WORKSHOP PROGRAMME

DAY 1: Tuesday, November 22

0800 **Registration and Administration**

0830 **Opening**
Statement of H.E. the Minister for Environment and Forests, India
Mr T. Chatterjee, Director, EPTRI and NETTLAP Thematic Network Node (TCHWM)
Dr G.V. Subrahmanyam, NETTLAP National Focal Point for India

0850 **Workshop Objectives, Approach, Content and Outcomes; NETTLAP**
Prof. John Hay, NETTLAP Coordinator, UNEP/ROAP, Bangkok, Thailand

0915 **Introduction of NETTLAP Personnel and Other Key Participants**

0930 **Approaches and Outcomes of the UNEP IE/PAC Industry/Environment Training Workshop**
Dr Fritz Balkau, UNEP IE/PAC, Paris, France

1000 Morning Tea

1015 **Training & Communication in Toxic Chemicals Management**
Mr Tishya Chatterjee (Module Moderator)
Keynote Presentation

1045 Classification and Labelling of Chemicals - Dr Nilay Chaudhuri, India

1115 Classification and Labelling of Chemicals - Mr Soli Arceivala, India

1145 Database on Hazardous Materials Handling Rules - Demonstration - Mr V.S. Chary, India

1200 ESCAP Database on Pesticides and the Environment - Demonstration - Mr Mahesh Pradhan, NETTLAP, UNEP/ROAP, Bangkok, Thailand

1215 **Discussion and Implications for Training and Communication at Tertiary Level**

1245 Lunch

DAY 1: Tuesday, November 22 (cont.)

1345 **Training & Communication in Chemical Safety and Process Risk Assessment**
Mr Garislav Chkolenok, UNEP/IRPTC, Geneva, Switzerland (Module Moderator)
Keynote Presentation

1430 Chemical Hazard and Risk Assessment - Dr K.V. Raghavan, India

1500 Information on Toxic Chemicals and Chemical Risks - Dr Devendra Wagley, Nepal

1530 Afternoon Tea

1600 Information on Toxic Chemicals and Chemical Risks - Dr Mohan Bickram Gewali, Nepal

1630 **Discussion and Implications for Training and Communication at Tertiary Level**

1730 Close

DAY 2: Wednesday, November 23

0830 **Training & Communication in Chemical Safety - Emergency Response (Onsite and Offsite) and Integrated Management**
Mr Paul Clarey, Deakin University, Melbourne, Australia (Module Moderator)
Keynote Presentation

0900 Awareness and Preparedness for Emergencies at Local Level (APELL) - Dr F. Balkau, UNEP IE/PAC, Paris, France

0930 Information on Toxic Chemicals and Chemical Risks - Dr Ajantha Perera, Sri Lanka

1000 **Discussion and Implications for Training and Communication at Tertiary Level**

1030 Morning Tea

1100 **Training & Communication in Prevention and Minimization of Hazardous Waste Generation**
Prof. Joo Hwa Tay, Nanyang Technological University, Singapore and NETTLAP Thematic Network Coordinator (TCHWM) (Module Moderator)
Keynote Presentation

1130 Prevention and Minimization of Hazardous Wastes - Mr Anwarul Islam, Bangladesh

DAY 2: Wednesday, November 23 (cont.)

1200 Hazardous Waste: A Review of Treatment and Disposal Options - Prof. Feroze Ahmed, Bangladesh

1230 Prevention and Minimization of Hazardous Wastes - Mr R.M.U. Senarath, Sri Lanka

1300 Lunch

1345 **Training & Communication in Hazardous Waste Management: Treatment and Other Aspects**

1345 Prevention and Minimization of Hazardous Wastes - Dr T. Chakrabarti, India

1415 Transboundary Movement of Toxic Chemicals and Hazardous Wastes - Dr D. Badgaa, Mongolia

1445 Institutional Capacities for Hazardous Waste Management - Dr P.V.R. Subramanyam, India

1515 Hazardous Waste Rules and Legislation - Dr Lakshmi Raghupathy, India

1545 **Discussion and Implications for Training and Communication at Tertiary Level**

1615 Close

1630 Departure of Tour

2030 Dinner

DAY 3, Thursday, November 24

0830 **UNEP's Activities in Environmental Technology Development and Transfer**
Mr Toru Tamura, UNEP/IETC, Osaka, Japan

0850 **ESCAP's Activities in Toxic Chemicals and Hazardous Waste Management**
Mr C. Konda, ESCAP, Bangkok, Thailand

0900 **Training Methods and Curriculum Development**
Prof. David Stokes, NETTLAP Thematic Network Node and Deakin University, Melbourne, Australia and Dr Paul Clarey, Deakin University, Melbourne Australia

0930 **Discussion**

1000 Morning Tea

DAY 3, Thursday, November 24 (cont.)

1030 **Training Kits, Packages and Materials - Demonstration, Trials and Evaluation**
Dr F. Balkau, UNEP IE/PAC, Paris, France

1230 Lunch

1330 **Training Kits, Packages and Materials (cont.)**
Prof. J. Hay, NETTLAP Network Coordinator, UNEP/ROAP, Bangkok, Thailand

1400 **Concluding Session**
Prof. Joo Hwa Tay, NETTLAP Thematic Network Coordinator (TCHWM)

Follow-up Activities: Personal and Collective
Proposals for Future Training
Feedback

1530 Afternoon Tea

1600 **Workshop Evaluation**

1645 **Close**
Dr G.V. Subrahmanyam, NETTLAP National Focal Point for India
Mr T. Chatterjee, Director, EPTRI and NETTLAP Thematic Network Node (TCHWM)
Prof. John Hay, NETTLAP Coordinator, UNEP/ROAP, Bangkok, Thailand

LIST OF PARTICIPANTS

1. **M. Anwarul Islam (Mr)**
Deputy Director
Dhaka Division
Department of Environment
7/8 C Lalmatia
Dhaka 1207
Bangladesh
Tel: 880-2-312490, 310603
Fax: 880-2-813186

2. **M. Feroze Ahmed (Prof)**
Department of Civil Engineering
Bangladesh University of Engineering & Technology (BUET)
Dhaka 1000
Bangladesh
Tel: 880-2-502196(O) 860366(R);
Fax: 880-2-863026

3. **Tishya Chatterjee (Mr)**
Director
The Environment Protection, Training & Research Institute (EPTRI)
HUDA Complex
S.R. Nagar
Hyderabad
India
Tel/Fax: (91 40) 291 366, 290 399 (O) 247 244 (R)

4. **P.V.R. Subramanyam (Dr)**
205, "Aishwarya"
Apsara Apartments
Sreenagar Colony Post
Hyderabad 500 873
India
Tel: 91-40-228020
Fax: 91-40-291366

5. **Nilay Chaudhuri (Prof)**
Professor
Jadavpur University
Avenue House
#10E, 107 Southern Avenue
Calcutta 700 029, India
Tel: 91-33-765908
Fax: 91-33-2448139

6. **Soli J. Arceivala (Prof)**
Chairman
AIC Watson Consultants Pvt Ltd
Raheeja Centre
13th floor
Nariman Point
Bombay 400 021
Maharashtra
India
Tel: 91-22-2834052, 2843220, 2842076
Fax: 91-22-2040398

7. **T. Chakrabarti**
Scientist & Head
Toxic Waste Management Division
National Environmental Engineering Research Institute (NEERI)
Nehru Marg
Nagpur 440 020
India
Tel: 91-712-226026 (O), 522378 (R)
Fax: 91-712-222725, 229531

8. **K.V. Raghavan (Dr)**
Director
Central Leather Research Institute (CLRI)
Adyar
Madras 600020
India
Tel: 91-44-4912150 (O); 4914465 (R)
Fax: 91-44-4911589
Internet: clri@sirnetm.ernet.in

9. **D. Badgaa (Dr)**
Director
Institute of Chemistry
Academy of Sciences of Mongolia
Mir 54-26
Ulaanbaatar-51
Mongolia
Tel: 976-1-53133
Fax: 976-1-321401 (c/o Dr Ts Adyasuren)

10. **Devendra Wagley (Dr)**
Central Department of Chemistry
Tribhuvan University
Kirtipur
Kathmandu
Nepal
Fax: 977-1-226820 (c/o R.P. Shrestha, CEDA)

11. **Mohan Bickram Gewali (Dr)**
Central Department of Chemistry
Tribhuvan University
Kirtipur
Kathmandu
Nepal
Tel: 977-1-472862 (R)
Fax: 977-1-418551

12. **Ajantha Perera (Dr)**
Department of Zoology
University of Colombo
Colombo
Sri Lanka
Tel: 94-1-586868
Fax: 94-1-432641 (c/o Mr Aruna Perera)

13. **R.M.U. Senarath (Mr)**
Asst. Manager
Environment Department
Board of Investment of Sri Lanka
No. 14 Sri Baron Jayathilaka Mawatha
Colombo 1
Sri Lanka
Tel: 94-1-320080
Fax: 94-1-430512

14. **John Hay (Prof.)**
NETTLAP Network Coordinator
Environmental Science
University of Auckland
Private Bag 92019
Auckland
New Zealand
Tel: 64-9-3737599 Extn 8437
Fax: 64-9-3737470
Email: je.hay@auckland.ac.nz

15. **Jan Sveen (Mr)**
Senior Consultant
NORAD
2834 Hunndazen
Norway
Fax: 61170341

16. **Mahesh Pradhan (Mr)**
NETTLAP Project Officer
UNEP ROAP
UN Building
Rajdamnern Avenue
Bangkok
Thailand
Tel: 66-2-2881801
Fax: 66-2-2803829
Email: pradhan.unescap@un.org

17. **Joo Hwa Tay (Prof)**
Head
Division of Water Resources & Transportation
School of Civil & Structural Engineering
Nanyang Technological University
Singapore 2263
Tel: 65-7995308
Fax: 65-7910676

18. **Fritz Balkau (Dr)**
Senior Programme Officer
UNEP Industry & Environment
Tour Mirabeau
39-43, quai Andre Citroen
75739 Paris Cedex 15
France
Tel: 33-1-44371450
Fax: 33-1-44371474

19. **Paul Clarey (Mr)**
Deakin University
662 Blackburn Road
Clayton
Victoria
Australia 3168
Tel: 61-3-2447381
Fax: 61-3-2447301

20. **G.V. Subrahmanyam (Dr)**
Additional Director
Ministry of Environment & Forests
Parayavaran Bhavan
New Delhi
India
Tel: 91-11-4364594
Fax: 91-11-4360678

21. **Lakshmi Raghupathy (Dr)**
Joint Director
Ministry of Environment & Forests
Parayavaran Bhavan
CGO Complex
New Delhi
India
Tel: 91-11-4361669
Fax: 91-11-4360678

22. **Toru Tamura (Mr)**
UNEP-IETC/GEC Cooperation Staff
UNEP International Environmental Technology Centre
2-110 Ryokuchi koen
Tsuramiku
Osaka
Japan
Tel: 81-6-9154592
Fax: 81-6-9150304

23. **G. Shkolenok (Dr)**
Scientific Affairs Officer
UNEP/IRPTC
Case Postale 356
CH -1219 Chatelaine
Geneva
Switzerland
Tel: 41-22-9799189
Fax: 41-22-7973460

MINISTER OF
ENVIRONMENT & FORESTS
INDIA

MESSAGE

I am glad to note that a Resources Development Workshop (RDW) on Toxic Chemicals and Hazardous Wastes is being organized by the United Nations Environment Programme (UNEP), in cooperation with the Environment Protection Training and Research Institute (EPTRI) between November 22-25. 1994 at Hyderabad.

Chemicals are an important factor in our economy, and in the recent years there has been a rapid increase in the number and variety of chemicals being used in industries and in our daily life. While the extensive use of chemicals has helped us to improve our lifestyles, it has also been responsible for major consequences, posing a threat to our health and well-being.

The extensive use of chemicals has resulted in the release of huge quantities of waste into the environment in the form of solids, liquids and gases. A substantial amount of these wastes are potentially hazardous to the environment - some of these have proved dangerous to living organisms, including human beings.

A large number of industrial accidents in this country involve hazardous and toxic chemicals and India has witnessed the worst of such disasters, the Bhopal Gas Leak. The lessons learnt from this experience necessitated working towards evolving procedures for safe handing of chemicals and to take steps towards prevention, control and mitigation of disasters.

At this stage we need to prevent both the instantaneous consequences of a disaster as well as slow penetration of chemicals and wastes into the environment. The Government of India has been working towards evolving a system for emergency preparedness and hazardous wastes management. This needs to be strengthened by educated and training personnel in the areas of toxic chemicals and hazardous wastes. I do hope that institutions like EPTRI will commit themselves to undertake this task.

The present workshop should not only aim at collection of information but also provided a means to channelise this information at all levels so that there is an awareness and preparedness to combat any situation in a planned manner The participation from other countries of South and Central Asian region should strengthen the activity in this region.

I send my best wishes for the success of the Workshop

KAMAL NATH
MINISTER of ENVIRONMENT & FORESTS
INDIA

ANNEX 4

OPENING ADDRESS

G.V. Subrahmanyam

NETTLAP National Focal Point for India
and
Additional Director
Ministry of Environment & Forests
New Delhi, India

At the outset, may I express my gratitude to UNEP for inviting me to participate in the opening of this Training and Resources Development Workshop on Toxic Chemicals and Hazardous Waste Management being organised by UNEP in cooperation with EPTRI. I am privileged to be associated with NETTLAP as National Focal Point (NFP) for India. The objective of NETTLAP is to enhance environmental expertise of staff in tertiary institutions in Asia and the Pacific. It is indeed a matter of great pleasure that this workshop is being held in Hyderabad in cooperation with EPTRI. Comparatively young, EPTRI has become, in a relatively short span, a premier institution for environmental training and research activities. EPTRI is also acting as Thematic Network Node (TNN) for Toxic Chemicals and Hazardous Wastes for the Central and South Asian Region. In addition, the Director of EPTRI is the Specialist Focal Point (SFP) for this Thematic Network.

Chemicals have become indispensable in many economic activities and are increasingly used in the industrial, agricultural and consumer sectors of all societies. World wide, of the some 10 million chemicals known to-day, over 60,000 are in common use and some 1000 new chemicals are released on to the market each year. Some of these chemicals exhibit toxic and other hazardous properties. They are potential health and environmental hazards to humans, animals, plants and wildlife. These chemicals may prove dangerous, if not, handled properly and safely.

In our country we had history's biggest environmental disaster at Bhopal in December, 1984. This disaster cost the country many lives and affected adversely and permanently several thousand people. This accident shows the fragility of industrial safety system and is a pointer to the dangers involved in production and use of chemicals which many otherwise be very useful. To-day we are living in a chemical age and any accident anywhere may set in motion changes that may affect the delicately balanced ecological system by poisoning air, water, or land and thereby endangering the life support system.

The extensive use of chemicals has resulted in the release of huge quantities of wastes into the environment in the form of solids, liquids and gases. A substantial amount of these wastes are potentially hazardous to human health or the environment, unless adequately handled, stored, transferred, treated and disposed.

In the wake of continuing expansion of industries in developing countries, not only has the quantitative dimensions of waste generated changed appreciably but the qualitative nature of the waste has also shown significant changes.

The major groups of industries that generate hazardous waste include inorganic and organic chemicals producers, petroleum refineries, iron and steel, non-ferrous metals (smelting and refining), metal finishing, pesticides, nitrogen fertilisers, drugs and pharmaceuticals, dyes and pigments and textile processing.

Waste generation is a function of technology and the effectiveness with which the technology employed is managed. In developing countries relatively dirty technologies are employed, especially in small and medium enterprises. They are rarely, if at all, operated at levels of efficiency for which they are designed. As such, waste generation intensities in terms of quantum of wastes per unit of product out put are much higher than what ought to be or what is obtained in developed economies.

Waste is generated not only in manufacturing processes but also from pollution control facilities.

A study conducted by the National Productivity Council (NPC) on hazardous chemicals waste management revealed that approximately one million tonnes of solid waste are generated annually by the 131 industrial units surveyed during the study. Of this nearly 22 per cent of the wastes come under the category of hazardous waste.

Recently (September, 1994) the National Productivity Council carried out inventories of hazardous waste generation in 14 industrial estates of five districts of Gujarat - viz. Ahmedabad, Baroda, Bharauch, Surat and Valsad. This survey indicated that of the total number of 7,926 units in these five districts, 1346 are hazardous waste generating units and approximately 0.44 million tonnes of hazardous waste is generated per year by these industrial units.

The key issue is that the quantum of waste generation is increasing rapidly - not only due to higher intensities but also because industrial base is expanding. It is reflected in the rate at which small enterprises numbering over 3 million to-day are multiplying. In France a 1% increase in economic growth means 2% extra waste. Generation of hazardous wastes in the U.S.A. is growing at an annual rate of 7%. The growth both in quantity and complexity of waste generation in a developing country like India is unlikely to be any different.

The management of such toxic and hazardous waste requires "a cradle to grave approach" which covers the generation of waste at its source and continues through all subsequent stages to final treatment and safe disposal.

To regulate the handling of hazardous substances and prevent accidents, the Ministry of Environment & Forests have notified three sets of Rules under the Environment (Protection) Act, 1986.

These are :

- Manufacture, Storage and Import of Hazardous Chemicals - Rules, 1989.
- Hazardous Waste (Management and Handling) - Rules, 1989.
- Manufacture, Use, Import, Export and Storage of Hazardous Microorganism/Genetically Engineered Organisms or Cells - Rules, 1989.

The Public Liability Insurance Act, 1991, has been brought out by the Ministry. The key features of this act are :

- To provide relief to affected persons due to accidents from handling hazardous wastes and hold owner liable;
- Compel owners of potentially hazardous chemical industries to insure themselves compulsorily to be able to give immediate relief to all affected parties.

The other steps taken by the Ministry for management of hazardous substances include safety audits in major accident prone hazard units, off-site emergency plans, Central Crisis Group Alert System, emergency response centres training programmes for various categories of personnel for enhancement of safety in industry and management of chemical accidents and setting up of a National Register for Potentially Toxic Chemicals.

Sound management of toxic chemicals and hazardous wastes requires amongst other actions, an investment in training and education. A factor which is hindering the introduction and maintenance of appropriate and sound management practices in toxic chemicals and hazardous waste is a shortage of trained, experienced and qualified personnel. The role of education, particularly of higher education, is to provide the highest level of manpower for managing the country's environmental issues. While everyone recognises the importance of environmental education and training, only some have clear ideas about what needs to be actually done or taught and very few have the experience as to how such courses can be successfully taught. This can be overcome by improving the quality and relevance of environmental education and training in various tertiary institutions. It is in this direction NETTLAP is doing a Yeoman's service in strengthening of tertiary institutions in Asia and the Pacific through the introduction of Training and Resources Development Workshops, by targeting educators and trainers at these institutions. The objective of these workshops is to enhance the environmental expertise of educators, through training and networking and of graduates by improving quality of education.

The workshops are designed to prepare curriculum guidelines, resource materials, instructional aids and other items which will be of use to those teaching in tertiary institutions. These workshops are more than the conventional training activities. All the participants are acknowledged trainers and educators - they will thus benefit from the resource materials and instructional aids related to TCHWM that will be prepared as part of this workshop.

They will also be encouraged to incorporate the newly acquired information and teaching methods in their regular training and also in short courses offered for the Government and industry. Thus a large number of students who are the decision makers and managers of the future can be trained and educated. Further, the beneficiaries of the workshop who are the staff of tertiary institutions are also often directly involved in advising on and assisting with,

the development and implementation of policies related to the management of toxic chemicals and hazardous substances. Thus the outcomes of the workshop include information and skills being transferred both widely and rapidly.

I hope this workshop will focus more on education and training methods and resource materials rather than spending time on national status or research studies. I am sure the workshop will be a valuable learning and awareness raising experience for all the participants and will identify activities which can strengthen the capabilities of tertiary level institutions in implementing an effective environmental training programme in various participating countries.

The following are some of the issues in hazardous waste management that need emphasis in tertiary education and training :

* Tracking of hazardous waste from generation to final disposal and their fate in the environment;
* Identification and classification of hazardous waste;
* Identification and evaluation of potential disposal sites;
* Waste minimisation and adoption of cleaner technologies of industrial pollution;
* Development and implementation of procedures and programmes for hazardous waste audits;
* Develop and use mechanisms for the risk management of chemicals;
* Develop, understanding and use of databases and other information systems on toxic chemicals and hazardous wastes; and
* To draw the results and expertise of international programme such as:
    - International Register for Potentially Toxic Chemicals (IRPTC);
    - The International Cleaner Production Programme;
    - London Guidelines for exchange of information on chemicals in international trade (London Guidelines); and
    - The Basel Convention on the transboundary movement of hazardous wastes and their control.

The sound management of toxic and hazardous waste will provide clean air and water to the future generations.

ANNEX 5

WORKSHOP OBJECTIVES, APPROACH, CONTENT AND OUTCOMES AND THE ROLE OF NETTLAP

John E. Hay

NETTLAP Coordinator
UNEP/ROAP
Bangkok, Thailand

and

Environmental Science
School of Environmental and Marine Sciences
University of Auckland
Auckland, New Zealand

THE WORKSHOP

The objective of the workshop is to identify and develop methods, tools and materials applicable for use in education, training and awareness programmes conducted by staff in tertiary institutions and related to the integrated management of hazardous materials.

The intention is to strengthen the ability of staff in tertiary institutions of the Asia-Pacific region, and the South and Central Asian sub-region in particular, to inform a range of audiences (e.g students, industry decision-makers, government officials, leaders of non-governmental organizations, tertiary level trainers) in the safety, cost effectiveness, local and impact aspects of toxic chemicals and hazardous waste management (TCHWM).

Staff from tertiary institutions, including universities, technical institutes, professional training institutes and teacher training colleges, will be the immediate beneficiaries of this workshop. They form a large and influential constituency. In addition to training and educating substantial numbers of students who are the decision-makers and managers of the future, staff of tertiary institutions are often directly involved in advising on, and assisting with, the development and implementation of policies related to the management of toxic chemicals and hazardous substances. These staff will be encouraged and assisted to incorporate the newly acquired information and teaching methods in their regular teaching activities, and also in short courses offered for government and industry. Thus, despite involving only a small but key group of people in the workshop itself, the information and skills will be transferred both widely and rapidly.

Specifically, the workshop will result in the direct training of workshop participants, but through them it will be possible to train their colleagues in tertiary institutions, students

in formal degree and certificate programmes, participants such as government officials, industry managers who attend short courses, as well as the general public through community outreach programmes conducted by the tertiary institutions. Relevant members of NETTLAP will share in the results of the workshop through distribution of a resources volume based on relevant workshop outputs. There is thus there is a large "multiplier effect" arising from this workshop.

The workshop is not a conventional technical workshop related to aspects of the management of hazardous materials. Rather the focus is on the identification, development, evaluation and dissemination of methods, tools, and materials used to support training activities in the management of hazardous substances. Thus the approach of the workshop is to share relevant knowledge, skills and experiences, to demonstrate and evaluate methods and tools, to develop and evaluate materials and to identify and commit to appropriate follow-up activities, individually and collectively.

The selection of workshop participants, and the programme itself, recognises that not all the relevant training expertise lies within tertiary institutions. For this reason the workshop brings together a broad range of participants: experienced trainers in hazardous materials management, from government and the private sector as well as from tertiary institutions themselves; individuals who are experienced in the more technical and practical aspects of hazardous materials management; and experienced environmental trainers and educators who can make contributions to training at the more generic level.

The workshop is conducted as a series of substantive modules focusing on training and communication in:

- the management of toxic chemicals;
- chemical safety and process risk assessment;
- emergency planning and response (both on and off site) and integrated management of chemicals;
- prevention and minimization of hazardous waste generation;
- treatment and other aspects of hazardous waste management;

and on:

- generic training methods;
- curriculum development; and
- training packages, kits and materials.

All outputs and outcomes of the workshop relate to some aspect of training in the management of hazardous materials:

- curriculum guidelines, training methods tools and materials related to TCHWM, and of principal use by staff in tertiary institutions;

- a published workshop report that also includes case studies demonstrating the application of the above outputs;

- tertiary level trainers aware of the resources and expertise available to them for teaching and training in TCHWM, and familiar with methods being used by experienced and successful trainers; and

- commitments for follow-up activities that build on the methods, tools and materials shared at the workshop.

THE ROLE OF NETTLAP

Staff of tertiary institutions (i.e. universities, technical institutes, training institutes and teacher training colleges) are key targets for environmental training for various reasons, including the:

- large multiplier effect inherent in training such staff, this arising from the immediate transfer to colleagues and to participants in tertiary education and training programmes (degree and diploma programmes, short courses, continuing education and continuing professional development courses etc);

- important role played by tertiary staff advising industry and government, including government ministers with respect to UNEP's priorities and effectiveness;

- frequent involvement of staff as technical consultants to government and in the private sector;

- important standing a staff as community opinion leaders; and

- existing experience of tertiary staff in environmental training, this being a knowledge and skills base that should be built upon.

It is for reasons such as these that countries of the Asia-Pacific region called on UNEP to involve staff of tertiary institutions in its environmental training programmes, as both participants and resource persons. These activities are coordinated and implemented, in part, by the Network for Environmental Training at Tertiary Level in Asia and the Pacific (NETTLAP).

NETWORK FOR ENVIRONMENTAL TRAINING AT TERTIARY LEVEL IN ASIA AND THE PACIFIC (NETTLAP)

The Network for Environmental Training at Tertiary Level in Asia and the Pacific was established by UNEP and is a key activity of UNEP's Environmental Education and Training Unit (UNEP/EETU) and the Regional Office for Asia and the Pacific (UNEP/ROAP).

The network consists of institutions and individuals active in environmental education and training at tertiary level in the Asia-Pacific region. NETTLAP works closely with its government appointed National Focal Points (NFPs) in the 35 countries participating in the

Network. This ensures that the environmental training needs of countries in the region are clearly identified and optimum use is made of existing expertise and other national resources.

Currently NETTLAP links over 150 key tertiary institutions and more than 1500 staff members who are active in environmental education and training and who can contribute to and/or benefit from the availability of resource materials and training programmes related to environment and development.

The Network is designed to:

- enhance the environmental expertise of tertiary level educators and through them the knowledge and skills of decision makers and policy formulators;
- increase the environmental skills and awareness of tertiary level graduates;
- enhance environmental technologies, and capacities for their use; and
- strengthen the overall environmental expertise in the region at technical, management and policy levels.

This is achieved by:

- enabling the updating and strengthening of environmental courses and programmes, and the environmental content in other specialized courses;
- preparation and dissemination of curricula guidelines, resource materials, learning aids and packages for environmental training;
- encouraging and disseminating innovative methods in environmental training;
- identification of needs and sharing of knowledge through ongoing interaction amongst network partners;
- implementation of targeted technical Training and Resources Development Workshops.

Achievement of NETTLAP's objectives is facilitated by the use of Thematic Networks, each with a Thematic Network Coordinator (TNC). Currently there are three - Toxic Chemicals and Hazardous Waste Management, Coastal Zone Management and Environmental Economics. For each theme, sub-regional Thematic Network Nodes (TNNs) have been appointed to enhance coverage of the vast Asia-Pacific region.

To further ensure that NETTLAP operates effectively at the national level many countries have also identified Specialist Focal Points (SFPs) in each theme.

To service its members, the principal activities of NETTLAP are:

- increasing environmental awareness and expertise of network members through operation of the Network and through distribution of a triannual newsletter -

NETTLAP News;

- maintaining and disseminating a directory of institutions and individuals active in environmental training at tertiary-level;

- conducting Training and Resources Development Workshops for tertiary-level environmental educators and trainers;

- preparing and disseminating curriculum guidelines and the resource materials, learning aids and training packages to support their implementation, these resources having been developed, adapted and evaluated at Training and Resources Development Workshops.

- convening regional consultative meetings on tertiary-level environmental education and training to identify emerging needs, and the methods to resolve short-comings in current capacities to address them; and

- developing and applying innovative approaches, methods and technologies to support the environmental education and training processes, often in collaboration with the private sector.

In the above activities NETTLAP cooperates with UNEP sub-programmes (e.g. Environmental Education and Training Unit, Industry and Environment Centre, Environmental Economics Unit, Oceans and Coastal Areas Programme, Secretariat for the Basel Convention, International Register for Potentially Toxic Chemicals), and other relevant regional and international organizations and institutions, in environmental training activities.

While UNEP has been providing catalytic funding to support the above activities of NETTLAP, there is a need broaden participation in and support for the Network, thereby ensuring its long-term sustainability.

NETTLAP should continue to give priority to serving the needs of its members. This requires an effective mechanism for determining the requirements of the membership and for responding to them. NETTLAP should strengthen its own communications channels - print, Email and, into the future, interactive video - as well as pioneering the application of options provided by others; e.g the Sustainable Development Network and Internet.

To justify its continuing existence NETTLAP must produce identifiable improvements in the quality and extent of environmental training being conducted by and within tertiary institutions in the region.

As an environmental training network, NETTLAP might be viewed as <u>one</u> delivery mechanism at the regional level, coordinating and assisting with delivering the following:

- appropriate technical input provided in part by the relevant specialized centres of UNEP;

- appropriate input in generic environmental training guidelines, methods and tools provided in part by the relevant units of UNEP; and

- appropriate responses to identified regional and national needs and capacities provided in part by UNEP/ROAP.

There are large multiplier effects associated with training staff in tertiary institutions and the key. Staff also make immediate and significant contributions to achieving desired environmental outcomes through their interactions with industry and government. For these reasons staff from tertiary institutions are urged to play an active role in NETTLAP and ensure the maximum benefits are gained from UNEP's environmental training activities at the regional level.

ANNEX 6

SUMMARY OF EUROPEAN INTER-AGENCY WORKSHOP
" *Training Approaches for Environmental Management in Industry* "

This workshop, held in Dresden, Germany, in September, 1994, was designed to commence a dialogue with selected European universities and institutes on how to train people on topics in environmental management, with a particular focus on prevention of industrial pollution.

This first European regional workshop was a collaborative effort of UNEP Industry and Environment (UNEP IE), the International Register of Potentially Toxic Chemicals (UNEP IRPTC), the WHO Programme for the Promotion of Environmental Health (PEH) and Programme for Promotion of Chemical Safety (PCS), the United Nations Industrial Development Organization (UNIDO) and the International Labour Office (ILO), together with UNEP's Regional Office for Europe (ROE) and the Environmental Education and Training Unit (EETU). They were joined by the Dresden University of technology and the International Academy of the Environment (IAE).

The programme reflected the long-standing concern by these partners that the new graduates and existing industrial personnel needed to be more aware of certain key issues, and use more effectively the programmes and services of the relevant organizations. One particular concern is that recent development in environmental management (e.g. use of preventative management tools such as waste audits and risk assessments) find their way as rapidly as possible into formal teaching curricula.

Twenty nine participants were invited from 24 countries in the European region. Most were professors, senior teachers or programme coordinators from universities or national training institutes. Their current training activities are aimed at graduate and undergraduate students in environment-related fields, senior government officials, environmental managers, employers, employees and trade union officials.

The 4-day workshop included demonstration and practice using a variety of training materials available from UNEP, WHO, UNIDO and ILO in four thematic areas:

- pollution sources
- cleaner production
- workplace chemical safety, accident prevention and preparedness
- industrial waste management

The workshop allowed participants to try out a number of new training modules and develop a feel for the particular training methods that they use. In addition, two workshop sessions focused specifically on enhancing training methodologies and on curriculum development.

The workshop concluded with a planning session in which participants reviewed the applicability of existing training materials and resources to their own institutions. They then developed plans to integrate and adapt some of the modules for their own teaching programmes upon return to their countries.

Follow-up to the workshop will take several directions, including support for national curriculum development by the sponsoring agencies, further workshops on training methodologies and/or an in-depth study of some of the modules, and collaboration in reviewing and producing further trainers' packages. A number of the participants intended to expand or strengthen their international collaboration and link directly on a bilateral basis.

Evaluation of the workshop by participants, resource persons and the collaborating organizations has produced the following guidance points:

* sessions are more immediately productive if participants can be prepared for the topic by structured pre-workshop questionnaires and reports and, where appropriate, by pre-workshop exercises. This is particularly applicable to short, intensive workshops.

* all technical papers should be sent to participants beforehand, together with abstracts, an annotated directory and some pre-study notes where appropriate, in order to encourage reading before travel to the meeting.

* there should be adequate time for discussions of presentations, even at the expense of deleting some presentations. Discussion time should not be sacrificed if timing slips.

* opportunities for information exchange between participants should be maximized trough short presentations and adequate time for informal contact at regular intervals throughout the meeting. Social events should be programmed earlier rather than later. Resource persons and administrative staff should be introduced at the beginning.

* Country reports, technical presentations and descriptions of organizations should occur preferably by way of short written summaries rather than being communicated in plenary sessions. Where speeches are used they should in all cases be kept to the main core purpose of the meeting.

* interactive workshop sessions are often more effective in producing a learning outcome than are formal plenary sessions. Skill-building is most effectively achieved by simulation exercises.

* close attention is needed to physical layout of meeting rooms. Placement of handouts and display area for documents should be kept separate and uncluttered. Core resource documents should be kept away from "advertising" materials. Someone should coordinate handouts to ensure that participants are not overloaded with printed material.

* substantial time should be allocated to a final session on action planning and personal follow-up plans of participants. An evaluation session is of assistance in planning subsequent workshops.

SELECTED LIST OF RELEVANT TRAINING PACKAGES AVAILABLE FROM UNITED NATIONS ORGANIZATIONS

Information supplied by Dr Fritz Balkau of UNEP IE, Paris, France

United Nations Environment Programme Industry and Environment (UNEP IE)

Cleaner Production. September 1994. Contains background reading, transparencies, bibliography, case studies, and work exercises. 110 pages.

Cleaner Production in Leather Tanning. A set of work exercises. September 1994. Contains work exercises and bibliography. 65 pages.

Environmental and Technological Issues Related to Lead-Acid Battery Recycling. Preliminary version September 1994. Contains background reading, transparencies, bibliography, and work exercises. 130 pages.

Management of Accident Prevention and Preparedness. September 1994. Contains background reading, transparencies, bibliography, case studies, and work exercises. 110 pages.

Hazardous Waste, Policies and Strategies. A Training Manual, December 1991. Contains background reading, case-study, work exercises, reference tables, and bibliography. 250 pages. 350 FF.

Landfill of Hazardous Industrial Wastes. A Training Manual. March 1994. Contains background reading, case-study, work exercises, reference tables, and bibliography. 315 pages. 350 FF.

INVENT. Industrial Waste Prediction Model, 1990. A training package and manual to familiarize users with the INVENT Calculation Programme.

Environmental Management of Mining Sites, UNEP/DDSMS. to be published in 1995. Contains background reading, transparencies, case-studies, work exercises, and bibliography. 200 pages.

Site Identification and Remediation Options for Contaminated Industrial Land. Preliminary version September 1994. Contains background reading, transparencies, bibliography, case studies, and work exercises. 110 pages.

Tools for Action to Prevent Ozone Depletion. Preliminary version May 1994. Contains background reading, transparencies, bibliography, and work exercises. 100 pages.

Enquiries: **F. Balkau, UNEP IE, 39-43 Quai André Citroën, 75739 Paris, France. Fax. (33 1) 44 37 14 74.**

United Nations Industrial Development Organization (UNIDO)

A Training Course on Ecologically Sustainable Industrial Development, 1994. Contents: 10 learning units, a video cassette containing seven short films, two floppy discs, three booklets, and a learning recall tape (30 min.). Available from UN sales centre, $250.

Enquiries: **R. Luken. UNIDO, P.O. Box 300, 1400 Vienna, Austria. Fax. (43 1) 211 313 352.**

International Labour Office (ILO)

Environmental Management Training: ILO/UNEP Programme in Support of Managers and Management Institutions (5 Volumes), 1987. Currently being updated.

Environmental Training, Policy and Practice for Sustainable Development, 1994.

Higher Productivity and a Better Place to Work. Practical ideas for owners and managers of small and medium-sized industrial enterprises, 1988.

Safety and Health in the Use of Chemicals at Work. A training manual, 1993.

Workers Education and Health. Discussion Booklets, 1993. Contains six booklets addressing workers-related environmental problems.

Enquiries: **Publications department, ILO, CH-1211 Geneva 22, Switzerland. Fax. (41 22) 798 86 85.**

World Health Organization (WHO)

Assessment of Sources of Air, Water and Land Pollution (2 Volumes), 1993. Describes the rapid source inventory assessment technique (RSIT), including updated emission factors and guidelines for applying RSIT to environmental management problems.

Problem-Based Training Exercises for Environmental Epidemiology. Instructor's Guide, Problem-Based Training Exercises for Environmental Epidemiology. Student's Guide, 1991. A two-part collection of exercises based on real-life situations which reviews the basic concepts in environmental epidemiology. The Instructor's Guide includes recommendations on how to use the exercises and suggested answers to problem sets.

Enquiries: **F. Lapensee. WHO, Environmental Technology Division of Environmental Health, 1211 Geneva 27, Switzerland. Fax. (41 22) 791 07 46.**

International Programme on Chemical Safety (IPCS)

Chemical Safety (Fundamentals of Applied Toxicology). Training Modules. Out of print, but currently being revised. Contents: material to handout, demonstration and exercises, slides, colour transparencies, and diskettes of text files and databases.

Multilevel Course on the Safe Use of Pesticides and on the Diagnosis and Treatment of Pesticide Poisoning, 1992.

Resource Guide on Training and Technical Assistance Activities of International Organizations in the Area of Chemical Safety.

Enquiries: **The Director, IPCS, 20 Avenue Appia, CH-1211 Geneva 27, Switzerland. Fax. (41 22) 791 48 48.**

United Nations Educational and Scientific and Cultural Organization (UNESCO)

UNESCO Series of Learning Materials in Engineering Sciences. Postgraduate Course in Environmental Education. Module on selected topics in environmental management, 1993.

Enquiries: **UNESCO, Engineering and Technology Division, 7, place de Fontenoy, 75700 Paris, France. Fax. (33 1) 40 65 95 35.**

International Maritime Organisation (IMO)

The Global Waste Inventory and Database, 1992. Not a training package, but a useful database that can be used as a teaching aid.

MARPOL 73/78 Annex I & II. A model course on marine pollution and environment protection.

Enquiries: **A. Ross, IMO, 4 Albert Embankment, London SE1 7SR, UK. Fax. (44 71) 587 32 10.**

UNEP'S SMALL WINDOWS PROJECT

UNEP's Environmental Education and Training Unit (UNEP/EETU) has developed a strategy (the *Small Windows Project*) to provide financial support for relevant environmental training and education projects. Environmental Education aims at increasing awareness, knowledge, skills and understanding of both children and adults with respect to the environment and to the human interrelationship with the environment. It has a long-term perspective.

Environmental Training aims at increasing and enhancing the knowledge, skills and attitudes as well as providing the management tools needed by individuals, organisations and governments to work towards the prevention and solution of environmental problems. It has a short- and mid-term perspective.

To be eligible for financial assistance through UNEP/EETU's Small Windows Project the proposed project must:

- be in the field of either Environmental Education or Environmental Training;
- have a requested budget that does not exceed US$10,000 for projects on Environmental Education, or US$15,000 for projects on Environmental Training;
- include a counterpart contribution in cash or in kind;
- have as its major objective to improve the environment through capacity building and aim towards sustainable development;
- be innovative and replicable;
- be carried out at the grassroots level;
- be small scale; and
- have clear starting and completion dates with concrete results expected at the end.

UNEP/EETU has provided guidelines for writing project proposals for the Small Windows Project.

The project proposal must be concise, but complete. The project proposal should follow the following format:

Title: The application should state clearly that it is a project proposal for a Small Windows Project on either Environmental Education or on Environmental Training.

1. Organisation(s) Involved

1.1 Description

Name, address, director, etc.

1.2 Background

The background of the organization(s), including objectives and activities, and affiliation, if any, with other institutions or organisations.

1.3 Staff

Description of the people carrying out the project, and their responsibilities.

2. The Project

2.1 Objectives

What are the objectives of the project? Give a description of how these objectives meet the needs of the local community and in what way they aim towards sustainable development.

2.2 Results

What concrete results can be expected out of the project?

2.3 Target group(s)

What are the target group(s) for the project - give a short description. Explain why this target group was chosen.

2.4 Support

If the project is supported by the government or a major organization, or if you have other donors, an indication of their names and the type and amount of support should be given.

3. Workplan and Timetable

3.1 Workplan

Give a detailed workplan describing the various activities that will be undertaken within the project.

3.2 Timetable

Give a timetable and description of the location where the activities will be carried out.

4. Budget

A detailed budget should be given, not only describing what the requested money is needed for, but also what in kind or financial contribution will be provided by the organisation. Indicate other possible donors.

5. Evaluation and follow-up

5.1 Evaluation

How will the results of the project be evaluated?

5.2 Follow-up

What will happen with the results of the project in the short and the long term? Are there any further activities anticipated?

5.3 Report

How will the project be reported back to UNEP/EETU? In which way will the expenses be justified?

Background documentation and correspondence which will support the project proposal should be enclosed.

The project proposal can be sent to:
Dr S. Yodmani, Director
UNEP Regional Office for Asia and the Pacific (ROAP)
United Nations Building
Rajdamnern Avenue
Bangkok 10200, Thailand
Telephone (66 2) 2829161-200/2829381-369
Telefax (66 2) 2803829/2809602; Telex TH 82315 BANGKOK or TH 82392 BANGKOK

ANNEX 9

PARTICIPANTS' PLEDGES

In order to encourage effective follow-up to the workshop, each participant was asked to make an individual pledge in response to the questions: i) what will you do? and ii) what would you wish to do as a member of a joint activity? The following are the individual pledges. They are quoted verbatim.

Mohan Gewali (Nepal)

i) educate students and any other person on danger of toxic and hazardous waste through different means.

ii) maintain formal/informal relationship with the participants of the workshop.

Toru Tamura (Japan)

i) stake holders dialogue to set demand-driven issues.

ii) establish an "alumni" association.

G.V. Subrahmanyam (India)

i) interact with NETTLAP, TNN and resource persons.

ii) help achieve the objectives of NETTLAP.

P.V.R. Subramanyam (India)

i) pledge to spread the objectives of the workshop to academic institutions.

ii) work with EPTRI in their activities in toxic chemicals and hazardous waste training programmes.

T. Chakrabati (India)

i) the training and resource kits will be utilized to design our future training programme on hazardous waste management for target audiences.

ii) Collectively I shall exchange my kits with me fellow participants so that we ALL CAN FINE TUNE OUR KITS based on newly acquired information.

Ajantha Perera (Sri Lanka)

i) I would make arrangements for a hazardous waste management workshop in Colombo, Sri Lanka.

ii) I would like to assist in networking the institutions in the region.

Anwarul Islam (Bangladesh)

i) disseminate information obtained and keep in touch with the concerned to obtain further information.

ii) generation of primary data, preparation of case studies and strengthening focal points and thematic nodes.

Paul Clarey (Australia)

i) prepare flexible delivery mode modules for three HAZMAT subjects: i) Integrated Management of Hazardous Materials; ii) Risk Assessment of Hazardous Materials; and iii) Environmental Protection and Occupational Health and Safety.

ii) maintain contacts and seek assistance from interested universities (or equivalent) in the development of EIA and Landuse Planning (or other suitable title) and integrate it with the three courses described above.

D. Badgaa (Mongolia)

i) to promote similar seminar in Mongolia.

ii) to strengthen training activities in particular countries.

Devendra Wagley (Nepal)

i) present workshop material useful for making training kits in our context.

ii) with help from resource persons from NETTLAP we run workshop in our country.

R.M.U. Senarath (Sri Lanka)

i) these packages can be used to organise workshops for the people directly involved in the handling of toxic chemicals and hazardous waste.

ii) follow-up action can be taken to implement the above package with assistance from the other countries in the region.

Feroze Ahmed (Bangladesh)

i) design a graduate course on toxic chemicals and hazardous waste management.

ii) share experience and materials.

G. Shkolenok (IRPTC)

Organise three sub-regional workshops for IRPTC users.

Fritz Balkau (UNEP IE)

i) I will send documents to those who request them in writing.

ii) we should field test some modules so that I can improve them.

Andrew Tay (Singapore)

i) to collect and disseminate information on resource materials.

ii) improve networking among members.

Soli Arceivala (India)

i) continued active interest in Toxic Chemical and Hazardous Waste Management, especially the latter.

ii) follow-up the present workshop with another workshop after 1 or 2 years; also collectively keep in touch.

Lakshmi Raghupathy (India)

i) contribute towards development of packages and help in continuing the activity in the areas.

ii) there should be periodic review and updating of activities initiated in this workshop.

Nilay Chaudhuri (India)

i) introduce three special course on toxic and hazardous chemicals and wastes - an extension of what we started in 1992 - and prepare handout material.

ii) group should be kind enough to exchange experiences and knowledge in the relevant area.

Tishya Chatterjee (India)

i) I will consult pertinent institutions in my region regarding their existing TCHW curricula. I will input the methodologies learnt in the workshop to enrich existing curricula and encourage further training and data development within the sub-region.

ii) network to access and exchange local information and pass it on to industry.