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# Final Report

ICS-UNIDO - MTEC Workshop on  
“Water and Soil Remediation  
Technologies”

November 16<sup>th</sup> -17<sup>th</sup>, 2005, Siam City Hotel, Bangkok,  
Thailand

UNIDO Project No.: TF/GLO/04/105  
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# **PART A**

## **Technical Report**

**ICS-UNIDO - MTEC Workshop on**

**“Water and Soil Remediation  
Technologies”**

**November 16-17, 2005, Siam City Hotel, Bangkok, Thailand**

## INTRODUCTION

In several developing countries, one of the most urgent problems to be solved is the lack of clean water for drinking as well as agricultural use and together with an appropriate management of such a resource there is a high demand of technologies for wastewater treatment, water purification and production of drinking water.

In these years several water and soil treatment technologies have been developed and many of them have proved to be very promising: research and development efforts are extending their applicability and improving their economic sustainability, leading in the years to come to their increasing use and to an interesting industrial market development, especially in developing countries.

Moreover, some new methodologies and tools for evaluating the applicability and sustainability of the different available technical options are of increasing interest for their use in the decision making processes, giving decision makers with the opportunity to perform an objective evaluation and identification of suitable solutions when a wide range of information, issues and needs are involved in the management of water resources and efficient and cost effective decisions have to be taken. The need for decision support is widely recognized and in recent years a large number of Decision Support Tools (DSTs) have been developed, with the aim not only of facilitating decision making but of helping to ensure that the process is transparent, documented, reproducible and hopefully robust, providing a coherent framework to explore the options available.

The International Centre for Science and High Technology (ICS-UNIDO), with the aim of providing decision makers (site owners, local community representatives, environmentalists, regulators, technologists, etc.) with the state-of-the-art on water and soil treatment techniques and promoting the use of a structured approach in technology evaluation and selection, is presently developing specific strategy addressed to improve capacity building of developing countries, promote joint projects and strengthen cooperation among institutions/centres of industrialized and developing/in transition economies operating in the field. In this regard, ICS-UNIDO is organizing workshops, training courses and meetings of experts, where new methodologies, tools and techniques for a proper clean-up of water as well as land resources are presented and discussed and the possibility of concerted actions and joint projects are explored.

In the ICS Work Programme for year 2005, a series of activities addressed to the transfer of know-how in the field of water and land resources protection and recovery in developing countries has been planned within the sub-programme on Remediation of the ICS Area of Pure and Applied Chemistry. Within this sub-programme, a Workshop on "Water and Soil Remediation Technologies", has been planned for South East Asian countries due to the importance of the topic. Consequently, the Workshop has been scheduled from 16 to 17 November 2005 in Bangkok, Thailand. The event represents an element of the above mentioned capacity building programme and a follow up of previously organized events like the latest Expert Group Meeting on "Technologies for Soil and Water Remediation and for POPs Destruction" held in Trieste, Italy, in May 2005, where the situation of water and land resources and relevant problems in SEA region was presented and discussed.

As an agricultural and agro-industrial country with more than 80% of her population being engaged in farming and whose highest income is from the export of agricultural products, Thailand has always accorded the highest priority to the promotion of agriculture and agro-industry. At present, water and soil treatment technologies and know-how is making fast progress. To manage and protect water and land resources efficiently, depends largely on the application of such technologies. Consequently, meeting among delegations from various countries will enrich Thailand's knowledge and expertise through the exchanging and sharing of experience and know-how. Furthermore, possible areas of cooperation will be conducted and carried out jointly by member countries to achieve common interests. Therefore, this international workshop to concentrate on the urgent problems of soil contamination and also the lack of clean water for drinking and agricultural use was directly relevant to our needs. Thailand was then selected to be the host of this event.

## OBJECTIVES

- ❖ To update information on chemistry-related water and land remediation problems in selected SEA countries and identifying priorities.
- ❖ To survey the state-of-the-art in the field of water and soil clean-up technologies
- ❖ To survey the state-of-the-art of DSTs in the field of water and soil treatment technology evaluation and selection, and discuss the prospects for their introduction and use in SEA countries
- ❖ To develop proposals for joint initiatives including relevant project proposals, also identifying possible funding schemes.

## ORGANIZATION

The workshop on "Water and Soil Remediation Technologies" was jointly organized by the International Center for Sciences & High Technology (ICS), United Nation Industrial Development Organization (UNIDO), and The National Metal and Materials Technology Center (MTEC).

### Local Organizer contact persons:

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## DATE AND SITE

The Workshop was held from 16<sup>th</sup> to 17<sup>th</sup> November 2005 at the Siam City Hotel, Bangkok, Thailand

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## PARTICIPATION

There was in total of 72 participants attended the workshop as described below.

### 1) Lecturers (Keynote speakers)

20 speakers participated in the workshop. They made presentations covering the whole range of the workshop's scope. These speakers were divided into:

- ❖ 8 invited international lecturers
- ❖ 2 national lecturers,
- ❖ 10 representatives of neighboring countries

The list of the lecturers together with the topics of the lectures is given in the attached "Program and Time Schedule" (see Annex A1)

### 2) Participants

35 participants from 19 organizations participated in the workshop and 17 local staff and reporters held workshop. They were divided into 3 following groups.

2.1) There were nine Thai governmental organizations participated in the meeting as follows:

The Pollution Control Department  
The Department of Industrial Works  
The Ministry of Science and Technology,  
The National Metal and Materials Technology Center  
The National Nanotechnology Center  
Thailand Research Fund  
Thailand Textile Institute  
Thailand Automotive Institute  
The Electrical and Electronics Institute of Thailand

2.2) Representatives of the following nine companies participated in the meeting:

Environmental Conservation Company  
EC System (Thailand) Co., Ltd.  
Trade Master International Co., Ltd.  
San E.68 Consulting Engineers Co., Ltd.  
Energy and Environmental Technology Department, JETRO Bangkok  
Thai Environmental Remediation Co., Ltd.  
Siam Cement Industry Co., Ltd  
Thanapaisan Co., Ltd.

2.3) Representatives of the following Thai universities attended the meeting:

Kasetsart University  
Mahidol University

Khon-Kaen University

Please also refer to the attached final "List of Participants" for the details (Annex A2).

## **WORKSHOP MATERIALS**

Each participant and lecturer obtained conference materials. The draft Aide Mémoire, draft Agenda, as well as invitation containing the main objectives of the forum and some details on the organization were distributed as electronic version by e-mail about 2-3 weeks before the Workshop started.

At the registration, the following materials were given to all of the registered persons:

- ❖ Final Aide Mémoire and Final program of the workshop
- ❖ A file folder containing a hard copy of abstracts and power point presentations in English
- ❖ Office supplies

All lecturers' materials have been put on a CD, which is available at ICS

## **OPENING CEREMONY**

The opening ceremony was chaired by Mr. Saksit Tridech, Permanent Secretary of the Ministry of Science and Technology, Thailand. Welcome speech were made by Mr. Stanislav Miertus, Chief of Area of Pure and Applied Chemistry, ICS-UNIDO, Mr. Giusto Sciarabba, Managing Director, ICS-UNIDO, and Mr. Sakarindr Bhumiratana, President, National Science and Technology Development Agency (NSTDA), Thailand

## **PROGRAMME**

Please refer to the attached final program and time schedule for the details (Annex A1).

## **FOLLOW-UP ACTIVITIES, COMMON INITIATIVES, RECOMMENDATIONS AND CONCLUSIONS**

According to the Agenda, a final session was held, where all the issues presented in the previous sessions of the Workshop were further analyzed and discussed in order to identify common needs and possible common initiatives and to define an overall follow-up plan.

Due to the number and complexity of the issues which were deemed suitable by participants to be taken into account for the definition of possible follow-up activities, with the aim of better organization and focus on the discussion, it was agreed to group all the different issues into four general topics of discussion, each representing common needs and priorities of the participating countries.

The four general topics of discussion were:

- "Technologies"
- "Decision Support Tools"
- "Networking & Collaboration"
- "International Programmes"

As a result, four working groups (WG1, WG2, WG3 and WG4) were formed. Each group dealt with one general topic. Participants have been then requested to join a working group, on the basis of their specific interests. The results of each WG discussion are presented below:

WG1: working group on "Technologies"

Participants:

- M. Balakrishnan, India
- A. Dutt Vyas, India
- B. Hasan Bashir, Pakistan
- C. Sokha, Cambodia
- J. Song, China
- I. Werellagama, Sri Lanka
- P. Saewong, Thailand
- B. I. Chuleemas, Thailand
- G. Centi, Italy

The panel identified the following priorities to be taken into account for follow-up activities addressed to the introduction, development and use of effective and sustainable water and soil remediation technologies in SEA countries:

- *New technologies:* the introduction of new technologies and methodologies for wastewater treatment and reuse for irrigation purposes (e.g. textile, tannery, distillery, pulp/paper,), for volume reduction of (industrial) sludge and for PCBs oil (from transformers) treatment/re-use, was deemed important for the efficient application in the region.
- *Assessment of technologies:* independent evaluators to assess existing technologies and plant installations (e.g. municipal wastewater plants - not working at a full capacity) in SEA countries were deemed necessary.
- *Training activities:* in particular the "training of trainers" in water and soil remediation. Specific focus was on rural areas pollution problems (e.g. by fluorine, arsenic, etc.), on water management for agricultural uses, on new technologies (e.g. membrane bioreactors) application was also suggested.
- *Documentation:* the preparation and distribution of manuals/guidelines for water sanitation in emergency areas (short and longer term solutions) was recommended.
- *Networking activities:* to be promoted and carried out in the SEA region in order to enable the exchange of information on emerging technologies and their applications. The creation of common databases of experiences and case histories to be shared among SEA countries was suggested. Sharing of experiences/data on Ecological Risk Assessment applications for the set-up of common Environmental Quality Standards of aquatic ecosystems and on the application of remediation technologies within Mekong River riparian countries (common databases) was also deemed particularly important.

WG2: working group on "Decision Support Tools"

Participants:

- Do Than Bai, Vietnam
- Anuphan Ittarut, Thailand
- Jenny Tan, Malaysia
- Wage Komarawidjaja, Indonesia
- A. Lodolo, ICS-UNIDO, Italy

The panel identified the following possible follow-up activities addressed to the introduction, development, and use of Decision Support Tools for technology assessment and selection in SEA countries:

- *Vietnam* - DST for Waste Water Treatment: great interest in the ICS in-house



developed Decision Support Tool (DAWTS) for water treatment technologies was expressed by Vietnam. Possible follow-up joint activities were identified for further development and improvement of DAWTS (improvement/test/validation) to better fit its specific application in SEA countries, like the testing of DAWTS in some full-scale wastewater treatment processes (case studies) carried out in Vietnam. In this regard, the Vietnam country representative expressed his availability to continuously provide ICS with data relevant to the above mentioned applications. Moreover, availability was expressed to test DAWTS within the case studies through the quantification of the performance of the applied technologies according to DAWTS criteria. Availability for suggestions and indications about further possible country-specific criteria for DAWTS improvement was also expressed.

- *Thailand - DST for Soil Treatment*: mutual exchange of information between ICS and Thailand, relevant to the already developed DSTs in the country, was agreed (Thailand already developed a DST for soil treatment, based on MS Access).
- *Malaysia - DST for Used Oil Regeneration*: interest was expressed by the country representative of Malaysia in the ICS in-house developed DST for oil regeneration technologies (SPORE). In this regard, it was agreed that ICS will provide indications regarding the information on oil regeneration technologies applied in the country to be collected and that Malaysia will provide ICS with the relevant data accordingly.
- *Indonesia - DSTs for Water Resources Management and for Solid Waste Management*: the country representative expressed the need for Indonesia to avail national decision makers of country-specific Decision Support Tools for the management of water resources and for the management of solid waste in Indonesia. Capacity building activities, together with the implementation of country-shaped DSTs in those fields were indicated as necessary for the country.
- *All countries - Training activities on DSTs development and use*: all panelists expressed the need of capacity building/training activities in the field of DST development and application for the region. In particular, the "training of trainers" and the use of DSTs during training courses were considered extremely important. Participation/cooperation of the countries in the design and implementation of "regionally shaped" training course was recommended.

#### WG3: working group on "Networking & Collaboration"

Participants:

- Mazlin Mokhtar, Malaysia
- Olivia la O' Castillo, Philippines
- Martin Schamann, Austria

The panel recommended the following approach to be taken into account within the possible future joint initiatives in SEA countries:

- To record information/data regarding: best practices, lesson learned, ongoing activities in the field of water and soil remediation – to be loaded onto a special website hosted by ICS-UNIDO and to be linked to relevant website of other key institutions operating in the field.
- To identify local (SMEs) in SEA region as special target groups to be informed of available and especially 'affordable' technologies. National (domestic) Focal Points in each country should be also identified, e.g. industry associations, or NGOs

- To distribute information and announcements on funding for programs; to bring together partners, collaborators, sponsors, etc.
- Emergency Preparedness and Disaster Support Systems and Action Plans should be prepared, aiming at and able to:
  - 1) Identify weak points that need to be strengthened.
  - 2) Pay immediate/prompt attention to disaster.
  - 3) Involve focal points in order to have integrative approach.
  - 4) Sharing of experiences like those of Pakistan, Sudan, Sri Lanka, Thailand would be very beneficial.
- Technologies should be affordable for fast availability particularly in time of disasters.
- Promote education: Capacity-building for primary, secondary and tertiary levels. to "Training of Trainers" should be given top priority.
- Share information regarding financial support – availability of funds and in-kind support; etc.
- Get commitment of governments and ministers e.g. through ASEAN, APEC, IPU, etc. ministerial meetings, or secretariats.
- Promote DSTs for 3 levels: high level i.e. top decision makers, medium level i.e. professionals / technical people, ground level i.e. the community and groups such as NGOs and users.

WG4: working group on "International Programmes"

Participants:

- S. Miertus, ICS-UNIDO, Italy
- Tiep Nguyen, UNIDO Field Office, Thailand
- Thumrongrut Mungcharoen, MTEC, Thailand
- Chantana Yuvaniyama, MTEC, Thailand
- Pomthong Malakul, MTEC, Thailand
- Basharat Bashir, Pakistan

Some priority aspects of cooperation were discussed. In particular, it was recommended to use specific expertise of ICS-UNIDO through cooperation with UNIDO regional offices in development of the projects being implemented by UNIDO, namely:

- A) The implementation of the POP Convention: the two POP-Enabling Activity Projects in Laos PDR and Myanmar and the BAT/BEP regional proposal for the ACMECS Region. PCBs could be the focused substance for Post-NIP, as most of the participants have raised their concerns to.
- B) Reduction of Industrial Pollution into the Mekong River through Transfer of Environmentally Sound Technologies (TEST).

ICS-UNIDO cooperation programme with Thailand was also discussed. Among priority issues indicated in Thailand is the requested technical assistance from ICS on the assessment of efficiency of applied water treatment technologies/facilities in Thailand as well as collaboration initiatives in the field of solid waste management study (special request of Prime Minister Office in Thailand). Moreover, further promotion of collaboration between ICS-UNIDO and MTEC was recommended particularly on Life Cycle Assessment (LCA) and EcoDesign e.g. LCA of degradable plastics, EcoDesign and Eco-labels of textile products, Biomass etc. In addition, Mahidol University is now working on a project called "Community-Involvement in Environmental Protection focused on Water Quality Monitoring", which has covered more than 200 canals in Bangkok and vicinity areas. This

project still needs collaboration and additional financial support for project continuation and sustainability.

Programmes of particular interest with respect of priority needs in Pakistan were indicated, namely:

- Degradable plastics programme,
- Technologies for water sanitation and drinking water production in areas of disaster.

#### **FINAL RECOMMENDATIONS**

At the end of the Working Group session, the outputs of each WG were presented and discussed in plenary session.

Besides the above indicated specific proposal and recommendations of each Working Group, participants agreed on the following general recommendations to ICS-UNIDO:

- To further promote awareness and capacity building activities in the SEA region
- To increase support for the preparation and promotion of projects in the SEA region

## Annex AI

### Final Programme

## **“Water and Soil Remediation Technologies” 16<sup>th</sup> -17<sup>th</sup> Nov. 2005, Bangkok, Thailand**

**Wednesday, 16<sup>th</sup> November 2005**

08:30-08:50 Registration of participants

#### *Opening Session*

**Chairpersons: Mr. Paritud Bhandhubanyong and Ms. Olivia Castillo**

- 08:50-08:55 Welcome address and Introduction of the “Water and Soil Remediation Technologies” Workshop (*Mr. Stanislav Miertus, Chief of Area of Pure and Applied Chemistry, ICS-UNIDO, Italy*)
- 08:55-09:00 Greetings and Welcome address (*Mr. Giusto Sciarabba, Managing Director, ICS-UNIDO, Italy*)
- 09:00-09:10 Welcome address and Report to Chairman on the Overall Status of the “Water and Soil Remediation Technologies” Workshop (*Mr. Sakarindr Bhumiratana, President, National Science and Technology Development Agency (NSTDA), Thailand*)
- 09:10-09:20 *Opening Remarks (Mr. Saksit Tridech, Permanent Secretary of the Ministry of Science and Technology, Thailand)*

#### *Session One*

### **NATIONAL AND INTERNATIONAL INITIATIVES/PROGRAMMES IN THE FIELD OF ENVIRONMENTAL POLLUTION REDUCTION AND REMEDIATION**

**Chairpersons: Mr. Thumrongrut Mungcharoen and Mr. Mazlin Mokhtar**

- 09:20-09:30 ICS-UNIDO mandate, strategy and programmes (*Mr. Giusto Sciarabba, Managing Director, ICS-UNIDO, Italy*)
- 09:30-09:45 ICS-UNIDO programme of the Chemistry Area with the focus on the initiatives in the field of remediation and environmental pollution reduction (*Mr. Stanislav Miertus, Chief of Area of Pure and Applied Chemistry, ICS-UNIDO, Italy*)
- 09:45-10:10 UNIDO programmes and initiatives in the field of environmental protection and recovery in SEA region (*Mr. Tiep Nguyen, UNIDO Field Office Representative, Bangkok, Thailand*)
- 10:10-10:35 Programmes/initiatives in the field of remediation and environmental pollution reduction in Thailand (*Mr. Paritud Bhandhubanyong, Director of MTEC, Thailand*)
- 10:35-10:50 Coffee Break**

**Chairpersons: Mr. Giusto Sciarabba and Mr. Stanislav Miertus**

- 10:50-11:15 International programmes/initiatives in the field of remediation and environmental pollution reduction: opportunities in SEA countries (*Ms. Olivia Castillo, Chair/President Asia Pacific Roundtable for Sustainable*

- Consumption & Production, Philippines)*
- 11:15-11:40 Capacity building and knowledge transfer in the field of water management and water remediation in East and South East Asian countries. SEA WF activities (*Mr. Mazlin Mokhtar, Chairman of MyCapNet and member of SEA CapNet, Malaysia*)
- 11:40-12:05 The Post-Tsunami Survey and International Implementation Programmes (*Mr. Niran Chaimanee, Department of Mineral Resources, Bangkok, Thailand*)
- 12:05-12:20 Survey of selected programmes of UN Organizations in the field of water treatment/purification with the focus on post-crisis initiatives (*Mr. Anil Dutt Vyas, Department of Civil Engineering, M.N.I.T, India*)
- 12:20-12:30 Discussion
- 12:30-13.30 **Lunch Break**

### *Session Two*

#### **ENVIRONMENTAL POLLUTION AND REMEDIATION: GENERAL ISSUES**

**Chairpersons:** *Mr. Andrea Lodolo and Mr. Wage Komarawidjaja*

- 13:30-13:55 Risk based approach for the management of contaminated sites (*Mr. Martin Schamann, Federal Environmental Agency, Austria*)
- 13:55-14:20 Criteria, methodologies and tools for risk analysis (*Mr. Martin Schamann, Federal Environmental Agency, Austria*)
- 14:20-14:45 Established and emerging technologies and techniques for water quality measurement and monitoring (*Mr. Gabriele Centi, ICS-UNIDO Scientific Expert and University of Messina, Italy*)

14:45-15:00 **Coffee Break**

**Chairpersons:** *Mr. Martin Schamann and Mr. Induka Werellagama*

- 15:00-15:25 Soil and groundwater remediation technologies: main features and applications (*Mr. Andrea Lodolo, ICS-UNIDO Scientific Expert, Italy*)
- 15:25-15:50 Waste water treatment technologies: main features and applications (*Mr. Gabriele Centi, ICS-UNIDO Scientific Expert and University of Messina, Italy*)
- 15:50-16:15 Emerging technologies for water sanitation and drinking water production (*Mr. Anil Dutt Vyas, Department of Civil Engineering, M.N.I., India*)
- 16:15-16:40 Decision Support Tools for clean-up technologies assessment and selection: ICS-UNIDO initiatives and experiences in the field (*Mr. Andrea Lodolo, ICS-UNIDO Scientific Expert, Italy*)
- 16:40-17:30 Discussion
- 18.00-20.00 **Welcome Dinner**

Thursday, 17<sup>th</sup> November 2005

*Session Three*

**OPEN PROBLEMS AND INITIATIVES IN THE FIELD OF ENVIRONMENTAL  
POLLUTION REDUCTION AND REMEDIATION**

*Environmental situation, open problems, ongoing and planned initiatives and possible  
follow-up actions in Thailand and other South East Asia (SEA) countries*

**Country / Institutional programmes' Reports**

Urgent problems, needs and initiatives in water and land resources management in SEA countries. Main topics to be dealt with:

- Topical environmental pollution problems in the countries: sources for soil, surface and groundwater pollution. Post-tsunami problems and needs
- General strategy for water resources management, water and soil remediation, priorities, long and short term objectives.
- Gaps and needs for remediation technologies, tools for contaminated water and soil treatment
- On-going and planned projects.
- Funding opportunities and schemes
- Project proposals' presentation

09:00-10:40

*(5 Country/Institute representatives contribution, 20 min. each):*

**Chairpersons: Mr. Gabriele Centi and Ms. Jenny Tan**

- **Thailand** (Mr. Anuphan Ittarut, Director of Water Quality Management Division, Pollution Control Department (PCD))
- **Cambodia** (Mr. Chrin Sokha, Chief of Water and Soil Quality Management Office, Department of Environmental Pollution Control, Ministry of Environment)
- **China** (Mr. Jing Song, Soil and Environment Bioremediation Research Center, Institute of Soil Science, CAS)
- **India** (Ms. Malini Balakrishnan, TERI School of Advanced Studies, Centre of Energy & Environment)

10:40-11:00 **Coffee Break**

11:00-13:00

*(6 Country/Institute representatives contribution, ca. 20 min. each):*

**Chairpersons: Mr. Andrea Lodolo and Ms. Malini Balakrishnan**

- **Indonesia** (Mr. Wage Komarawidjaja, Center for the Assessment and Application of Environmental Technology, Agency for the Assessment and Application of Technology)
- **Pakistan** (Mr. Basharat Hasan Bashir Engineering and Technology Department, Allama Iqbal Open University, Islamabad)
- **Malaysia** (Ms. Jenny Tan, Center for Environmental Technologies)
- **Philippines** (Ms. Olivia Castillo, Chair/President Asia Pacific Roundtable for Sustainable Consumption & Production)
- **Sri Lanka** (Mr. Induka Werellagama, Faculty of Engineering, University of Peradeniya)
- **Viet nam** (Mr. Do Thanh Bai, Center of Environmental Protection and Chemical Safety, Ministry of Industry)

13:00-14:30 *Lunch Break*

*Session Four*

**FOLLOW-UP ACTIVITIES, COMMON INITIATIVES,  
RECOMMENDATIONS AND CONCLUSIONS**

**Panelists:** *Mr. Pomthong Malakul, Ms. Olivia Castillo, Mr. Mazlin Mokhtar, Mr. Stanislav Miertus, Mr. Andrea Lodolo, Mr. Gabriele Centi*

14:30-17:00 Identification and development of possible common initiatives: follow-up activities development (*working groups*):

- Proposals development
- Presentation and discussion of results
- Definition of follow-up activities and relevant action plan

15:45-16:15 *Coffee Break*

17:00-17:30 Recommendations and conclusions of the Workshop.

## **Annex AII**

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# **PART B**

# **Financial Report**

**ICS-UNIDO Forum on  
“Water and Soil Remediation  
Technologies”**

**November 16-17, 2005, Siam City Hotel, Bangkok, Thailand**

**UNIDO Project No.: TF/GLO/04/105  
Purchase Order No.: 16000990**

## FUNDING

The total budget for the organization was 23,000 Euro (€).

The planned contribution from ICS-UNIDO amounted to 18,000 €. to be spent for the budget items specified in the "Terms of Reference" (i.e.: accommodation and meals of key lecturers and participants, travel of key lecturers and participants, internal transport).

Table 1: The list of expenditure (in €) for the seminar on "Water and Soil Remediation Technologies"

| <i>A) ICS-UNIDO Total contribution in EURO:</i>  |                 |
|--|-----------------|
| Accommodation (including ABF) for 13 invited international participants (including key lecturers)<br><i>(~54 EURO/night/room x 3 nights x 13 rooms) + 3 spare rooms for participants that may have to spend 4 nights due to their flight availability (~54 EURO/night/room x 3 rooms)</i>  | 2,268           |
| Meals and daily allowance for 13 international lecturers and participants (as below, including two coffee breaks per day during a 2-day workshop)<br><br><ul style="list-style-type: none"> <li>- Lunch during the workshop (~15 EURO/day x 2 days x 13 persons)</li> <li>- Welcome dinner on Nov. 16 (~13 EURO/day x 1 day x 13 persons)</li> <li>- Dinner on Nov. 17 (~15 EURO/day x 1 days x 13 persons)</li> </ul> | 754             |
| Ad hoc DSA for 13 international lecturers and participants + 1 national participant from outside Bangkok<br><br><i>Allowance not exceeding 20.5 € /day /person x 2 days x 14 persons</i><br><i>Allowance(for some participants that may have an extra stay in Thailand due to their flight availability) 50 € /day /person x 1 day x 3 persons</i>   | 724             |
| Accommodation (including ABF) for 1 national participant from the country (i.e. outside Bangkok) <i>(~54 EURO/night x 3 nights x 1 person)</i>   | 162             |
| Meals for 37 national participants (including one lunch and two coffee breaks per day during a 2-day workshop and a welcome dinner)<br><br><i>Lunch and coffee breaks during the workshop (~15 EURO/day x 2 days x 37 persons)+</i><br><i>Welcome dinner (~13 EURO/day x 1 day x 37 persons)</i>   | 1,591           |
| Travel of 13 invited international lecturers and participants<br><i>(~860.30 EURO/participant x 13 persons)</i>  | 11,034          |
| Travel of 1 national participant from the country (i.e. outside Bangkok)   | 90              |
| Local transport <i>(Round-trip Airport transfers ~45 EURO x 14 persons)</i>  | 630             |
| Workshop materials   | 747             |
| <b>Total ICS Contribution:</b>   | <b>€ 18,000</b> |

Note: 48.47 Baht / 1 €



The other expenses related to administrative and secretarial support (e.g. communication, lecturing aids, etc.), were paid by the organizer's own research grant.

The pre-financing payment of € 14,400 was already transferred to the local organizer. Since the actual workshop expenses within the ICS-UNIDO budget were € 12,530.63, mainly due to lower costs for travels of invited international lecturers and participants, there were the relevant leftover of € 1,869.37 that would be returned to UNIDO after approval of the Final Report.

For further details pls. refer to the attached budget breakdown (Annex B1)

**Annex B1**

**"Water and Soil Remediation Technologies"  
November 16-17, 2005, Bangkok, Thailand**

TOTAL FUNDS FROM  
UNIDO EURO 18.000

| DESCRIPTION   | Budget<br>in EURO | Disbursement<br>EURO | Disbursement<br>i.c. | Difference<br>EURO |
|---|-------------------|----------------------|----------------------|--------------------|
| name 0 Mr. Martin Schamann  | 162               | 216                  |                      | -54                |
| name 1 Mr. Chrin Sokha  | 162               | 162                  |                      | 0                  |
| name 2 Mr. Jing Song  | 162               | 162                  |                      | 0                  |
| name 3 Mr. Anil Dutt Vyas   | 162               | 162                  |                      | 0                  |
| name 4 Ms. Malini Balakrishnan  | 162               | 162                  |                      | 0                  |
| name 5 Mr. Wage Komarawidjaja   | 162               | 162                  |                      | 0                  |
| name 6 Mr. Gabriele Centi   | 162               | 162                  |                      | 0                  |
| name 7 Ms. Jenny Tan Suat Eam   | 162               | 162                  |                      | 0                  |
| name 8 Mr. Mazlin bin Mokhtar   | 162               | 162                  |                      | 0                  |
| name 9 Mr. Basharat Hasan Bashir  | 162               | 216                  |                      | -54                |
| name 10 Ms. Olivia Castillo   | 162               | 162                  |                      | 0                  |
| name 11 Dr. D. R. I. B. Werellagama   | 162               | 162                  |                      | 0                  |
| name 12 Mr. Do Thanh Bai  | 162               | 162                  |                      | 0                  |
| Spare room for participant that may spend 4 nights due to their flight availability | 162               | N/A                  |                      | 162                |
| <b>Accommodation for international lecturers and participants</b>                   | <b>2,268</b>      | <b>2,214</b>         |                      | <b>-54</b>         |
| name 0 Mr. Martin Schamann  | 58                | 58                   |                      | 0                  |
| name 1 Mr. Chrin Sokha  | 58                | 58                   |                      | 0                  |
| name 2 Mr. Jing Song  | 58                | 58                   |                      | 0                  |

| DESCRIPTION  | Budget in EURO | Disbursement EURO | Disbursement l.c. | Difference EURO |
|--|----------------|-------------------|-------------------|-----------------|
| name 3 Mr. Anil Dutt Vyas  | 58             | 58                |                   | 0               |
| name 4 Ms. Malini Balakrishnan   | 58             | 58                |                   | 0               |
| name 5 Mr. Wage Komarawidjaja  | 58             | 58                |                   | 0               |
| name 6 Mr. Gabriele Centi  | 58             | 58                |                   | 0               |
| name 7 Ms. Jenny Tan Suat Eam  | 58             | 58                |                   | 0               |
| name 8 Mr. Mazlin bin Mokhtar  | 58             | 58                |                   | 0               |
| name 9 Mr. Basharat Hasan Bashir   | 58             | 58                |                   | 0               |
| name 10 Ms. Olivia Castillo  | 58             | 58                |                   | 0               |
| name 11 Dr. D. R. I. B. Werellagama  | 58             | 58                |                   | 0               |
| name 12 Mr. Do Thanh Bai   | 58             | 58                |                   | 0               |
| <b>Meals for international lecturers and participants</b>                                    |                |                   |                   |                 |
| name 0 Mr. Martin Schamann   | 41             | 91                |                   | -50             |
| Remark: Additional allowance for extra day of stay in Thailand (please see the attachment 1) |                |                   |                   |                 |
| name 1 Mr. Chrin Sokha   | 41             | 41                |                   | 0               |
| name 2 Mr. Jing Song   | 41             | 41                |                   | 0               |
| name 3 Mr. Anil Dutt Vyas  | 41             | 114               |                   | -73             |
| Remark: Additional allowance to cover his expense in India (please see the attachment 2)     |                |                   |                   |                 |
| name 4 Ms. Malini Balakrishnan   | 41             | 41                |                   | 0               |
| name 5 Mr. Wage Komarawidjaja  | 41             | 41                |                   | 0               |
| name 6 Mr. Gabriele Centi  | 41             | 41                |                   | 0               |
| name 7 Ms. Jenny Tan Suat Eam  | 41             | 41                |                   | 0               |
| name 8 Mr. Mazlin bin Mokhtar  | 41             | 41                |                   | 0               |
| name 9 Mr. Basharat Hasan Bashir   | 41             | 41                |                   | 0               |
| name 10 Ms. Olivia Castillo  | 41             | 41                |                   | 0               |
| name 11 Dr. D. R. I. B. Werellagama  | 41             | 41                |                   | 0               |
| name 12 Mr. Do Thanh Bai   | 41             | 41                |                   | 0               |

| DESCRIPTION   | Budget in EURO | Disbursement EURO | Disbursement i.c. | Difference EURO |
|---|----------------|-------------------|-------------------|-----------------|
| <i>Allowance for some participants that may have an extra stay in Thailand due to their flight availability) 50 €/day/person x 1 day x 3 persons</i>  | 150            | N/A               |                   | 150             |
| <b>Ad hoc DSA for international lecturers and participants and national participant from outside BKK</b>  | 724            | 693               |                   | 27              |
| name 0 Mr. Anuphan Ittharatana  |                |                   |                   |                 |
| Remark: MTEC has transferred Ms. Boonthk iwal's Ad hoc DSA to Mr. Ittharatana because he was a national representative who was responsible for preparing a country report while Ms. Boonthk iwal was only a participant. As a local organizer, we think support for accommodation and transportation expenses should be sufficient for her participation. | 162            | 162               |                   | 0               |
| <b>Accommodation for participants from the country</b>  | 162            | 162               |                   | 0               |
| <b>Meals for 37 participants from the country</b>   | 1591           | 1254.25           |                   | 336.75          |
| <b>Travels</b>  |                |                   |                   |                 |
| name 0 Mr. Martin Schamann  | 1,667          | 841.17            |                   | 825.83          |
| name 1 Mr. Chrin Sokha  | 250            | 182.80            |                   | 67.20           |
| name 2 Mr. Jing Song  | 744            | 519.47            |                   | 224.53          |
| name 3 Mr. Anil Dutt Vyas   | 495            | 475.50            |                   | 19.50           |
| name 4 Ms. Malini Balakrishnan  | 495            | 403.47            |                   | 91.53           |
| name 5 Mr. Wage Komarawidjaja   | 595            | 307.00            |                   | 288.00          |
| name 6 Mr. Gabriele Centi   | 3,105          | 1,716.40          |                   | 1,388.60        |
| name 7 Ms. Jenny Tan Suat Eam   | 304            | 229.40            |                   | 74.60           |
| name 8 Mr. Mazlin bin Mokhtar   |                |                   |                   |                 |
| Remark: This budget was planned for a Japanese representative, but he could not participate in the workshop and had nominated his colleague in Malaysia instead.  | 1,730          | 229.40            |                   | 1,500.60        |
| name 9 Mr. Basharat Hasan Bashir  | 205            | 727.20            |                   | -522.20         |
| name 10 Ms. Olivia Castillo   | 600            | 279.00            |                   | 321.00          |
| name 11 Dr. D. R. I. B. Werellagama   | 530            | 351.00            |                   | 179.00          |

| DESCRIPTION  | Budget in EURO | Disbursement EURO | Disbursement i.c. | Difference EURO |
|--|----------------|-------------------|-------------------|-----------------|
| name 12 Mr. Do Thanh Bai                                     | 314            | 262.80            |                   | 51.20           |
| Remark: ~860.30 EURO/participant x 13 persons                |                |                   |                   |                 |
| <b>Total travel for international participants</b>           | <b>11,034</b>  | <b>6,524.61</b>   |                   | <b>4,509.39</b> |
| name 0 Mr. Niran Chaimanee                                   |                |                   |                   |                 |
| name 1 Dr. Paritud Bhandhubanyong                            |                |                   |                   |                 |
| <b>Total travel (contribution) for national participants</b> |                |                   |                   |                 |
| name 0 Ms. Chuleemas Boonthkiwai                             | 90             | 87.27             |                   | 2.73            |
| <b>Total travel for national participants</b>                | <b>90</b>      | <b>87.27</b>      |                   | <b>2.73</b>     |
| name 0 Mr. Martin Schamann                                   | 45             | 28.64             |                   | 16.36           |
| name 1 Mr. Chrin Sokha                                       | 45             | 28.64             |                   | 16.36           |
| name 2 Mr. Jing Song   | 45             | 28.64             |                   | 16.36           |
| name 3 Mr. Anil Dutt Vyas                                    | 45             | 28.64             |                   | 16.36           |
| name 4 Ms. Malini Balakrishnan                               | 45             | 28.64             |                   | 16.36           |
| name 5 Mr. Wage Komarawidjaja                                | 45             | 28.64             |                   | 16.36           |
| name 6 Mr. Gabriele Centi                                    | 45             | 28.64             |                   | 16.36           |
| name 7 Ms. Jenny Tan Suat Eam                                | 45             | 28.64             |                   | 16.36           |
| name 8 Mr. Mazin bin Mokhtar                                 | 45             | 28.64             |                   | 16.36           |
| name 9 Mr. Basharat Hasan Bashir                             | 45             | 28.64             |                   | 16.36           |
| name 10 Ms. Olivia Castillo                                  | 45             | 28.64             |                   | 16.36           |
| name 11 Dr. D. R. I. B. Werellagama                          | 45             | 28.64             |                   | 16.36           |
| name 12 Mr. Do Thanh Bai                                     | 45             | 28.64             |                   | 16.36           |
| name 13 Ms. Chuleemas Boonthkiwai (national participant)     | 45             | 0                 |                   | 45              |
| <b>Transportation</b>  | <b>630</b>     | <b>372.2</b>      |                   | <b>257.88</b>   |
| <b>Workshop material</b>                                     | <b>747</b>     | <b>489.3</b>      |                   | <b>277.7</b>    |
| <b>GRAND TOTAL</b>   | <b>18,000</b>  | <b>12,530.65</b>  |                   |                 |

| DESCRIPTION  | Budget<br>in EURO | Disbursement<br>EURO | Disbursement<br>I.C. | Difference<br>EURO |
|--|-------------------|----------------------|----------------------|--------------------|
| TOTAL BUDGET FROM UNIDO  | 18000             |                      |                      |                    |
| ALREADY TRANSFERRED AMOUNT (80%)                                       | 14,400            |                      |                      |                    |
| LEFTOVER AMOUNT TO BE RETURNED TO UNIDO<br>(after actual disbursement) | 1,869.37          |                      |                      |                    |