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Non-metallic Industries
Pilsen, Czechoslovakia

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TECHNICAL WORKSHOP ON THE NON-METALLIC SORBENTS
FOR ENVIRONMENTAL PROTECTION

Organized by UNIDO and the UNIDO-Czechoslovakia
Joint Programme, Non-metallic Industries,
from 23 May through 1 June 1989 in Pilsen,
Czechoslovakia

F I N A L R E P O R T

This report has been prepared by:

Board of Participants in the Technical Workshop
UNIDO-Czechoslovakia Joint Programme,
Non-metallic Industries, Pilsen

Pilsen, Czechoslovakia

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LIST OF ABBREVIATIONS

1. UCJP UNIDO-Czechoslovakia Joint Programme, Non-metallic Industries, Pilsen
2. RICRRMP..... Research Institute for Ceramics, Refractories and Non-metallic Raw Materials, Pilsen
2. INTIB Industrial and Technological Information Bank
3. DSA Daily Subsistence Allowance

I. INTRODUCTION

The Technical Workshop on the Non-metallic Minerals for Environmental Protection was organized by UNIDO Vienna and by the UNIDO-Czechoslovakia Joint Programme, Non-metallic Industries in Pilsen, Czechoslovakia, in co-operation with the Research Institute for Ceramics, Refractories and Non-metallic Raw Materials in Pilsen.

The objective of the workshop was to foster the exploitation of selected non-metallic sorbents in the environmental engineering, mainly for wastewater clean-up and reduction of air pollution and in agriculture in developing countries. Identification of areas of interest for transfer of technologies, technical co-operation and training through UNIDO and the UNIDO-czechoslovakia Joint Programme, Non-metallic Industries, Pilsen was also the objective of the workshop.

The UNIDO-Czechoslovakia Joint Programme, Non-metallic Industries in Pilsen was established at the Research Institute for Ceramics, Refractories and Non-metallic Raw Materials, Pilsen and it has been backed by the companies associated under the Czechoslovak Ceramic Works. It commenced its activities in 1978. The Joint Programme has also been maintaining close contacts with companies producing lime, cement, bricks, glass and other products based on non-metallic minerals.

The Joint Programme provides assistance to developing countries in fostering twinning arrangements between the appropriate Czechoslovak organizations and similar ones in the developing countries in carrying out individual training programmes and in organizing workshops, in testing raw materials together with the related technological research and pilot investigations leading to the selection of appropriate industrial technology. Its staff provides technical assistance that covers all technological issues of the development of ceramics, advanced ceramics, building materials and non-metallic

minerals based industries. The Joint Programme also renders technical assistance to developing countries within its programme of energy conservation and management in the application of non-metallic minerals and rocks in agriculture and environmental engineering.

Transfer of technical and scientific information has taken up a very important place in the overall activity of the Joint Programme. The information and publications are distributed through a node of INTIB specialized in non-metallic minerals and energy conservation which is equipped for contacts with external databanks.

II. PARTICIPANTS

20 high-qualified governmental nominees from 16 developing countries and 7 observers from 3 other countries took part in the workshop. Their list is presented as Annex 1.

The Workshop was of great concern for many developing countries. It should be noted that concern of developing countries for sending their representatives was much more higher and a large number of nominees could not be accepted.

III. LANGUAGE

The programme was conducted in English and the lectures and country reports were typed in English, too.

IV. ORGANIZATION OF THE WORKSHOP

Organization was ensured by the Organizing Committee:

Director of the Technical Workshop	Mr. A. Lošťák, General Director of the Czechoslovak Ceramic Works, Prague, Guarant of the Joint Programme, member of UNIDO-ČSSR Joint Committee for Co-operation
Programme Director	Mr. Z. A. Engelthaler, Chief Executive of the UNIDO-Czechoslovakia Joint Programme, Non-metallic Industries, Pilsen and Director of the Research Institute for Ceramics, Refractories and Non-metallic Raw Materials, Pilsen
UNIDO Vienna Representative	Mr. N. G. Biering, Industrial Development Officer and Liaison Officer of the UNIDO-Czechoslovakia Joint Programme, Non-metallic Industries, Pilsen
Technical Secretary	Mr. J. Müller, Senior Expert of the UNIDO-Czechoslovakia Joint Programme, Non-metallic Industries, Pilsen
Organization and Financing	Ms. E. Engelthalerová, Chief of Administration of the UNIDO-Czechoslovakia Joint Programme, Non-metallic Industries, Pilsen
Co-operators	Mr. S. Hora, Technical Director, Research Institute for Ceramics, Refractories and Non-metallic Raw Materials, Pilsen Mr. O. Řehořovský, Director for Economics and Development, Research Institute for Ceramics, Refractories and Non-metallic Raw Materials, Pilsen
General Rapporteurs	Mr. P. Duchek, Expert, UNIDO-Czechoslovakia Joint Programme, Non-metallic Industries, Pilsen Mr. F. Pecháček, Expert, UNIDO-Czechoslovakia Joint Programme, Non-metallic Industries, Pilsen

Administration,
Information and
Reporting

Mr. J. Žaloudek, Chief, INTIB node,
UNIDO-Czechoslovakia Joint Programme,
Non-metallic Industries, Pilsen

Mr. M. Jarausch, Expert, UNIDO-
Czechoslovakia Joint Programme,
Non-metallic Industries, Pilsen

Ms. A. Hrušová, Clerk

Ms. Z. Zoubková, Clerk

Ms. I. Vrzalová, Clerk of INTIB node
UNIDO-Czechoslovakia Joint Programme,
Non-metallic Industries, Pilsen

Board of Participants

Chairman

Mr. Mohand Said Ould Ali (Algeria)

Members

Mr. Gonzales Nodarse V. (Cuba)

Ms. Kumari Amarasinghege (Sri Lanka)

I. Programme of the Workshop

The Workshop concentrated on the application of non-metallic raw materials for environmental protection. Seven lectures were presented by scientists, researchers and professionals from industries and technical universities that focused on various aspects related to the successful introduction of technologies based on non-metallic sorbents. The lectures were governed by considerations guiding to practical and economical applications. The information provided by lecturers was supported by case studies to demonstrate selected technologies and their advantages.

The programme of the Workshop comprehended study visits that enabled the participants to compare different ways of applications. The programme focused on sorbent processing, aspects of their applications for waste disposal and to solutions of ecological problems. A considerable part of practical studies was devoted to the demonstration of cheap methods of different water pollution remedies through bentonite considering the conditions and financial possibilities of small units.

The participants were also informed of relevant testing methods to research appropriate technologies of non-metallics integrated exploitation.

The lectures and industrial study visits were completed by round table discussions giving the participants opportunity to exchange their opinions and experience with lecturers, managers and technical staffs in the institutes visited as well as among themselves.

During the Workshop the participants were given opportunity to visit other industrial enterprises according to their personal concern.

The participants from Algeria, Brazil, Zambia, USSR, China, Ethiopia, Jordan and Nigeria expressed individual requests for further co-operations with Czechoslovak industries and research institutions through the UNIDO-CSSR Joint Programme, Pilsen. The questions of the requested co-operations were discussed and concluded in separate minutes.

The Workshop was co-chaired by the Board of Participants who elected the representative of Algeria as their chairman. They collaborated with the Joint Programme staff to prepare the final report.

2. Discussions

The participants enriched their scope of knowledge during the discussions with the representatives who are mentioned in Annex 2.

3. Documentation and Aids

The following documentation and aids were handed over to each of the Technical Workshop participant.

- Technical Workshop Schedule
- Complete set of seven lectures
- Bulletins, booklets and technical leaflets of the UNIDO-Czechoslovakia Joint Programme, Non-metallic Industries, Pilsen

- Cumulative list of Joint Programme publications
- Publications and folder on the Research Institute for Ceramics, Refractories and Non-metallic Raw Materials, Pilsen
- AKTIBENT - description of water purification plants
- Multilingual vocabulary for ceramic industry and non-metallic raw materials
- English-Czech Practical Handbook
- Writing materials and handbag
- Protective helmet for in-plant training
- Selected samples of non-metallics

4. Lectures Delivered

1. Mr. A. Lošťák: Utilization of Non-metallic Minerals and Rocks in Czechoslovakia
2. Mr. Z.A. Engelthaler: New Applications for Non-metallic Minerals and Rocks in Environmental Engineering
3. Mr. J. Müller: Concise Review of Industrial Waste Management
4. Mr. J. Kačín: Activated Bentonite for Wastewater Purification
5. Mr. J. Petr: Non-metallic Sorbents in Agriculture in View of Waste Exploitation
6. Mr. F. Pecháček: Exploration of Non-metallic Minerals and Rocks in Respect of Environmental Engineering
7. Mr. J. Stoklasa: Anthropo-ecological Theory as Background for Solving Ecological Problems

5. List of Locations of In-plant Training

Interdisciplinary Approach for the Exploitation of Non-metallic Sorbents for Environmental Protection	UNEP-Czechoslovakia Joint Programme, Non-metallic Industries, Pilsen
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Application of sorbents in agriculture in respect of waste water disposal	State Farm Křimice
Application of non-metallic sorbents in wastewater disposal plant	Waste Water Disposal Plant in Prague
Application of activated bentonite to clean oily waste water	Waste Water Disposal Plant in Plzeň
Exploitation of non-metallic sorbents with respect of environmental protection	Research Institute for Ceramics, Refractories and Non-metallic Raw Materials, Pilsen and its division at Karlovy Vary

List of institutions visited on special request

- 1) Research Institute for Ceramics, Refractories and Non-metallic Raw Materials, Pilsen, Research Division Horní Bříza
 - 2) Westbohemian Ceramic Works, kaolin deposit and washing plant Kaznějov
 - 3) Westbohemian Ceramic Works, stoneware production plant, Třemošná
 - 4) Westbohemian Ceramic Works, wall tiles production plant, Horní Bříza
 - 5) Northbohemian Ceramic Works, bentonite deposit and processing plant, Obrnice u Mostu
 - 6) Production plant for expanded and hydrophobized perlite, Prague
 - 7) Expanded clay production plant, Vintířov
 - 8) Sanitaryware production plant, Bechyně
 - 9) Research Institute for Agriculture, Staňkov
 - 10) Chlumčany Ceramic Works, production plant for floor tiles, Chlumčany
6. Presentation of Country Reports

Distinguished participants delivered country reports describing the actual and development situation in the

field of geological reserves, extraction and upgrading and application of locally available non-metallic sorbents in their countries. The country reports from Argentina, Brazil, Cuba, Cyprus, Ethiopia, Jordan, Nigeria, Syria and Thailand were of special interest as some of them were based on the Joint Programme Pilsen previous activities. All participants agreed that the Joint Programme Pilsen will dit the country reports as its official publication.

V. ADMINISTRATIVE ORGANIZATION OF THE PROGRAMME

1. Administrative Work

Administrative staff was engaged in organizing and arranging lectures, plant visits in factories and in the Research Institute, accommodation arrangements, local transport, social events, providing for visas and airtickets booking, etc.

2. Secretariat and Audience Room

The Secretariat of the Workshop was established in the premises of the UNIDO-Czechoslovakia Joint Programme, the Audience Room in the Ural hotel in Pilsen.

VI. EVALUATION BY THE PARTICIPANTS

This workshop offered a unique opportunity for the participants to share their experience and to upgrade their knowledge as the technologies and know-how demonstrated during the workshop programme guide to the industrial development friendly to nature. The participants have recognized that the information gained during the visits, lectures and round table discussions will help in their home countries.

Following visits to the Research Institute for Ceramics, Refractories and Non-metallic Raw Materials, Pilsen and factories of the Czechoslovak Ceramic Works the participants desired for further co-operation with the UNIDO-Czechoslovakia Joint Programme, Non-metallic Industries, Pilsen in the field of training, testing and evaluation

of non-metallic sorbents for agricultural application, waste water treatment and environmental protection applications and assistance in establishing laboratories, research facilities and production units in their home countries.

The participants expressed their gratitude to UNIDO and the Joint Programme, Pilsen for arranging this workshop in Czechoslovakia where the authorities are very generous in sharing their knowledge and experience. The participants highly appreciated promptness, extended by the organizers to arrange for extra visits of plants according to their individual concern and requests.

They were thankful to Mr. Dr. A. Lošťák, General Director of the Czechoslovak Ceramic Works and Director of the Workshop, for his active part in the programme.

They greatly appreciated the role of Mr. Z. A. Engelthaler, director of the Research Institute for Ceramics, Refractories and Non-metallic Raw Materials and Chief Executive of the UNIDO-Czechoslovakia Joint Programme, Non-metallic Industries, Pilsen for well prepared programme and his personal involvement in various activities. They further appreciated his part in the round-table discussions.

The participants expressed their gratitude to Mrs. E. Engelthalerová, Chief of Administration and to the other staff members of the UNIDO-Czechoslovakia Joint Programme, Non-metallic Industries, Pilsen who were always helpful and contributed to the success of the workshop.

VII. CONCLUSIONS AND RECOMMENDATIONS

Non-metallic minerals and rocks play an important role among the industrialization plans and projects of developing countries. International co-operation and technical assistance to promote the development of industrial minerals sector is needed.

UNIDO and the UNIDO-Czechoslovakia Joint Programme, Non-metallic Industries should:

1. Arrange regular workshops and seminars at regional and interregional level specialized on one mineral alternating with workshops devoted to broader technological problems annually.
2. Continue editing technical publications focused on particular minerals, particular plant profiles and other issues as requested by developing countries. These publications will be distributed through the INTIB node, Pilsen, which can also edit and distribute titles presented by the scientists, researchers and professionals from developing countries who may have concern. Participants requested Joint Programme publications in the amounts of 30 - 110 titles. On the other hand they agreed that the country reports presented can be published and distributed by the Joint Programme. The participants desire that the Joint Programme, Pilsen technical publications may be made available to the R + D organizations through UNDP offices in the respective developing countries.
3. Continue casting new audiovisual programmes focusing on particular problems related to the industrial minerals so that training process in their national centres could be upgraded. The participants found the presented audiovisual programmes interesting and useful and requested UNIDO and Joint Programme, Pilsen to provide copies for their national centres.
4. In promoting the appropriate exploitation of non-metallic minerals industries, e. g. building materials industry, paper, glass, rubber, cosmetics, ceramics, refractories, foundry. Governments should take necessary measures to ensure the proper utilization of locally available raw materials including the measures taken to lower the waste during minerals processing which will contribute

considerably to economic results and environmental protection. In this respect it is recommended that inventory studies are conducted and industrial directories are prepared and made available to the users. An important part of the exploration process is the characterization of the raw materials. The participants recognized the work that the Joint Programme carried out in testing non-metallic raw materials for developing countries and welcome any possibilities of extending this activity through a new UNIDO project.

5. Non-metallic minerals and rocks functioning as sorbents may successfully be applied in agriculture to enhance the yield of deficient soils and wastewater disposal. To promote the application of those minerals in developing countries the following is recommended:

- establishment of UNIDO network of non-metallic sorbents experts with its headquarters at the guidance of Joint Programme, Pilsen
- establishment of a group of consultants to assist developing countries in this field
- organization of group training programmes
- publishing activities, dissemination of new technical information

According to the wish of individual country nominees minutes of possible co-operation between respective organizations in developing countries and UNIDO-Czechoslovakia Joint Programme, Non-metallic Industries, Pilsen were prepared, discussed and signed. The Joint Programme Pilsen will discuss the minutes with UNIDO Vienna Headquarters and participants with governmental bodies, UNDP and UNIDO SIDFAs in respective developing countries.

Chief Executive of UGJP explained to all participants that project formulation procedure is a very important

and responsible matter. Objectives, needs and aims must be known and clearly formulated. (Annex 3). For more complicated projects it is possible and recommended to ask for a preparatory assistance of UNDP by inviting UCJP (or other) experts for the formulation of projects (preparatory assistance mission).

As for SIS missions, they may be applied for urgent problems occurring either in the R + D (institutions etc.) or the industry.

Minutes on preliminary considerations will be handed over in 1 copy to UNIDO Vienna and put into the file of UCJP for the possible future technical help in developing countries.

7. The participants recommend that UNIDO and UNIDO-ČSSR Joint Programme arrange for a Workshop on Utilization of Non-Metallics for Environmental Engineering next year. The workshop is suggested to last 2 weeks involving 5-6 day round trip to study geology, mining, processing, beneficiation and integrated exploitation of non-metallic minerals and rocks with the stress on environmental engineering. It is recommended that nominees in further workshops should be instructed to bring written country reports to be duplicated and distributed in advance to the participants. The Joint Programme is requested to provide the nominees with a synopsis of the country report presentation.
8. The participants strongly request UNIDO to reconsider the question of covering financially the round-trip air tickets. The condition of participation that Governments have to finance the travel is felt to disqualify the participants from poor least developed countries.
9. Responding to the inquiries of participants as for technical and scientific information, its dissemination and obtaining the Computer Model for Feasibility Analyses and Reports (COMFAR) they were informed of contact addresses attached as Annex 4.

- 1) Mr. Said Ould Ali
Chief of Department
E.N.O.F, Alger
Algeria
- 2) Ms. Ana Maria Celeda
Chief Mineral Processing division
National Institute of Indust. Technology, Buenos Aires,
Argentina
- 3) Mr. Jader Martins
Senior Mineral Programme Coordinator
CETEC Belo Horizonte
Brazil
- 4) Mr. J. E. Perez Gonzales
Head Specialist
Geological and Mining Enterprise, Ministry of Industry for
Construction Materials, Habana
Cuba
- 5) Mr. Nodarse Victor Gonzalez
Head of Department
Quarry Exploitation, Union of Quarry Enterprises,
Ministry of Industry for Construction Materials, Habana
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- 6) Ms. Limei Tu
Senior Engineer, Department Director
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shan District, Beijing,
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- 7) Ms. Meijuan Ji
Department Chief
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- 8) Mr. Anhony Demetriou
Operation Manager
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- 9) Mr. Zakaria Abd Rabo
Mechanical Engineer
The General Company for Ceramic and Porcelain Productions
Egypt
- 10) Mr. Tadesse Mesfin
Technical Manager
Ethiopian Cement Corporation, Addis Ababa
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- 11) Mr. Asnakew Woldeab
Head of Division
Soil and Water Management, Institute of Agriculture,
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- 12) Mr. S.A.S. Lavasani Bozorg
Plant Expert and Manager of Project
Water Supply and Water Treatment, Ministry of Energy,
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- 13) Mr. Misbah A. Haddad
Head of Mining Division
Ministry of Energy and Natural Resources Authority,
Amman
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- 14) Mr. Bong Gyun Kim
Senior Research Officer, Pyongyang
Korea P.D.R
- 15) Mr. Joon Sun Won
Associate Professor
Hamhung Institute
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- 16) Mr. Olurunfemi B.N.
Chief Scientific Officer and Head
The Raw Materials Research and Development Council, Lagos
Nigeria

- 17) Ms. Kumari Amarasinghege
Postgraduate Student at the Agricultural University,
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- 18) Mr. Bachar Wani
General Manager
General Company for Sewerage in Aleppo
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- 19) Mr. W. C. Lombe
Mineral Processing Engineer
Eastern and Southern African Mineral Resources Develop-
ment Centre (Tanzania)
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- 20) Mr. Chaiyuth Klinsukont
Director
TISTR (Thailand Institute of Scientific and Technologi-
cal Research), Bangkok
Thailand

OBSERVERS

- 21) Mr. N. S. Toropov
Chief of Laboratories, Deputy Director
Research Institute for Refractory and Advanced Ceramics,
Sverdlovsk
Soviet Union
- 22) Mr. Yang De Liang
Director
Xianyang Research and Design Institute of Ceramics
China P.R.
- 23) Mr. Wang Kang
Chief Engineer
Xianyang Research and Design Institute of Ceramics
China P.R.

- 24) Mr. Liyan Ping
Research Officer
Xianyang Research and Design Institute of Ceramics
China P.R.
- 25) Mr. Varga Zsigmond
General Director
Agroinnova Szolnok
Hungary
- 26) Mr. Lafferton László
Director of Production
Agroinnova, Szolnok
Hungary
- 27) Mr. Zubek Lajos
Chief Adviser
Agroinnova Szolnok
Hungary

Officials and technicians met during the workshop programme

CSSR

- Mr. A. Lošák, General Director of the Czechoslovak Ceramic Works, Prague
- Mr. P. Hostinský, Mayor of the city of Pilsen
- Mr. Z. A. Engelthaler, chief Executive of the UNIDO-Czechoslovakia Joint Programme, Non-metallic Industries, Pilsen and Director of the Research Institute for Ceramics, Refractories and Non-metallic Raw Materials, Pilsen
- Mr. J. Petr, Director, Agricultural State Farm, Křimice
- Mr. J. Dlouhý, chief, Dept. of Horticulture, State Farm Křimice
- Mr. Z. Štěpánek, Head of the Division, Research Institute for Ceramics, Refractories and Non-metallic Raw Materials, Pilsen (hereinafter called RICRRMP), Division at Karlovy Vary
- Mr. M. Hladeček, chief of Laboratory Department, RICRRMP, Division at Karlovy Vary
- Mr. J. Smrž, Senior Research Officer RICRRMP, Division at Karlovy Vary
- Mr. V. Šebek, Senior Research Officer, RICRRMP, Division at Karlovy Vary
- Mr. V. Konůpek, Senior Research Officer, RICRRMP, Division at Karlovy Vary
- Mr. V. Kádě, Senior Research Officer, RICRRMP, Division at Karlovy Vary

- Mr. J. Kacín, Chief of Research Department, RICRRMF
- Mr. J. Stoklasa, Head of Ecology Department, Institute of Landscape Ecology; Czechoslovak Academy of Sciences, České Budějovice
- Mr. J. Běl, Chief of the Wastewater disposal plant, Váhostav, n. p. Praha
- Mr. V. Šmolík, Chief of the Wastewater disposal plant, Transport services of the town Pilsen
- Mr. S. Frank, Assistant of Director, Westbohemian Breweries, Pilsen
- Ms. E. Engelthalerová, Chief of Administration, UNIDO-Czechoslovakia Joint Programme, Non-metallic Industries, Pilsen
- Mr. J. Müller, Senior Expert, UNIDO-Czechoslovakia Joint Programme, Non-metallic Industries, Pilsen
- Mr. J. Žaloudek, Chief INTIB node, UNIDO-Czechoslovakia Joint Programme, Non-metallic Industries, Pilsen
- Mr. P. Duchek, Expert, UNIDO-Czechoslovakia Joint Programme, Non-metallic Industries, Pilsen
- Mr. M. Jarausch, Expert, UNIDO-Czechoslovakia Joint Programme, Non-metallic Industries, Pilsen
- Mr. M. Nový, Expert, UNIDO-Czechoslovakia Joint Programme, Non-metallic Industries, Pilsen
- Mr. F. Pecháček, Expert, UNIDO-Czechoslovakia Joint Programme, Non-metallic Industries, Pilsen
- Ing. Zbyněk Pospíšil, Trade Representative Prerov Machinery

Project Development (Main Guidelines)

1. Justification and Background Informations
2. Objectives - Long term and development objectives
- Immediate objectives
3. Inputs
 - a. national input, i. e. from Government, or Privat enterprise or from co-operatives
 - b. UNIDO input
 - b 1. International consultants, need expressed in W/m (working months)
 - b 2. Training - domestic
- abroad
Content of training programme
- what field
- duration
- cost of training with breakdown per person and per months
 - b 3. Equipment
testing equipment or pilot plant
 - b 4. Miscellaneous
4. Outputs
For each input what will be the output
5. Activities of the Project
to be defined according to objectives, inputs and the real need. UN Authorities will select the best way and place for each country. If very specific request, as an exemption, will be submitted, it must be explained and justified.
6. Budget
Costs of different inputs are evaluated and covered by:

6.1 Governmental contribution

- in kind
- in US Dollars contribution shows good will and interest, cost sharing

6.2 UNIDO contribution in US Dollars

Project Development Administration

The project concept or proposal to be submitted through the Governmental contacting office,

original to UNDP

copies to UNIDO SIDFA (if established) and to UNIDO,

att. Mr. G. R. Latortue

Director

Project Review and Appraisal Division

UNIDO

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