputy Director
 Tel: +81-25-280-5694
 E-mail: u0301602@mail.pref.niigata.jp

Mr. Sadayoshi Watanabe
 Senior Section Chief
 Tel: +81-25-280-5154
 E-mail: env-con@mail.pref.niigata.jp

Mr. Ken Yamashita
 Assistant Counselor
 Tel: +81-25-280-5154
 E-mail: env-con@mail.pref.niigata.jp

Niigata City

602-1 Ichiban-cho, Gakkouchou-dori, Niigata
 951-8550, Japan

Mr. Masato Endo
 Division Director
 Environmental Pollution Control Division
 Environmental Affairs Department
 Public Affairs Bureau
 Tel: +81-25-226-2723
 Fax: +81-25-228-2199
 E-mail: kankyou@city.niigata.lg.jp

Mr. Tsuyoshi Kanda
 Assistant Division Director
 Environmental Pollution Control Division
 Environmental Affairs Department
 Public Affairs Bureau
 Tel: +81-25-226-2723
 Fax: +81-25-228-2199
 E-mail: kankyou@city.niigata.lg.jp

Mr. Tatsunori Eguchi
 Section Chief
 Atmospheric Environment Section
 Environmental Pollution Control Division
 Environmental Affairs Department
 Public Affairs Bureau
 Tel: +81-25-226-2723
 Fax: +81-25-228-2199
 E-mail: kankyou@city.niigata.lg.jp

Mr. Masashi Saito
 Technical Staff
 Atmospheric Environment Section
 Environmental Pollution Control Division
 Environmental Affairs Department
 Public Affairs Bureau
 Tel: +81-25-226-2723
 Fax: +81-25-228-2199
 E-mail: kankyou@city.niigata.lg.jp

Mr. Hideto Abe
 Technical Staff
 Atmospheric Environment Section
 Environmental Pollution Control Division
 Environmental Affairs Department
 Public Affairs Bureau
 Tel: +81-25-226-2723

Fax: +81-25-228-2199
E-mail: kankyoku@city.niigata.lg.jp

Mr. Philip Brunton
Coordinator for International Relations (CIR)
Foreign Affairs Division
Tel: +81-25-226-2053
Fax: +81-25-225-3255

3rd Floor, Outreach Building
P.O. Box4, Klongluang, Pathumthani 12120
Thailand

Dr. Jiang Wei
Coordinator, EANET Secretariat
Tel: +66-2-524-5366
Fax: +66-2-524-6233
E-mail: Wei.Jiang@rrcap.unep.org

Observers

Niigata Prefectural Liaison Council for Acid Deposition Research

Dr. Koichi Katoh
Head
Katoh Chemical
7492-140 Ikarashi Ninocho, Niigata 950-2102
Japan
Tel: +81-25-262-3129
Fax: +81-25-261-3407
E-mail: kmkatoh@suite.plala.or.jp

Environmental Science Research Niigata

Mr. Hiroshi Hoshino
Manager
General Affairs Department
Environmental Science Research Niigata
8-13 Higashisakae-cho, Yoshida-machi,
Nishikanbara-gun, Niigata 959-0291
Japan
Tel: +81-256-93-4509
Fax: +81-256-92-6899
E-mail: hh@ns.kanken-net.or.jp

Joetsu Environmental Science Center

Mr. Shigeru Sato
Environment Manager
Joetsu Environmental Science Center
1666 Shimomonzen, Joetsu, Niigata 942-0063
Japan
Tel: +81-255-44-5021
Fax: +81-255-45-2498
E-mail: sato-s@jo-kan.or.jp

Secretariat for EANET

Regional Resource Center for Asia and the Pacific,
United Nations Environment Program (UNEP
RRC.AP)
c/o Asian Institute of Technology

Ms. Adelaida Bonquin Roman
Programme Officer, EANET Secretariat
Tel: +66-2-524-6244
Fax: +66-2-516-2125
E-mail: Adelaida.Roman@rrcap.unep.org

Network Center for EANET

Acid Deposition and Oxidant Research Center
(ADORC)
1182 Sowa, Niigata 950-2144
Japan
Tel: +81-25-263-0550
Fax: +81-25-263-0566
E-mail: eanet@adorc.gr.jp

Dr. Tsumugu Totsuka
Director General
Tel: +81-25-263-0551
Fax: +81-25-263-0566
E-mail: totsuka@adorc.gr.jp

Dr. Sergey Arkadyevich Gromov
Deputy Director General
Tel: +81-25-263-0552
Fax: +81-25-263-0566
E-mail: gromov@adorc.gr.jp

Mr. Yoshiyuki Yoichi
Deputy Director General
Tel: +81-25-263-0553
Fax: +81-25-263-0567
E-mail: yoichi@adorc.gr.jp

Mr. Mitsuo Takei
Head
General Affairs Department
Tel: +81-25-263-0554
Fax: +81-25-263-0566
E-mail: takei@adorc.gr.jp

Mr. Akihito Morizumi
Head Clerk
General Affairs Department
Tel: +81-25-263-0550
Fax: +81-25-263-0566
E-mail: morizumi@adorc.gr.jp

Ms. Emiko Kato
Administrative Staff
General Affairs Department
Tel: +81-25-263-0551
Fax: +81-25-263-0566
E-mail: ekato@adorc.gr.jp

Ms. Aya Ohashi
Administrative Staff
General Affairs Department
Tel: +81-25-263-0550
Fax: +81-25-263-0566
E-mail: ohashi@adorc.gr.jp

Mr. Jiro Sato
Head
Planning and Training Department
Tel: +81-25-263-0555
Fax: +81-25-263-0567
E-mail: sato@adorc.gr.jp

Mr. Yutaka Taneoka
Senior Researcher
Planning and Training Department
Tel: +81-25-263-0556
Fax: +81-25-263-0567
E-mail: taneoka@adorc.gr.jp

Ms. Ayako Kawauchi
Administrative Staff
Planning and Training Department
Tel: +81-25-263-0556
Fax: +81-25-263-0567
E-mail: kawauchi@adorc.gr.jp

Dr. Tsuyoshi Ohizumi
Head
Atmospheric Research Department
Tel: +81-25-263-0557
Fax: +81-25-263-0567
E-mail: ohizumi@adorc.gr.jp

Mr. Minoru Shimotori
Researcher
Atmospheric Research Department
Tel: +81-25-263-0558
Fax: +81-25-263-0567
E-mail: shimotori@adorc.gr.jp

Mr. Toshiyasu Matsui
Researcher
Atmospheric Research Department
Tel: +81-25-263-0558
Fax: +81-25-263-0567
E-mail: matsui@adorc.gr.jp

Dr. Hiroyuki Sase
Senior Researcher
Ecological Impacts Research Department

Tel: +81-25-263-0560
Fax: +81-25-263-0567
E-mail: sase@adorc.gr.jp

Mr. Takuji Oida
Researcher
Ecological Impacts Research Department
Tel: +81-25-263-0560
Fax: +81-25-263-0567
E-mail: oida@adorc.gr.jp

Mr. Shinji Nakayama
Head
Data Management Department
Tel: +81-25-263-0561
Fax: +81-25-263-0567
E-mail: nakayama@adorc.gr.jp

Mr. Yuzuru Nishikawa
Principal Researcher
Data Management Department
Tel: +81-25-263-0559
Fax: +81-25-263-0567
E-mail: nishikawa@adorc.gr.jp

Dr. Kazuhide Matsuda
Senior Researcher
Data Management Department
Tel: +81-25-263-0562
Fax: +81-25-263-0567
E-mail: matsuda@adorc.gr.jp

Dr. Zhiwei Han
Researcher
Data Management Department
Tel: +81-25-263-0562
Fax: +81-25-263-0567
E-mail: han@adorc.gr.jp

Ms. Ayako Aoyagi
Researcher
Data Management Department
Tel: +81-25-263-0562
Fax: +81-25-263-0567
E-mail: aoyagi@adorc.gr.jp

Dr. Tatsuya Sakurai
Researcher
Data Management Department
Tel: +81-25-263-0562
Fax: +81-25-263-0567
E-mail: sakurai@adorc.gr.jp