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## CONTACT

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INTERNATIONAL CENTRE FOR SCIENCE AND HIGH TECHNOLOGY

*in cooperation with*

THE SLOVAK ENVIRONMENTAL AGENCY

**Final Report of the Workshop**

***Remediation Technologies Application for Heavily  
Polluted Sites in CEE countries***

Bratislava, 24 - 26 June 2002

UNIDO Project **TF/GLO/00/105**

UNIDO Contract No. **2002/151**

## Background

One of the most urgent problems to be faced at a global level is the decontamination of soil and waters due to domestic and industrial activities. Large polluted areas besides having lost their eco-functionality, often represent a serious risk for human health.

The policy for the restoration of natural resources is thus a priority in many countries, both industrialized and with economies in transition, and there is the need to allocate extensive financial as well as scientific and technical resources for environmental protection and recovery. Environmental situation in each country is specific by type, distribution and extent of contamination and a proper integrated environmental strategy together with the availability of sound and suitable decontamination technologies is one of the priorities for the years to come.

On the basis of the above considerations ICS, in cooperation with the Slovak Environmental Agency, has organized a workshop on "*Remediation Technologies Application for Heavily Polluted Sites in CEE Countries*", which represents one of further steps of the ICS programme.

## Objectives

- To survey strategies, criteria, methodologies and tools for the risk based management of contaminated sites as well as tools (DSTs) for the management of environmental recovery activities.
- To survey environmental regulatory framework – legislative tools for environmental recovery initiatives and existing information systems on pollution sources and contaminated sites.
- To survey the state of art in CEE transition-economy countries and identify key common problems.
- To define the ICS-UNIDO follow-up actions relevant to the topic in selected transition-economy countries as well as the actions to be taken for the establishment of the ICS CEE Forum on Remediation.

## Organization

The workshop was organized by the Slovak Environmental Agency in cooperation with the Ministry of the Environment of the Slovak Republic in the Institute of Education and Services in Bratislava between 24 and 26 June 2002.

## Funding

The ICS-UNIDO approved contribution was US\$ 20,000.

The amount received on 12 June 2002 was US\$ 16,000.

The hosting country contributed 2,000 US\$ for the administrative support of the workshop, rent of premises and equipment.

The actual expenses covered by UNIDO (US\$ 13,919) were lower than the foreseen sum especially in the item *Travel of invited lecturers and participants*, mainly because there were more lecturers from neighbouring countries than the original assumption was and their travel expenses were lower and also because some foreign lecturers found other financial sources to cover their air tickets than our budget. No reduction of the total number of participants occurred, actually the number of lecturers and participants were even higher than the original planned.

The leftover of the UNIDO contribution (US\$ 2,081) will be reimbursed to UNIDO.

A summary of the final budget is given in **Appendix 1**.

### Lecturers

|                    |  |                 |
|--------------------|--|-----------------|
| Igor Volodin       | UNIDO Vienna                                   | Austria         |
| David LaRoche      | UNIDO-GEF Vienna                               | Austria         |
| Herbert Haubold    | Austrian Federal Environment Agency            | Austria         |
| Stanislav Miertus  | ICS-UNIDO Trieste                              | Italy           |
| Andrea Lodolo      | ICS-UNIDO Trieste                              | Italy           |
| Martin Murín       | Ecotoxicological Centre                        | Slovakia        |
| Ivan Holoubek      | RECETOX-TOCOEN and Associates                  | Czech Republic  |
| Martin Schamann    | Austrian Federal Environment Agency            | Austria         |
| Jan Japenga        | Alterra Green World Research                   | The Netherlands |
| Jim Philp          | Napier University, School of Life Sciences     | United Kingdom  |
| Luigi Pistone      | Siirtec Nigi S.p.A.                            | Italy           |
| Milan Matuška      | Ministry of Environment of the Slovak Republic | Slovakia        |
| Miroslav Holubec   | Research Institute of Water Management         | Slovakia        |
| Kamil Vrana        | Research Institute of Water Management         | Slovakia        |
| Katarína Földešová | Research Institute of Water Management         | Slovakia        |
| Fritz Balkau       | UNEP   | France          |
| Viera Fecková      | Slovak Cleaner Production Centre               | Slovakia        |

### Participation

Participation was opened to scientists, experts in remediation, governmental representatives, representatives of industries, universities, managers and others dealing with environmental protection and recovery issues.

The total number of registered participants and lecturers was 52.

The full list and addresses of lecturers and participants are in **Appendix 2**.

### Participants by their sphere of operation

| Country    | Government | Industry | Science and Research | Others | Total |
|------------|------------|----------|----------------------|--------|-------|
| Albania    | 1          |          |                      |        | 1     |
| Bulgaria   |            |          | 1                    |        | 1     |
| Croatia    | 1          |          |                      |        | 1     |
| Czech Rep. | 1          |          |                      |        | 1     |

|              |           |          |           |          |           |
|--------------|-----------|----------|-----------|----------|-----------|
| Denmark      |           |          |           | 1        | 1         |
| Hungary      | 1         |          |           |          | 1         |
| Lithuania    |           |          | 1         |          | 1         |
| Moldova      | 1         |          |           |          | 1         |
| Romania      |           |          | 1         |          | 1         |
| Slovakia     | 7         | 6        | 10        | 1        | 24        |
| Slovenia     |           |          | 1         |          | 1         |
| Yugoslavia   | 1         |          |           |          | 1         |
| <b>Total</b> | <b>13</b> | <b>6</b> | <b>14</b> | <b>2</b> | <b>35</b> |

## Materials

Each workshop participant obtained a folder with the essential information, agenda, list of participants, lecture notes, a notebook and badge.

## Opening Ceremony

The Opening Ceremony was attended by about 60 people: invited guests, lecturers and participants.

The workshop was opened by László Miklós, the Minister of Environment of the Slovak Republic.

Other welcome speeches were delivered by:

- Stanislav Miertus, Area Director, ICS-UNIDO,
- Alojz Nemethy, Ambassador and Permanent Representative of the Slovak Republic to the United Nations and other International Organizations in Vienna,
- Luca Del Balzo di Presenzano, Italian Ambassador in the Slovak Republic and
- Igor Volodin, UNIDO Vienna.

## Agenda

The Agenda of the workshop is in the **Appendix 3**.

## Field Trip

A half-day field trip was organized on 25 June to the largest Slovak refinery Slovnaft a.s. with following program:

1. *PC and video presentation in the Slovnaft Presentation Centre*

- Slovnaft water management presentation
- Groundwater hydraulic protection system (GWHPS)
- 3-dimensional model GWHPS

2. *Field excursion in Slovnaft area:*

- Inner HC line
- GWHPS Control Center
- Pumping well of the inner HC line: RČ-34-A
- Pumping station ČS 2
- Re-pumping station of oil PSRL 2
- Solo well example
- Mobile unit free oil pumping – an indicatory system well example.

## Assessment of the Workshop

A questionnaire was distributed to the participants. The results are summarized in the table below.

| <i>Item</i>                            | <i>Excellent</i><br>% | <i>Very good</i><br>% | <i>Good</i><br>% | <i>Fair</i><br>% | <i>No reply</i> |
|--|-----------------------|-----------------------|------------------|------------------|-----------------|
| The information process was            | 31                    | 63                    | 6                | 0                | 0               |
| Announcement & pre-course material     | 50                    | 31                    | 13               | 0                | 6               |
| Scientific program (general)           | 25                    | 50                    | 19               | 0                | 6               |
| Lecture / workshop                     | 13                    | 69                    | 18               | 0                | 0               |
| Small working groups                   | 31                    | 38                    | 18               | 0                | 13              |
| Case studies                           | 31                    | 38                    | 25               | 0                | 6               |
| Extra-time specific question / example | 31                    | 32                    | 31               | 0                | 6               |
| Students:                              | <i>Balanced</i>       | <i>Unbalanced</i>     | <i>No reply</i>  |                  |                 |
| scientific knowledge                   | 69                    | 13                    | 0                |                  |                 |
| Duration of program:                   | <i>Just right</i>     | <i>Too long</i>       | <i>Too short</i> |                  |                 |
| number of days                         | 75                    | 6                     | 19               |                  |                 |
| length of working days                 | 68                    | 32                    | 0                |                  |                 |
| Training facilities and hotel          | <i>Excellent</i>      | <i>Very good</i>      | <i>Good</i>      | <i>Fair</i>      | <i>No reply</i> |
| Lecture / training room                | 19                    | 38                    | 32               | 11               | 0               |
| Breaks / refreshment                   | 19                    | 50                    | 31               | 0                | 0               |
| Hotel accommodation                    | 0                     | 44                    | 25               | 0                | 31              |
| Meals at the hotel                     | 13                    | 38                    | 31               | 5                | 13              |
| Organizer's response                   | 56                    | 25                    | 13               | 0                | 6               |
| Overall program organization           | 50                    | 38                    | 6                | 0                | 6               |
| Follow-up:                             | <i>Yes</i>            | <i>Maybe</i>          | <i>No</i>        |                  |                 |
| Would you recommend to others          | 88                    | 6                     | 6                |                  |                 |

As can be seen from the table, the participants' feedback was very positive and the overall score of the top two grades (excellent + very good) was 71%. The only insufficiency was connected with very hot weather and lecture room without air conditioning.

## Proposal for Possible Follow-up Activities

The workshop led to preliminary proposals of follow-up activities, mainly focused on the development of CEE Forum on Remediation, which is also one of the recommendations from the International Forum on Strategies and Priorities for Environmental Industries, which was held in Bratislava on 12-14 June 2002. The main objective of the Forum is to support CEE countries in tackling problems related to heavily polluted sites with special regard to:

- Information management
- Knowledge transfer, exchange of data and expertise with regard to remediation technologies and their application
- Support the development and implementation of decision support tools in risk based management of contaminated sites and in remediation technology evaluation and selection

- Tight cooperation with other international initiatives / networks
- Identification and possible promotion of pilot projects devoted to urgent remediation problems

**Next actions to be undertaken for the CEE Forum on Remediation:**

*1<sup>st</sup> Phase:*

- Creation of a permanent CEE forum Committee, creation and maintenance of the CEE Forum website, secretary, etc.
- Preparation of the draft project proposal of CEE Forum to be submitted to the 6<sup>th</sup> Framework Programme

*2<sup>nd</sup> Phase:*

- Creation of the Task Groups of the CEE Forum, identification of partners, leading institutions/persons for each Task Group
- Preparation of the action plan and full implementation of the CEE Forum

Banská Bystrica, 12 July 2002



Jarmila Dupejová  
Local Organizer

## Appendix 1

**Workshop on Remediation Technologies Application for Heavily Polluted Sites in CEE Countries  
Bratislava, Slovakia, 24 - 26 June 2002**

Rate of Exchange: 46.519 local currency (Slovak crown SKK) / dollar

BUDGET UNIDO

TOTAL FUNDS FROM UNIDO US dollars 20,000  
TOTAL FUNDS FROM UNIDO SKK 930,380

| DESCRIPTION                             | Budget in US\$ | Budet local curr. | Disbursement US\$ | Disbursement l.c. | Difference US\$ | Difference l.c. |
|---|----------------|-------------------|-------------------|-------------------|-----------------|-----------------|
| <i>International lecturers</i>          |                |                   | 1,043             | 48,519            |                 |                 |
| Balkau, Fritz                           |                |                   | 22                |                   |                 |                 |
| Haubold, Herbert                        |                |                   | 15                |                   |                 |                 |
| Holoubek, Ivan                          |                |                   | 15                |                   |                 |                 |
| Japenga, Jan                            |                |                   | 340               |                   |                 |                 |
| Philp, Jim                              |                |                   | 320               |                   |                 |                 |
| Pistone, Luigi                          |                |                   | 316               |                   |                 |                 |
| Martin Schamann                         |                |                   | 15                |                   |                 |                 |
|   |                |                   | 0                 |                   |                 |                 |
| <i>National lecturers</i>               |                |                   | 0                 |                   |                 |                 |
| <i>International participants</i>       |                |                   | 3,927             | 182,680           |                 |                 |
| Bozhinova, Paunka                       |                |                   | 298               |                   |                 |                 |
| Conisescu, Andrei                       |                |                   | 315               |                   |                 |                 |
| Druzina, Branko                         |                |                   | 63                |                   |                 |                 |
| Dumitru, Mihail                         |                |                   | 112               |                   |                 |                 |
| Hasznos, Gabor                          |                |                   | 30                |                   |                 |                 |
| Kadunas, Kestutis                       |                |                   | 572               |                   |                 |                 |
| Luarasi, Genci                          |                |                   | 396               |                   |                 |                 |
| Mucala, Miloš                           |                |                   | 26                |                   |                 |                 |
| Kent Pedersen                           |                |                   | 1,151             |                   |                 |                 |
| Stanojevic, Ljiljana                    |                |                   | 381               |                   |                 |                 |
| Tonkovic, Vladimir                      |                |                   | 138               |                   |                 |                 |
| Pre-paid air ticket (Mr. Conisescu)     |                |                   | 445               | 20,712            |                 |                 |
| <b>Total travels</b>                    | <b>10,900</b>  | <b>507,057</b>    | <b>4,970</b>      | <b>231,199</b>    | <b>5,930</b>    | <b>275,858</b>  |
| <i>Accommodation &amp; meals</i>        |                |                   |                   |                   |                 |                 |
| <i>international participants meals</i> |                |                   |                   |                   |                 |                 |
| Ustav vzdelavania a sluzieb             |                |                   | 1,090             | 50,716            |                 |                 |
| Hotel-restaurant TAXIS                  |                |                   | 125               | 5,804             |                 |                 |
| <i>international participants hotel</i> |                |                   |                   |                   |                 |                 |
| Ustav vzdelavania a sluzieb             |                |                   | 2,967             | 138,000           |                 |                 |
| Hotel Kyjev                             |                |                   | 142               | 6,600             |                 |                 |
| <i>national participants meals</i>      |                |                   |                   |                   |                 |                 |
| Ustav vzdelavania a sluzieb             |                |                   | 1,894             | 88,084            |                 |                 |
| Hotel-restaurant TAXIS                  |                |                   | 72                | 3,337             |                 |                 |
| <i>national participants hotel</i>      |                |                   | 1,384             | 64,400            |                 |                 |
| others                                  |                |                   | 0                 | 0                 |                 |                 |
| <b>Total accomodation and meals</b>     | <b>8,100</b>   | <b>376,804</b>    | <b>7,674</b>      | <b>356,941</b>    | <b>426</b>      | <b>19,863</b>   |
| Local transportation                    | 1,000          | 46,519            | 881               | 41,000            | 119             | 5,519           |
| <b>Total local transportation</b>       | <b>1,000</b>   | <b>46,519</b>     | <b>881</b>        | <b>41,000</b>     | <b>119</b>      | <b>5,519</b>    |
| <i>Miscellaneous</i>                    |                |                   |                   |                   |                 |                 |
| Exchange rate difference                | 0              | 0                 | 394               | 18,350            | -394            | -18,350         |
| others                                  | 0              | 0                 | 0                 | 0                 | 0               | 0               |
| <b>Total Miscellaneous</b>              | <b>0</b>       | <b>0</b>          | <b>394</b>        | <b>18,350</b>     | <b>-394</b>     | <b>-18,350</b>  |
| <b>GRAND TOTAL</b>                      | <b>20,000</b>  | <b>930,380</b>    | <b>13,919</b>     | <b>647,490</b>    | <b>6,081</b>    | <b>282,882</b>  |

TOTAL BUDGET FROM UNIDO 20,000  
ALREADY TRANSFERRED (80%) 16,000  
FUNDS TO BE RETURNED 2,081  
(after actual disbursement)



**WORKSHOP ON REMEDIATION TECHNOLOGIES APPLICATION  
FOR HEAVILY POLLUTED SITES IN CEE COUNTRIES**

**Bratislava, 24 – 26 June 2002**

|   |  |
|---|--|
| <p><b>Auxt Anton</b><br/>HES-Comgeo, s.r.o.<br/>Hlboká 16, 974 01 Banská Bystrica<br/>Kostiviarska cesta 4<br/>974 01 Banská Bystrica<br/>Slovakia</p>  | <p>Phone : 00421-48-4285153<br/>Fax : 00421-48-4285154<br/>E-mail : <a href="mailto:hes@penet.sk">hes@penet.sk</a></p>                       |
| <p><b>Balkau Fritz</b><br/>United Nations Environment Programme<br/>Division of technology, Industry and Economics<br/>UNEP Tour Mirabeau<br/>39-43 quai André – Citroën<br/>75739 Paris cedex - France</p> | <p>Phone : 0033-1-44371440<br/>Fax : 0033-1-14371474<br/>E-mail : <a href="mailto:fbalkau@unep.fr">fbalkau@unep.fr</a></p>                   |
| <p><b>Bozhinova Paunka</b><br/>N. Poushkarov Institute of Soil science<br/>7, Shosse Bankya Str., P.O.BOX 1369<br/>1080 Sofia<br/>Bulgaria</p>  | <p>Phone : 00359-2-242201<br/>Fax : 00359-2-248937<br/>E-mail: <a href="mailto:p_bojinova@yahoo.com">p_bojinova@yahoo.com</a></p>            |
| <p><b>Brezováková Andrea</b><br/>Slovak Hydrometeorological Institute<br/>Jeséniova 17<br/>833 15 Bratislava<br/>Slovakia</p>   | <p>Phone : 00421-2-59415299<br/>Fax :<br/>E-mail : <a href="mailto:Andrea.Brezovakova@shmu.sk">Andrea.Brezovakova@shmu.sk</a></p>            |
| <p><b>Bučková Mária</b><br/>Istrochem, a.s.<br/>Nobelova 34, 836 05 Bratislava<br/>Slovakia</p>   | <p>Phone : 00421-2-49512040<br/>Fax : 00421-2-49512498<br/>E-mail : <a href="mailto:buckova@istrochem.sk">buckova@istrochem.sk</a></p>       |
| <p><b>Čík Gabriel</b><br/>Faculty of Chemical and Food Technology<br/>Slovak University of Technology<br/>Radlinského 9, 812 37 Bratislava<br/>Slovakia</p>   | <p>Phone : 00421-2-52495243<br/>Fax : 00421-2-52495243<br/>E-mail : <a href="mailto:cik@chtf.stuba.sk">cik@chtf.stuba.sk</a></p>             |
| <p><b>Conisescu Andrei</b><br/>Parliament of Republic of Moldova<br/>Committee for Ecology and Development Territory<br/>Cisinau, bvd. Stefan cel Mare, 105<br/>Moldavia</p>                                | <p>Phone : 00373-2-233733<br/>Fax : 00373-2-238044<br/>E-mail : <a href="mailto:a.conisescu@parlament.md">a.conisescu@parlament.md</a></p>   |
| <p><b>Döményová Jana</b><br/>Slovak Hydrometeorological Institute<br/>Jeséniova 17<br/>833 15 Bratislava<br/>Slovakia</p>   | <p>Phone : 00421-2-59415318<br/>E-mail : <a href="mailto:jana.domenyova@shmu.sk">jana.domenyova@shmu.sk</a></p>                              |
| <p><b>Druzina Branko</b><br/>Institute of Public Health of Republic of Slovenia<br/>Trubarjeva 2<br/>1000 Ljubljana<br/>Slovenia</p>  | <p>Phone : 00386-1-2441486<br/>Fax : 00386-1-2441447<br/>E-mail : <a href="mailto:branko.druzina@ivz-rs.si">branko.druzina@ivz-rs.si</a></p> |
| <p><b>Dumitru Mihail</b><br/>Research Institute for Soil Science and Agrochemistry<br/>B-dul Marasti, No. 61, Sector 1<br/>COD 71331, Bucharest<br/>Romania</p>   | <p>Phone : 0040-1-2229452<br/>Fax : 0040-1-2225979<br/>E-mail : <a href="mailto:mdumitru@icpa.ro">mdumitru@icpa.ro</a></p>                   |

|  |   |
|--|---|
| <b>Dupej Jozef</b><br>Slovak Environmental Agency<br>Tajovského 28<br>975 90 Banská Bystrica<br>Slovakia             | Phone: 00421-48-4132152<br>Fax: 00421-48-4230409<br>E-mail: <a href="mailto:dupej@sazp.sk">dupej@sazp.sk</a>                                      |
| <b>Dupejová Jarmila</b><br>Slovak Environmental Agency<br>Tajovského 28<br>975 90 Banská Bystrica<br>Slovakia        | Phone: 00421-48-4132152<br>Fax: 00421-48-4230409<br>E-mail: <a href="mailto:dupejova@sazp.sk">dupejova@sazp.sk</a>                                |
| <b>Durová Katarína</b><br>State Health Institute<br>Trnavská 52, Bratislava<br>Slovakia                              | Phone : 00421-2-44372807<br>Fax : 00421-2-44372641<br>E-mail : <a href="mailto:katka@dura.sk">katka@dura.sk</a>                                   |
| <b>Fatulová Elena</b><br>Ministry of the Environment of the SR<br>Nám. L. Štúra 1<br>812 35 Bratislava<br>Slovakia   | Phone: 00421-2-59562187<br>Fax: 00421-2-59562310<br>E-mail: <a href="mailto:fatulova.elena@lifeenv.gov.sk">fatulova.elena@lifeenv.gov.sk</a>      |
| <b>Fecková Viera</b><br>Slovak Cleaner Production Centre<br>Pionierska 15<br>831 02 Bratislava<br>Slovakia           | Phone : 00421-2-44454328<br>Fax : 00421-2-44259015<br>E-mail : <a href="mailto:sccp@cpz.sk">sccp@cpz.sk</a>                                       |
| <b>Fodor Miloš</b><br>U.S.Steel Košice, s.r.o<br>Vstupný areál U.S.Steel<br>044 54 Košice<br>Slovakia                | Phone: 00421-55-6737175<br>Fax: 00424-55-9767277<br>E-mail: <a href="mailto:mfodor@usske.sk">mfodor@usske.sk</a>                                  |
| <b>Földešová Katarína</b><br>Research Institute of Water Management<br>L. Svobodu 5<br>812 49 Bratislava<br>Slovakia | Phone : 00421-2-59343420<br>Fax : 00421-2-54411941<br>E-mail : <a href="mailto:foldesova@vuvh.sk">foldesova@vuvh.sk</a>                           |
| <b>Gajdošová Henrieta</b><br>State Health Institute<br>Trnavská 52, Bratislava<br>Slovakia                           | Phone : 00421-2-44372807<br>Fax : 00421-2-44372641<br>E-mail : <a href="mailto:gajdosova@szusr.sk">gajdosova@szusr.sk</a>                         |
| <b>Gyüreová Daniela</b><br>Ministry of the Environment of the SR<br>Nám. L. Štúra 1<br>812 35 Bratislava<br>Slovakia | Phone : 00421-2-59562271<br>Fax: 00421-2-59562248<br>E-mail: <a href="mailto:gyureova.daniela@lifeenv.gov.sk">gyureova.daniela@lifeenv.gov.sk</a> |
| <b>Harča Vojtech</b><br>Slovnaft, a.s.<br>Vlčie Hrdlo<br>Bratislava<br>Slovakia                                      | Phone: 00421-2-40458960<br>Fax: 00421-2-40556970<br>E-mail: <a href="mailto:vojtech.harca@slovnaft.sk">vojtech.harca@slovnaft.sk</a>              |
| <b>Hasznos Gabor</b><br>Ministry for Environment and Water<br>1011-Budapest, Fő u. 44-50,<br>Hungary                 | Phone : 0036-1/457-33-00<br>Fax : 0036-1/201-30-56<br>E-mail: <a href="mailto:hasznos@mail.ktm.hu">hasznos@mail.ktm.hu</a>                        |
| <b>Holoubek Ivan</b><br>RECETOX-TOCOEN and Associates<br>Kamenice 126/3<br>625 00 Brno<br>Czech Republic             | Phone : 00420-5-47121401<br>Fax : 00420-5-47121431<br>E-mail : <a href="mailto:holoubek@chemi.muni.cz">holoubek@chemi.muni.cz</a>                 |

|  |  |
|--|--|
| <b>Holubec Miroslav</b><br>Research Institute of Water Management<br>L. Svobodu 5<br>812 49 Bratislava<br>Slovakia | Phone : 00421-2-59343439<br>Fax : 00421-2-54411941<br>E-mail : <a href="mailto:Holubec@vuvh.sk">Holubec@vuvh.sk</a>                        |
| <b>Haubold Herbert</b><br>Austrian Federal Environment Agency<br>Spittelauer Lände 5<br>1090 Wien<br>Austria       | Phone: 0043-1-313045506<br>Fax: 0043-1-313045400<br>E-mail: <a href="mailto:haubold@ubavie.gv.at">haubold@ubavie.gv.at</a>                 |
| <b>Chriaštel' Róbert</b><br>Slovak Hydrometeorological Institute<br>Jeséniova 17<br>833 15 Bratislava<br>Slovakia  | Phone : 00421-2-59415240<br>Fax : 00421-2-59415393<br>E-mail : <a href="mailto:robert.chriastel@shmu.sk">robert.chriastel@shmu.sk</a>      |
| <b>Janová Vlasta</b><br>Ministry of the Environment of the SR<br>Nám. L. Štúra 1<br>812 35 Bratislava<br>Slovakia  | Phone: 00421-2-59562460<br>Fax: 00421-2-59562031<br>E-mail: <a href="mailto:janova.vlasta@lifeenv.gov.sk">janova.vlasta@lifeenv.gov.sk</a> |
| <b>Japenga Jan</b><br>Alterra Green Wolrd Research<br>P.O.BOX 47<br>6700 AA Wageningen<br>The Netherlands          | Phone : 0031-317-474274<br>Fax : 0031-317-419000<br>E-mail : <a href="mailto:j.japenga@alterra.wag-ur.nl">j.japenga@alterra.wag-ur.nl</a>  |
| <b>Kadunas Kestutis</b><br>Geological Survey<br>Konarskio 35<br>2600 Vilnius<br>Lithuania                          | Phone : 00370-5-2136272<br>Fax : 00370-5-336156<br>E-mail : <a href="mailto:Kestutis.kadunas@lgt.lt">Kestutis.kadunas@lgt.lt</a>           |
| <b>Kočan Anton</b><br>Institute of Preventive and Clinical Medicine<br>Limbová 14<br>833 01 Bratislava<br>Slovakia | Phone: 00421-2-59369216<br>Fax: 00421-2-59369217<br>E-mail: <a href="mailto:kocan@upkm.sk">kocan@upkm.sk</a>                               |
| <b>LaRoche David A.</b><br>UNIDO-GEF<br>Vienna   | Phone :<br>E-mail : <a href="mailto:davidl@together.net">davidl@together.net</a>   |
| <b>Lieskovská Zuzana</b><br>Slovak Environmental Agency<br>Tajovského 28<br>975 90 Banská Bystrica<br>Slovakia     | Phone: 00421-48-4132160<br>Fax: 00421-48-4132160<br>E-mail: <a href="mailto:lieskov@sazp.sk">lieskov@sazp.sk</a>                           |
| <b>Lodolo Andrea</b><br>ICS-UNIDO<br>Area Science Park<br>Building L2<br>34012 Trieste<br>Italy                    | Phone: 0039-040-9228114<br>Fax: 0039-040-9228115<br>E-mail: <a href="mailto:lodolo@ics.trieste.it">lodolo@ics.trieste.it</a>               |
| <b>Luarasi Genci</b><br>Ministry of Industry and Energetic<br>Bulevardi Dëshmorat e Kombit 2<br>Tirana<br>Albania  | Phone : 00355-4-230139<br>Fax : 00355-4-230139<br>E-mail : <a href="mailto:gluarasi@yahoo.com">gluarasi@yahoo.com</a>                      |
| <b>Matuška Milan</b><br>Ministry of the Environment of the SR<br>Nám. L. Štúra 1<br>812 35 Bratislava<br>Slovakia  | Phone: 00421-2-59562368<br>Fax: 00421-2-59562662<br>E-mail: <a href="mailto:matuska.milan@lifeenv.gov.sk">matuska.milan@lifeenv.gov.sk</a> |

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| <b>Metelková Miroslava</b><br>Slovak Hydrometeorological Institute<br>Jeséniova 17<br>833 15 Bratislava<br>Slovakia         | Phone : 00421-2-59415258<br>Fax : 00421-2-54773602<br>E-mail: <a href="mailto:miroslava.metelkova@shmu.sk">miroslava.metelkova@shmu.sk</a> |
| <b>Miertus Stanislav</b><br>ICS-UNIDO<br>Area Science Park<br>Building L2<br>34012 Trieste<br>Italy                         | Phone: 0039-040-9228114<br>Fax: 0039-040-9228115<br>E-mail: <a href="mailto:miertus@ics.trieste.it">miertus@ics.trieste.it</a>             |
| <b>Mihalková Agáta</b><br>U.S.Steel Košice, s.r.o<br>Vstupný areál U.S.Steel<br>044 54 Košice<br>Slovakia                   | Phone: 00421-55-6738029<br>Fax: 00421-55-6737277<br>E-mail: <a href="mailto:amihalkova@usske.sk">amihalkova@usske.sk</a>                   |
| <b>Mucala Miloš</b><br>Ministry of Environment<br>Vršovická 65<br>100 10 Praha 10<br>Czech Republic                         | Phone: 0042-2-67122067<br>Fax: 0042-2-67310305<br>E-mail: <a href="mailto:mucala_milos@env.cz">mucala_milos@env.cz</a>                     |
| <b>Murín Martin</b><br>Ecotoxicological Centre Bratislava Ltd.<br>Nádražná 36<br>900 28 Ivanka Pri Dunaji<br>Slovakia       | Phone : 00421-2-45943712<br>Fax : 00421-2-45945223<br>E-mail : <a href="mailto:etcba@gtinet.sk">etcba@gtinet.sk</a>                        |
| <b>Palúchová Katarína</b><br>Slovak Environmental Agency<br>Tajovského 28<br>975 90 Banská Bystrica<br>Slovakia             | Phone: 00421-48-4132160<br>Fax: 00421-48-4132160<br>E-mail: <a href="mailto:paluch@sazp.sk">paluch@sazp.sk</a>                             |
| <b>Pedersen Kent</b><br>NIRAS Consulting Enquireers and Planners A/S<br>Sortemosevej 2<br>3450 Allerod<br>Denmark           | Phone: 0045-48-104200<br>Fax: 0045-48-104300<br>E-mail: <a href="mailto:kep@niras.dk">kep@niras.dk</a>                                     |
| <b>Philp Jim</b><br>Napier University<br>School of Life Sciences<br>10 Colinton Road<br>Edinburch EH3 9JJ<br>United Kingdom | Phone: 0044-131-4552462<br>Fax: 0044-131-4552291<br>E-mail: <a href="mailto:j.philp@napier.ac.uk">j.philp@napier.ac.uk</a>                 |
| <b>Pistone Luigi</b><br>Siirtec Nigi S.p.A.<br>Via Algardi, 2 Milan<br>Italy  | Phone : 0039-33-58139068<br>Fax : 0039-02-95441543<br>E-mail : <a href="mailto:luigipistone@yahoo.com">luigipistone@yahoo.com</a>          |
| <b>Polaczek Jerzy</b><br>Industrial Chemistry Research Institute<br>Rydygiera 8<br>02-793 Warszawa<br>Poland                | Phone: 0048-22-6339792<br>Fax: 0048-22-6339792<br>E-mail: <a href="mailto:Jerzy.Polaczek@ichp.pl">Jerzy.Polaczek@ichp.pl</a>               |
| <b>Ronchetti Ladislav</b><br>Petrochema, a.s. Dubová<br>976 97 Nemecká<br>Slovakia  | Phone: 00421-48-6303712<br>Fax: 00421-48-6192428<br>E-mail: <a href="mailto:surab@petrochema.sk">surab@petrochema.sk</a>                   |

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| <b>Schamann Martin</b><br>Umweltbundesamt<br>Spittelauer Laende 5<br>1090 Vienna<br>Austria  | Phone : 0043-1-31304-3370<br>Fax : 0043-1-31304-3211<br>E-mail : <a href="mailto:schamann@ubavie.gv.at">schamann@ubavie.gv.at</a>             |
| <b>Stanojevic Ljiljana</b><br>Ministry for Natural Resources and Environmental<br>Protect<br>Nemanjima 22-26<br>11000 Belgrade                   | Phone : 00381-15-346912<br>Fax : 00381-15-346912<br>E-mail : <a href="mailto:ducca@ptt.yu">ducca@ptt.yu</a>                                   |
| <b>Šoltés Andrej</b><br>ASPEK<br>Drieňová 24<br>826 03 Bratislava<br>Slovakia  | Phone: 00421-2-48297545<br>Fax: 00421-2-48297546<br>E-mail: <a href="mailto:mail@aspek.sk">mail@aspek.sk</a>                                  |
| <b>Šuchová Marianna</b><br>HES-Comgeo, s.r.o.<br>Hlboká 16, 974 01 Banská Bystrica<br>Kostiviarska cesta 4<br>974 01 Banská Bystrica<br>Slovakia | Phone : 00421-48-4285153<br>Fax : 00421-48-4285154<br>E-mail : <a href="mailto:hes@penet.sk">hes@penet.sk</a>                                 |
| <b>Táncošová Zuzana</b><br>Slovak Hydrometeorological Institute<br>Jeséniova 17<br>833 15 Bratislava<br>Slovakia                                 | Phone : 00420-2-59415294<br>Fax : 00420-2-59415393<br>E-mail : <a href="mailto:zuzana.tancosova@shmu.sk">zuzana.tancosova@shmu.sk</a>         |
| <b>Tonković Vladimir</b><br>Ministry of Environment<br>Ul. grada Vukovata 78<br>10000 Zagreb, Croatia  | Phone : 00385-1-6106392<br>Fax : 00385-1-6118388<br>E-mail : <a href="mailto:vladimir.tonkovic@duzo.tel.hr">vladimir.tonkovic@duzo.tel.hr</a> |
| <b>Volodin Igor</b><br>UNIDO<br>P.O.BOX 300<br>A 1400 Vienna,<br>Austria   | Phone : 00431-26026 3938<br>Fax : 00431-26026 6819<br>E-mail : <a href="mailto:ivolodin@unido.org">ivolodin@unido.org</a>                     |
| <b>Vrana Kamil</b><br>Research Institute of Water Management<br>Viedenská cesta 5<br>Bratislava<br>Slovakia                                      | Phone: 00421-2-62246745<br>Fax:<br>E-mail: <a href="mailto:hydeko@hydeko.sk">hydeko@hydeko.sk</a>   |



INTERNATIONAL CENTRE FOR SCIENCE AND HIGH TECHNOLOGY

**Workshop**

**on**

***“Remediation Technologies Application  
for Heavily Polluted Sites in CEE Countries”***

**Slovak Republic**

***24 -26 June 2002***

***AGENDA***



UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

## Monday, 24 June 2002

08:00-09:30 Registration of Participants

### Opening Session

(Moderator: Mrs. J. Dupejova)

09:30-09:45 Welcome addresses and greetings (Mr. L. Miklós, Minister of the Environment of the Slovak Rep., Mr. S. Miertus, ICS-UNIDO, Italy, Mr. A. Nemethy, Ambassador Slovak Permanent Mission to the UN, Mr. I. Volodin, UNIDO, Vienna)

09:45-10:00 Key environmental issues in the Slovak Rep. (Mr. L. Miklós, Minister of the Environment of the Slovak Rep.)

10:00-10:15 ICS-UNIDO mandate, strategy and programmes. Presentation of the workshop (Mr. S. Miertus, ICS-UNIDO, Italy)

10:15-10:30 *Coffe break*

### ● Session One: International Initiatives for Environmental Protection and Recovery (Part A)

(Chairperson: Mr. S. Miertus)

10:30-10:45 ICS-UNIDO international programmes/initiatives in the field of remediation and environmental pollution reduction (Mr. A. Lodolo, ICS-UNIDO, Italy)

10:45-11:00 UNIDO Programmes in remediation, POPs destruction and environmental pollution reduction (Mr. I. Volodin, UNIDO, Vienna)

11:00-11:15 UNIDO/GEF programmes in the field of remediation and POPs destruction (Mr. D. LaRoche, UNIDO- GEF, Vienna)

11:15-11:35 Opportunities for concerted activities within the sixth framework programme of the European Commission" (Mr. H. Haubold, Austria)

11:35-11:45 *Break*

11:45-12:00 Persistent Toxic Substances (PTS): priorities for CEE countries (Mr. M. Murin, Ekotoxikologicke Centrum, Slovakia)

12:00-12:20 Survey of ongoing activities in the field of remediation of POPs in CEE countries (Mr. I. Holoubek, Czech Rep.)

● 12:20-12:35 Other international initiatives in the field of contaminated land (Mr. M. Schamann, ICS-UNIDO)

12:35-13:00 Discussion

13:00-14:20 *Lunch*

### Session Two: Environmental Pollution and Remediation. General technical issues.

(Chairperson: Mr. A. Lodolo)

14:20-14:40 Criteria and methodologies for the identification of hot-spots and decontamination priorities. Risk analysis. (Mr. M. Schamann, ICS-UNIDO)

14:40-15:00 Decision support tools for the management of environmental recovery activities. (Mr. J. Japenga, the Netherlands.)

15:00-15:20 Established and emerging remediation technologies: characteristics, applicability, advantages, limitations. (Mr. Jim Philp, U.K.)

15:20-15:40 Advanced technologies for POPs destruction (Mr. C. Pistone, Italy)

15:40-16:00 *Coffee Break*

**Session three: Environmental Pollution and Remediation in CEE Countries.  
(Part A) focus on experiences in Slovak Rep.  
(Chairperson: Mrs. E. Fatulova)**

- 16:00-16:20 Environmental Situation in CEE Countries – an Overview (Mr. M. Schamann, ICS-UNIDO)
- 16:20-16:35 Introduction to the current status on polluted sites in Slovak Rep. (Ms. E. Fatulova, MoE - Slovak Rep.)
- 16:35-16:50 Environmental regulatory framework. Legislative principles for environmental recovery initiatives in Slovak Rep. (Mr. M. Matuska, MoE - Slovak Rep.)
- 16:50-17:15 Risk assessment guidelines for polluted sites in Slovak Rep. (Mr. M. Holubec, Water Research Institute, Slovak Rep.)
- 17:15-17:20 Inventory of potentially contaminated sites: opportunities for joint initiatives. The Danish-Slovak experience. (Mr. K. Vrana, Hydeko-KV, Slovak Rep.)
- 17:20-17:35 Selected Case Studies in Slovak Rep.:
- Toxic waste deposit Chemko Strazke: investigation, risk assessment (Ms. K. Foldosova, Water Research Institute, Slovak Rep.)
- 17:35-18:00 Discussion
- 19:00 - Gala Dinner

**Tuesday, 25 June 2002**

**Session four: International Initiatives for Environmental Protection and Recovery (part B)  
(Chairperson: Mr. I. Holoubek)**

- 09:00-9:20 UNEP programmes/initiatives in the field of remediation and environmental pollution reduction (F. Balkau, UNEP, Paris)
- 09:20-9:40 Centre for Cleaner Production of UNIDO in Slovakia: Activities and Experiences (Ms. V. Fecková CCP/UNIDO, Slovakia)
- 09:40-9:55 UNIDO/ITPO in Slovakia: Activities and Experiences (Mr. V. Wiedermann, UNIDO/ITPO, Slovakia)

**Session five: Environmental Pollution and Remediation in CEE Countries.  
(Part B) focus on experiences in other CEE Countries  
(Chairperson: Mr. M. Schamann)**

- 09:55-11:10 Country Reports presentations (15 min. each).
- 11 Countries: Albania, Bulgaria, Croatia, Czech Republic, Hungary, Lithuania, Moldova, Poland, Romania, Slovenia, Yugoslavia.

**Main topics to be dealt with:**

- **Topical Environmental Pollution Problems in the Country: Sources for Soil and groundwater Pollution.**
- **General Strategy for Contaminated Sites Remediation, Long Term and Short Term Objectives; Priority Sites.**
- **Environmental Regulatory Framework, Funding Opportunities for Remediation Activities.**
- **Technological Background: Applied Remediation Technologies, Facilities for Contaminated Soil Treatment, etc.**
- **On-going and Planned Remediation Initiatives.**



- 11:10-11:30 *Coffee break*
- 11:30-13:00 Country Reports presentations (*continuation*)
- 13:00-13:20 Discussion
- 13:20-14:20 *Lunch*

### **Session Six: Remediation Site Visit**

- 14:20-17:30 Field excursion, including the presentation of the case study "Slovnaft a.s.: contamination of groundwater, protective measures (*Slovnaft representative*)
- 18:30 -19:30 *Dinner*

## **Wednesday, 26 June 2002**

### **Session Seven: Follow-up Activities and Common Initiatives**

(*Chairpersons: Representative of the MoE of Slovak Rep., Mr. A. Lodolo, Mr. S. Miertus, Mr. M. Schamann*)

- 09:00-09:20
- The concept of the ICS-UNIDO CEE Forum on remediation.
  - Follow-up of the UNIDO "International Forum on Strategies and Priorities for Environmental Industries, Bratislava, 12-14 June 2002 (*M. Schamann, S. Miertus*)
- 09:20-09:50 Identification of possible common initiatives for the promotion and development of ICS-UNIDO CEE Forum on Remediation. Set-up of Working Groups.
- 09:50-10:10 *Coffee break*
- 10:10-12:10 Proposal's Development (Working Groups)
- 12:10-12:50 Presentation of results and recommendations
- 12:50 13:00 Conclusions of the workshop.
- 13:00-14:00 *Lunch*
- 14:00 -18:00 Informal discussions
- 18:00 -19:00 *Dinner*