



**TOGETHER**  
*for a sustainable future*

## OCCASION

This publication has been made available to the public on the occasion of the 50<sup>th</sup> anniversary of the United Nations Industrial Development Organisation.



**TOGETHER**  
*for a sustainable future*

## DISCLAIMER

This document has been produced without formal United Nations editing. The designations employed and the presentation of the material in this document do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations Industrial Development Organization (UNIDO) concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries, or its economic system or degree of development. Designations such as “developed”, “industrialized” and “developing” are intended for statistical convenience and do not necessarily express a judgment about the stage reached by a particular country or area in the development process. Mention of firm names or commercial products does not constitute an endorsement by UNIDO.

## FAIR USE POLICY

Any part of this publication may be quoted and referenced for educational and research purposes without additional permission from UNIDO. However, those who make use of quoting and referencing this publication are requested to follow the Fair Use Policy of giving due credit to UNIDO.

## CONTACT

Please contact [publications@unido.org](mailto:publications@unido.org) for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at [www.unido.org](http://www.unido.org)

22145

*Draft Final Report*

# **Recommendations for Future Activities and Development of the NCPC's in Costa Rica, Guatemala, El Salvador**

**Prepared by**  
Thomas Heim  
Heinz Leuenberger

Muttenz, 18/7/1998

# 1 Long-term CP-Training Program

The training courses will be offered both to the staff of the Centre and to interested institutions or individuals outside the Centre.

## 1.1 NCPC Staff Training

The potential members of the NCPC Staff, to the extent that they could be identified by individual Centres, have, in large part, appropriate competence in various areas of environmental protection, as well as in the methodology of "cleaner production". However, there has been until now no comprehensive assessment of this competence, notably its practical applications, in all the relevant domains. In order to develop internal NCPC courses on an effective basis, we propose that all NCPC Staff, at the beginning of their employment in September or October, complete a detailed questionnaire that we would set up. On the basis of its results, we would prepare a first "entry module". Following individual preparation through correspondence courses, common theoretical and practical modules would be offered in Switzerland to the Staff of the three (or four) Centres. The modules would cover strategy, methodology and the initial steps of professional work. Skills of effective result presentation and communication would also be covered.

On their return to Central America, the Staff, working in teams of two, would need to complete a comprehensive environmental audit, a feasibility study of follow up measures, financing and implementation in a medium-size operation. At the beginning of the feasibility study, the participating firms (that would be selected on a voluntary basis) would commit themselves to making their data available to the students, and to allowing them taking their own measurements. The students would then need to make a pre-assessment and an assessment of clean production procedures. In return, the participating firms would obtain complete documentation for the implementation of "cleaner production" including a feasibility and a financing study. Each stage of this work would, in any event, be discussed and assessed in the presence of international specialists. The Backstop Institute would be available to provide further clarification and guidance.

On completion of such training, every member of the Staff would be in the position to provide detailed advice concerning the conduct in practice of an environmental audit, and better to assess the quality of other audits.

A final report would document the work that has been done. The firm could then also be used as a demonstration project in subsequent training programmes.

## 1.2 External Training Courses

We propose the following course programmes to interested parties:

Title	Duration	Subject	Persons to be addressed	Partners	Teachers
„cleaner production strategy“ awareness building	1 day	<ul style="list-style-type: none"> <li>• strategy</li> <li>• case study</li> <li>• advantages</li> <li>• how to start</li> </ul>	Decision makers in industry, government, universities, banks (managers, lawyers, bankers, politicians, professors, journalists)	<ul style="list-style-type: none"> <li>• host institute</li> <li>• ministries</li> <li>• associations</li> <li>• banks</li> </ul>	<ul style="list-style-type: none"> <li>• int. Experts</li> <li>• NCPC-directors</li> </ul>
„cleaner production“ basic theory	5-10 days	<ul style="list-style-type: none"> <li>• strategy</li> <li>• methodology</li> <li>• pre-assessment in a plant</li> <li>• case studies</li> <li>• project organisation</li> </ul>	<ul style="list-style-type: none"> <li>• technical managers</li> <li>• chief engineers</li> <li>• production managers</li> <li>• consultants</li> <li>• professors, lecturers</li> </ul>	<ul style="list-style-type: none"> <li>• universities</li> <li>• associations</li> <li>• industries</li> <li>• host institutions</li> </ul>	<ul style="list-style-type: none"> <li>• int. Experts</li> <li>• NCPC-staff</li> <li>• nat. experts</li> </ul>
„cleaner production“ training course (Module A)	6-8 months part time (1-2 days/week)	<ul style="list-style-type: none"> <li>• strategy</li> <li>• methodology</li> <li>• pre-assessment, assessment in plant</li> <li>• feasibility study</li> <li>• financial assessment, implementation</li> </ul>	<ul style="list-style-type: none"> <li>• chief engineers</li> <li>• engineers</li> <li>• consultants</li> <li>• post graduate students</li> </ul>	<ul style="list-style-type: none"> <li>• industries</li> <li>• associations</li> <li>• universities</li> </ul>	<ul style="list-style-type: none"> <li>• NCPC-staff</li> <li>• int. Experts</li> </ul>
„cleaner production“ Master Degree	2 years (incl. Diploma work) full time	<ul style="list-style-type: none"> <li>• environmental technology and science</li> <li>• ecology</li> <li>• Module A</li> <li>• life cycle assessment</li> <li>• ISO 14000</li> <li>• risk management</li> </ul>	<ul style="list-style-type: none"> <li>• post graduate students</li> <li>• consultants</li> </ul>	<ul style="list-style-type: none"> <li>• national university</li> <li>• FHBB</li> <li>• Swiss universities</li> </ul>	<ul style="list-style-type: none"> <li>• nat. and int. University professors</li> <li>• NCPC-staff</li> <li>• int. Experts</li> </ul>
„cleaner production“ <ul style="list-style-type: none"> <li>• textile</li> <li>• food</li> <li>• chemical</li> <li>• tanneries</li> </ul>	3-6 months part time (1 day/week)	<ul style="list-style-type: none"> <li>• methodology</li> <li>• production methods</li> <li>• good housekeeping</li> <li>• etc.</li> </ul>	<ul style="list-style-type: none"> <li>• technicians</li> <li>• production workers</li> </ul>	Associations of	<ul style="list-style-type: none"> <li>• NCPC-staff</li> <li>• nat. experts</li> </ul>

### 1.3 Basic Rules for Training Courses

Since the quality of the courses is decisive for the future reputation of the Centres and their recognition by industry and universities, successful and effective design of training courses should comply with the following rules:

#### Principle

Training and education activities must correspond to actual demand.

#### Means

Demand must be identified and reflected in programme curricula targeting relevant groups.

#### Procedure

For every training activity there should be a definition of successive level objectives. Knowledge acquisition assessments (exams, practice, feedback) are required for every course. The procedure consists of three levels (see Allgemeine Didaktik, Prof. K. Frey, ETH Zürich)

1. Key consideration: „On what grounds is this course required?“

Examples: a) Environmental pollution by industry has reached in ... dramatic levels. Firms are prepared to take the necessary measures, but lack financial resources for that purpose. The NCPC will assist the firms in the planning of cost-effective CP measures.

Or

b) In ..., regulations were established that compel the firms to conduct a CP audit. However, practical experience is missing. The NCPC will therefore train consultants in order to provide the firms with access to CP expertise.

2. Instrumental objective:

“What will the participants know/be able to do on the completion of the course/programme of courses?“

Examples: a) The participating managers know, that they can save money with CP. They know, that a proven methodology, international groups of specialists, and technical/financial support by the NCPC are available for that purpose. They have formed a positive view of CP possibilities in their firms.

Or

b) The participating consultants know the difference between CP and end-of-the-pipe measures. They are conscious of the need for methodical procedures in the implementation of CP measures. They can sell CP measures convincingly.

### 3. Operational training objectives:

“What specifically do the participants know/are able to do on the completion of the course/programme of courses?”

#### Examples:

The participating consultants:

- know the UNIDO methodology for CP-Measures
- can independently direct/conduct a CP audit in an establishment
- can plan and execute materials flow analyses
- can interpret life-cycle analyses
- etc.

Basically, every course should end with a performance test. In the absence of such a test, it is possible that graduates be granted certificates, attestations or diplomas without effectively acquiring the required competence. The value of the education would thus be distorted or rendered meaningless.

## 1.4 Quality Control of the Courses

The quality of a course should be continually checked as regards the following aspects:

- fulfilling of the requirements of industry
- meeting the expectations of the participants
- quality of documentation
- teaching structure
- quality of the teachers/instructors
- balance between theory and practice
- learning impact

Systematic, periodic quality control allows the Centres to continually improve their courses and adjust them to the needs of their clients. This enhances the participants' willingness to pay fees that fully cover course costs.

## 2 Proposal for Efficient Networking

In order to propagate „cleaner production“ quickly and efficiently, the NCPC's should establish an effective network of contacts. This, however, is possible only when co-operation brings advantages to all involved. The Centres must also have a proper, clearly defined structure. They must offer specific services of recognised quality.

Possible forms of co-operation include:

- Formation of Working Groups (within a branch or across several branches of industry)
- Regular bilateral meetings
- Seminars and workshops
- Participation/integration of representatives of external organisations in the activities of component bodies of NCPCs (e.g. positions on the Advisory Board or the Board of Directors)
- External services procurement (consulting)
- Joint research and development projects
- Provision of services by the NCPC to government departments, associations, etc.
- Regular meetings with other NCPCs in the Region

We propose that the formation of working groups and the implementation of joint research and development projects be specifically included in the initial Annual Plans of the NCPCs. Realisation of such projects requires, necessarily, appropriate financing. Experience shows that these projects provide an excellent opportunity for the establishment and maintenance of the necessary channels of co-operation and communication. They promote, in addition, the building of national capacities. Project proposals could include:

- Elaboration of energy-saving measures in the electroplating industry (in co-operation with a technology department of a university)
- Creation of an analysis set for rapid identification of emissions originating in firms within selected branches of industry (in co-operation with a technology department of a university)
- Analysis of the cost structure in production plants in selected sectors of industry (e.g. joint student activities between a local university and the FHBB)
- etc.

### 2.1 Costa Rica

*Policy:*

-

*Education, Training, Awareness:*

- Research Institute for Leather Tanneries, UCR
- UNA Chemistry Department
- Research Institute for Coffee Industry
- National Training Institute INA
- National University, Laboratory for Waste Management
- Ministry of Science and Technology
- Institute of Technology (Host institution)

*Industries:*

- Ministry of industries
- Chamber of industries (Host institution)
- Association for food production
- Association for ... (Metal finishing)
- Costa Rica committee for sustainable management
- Consulting companies
- Industries
- CEGESTI (Host institution)

*Local Consultants:*

- CEGESTI (Host institution)

*Finances:*

- Public bank of Costa Rica (Green loan)
- EACA, Engresos...
- Ecoingresos
- INCAE
- CFA (Corporacion Financiera Ambiental)

*International:*

- FHBB (Counterpart: EMPA, Stenum, IVAM, Lovell)
- UNIDO
- UNEP
- World Bank
- ADB (American Development Bank)

**2.2 El Salvador***Policy:*

- MARN (Ministry of Environment)



*Education, Training, Awareness:*

- Universidad Catolica Centroamericana (UCA), Mr. Francesco Chavez: most appropriate partner for training, education, consulting
- Universidad de El Salvador
- Universidad Don Bosco

*Industries:*

- ANEP/ASI, Committee of Eco Efficiency
- AMPES

*Local Consultants:*

- Propel
- Eurolatina

*Finances:*

- CFA (Corporacion Financiera Ambiental)

*International:*

- FHBB (Counterpart; EMPA, Stenum, IVAM, Lovell)
- UNIDO
- UNEP
- World Bank
- ADB (American Development Bank)
- USAID
- EP3

**2.3 Guatemala***Policy:*

- Environmental Advisor to the President of Guatemala (Mr. Arzu)
- Advisor of the Vice President of Guatemala (Ing. Gustavo Blanco)

*Education, Training, Awareness:*

- CONAMA (Comision Nacional de Medio Ambiente)
- Universidad del Valle

*Industries:*

- Camara de Industria

*Local Consultants:*

-

*Finances:*

- CFA (Corporacion Financiera Ambiental)
- Banco de Industria
- CONCYT (Consejo de Ciencia y Tecnologia)

*International:*

- FHBB (Counterpart; EMPA, Stenum, IVAM, Lovell)
- UNIDO
- UNEP
- World Bank
- ADB (American Development Bank)
- USAID
- EP3

### 3 Inputs to the Business Plans

#### 3.1 Overall Strategy

The general strategy and its operational implementation in the NCPCs have to be comprehensively presented in the business plans. Otherwise, the importance and the detailed objectives of specific activities will not be identified with sufficient clarity. It is important for the efficient use of time, personnel and material resources to identify the likely results of each specific activity. For instance: what can be achieved with “information”? (motivation can be generated only in specific circumstances) etc.

The fundamental considerations in this respect include:

##### **Determination of the aims of CP measures**

- Decline in industrial pollution
- Resource conservation
- Increase in a firm’s competitiveness

##### **Means used to achieve the objectives**

Optimisation of industrial processes (CP)

##### **General procedure**

Change in firms’ approach to investment in environmental technology through exploitation of savings- and profit-generation potential (firms should see advantages in CP, or they will not make the effort). This process takes place at three levels:

##### *The macro level*

Objective: to improve the framework conditions for CP (the policy level)

Question: Are there advantages for a firm in the introduction of CP technology?

Intervening factors: Legislation, raw material and energy prices, personnel costs/charges, waste disposal costs

Market preferences, standards and norms, financing opportunities and instruments

Means: discussions, written inputs, conferences

##### *The meso level*

Objective: to improve firms’ motivation for CP (when advantages available)

Question: Did the firms identify the advantages?

Intervening factors: available information, accounting practices, education levels

Firms’ familiarity with the market

Means: information (printed material, seminars, workshops), training at the manager and industry association levels

*The micro level*

Objective: to improve the knowledge and abilities in respect of CP among firms and consultants

Question: Are (the already motivated) firms ready to appropriately plan and introduce CP measures?

Intervening factors: education and training, technical information, financing, consulting

Means: education/training (consultants, specialists in the industry, demonstration projects)

### 3.2 General remarks

- There is a lack of a clear relationship between today's "demands" and statements about further development. What factors influence the "demands"? An appropriate awareness-programme could be influenced by effective demand. "Needs" are abundantly clear (see industrial pollution, obsolete production processes, etc.)
- Concrete data about current prices are crucial.
  - Electricity
  - Coal
  - Water
  - Disposal (waste dump charges)
 as well as their likely evolution in the future.
- How is the marketplace in Central America likely to develop? Accession to NAFTA etc., Will this generate demand for:
  - ISO 14 000
  - Eco-labelling
  - Other CP-related instruments and measures?
  - Effects of the improvements in product quality due to CP on the marketplace and on production structures?
- To repeat: goals and expected results must be realistic
- Future financing could tap sources such as:
  - World Bank
  - Local Government
  - Additional donors
- Swiss firms active in Central America could possibly be encouraged to co-operate with the NCPCs
- The question of the personnel effectively available to the NCPCs, and on what financial conditions has to be dealt with. It must be answered clearly!
- The quality control in the NCPCs (training courses, audits, etc.) is a key requirement for success. This aspect is still missing.

- The specific use of financial instruments is not described (example: many CP measures should be taken together with the sustainable treatment of emissions; otherwise, for instance, the concentration of toxins in the effluent could increase in parallel with water-use savings). Moreover, financial savings usually can be realised only after a certain time. Low-cost credit must be available for initial investments to bridge this pay-back lag.

### **3.3 Remarks on Business Plans of Individual NCPCs**

#### **3.3.1 Costa Rica**

(already discussed bilaterally)

#### **3.3.2 El Salvador**

- The structure of the NCPC to be clarified (Board of Directors)
- Relationships with UNIDO and FHBB are unclear
- Objectives: effects on the environment (emissions / immissions), realistic, verifiable abatement goals to be stated
- Policy level: to be made specific
- Training activities to be related more precisely to local needs
- What are the sources of the client demand?
- Competition: Wherein lies the competitive advantage for the NCPC? Planning for a market analysis of individual proposals?
- Course programme. The participants should have tangible assets in hand on the completion of the programme (certificate and scores/results/achievements, relating, for instance, to a specific firm; a combination of practical activity (audits) and theory will be necessary)
- What will be the first steps in the activity of the NCPC?
- It must be clearly stated who should work on specific important issues (not everything can be defined in the BP): e.g. regulations for the Board of Directors, methodology (adjustment to UNIDO methodology)

#### **3.3.3 Guatemala**

- A good BP, well structured, to be revised for details (e.g. missing page numbers, headlines and footnotes with documentation references)
- Policy level: to be made specific
- Competition: Wherein lies the NCPC's competitive advantage? Planning for a market analysis of individual proposals?
- The summary is not complete
- The structure of the NCPC: to be defined (not "part of the projects being offered by the Business Board")
- Vision: not "application", a weaker wording is needed

- Background: the case for CP is missing; at the beginning?
- Trends: a case for CP? Are they good or bad for CP?
- More tables, less text (e.g. statistics about the national economy)
- Environmental background and trends: a case for CP?
- Participants: the situation should be summarised
- Competencies: the meaning of the paragraph?
- Objectives: see paragraph 3.1. above
- Dissemination of information: goals rather than means should be identified
- Plant assessment: 5% is rather high
- The environment: criteria for pollution abatement are unclear – per firm?
- How will it be determined whether abatement objectives have been reached or not?
- Goals for Year One: FHBB should be mentioned
- Strategy and profile of the NCPC: are the clients prepared to pay?
- Relationship client-service: the purpose of the paragraph is unclear
- Strategies of service: numbering should be 3.4, not 3.5
- “Being part of the organisational structure of the CIG”: no, the structure should be independent and should be fully described
- Expected results: How can a general abatement of 40% per plant be measured? Only verifiable objectives should be stated
- Organisation structure: chapter 4.1 should be revised – independent structure, Board of Directors, FHBB linkage. Chapter 4.2 should also be revised. It should be stated who decides what or who should write regulations governing allocation of authority
- Implementation: presentation as a project would be useful.

## 4 Establishment of a long-term working relationship between the NCPCs and FHBB

Basically, the tasks and obligations of the Backstopping Organisation (FHBB) will be defined by the requirements of the NCP Centres and their potential "clients". Over time, these tasks are likely to evolve from educational and strategic support to technical consulting.

The responsibilities of the FHBB are outlined below on the basis of our experience with similar projects, extensive discussions in the course of our mission and the needs subsequently identified. In Part II, we define the framework conditions for effective support by the FHBB. Part III contains the CVs of the participating staff.

### 4.1 Terms of Reference for FHBB

The following tasks should be secured by FHBB. It is however possible to engage additional institutions or individuals for specific limited tasks.

- FHBB advises the Centres concerning partnerships, marketing strategies, setting of priorities for dealing with various sectors of industry and the establishment of general objectives and specific targets for their activities.
- FHBB supports the NCPC in the planning and the execution of professional training courses substantively and operationally.
- FHBB provides international specialists for the execution of courses or education/training programmes.
- FHBB is a partner in the education/training programmes (e.g. Master Degree, post-graduate diploma), that will be offered in collaboration with national Universities, UNIDO and the NCP Centres.
- FHBB supports the Centres in the comprehensive control of the quality of the courses/programmes being offered (contents, teaching methods, requirements).
- FHBB acts as an information and reference facility and a turn plate for dealing with technical inquiries and problems.
- FHBB organises and carries out in Switzerland education/training courses for NCPC Staff and selected advisors.
- FHBB supports and co-ordinates the Centres' contacts with universities in Switzerland and abroad and with industrial firms in Switzerland.
- FHBB supports the Centres concerning issues of environmental policy („policy advice“). When desired and necessary, it will search for Swiss specialists.
- FHBB supports the Centres in the development of communications technology.
- FHBB makes available to the Centres information regarding Swiss and other technology in the area of „clean production“.
- FHBB is co-responsible for the attainment of NCPC objectives.

- FHBB promotes exchanges of students between the NCP Centres and the Institute.
- FHBB supports the NCPC in the evaluation of Annual Plans
- FHBB assists the NCPC's in the design of demo-projects.
- FHBB is responsible for monitoring and supervision of the demo-projects.
- FHBB can participate in the board of directors of the NCPC's

For the subsequent control of the FHBB performance it is necessary to establish already at this stage appropriate indicators and clearly to define objectives. These considerations impact both on TORs and the framework conditions that will need to apply to FHBB through the duration of the project.

## **4.2 Framework provisions for the FHBB as a Backstopping Organisation**

While these provisions cannot be defined conclusively at this time, three important points have to be listed:

- The requirements of the Centres should be clarified and defined carefully. The goals for the Centres and the Counterpart should be defined precisely and renewed annually.
- The respective prerogatives of the Centres and of the Counterpart should be established clearly.
- In the long term, the co-operation between the Centres and the FHBB must be regulated contractually. Obligations and contingencies should be formally specified, so that a long-term co-operation would be possible on a basis of mutual trust and confidence.

## **4.3 Concluding remarks**

The above Terms of Reference and the contract of cooperation should be distributed to the participant NCPC's, UNIDO, and BAWI for consideration, consultation and formal approval. Criticisms, additions and remarks should be discussed subsequently. The definitive version should be clearly formulated with the concurrence of all the Participants.



**Annex: CV's**

## **Curriculum Vitae**

Name Barblan, Men Frank  
Dr. sc. techn., dipl. Ing. Chem. ETH, Chemical Engineering

Year of birth 1946

Citizenship Swiss

### ***Higher Education***

1962 - 1967 Baccalaureate, Kantonschule Chur, Canton Grisons, Switzerland

1967 - 1971 Master of Science in Chemical Engineering, Faculty of Chemistry, Swiss Federal Institute of Technology, Zurich

1971 - 1975 Doctor of Science (Chemical Engineering) Swiss Federal Institute of Technology, Zurich  
Dissertation: "Oxidation of p-Nitrotoluene, a Kinetic Study" with Prof. Dr. J. R. Bourne and Prof. Dr. G. Gut

1972 - 1975 Assistant by Prof. G. Gut

1974 - 1976 Post-doctoral Studies in Business Management, Institute for Business Management, Swiss Federal Institute of Technology, Zurich

### ***Career Development***

1975 - 1981 Chemist, Research and Development Department, Säurefabrik Schweizerhall, MuttENZ

1982 - 1989 Head of pilot production, Research and Development Department, Säurefabrik Schweizerhall, Basel

### ***Experience as University Professor***

1989 - Professor, Department of Chemistry, Basel Institute of Technology  
Lectures, colloquia and practical training in Chemical Process Engineering and Chemical Reaction

1991 - Head of the Chemical Process Technology Centre, Basel Institute of Technology

### ***Special Qualifications and Skills***

Design and simulation of chemical processes  
Thermal risks of chemical processes  
Chemical process safety analysis  
Design of mechanical and thermal processes  
Process control  
Heat and mass transfer operations  
Design and operation of chemical plants

## **Recent Projects (Selection)**

<i>Partner:</i>	<i>Subject:</i>
Pro Rheno, Basel	Simulation of the behavior of a Waste Water Treatment Plant in case of an accident
AVAG, Jaberg	Removal of Ammonium from sewage sludge water by thermal separation
Roche AG, Sisseln	Ketalisation by reactive rectification
Bertrams; MuttENZ	Heat transfer in deep temperature reactors
Roche, Basel	Residence time distribution and mass transfer in a new loop reactor
Novartis, Basel	Feasibility study, reduction of Nitroaromatic compounds
Säurefabrik, Basel	Sulfochlorination of aromatic compounds, a reaction kinetic investigation
Elutherm AG, Stein	Removal of water from an oil/ethanol extraction mixture
Anbex AG, Pratteln	Testing of the new Compositepacking <sup>®</sup> for the thermal separation by rectification and comparison with Rombopack <sup>®</sup> from Kühni AG
Internal/Kühni AG	Optimization of the operation process of a Kühni pilot plant extraction column and measurement of the separation capability
Rohner AG, Pratteln	Process development of 2,3,5-Trimethyphenol
Bachem AG, Bubendorf	Process development of N-Hydroxy-succinimide

## **List of Publications/Speeches**

Publications/papers:	Chimia 48 (1994) 524 – 525 Chimia 49 (1995) 309 – 311
Speech	Mettler RC-1 User Forum 1997, Lugano

## **Personal Mandate**

Member of Swiss Society of Engineers and Architects, Section Process Technology and Chemical Engineering

Member of New Swiss Chemical Society, Section Industrial Chemistry

## **Languages**

German (Mother tongue), English, French, Italian

## Curriculum Vitae

Name	Heim, Thomas Dr. nat. sc. ETH, Natural Sciences and Toxicology
Year of birth	1955
Citizenship	Swiss

### **Higher Education**

1971 - 1975	4 years Cantonal School, Aarau (Grammar school), final certificate Type B (Natural Sciences)
1975 - 1979	Studied Natural Sciences at the Swiss Federal Institute of Technology (ETH), Zurich
1980 - 1984	Doctorate at the Institute of Toxicology at the University and ETH Zurich, under Prof. Chr. Schlatter

### **Career Development**

1980 - 1984	Part-time Assistant at the Institute of Toxicology; involved, among other things, in customer support
1982 - 1986	Subsidiary teacher at the Design School, Zurich. Subjects: Natural Philosophy (Chemistry, Physics, Professional Hygiene and Environmental Protection)
1984 - 1987	Self-employed, and board member of Oekoscience Zurich
October 1987	Co-founder of Carbotech Ltd., Environmental Analysis, Consulting and Interdisciplinary Projects, Basel
1990 - 1995	Professorship in Waste Management in the Post-doctorate studies in Environmental Protection at the University of Zurich
1991, 1992	Professorship in the Investigation of the Environmental Compatibility of Materials at the University of Zurich
1991 -	Resident lecturer with 50% curriculum at Basel Institute of Technology in MuttENZ (Participation in the creation and operation of Postgraduate Environmental Studies, NDS-U)
1992	Expert commission for the support of term work (Soil Protection) at the Institute of Terrestrial Ecology at the ETH Zurich
1992 -	Visiting lecturer at the department for Postgraduate Environmental Studies at the Institute of Technology (ITR), Rapperswil (Subject: Waste prevention and clean technologies)
1997 -	Lecturer at the department for Environmental Sciences at the ETH Zurich (Subject: Didactics in environmental education)

## **Personal Mandate**

Member of the Federal Commission for Eco-toxicology

Deputy Member of the "Material Criteria" Work group of the Federal Commission for Interference

## **Publications (Selection)**

Transfer of (<sup>3</sup>H) Pyrrolizidine Alkaloids from *Senecio Vulgaris* L. and Metabolites into Rat Milk and Tissues. *Toxicology Letters* 17 (1983) 283 - 288

Yttrium. In: *Metals and their Compounds in the Environment*. Edited by Ernest Merian. VCH Verlagsgesellschaft, Weinheim, Basle, Cambridge, 1991

Reduction of Toxic Wastes by Avoidance and Re-cycling. Case Studies from Production; Procedural Possibilities for Authorities, Associations and Companies. Issued by the Federal Office for the Environment, Forests and Land (BUWAL). Schriftenreihe Nr. 161, Bern, December 1991

Project Management and Report: Environmentally-correct handling of materials in the administration of 7 areas, including underground and surface engineering (Cantonal Laboratory, Basle-City, 1991)

Project Management and Report: The Effects of Taxes and Government Works on Environmental Behavior: a Study of the valid legal regulations in Canton Basle-City (Co-ordination Centre for Environmental Protection, Basle-City)

## **Lectures and Articles (Selection)**

Avoidance of waste in the Galvanization Industry. Lecture at the University of Fribourg during the Seminar "Produire en respectant l'environnement" from the Contact Group Schools-Business-State, 17.9.92

Opening lecture at the "Avoidance of Waste in Industry" Seminar in Stans, 11.9.92

Avoidance of Waste in the Production-Strategies of Local Authorities and Businesses. Lecture at the meeting of the Swiss Union for Water Protection and Clean Air (VGL), Zurich, 12.6.91

Environmental Protection using the Instruments of the Market Economy

Article in: *Diskussion*, No. 16, December 1991

Eco-toxicology in Risk Analysis. Lecture to the Specialist meeting of the Ecological Society of Switzerland (OeVS), 14.4.89

Methodical Practices and Practical Problems in the Investigation of the Environmental Compatibility of Materials. Lecture to the Specialist meeting of the Ecological Society of Switzerland (OeVS), 26.10.90

## **Languages**

German (Mother tongue), French, English, Spanish

## **Curriculum Vitae**

Name Jeiziner Christof  
Chemist HTL

Year of birth 1967

Citizenship Swiss

### ***Higher Education***

1988 - 1991 Diploma study in Chemistry HTL, Wallis Engineering School of Technology, Sion

### ***Career Development***

1983 - 1987 Apprenticeship in chemical Production, Lonza AG, Visp, Switzerland

1987 - 1988 Operator of a Multi Product Plant, Lonza AG, Visp, Switzerland.

1992 - 1997 Assistant at Basel Institute of Technology, Institute of Environment, MuttENZ, Switzerland

1998- Department Engineer at Basel Institute of Technology, Institute of Environment, MuttENZ, Switzerland

### ***Recent Projects***

1995 Project "Determination of the resident time distribution", tracer experiment and simulation of the behavior of a Waste Water Treatment Plant, ARA Rhein, Pratteln, Switzerland

1996 - Swiss Technology Project: "Technology Transfer in Selective Heavy Metal Recovery by Selective Ion Exchange" technical support and Simulations

1997 / 1998 Swiss National Fund Research and Capacity Building Project, Uganda, technical support, lectures and practical training in laboratory praxis and instrumental analytic at Fisheries Research Institute, Jinja, Uganda

### ***Languages***

German (Mother tongue), English, French

## Curriculum Vitae

Name Leuenberger, Heinz  
Dr. sc. nat. ETH, Chemistry

Year of birth 1952

Citizenship Swiss

### **Higher Education**

1968 - 1972 Baccalaureate, Langenthal High School, Canton Berne, Switzerland

1972 - 1973 Faculty of Physics, Swiss Federal Institute of Technology, Zurich

1973 - 1978 Bachelor of Science (Chemistry), Swiss Federal Institute of Technology, Zurich

1978 - 1979 Travel to Asia, visits with Swiss Technology Assistance Projects in South and South East Asia

1979 - 1983 Doctor of Science (Chemistry) Swiss Federal Institute of Technology, Zurich  
Dissertation: "The Synthesis of Enantio-Ferricrocine, a Natural Substance" with Prof. Dr. W. Keller-Schierlein

1982 College Professor's Diploma, Swiss Federal Institute of Technology, Zurich

1983 - 1984 Post-doctoral Program for Co-operation with Developing Countries, Swiss Federal Institute of Technology, Zurich

### **Career Development**

1981 - 1983 Lecturer in Chemistry, Stadelhofen and Lee high schools, Canton Zurich, Switzerland

1983 Chemist, Pokhara (Nepal), responsible for drinking water analysis: bacteriology, spectroscopy

1984 - 1985 Research Chemist, Federal Materials Testing and Research Institute (EMPA), Dübendorf, Switzerland

1985 - 1987 Consulting expert, Oekoscience, Zurich

1987 - 1988 Expert, Public Authority for Water Management, Canton of Solothurn, Switzerland.

1988 - 1991 Head, Department for the Prevention of Water Pollution, Public Authority, Canton of Solothurn, Switzerland

1990- Lecturer, waste management and water management, Post-graduate Program in Environmental Science, University of Zurich, Switzerland

1991- Partner, Carbotech Ltd., Environmental Analysis, Consulting and Interdisciplinary Projects, Basel and Solothurn, Switzerland.

1991- Professor and Head of Department, Postgraduate Program in Environmental Science and Technology, Basel Institute of Technology, Basel, Switzerland

1998 - Honorary lecturer at the Makerere University, Kampala, Uganda

### ***Additional responsibilities (selection)***

Swiss Delegate, OECD Working Group on Environmental Quality and Technology, 1995-1997

Head, Swiss National Fund Water Technology Projects, Bulgaria, 1996

Member, Swiss National Fund Research and Capacity Building Project, Uganda, 1994

Director, International Hazardous Waste Management Seminary, Basel Institute of Technology, from 1996 annually

Visiting Professor „Jinja Fishery Institute“, Uganda, 1995

### ***Recent Projects (selection)***

Plan of action for the Management of Toxic Wastes in the Cantons of Basel-Stadt and Basel-Landschaft, 1995

Water Management Concept for the Canton Solothurn, 1997

Desk study: Marine Based Waste Stabilization Ponds in Cirebon, Indonesia, 1995

Desk study: Air Pollution Control in a Viscose factory, China, 1996

Hospital Waste Management Concept in Szeged, Hungary, 1994-1995

Pre-Feasibility study and Feasibility study: Clean Production and Environmental Technology Centre in Indonesia, 1996-1997

Study for Environmental Measurements in Small and Medium Industries in Indonesia, 1996

Feasibility study for constructed wetlands, Switzerland, 1996

Training concept for the implementation of the Basel Convention in Africa, UNITAR, 1997/98

### ***Personal Mandate***

Member of workgroup "Protect Ground Water from Contamination with Chemical Substances" in the Association of Swiss Hydrogeologists

Member of the Commission of Experts on Environmental Technology in the Canton of Basel-Landschaft

Member of the Commission of Experts on Environmental Problems in the Canton of Basel-Stadt

### ***Languages***

German (Mother tongue), English, French



## Curriculum Vitae

Name	Rohrer Silvio Engineer HTL
Year of birth	1970
Citizenship	Swiss

### **Higher Education**

1991 - 1994	Diploma study in Mechanical Engineering HTL (process controlling), Swiss Central Engineering School of Technology, Horw/Lucerne
1995 - 1996	Postgraduate Program in Environmental Sciences and Technology, Basel Institute of Technology, Basel, Switzerland (water, air, noise, waste, soil, radiation, environmental laws)

### **Career Development**

1986 - 1990	Apprenticeship in Mechanics, Maxon DC Motor, Interelectric Ltd., Sachseln, Switzerland
1990 - 1991	Mechanician, Maxon DC Motor, Interlectric Ltd., Sachseln, Switzerland. Production tools, prototypes
August 1994 - August 1995	Process Engineer, Von Roll Environmental Technology, Sursee, Switzerland. Engineering of waste water treatment plant for municipal waste combustion, engineering of residues treatment for municipal waste combustion, basic and detail engineering for MWC Bern, MWC Buchs, St. Gallen, MWC Limmthal/ Zurich, MWC Emmensptiz/Zurich
1997 -	Project Assistant, Research and Development Engineer at Basel Institute of Technology, Institute of Environment, Muttenz, Switzerland. Swiss Technology Project: "Technology Transfer in Selective Heavy Metal Recovery by Selective Ion Exchange". Development, engineering and building of a pilot plant, plant integration (scale up) for industry waste water treatment  Know how transfer: Characterization of fly ash from municipal waste combustion and coal powder plant, analysis and disposal

### **Languages**

German (Mother tongue), English, French

## **Curriculum Vitae**

Name Steinegger, Fred  
Master's degree in mechanical engineering

Year of birth 1944

Citizenship Swiss

### **Higher Education**

1958 - 1960 High School, Camden, S.C. and Waynesboro, Va. USA

1960 - 1964 German International School, The Hague, Netherlands  
Degree: German Abitur (Baccalaureate)

1964 - 1970 Faculty of Mechanical Engineering, Swiss Federal Institute of Technology, Zurich, Switzerland;  
special studies in process engineering and process control

1970 Master's degree in Mechanical Engineering, Swiss Federal Institute of Technology, Zurich, (dipl. Ing. ETH)

### **Career Development**

1970 - 1974 Kuehni AG, Gewerbestr. 28, CH-4123 Allschwil, equipment and plants for chemical and environmental processes; as process design engineer and project manager

1975 - 1977 Inventa AG, Member of the Ems Group, CH-7013 Domat-Ems, licensing and engineering of polyester and nylon polymerization and spinning plants; as sales support and design engineer

1976 6 months at Kaohsiung, Taiwan, as leading member of a start up team for a polyester plant

1978 - 1989 F. Hoffmann-LaRoche AG, CH-4070 Basel, pharmaceuticals, vitamins, chemicals, with its own engineering department; as process design engineer and project manager

1979 - 1989 Part time tutor at the Basel Institute of Technology, CH-4132 Muttenz, Switzerland, in process engineering

since 1990 Professor at the Basle Institute of Technology, CH-4132 Muttenz, Switzerland; lectures and practical work in engineering thermodynamics, process engineering, environmental sciences, pilot plant applications  
Member of the supervisory committee of the Chemical Processes Center at the Basle Institute of Technology

### **Languages**

German (Mother tongue), English, French, Dutch

## **Curriculum Vitae**

Name Totschnig Edith  
M.Sc. nat., Biology

Year of birth 1969

Citizenship Austrian

### ***Higher Education***

1980 - 1988 Baccalaureate, Retihmann High School, Innsbruck, Austria

1988 - 1994 Master of Science (Biology), University of Innsbruck, Austria. Master's Thesis: "Soil respiration at alpine grassland under different land-use" Monte Bodoe, Italy; supervisor Prof. A. Cernusca, Institute of Botany, University of Innsbruck, Austria

1995 - 1998 Post-doctoral Study in "Man-Society-Environment", University of Basel, Switzerland

1996 - 1997 Post-doctoral Study in "Environment", Basel Institute of Technology, Institute of Environment, MuttENZ, Switzerland

### ***Career Development***

1994 - 1995 Lecturer in Biology, Sillgasse High School, Innsbruck, Austria

### ***Languages***

German (Mother tongue), English, Danish, Basics in French, Spanish

## **Curriculum Vitae**

Name                      Wolf, Markus  
                                  Dr. phil. II, Microbiologist

Year of birth             1953

Citizenship              Swiss, citizen of Berg SG

### ***Higher Education***

1966 - 1973              Gymnasium and teachers education college Solothurn

1975 - 1981              University of Zurich; Studies in microbiology, biochemistry and physical chemistry

1981                      Diploma in Microbiology, University of Zurich

1983 - 1988              University of Zurich, Institute of Plant Biology; Ph.D. thesis with Professor Bachofen on „Microbial degradation of bitumen”

1986 - 1988              University of Zurich; Postgraduate Studies in Biology for college teachers

1988                      Ph.D., University of Zurich

1988                      Teaching diploma for Biology (college level), University of Zurich

1992 - 1994              Swiss Federal Institute of Technology Zurich; Postgraduate Course on Developing Countries

1994                      NADEL Certificate, Swiss Federal Institute of Technology

### ***Career Development (Present position and responsibilities)***

since 1994              Research Associate at the Institute of Plant Biology of the University of Zurich and at the Institute of Environment of Basle Institute of Technology. Lecturer at Basel Institute of Technology on the topic Environment and Development

since 1994              Head of the Priority Program Environment project „Use and protection of water resources in lake Victoria through sustainable management of wetland-ecotones“ of the Swiss National Science Foundation. The project’s main focus is on institution and capacity building on urban environmental management issues. The project is carried out in collaboration with the University of Zurich, the Fisheries Research Institute in Jinja, Uganda, and the Makerere University

since 1997              Management of the project „Bioremediation of heavy metal contaminated soils“ of the Swiss National Science Foundation (Head: Prof. Bachofen). The project is carried out within the frame of the „Cooperation in Science and Research with Central and Eastern European Countries and New Independent States“ and in collaboration with the University of Zurich, the Technical University of Budapest, Hungary, and the University of Horticulture and Food Industry, Budapest.

since 1996              Member of course management of the „International Workshop on Hazardous Waste Management“ at Basle Institute of Technology.

since 1996              Lecturer in Biology and Ecology at the Postgraduate Course on Environment of Basle Institute of Technology, the University of Zurich and the Makerere University Uganda