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UNITED NATIONS INDUSTRIAL ORGANIZATION

PROJECT PROPOSAL

PART A - BASIC DATA

COUNTRY : Korea/Czechoslovakia
PROJECT NUMBER :
PROJECT TITLE : "Extraction of Alumina from Non-Bauxitic Clays"
Twinning Agreement between the Korea Institute of Science and Technology (KIST), Seoul, Korea and the Research Institute for Metals (RIM). Panensk'e Brezany, Czechoslovakia
SCHEDULED START : July 1990
SCHEDULED COMPLETION : June 1993 with possibility of extension
ORIGIN AND DATE OF OFFICIAL REQUEST : KIST and RIM May, 1989
GOVERNMENT COUNTER-PART AGENCIES :
UNIDO CONTRIBUTION : US \$ 30,000
GOVERNMENT CONTRIBUTION : Korea/\$800,000 and Czechoslovakia/\$800,000
CURRENCY REQUIRED FOR UNIDO INPUT : US \$ 30,000
CONVERTIBLE : US \$ 30,000
OTHER :
UNIDO SUBSTANTIVE BACK-STOPPING SECTION :
PROGRAMME COMPONENT CODE :
PROPOSAL SUBMITTED BY : KIST and RIM
DATE OF SUBMISSION :

21/8

PART B - NARRATIVE

1. Background and Justification

Aluminium production in Czechoslovakia depends on bauxite import from abroad. Since 1953, the aluminium oxide for electrolysis is produced from low-grade Hungarian bauxites using the sintering method. Because of high energy consumption in this process, method of high-pressure alkaline leaching of bauxites in a tube autoclave has been developed in the Research Institute for Metals. Favourable technological and economic results and high grade of energy utilization enabled to introduce this method into production in 1986/63,000 t Al_2O_3 per year./ With Al_2O_3 and Al production being intensified, project documentation for high-pressure units with capacity of 100,000 and 200,000 t Al_2O_3 per year is in process of completion at present; this will lead to an alternative process to sintering method.

In connection with introduction of new methods for Al_2O_3 production, the replacement of imported bauxites by domestic non-bauxite materials becomes possible as well. Firstly, the method of sintering power plant fly ash and clays with limestone was developed and tested in production scale in the sixties. Furthermore, Since 1975 RML has been engaged in hydrothermal decomposition of aluminosilicate materials, such as low-modulus and high-silicate bauxites, by-products, such as red or brown mud and fly ashes, kaolins, underlying and overlying clays, shales etc.

In Korea, bauxite has also been imported from overseas to produce aluminium metal. However, there are various kinds of non-bauxite type raw materials deposited in Korea. With this fact

in mind, Korea team has been developing economic processes for alumina extraction from clay minerals and for purification of iron and alkali metals from the resultant alum solution, partly in pilot and partly lab. scale.

Researchers for industrial utilization of the solid residue from the acid extraction and for development of a process for a high purity alumina are also underway such that KIST is in a position to seek a joint programme with a relevant industry for commercialization of the whole process.

2. Special Consideration

The major purpose of the project is to lay the basis for establishment of bilateral interest to co-operate on the basis of sharing experience in industrialization and technology and know-how between KIST and RIM. Judging by the potential of immediate industrial application of this project in each country, heavy emphasis must be placed upon exchange of the technology-scale-up-information and critical evaluation of economic factors.

3. Objectives

The main objectives of this project is to develop a practical process for extraction of alumina from domestic non-bauxitic clays and manufacturing processes of alumina-related products. With close co-operation between the two research institutes of Czechoslovakia and Korea by jointly sharing experiences and facilities.

For this purpose, high-pressure alkaline leaching technology of non-bauxite raw materials with modulus min. $M_{Si} = 0.8$ in the tube reactor is to be tested with one or non-bauxite deposits in , laboratory -, model - and pilot scale.

4. Project Outputs

It is expected that through implementation of this project, both institutes will increase their capabilities in order to become focal points of innovation and technology improvement in their countries. The activities which should be done by the two research institutes, supported by UNIDO, are expected to produce:

- determination of optimum parameters of high-pressure alkaline leaching, Al_2O_3 recovery from extracts and extract recycling during the laboratory-, model- and pilot-tests
- determination of physico-chemical parameters of liquid and solid phases including the sedimentation and filtration of the rest after leaching
- documentation for projecting full-scale equipment on the basis of pilot tests
- verification of the use of solid wastes in national economy,
- interim and final report on investigation results of complex wastefree utilization of the non-bauxite raw material

5. Project Activities

We suppose first stage of solving the joint research project for the period 1990-1991. In the first stage, the optimum technology parameters will be determined in laboratory and model scale using the equipment of the Research Institute for Metals.

In the second stage, for the period of 1992 - 1993, the pilot-plant verification of technology will be carried out and the wastes will be tested as to their application in national economy. The time of solving is planned for 3 years including evaluation and the final report.

6. Project Input

UNIDO will provide US \$ 30,000 for the period July 1990 - June, 1993 in convertible currency and equivalent of US \$ 1,600,000 in local, non-convertible currency will be provided by the countries concerned (Korea: US \$ 800,000 and Czechoslovakia US \$ 800,000).

7. Evaluation Plan

The project will be evaluated during the implementation and upon completion by the NGOs, Business and Industrial Institutions Co-operation Section, and PDES with participation of the representatives from KIST and RIM.

8. Envisaged Follow-up

The first phase of this three-year project will end in July 1991. In the light of experience gained during this phase, a long-term follow-up project will be considered by the NGOs, Business and Industrial Institutions Co-operation Section, and PDES.

FART C - CLEARANCE AND APPROVAL

Cleared by:

Date:

Approved by:

Date:

Date:

Amount approved

Source of Funds:

Convertible Currency:

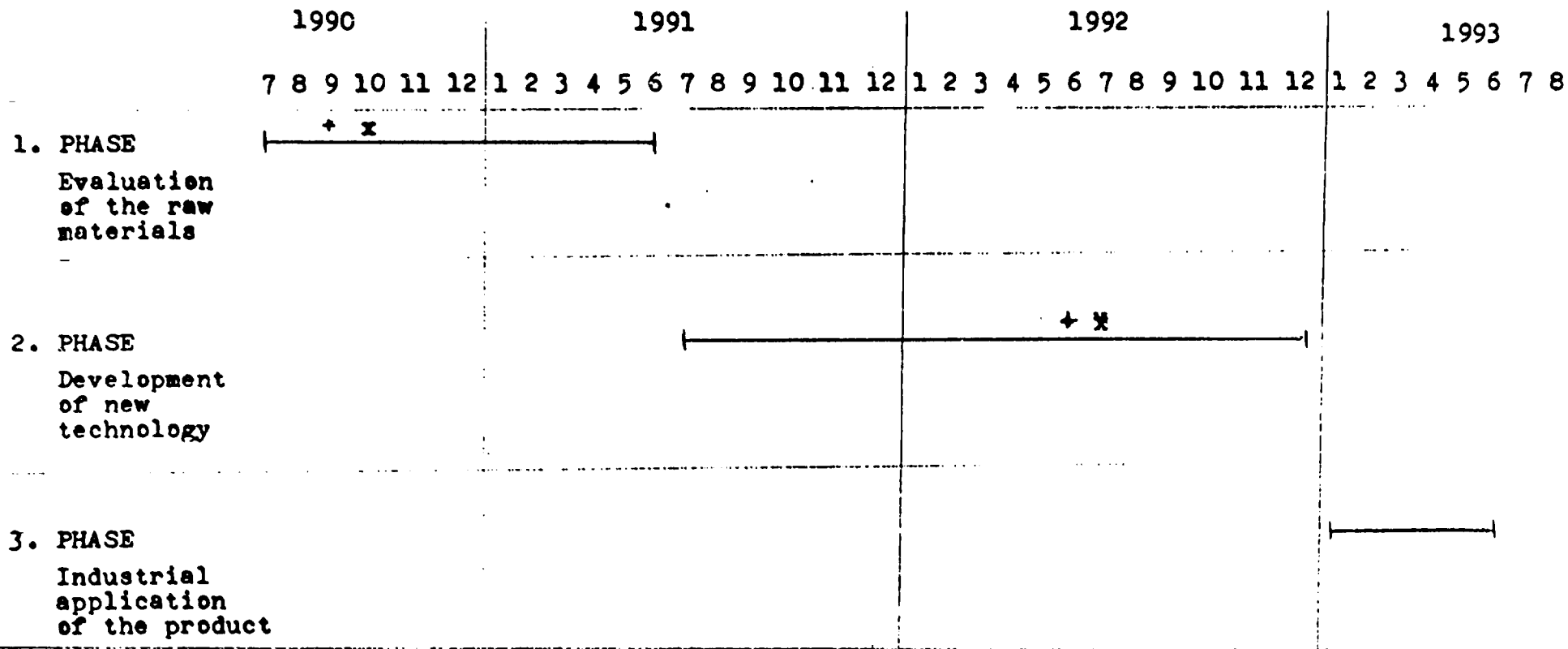
Other

Date PAD requested:

WORKING PLAN 1990/93

<u>PHASES OF RESEARCH</u>	Duration	Starting Date
1. Evaluation of the raw materials	12 months	1st July 1990
Consultation of experts : / 2 /		
- in Korea	14 days	1st September
- in Czechoslovakia	14 days	1st October
2. Development of new technology	18 months	1st July 1991
Training of engineers : / 3 /		
- in Korea	10 days	June 1992
- in Czechoslovakia	10 days	July 1992
3. Industrial application of the product	6 months	1st January 1993

WORKING PLAN 1990 - 1993



+ mission of Czechoslovakian experts to Korea

x mission of Korea experts to Czechslovakia

FINANCIAL CONTRIBUTION OF UNIDO TO THE WORKING PLAN 1990/1993

/ in US dollars /

<u>Expert Component / 1990 /</u>	<u>Duration</u>	1990/93
Roud-trip tickets for 2 Czechoslovakian experts in KAIST - Seoul - Korea	14 days	6,000
Roud-trip tickets for 2 Korea experts in RIC - Pilsen - Czechoslovakia	14 days	6,000
<u>Training Component / 1992 /</u>		
Roud-trip tickets for 3 Czechoslovakian engineers to be trained at the KAIST - Seoul - Korea	10 days	9,000
Roud-trip tickets for 3 Korea engineers to be trained at the RIC - Pilsen - Czechoslovakia	10 days	9,000
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GRAND TOTAL		30,000

FINANCIAL CONTRIBUTION OF RIC TO THE WORKING PLAN 1990/1993

/ in CK /

<u>Expert Component / 1990 /</u>	<u>Duration</u>	1990/1993
Allowance for the industrial experts / 2 / coming from Korea		
- for salaries	2 x 14 days	equiv to 3 000 US \$
- for accommodation	2 x 14 days	
<u>Training Component / 1992 /</u>		
Daily subsistence for 3 Korea engineers to be trained at the RIC	3 x 10 days	equiv to 1 500 US \$
Allocation to cover additional costs		equiv to 1 000 US \$
Joint Research		equiv to 793 000 US \$
<u>Miscellaneous</u>		equiv to 1 500 US \$
<hr/>		
GRAND TOTAL		equiv to 800 000 US \$ in local non-convertible currency

FINANCIAL CONTRIBUTION OF KAIST TO THE WORKING PLAN 1990/1993

<u>Expert Component / 1990 /</u>	<u>Duration</u>	1990/1993
Allowance for the industrial experts coming from Czechoslovakia		
- for salaries	2 x 14 days }	equiv. to 800 000 US\$
- for accommodation	2 x 14 days }	
<u>Training Component / 1992 /</u>		
Daily subsistence for 3 Czechoslovak engineers to be trained at the KAIST	3 x 10 days	equiv. to 1 500 US \$
Allocation to cover additional costs		equiv. to 1 000 US \$
Joint Research		equiv. to 793 000 US \$
<u>Miscellaneous</u>		equiv. to 1 500 US \$
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GRAND TOTAL "		equiv. to 800 000 US \$ in local non convertible currency