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STRENGTHENING OF ESSENTIAL OIL INDUSTRY IN KOREA

DP/DRK/88/001

DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA

Technical report: Preparation of basis for supplying and erection of the equipment*

Prepared for the Government of Democratic People's Republic of Korea
by the United Nations Industrial Development Organization,
acting as executing agency for the United nations Development Programme

Based on the work of S. Laugner, Chemical Technologist

Backstopping Officer: T. De Silva, Chemical Industries Branch

United Nations Industrial Development Organization
Vienna

* This document has not been edited.

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SUMMARY AND INTRODUCTION

Title of project: Strengthening of the Essential Oil Industry in Korea

Number of the project: DP/DRK/88/001

Job Description: Chemical Technologist and CTA

In accordance to the job description from April 25, 1991 the Chemical Technologist had the "special responsibility for preparation of agreements for installation of equipment".

This mission was performed on the base of recommendation No. 3 in the part report 2 of January 1991.

The special tasks for this mission were:

- To commend special technical details contained in the technical documentation of bench scale equipment and
- to agree on behalf of the supplier of this equipment with DPRK-counterpart, all matters connected with delivery, transportation, erection and running-up of this equipment.

This part report No. 3 contains the main results of the fulfilment of this task and states some recommendations for the partners working at present on this project.

I. SUPPLYING AND ERECTION OF EQUIPMENT

Detailed information about supplying and erection of equipment is given in the "Minutes about the project DP/DRK/88/001..." (see annex No. 3). These minutes have been handed over by the consultant in June 1991 to UNIDO while debriefing in Vienna and to contractor and the subcontractor after returning to Germany, in order that all partners working on this project got the actual information about the results of the consultant's mission.

The NPD and CTA agreed with each other about following time schedule for the further work in supplying and erection of bench scale equipment:

- Construction works for equipment hall and machine room

  . Begin: 1991-07-15
  . Finish: 1991-08-31

- Expected end of manufacturing of equipment: 1991-08-31

- Beginning of shipment: 1991-09-15

- Duration of shipment: appr. 2 months

The NPD requested that the equipment has to arrive in Pyongyang not later than end of October 1991 before the winter begins there.

- Planned time for erection of equipment: 1 month

- Planned beginning of start-up: 1991-12-01

II. RESEARCH WORK AT P.E.O.R.C.

The NPD informed briefly about R&D works carried out last year at P.E.O.R.C.:

- Work for determination and growing of most productive flowers and their modifications in accordance to the constituents in essential oils.

  They have investigated more than 100 samples of 20 modifications of flowers using ethanol as extraction medium, among them:

  - 10 modifications of Rosa rugosa;
  - lilac white, blue;
  - other kinds of rosa

  One recommendation is the growing of Rosa-rugosa-modification with more than 5 petals. This takes approximately 2 years.

- Activities for increasing the yield of essential oils

  Approximately only 50 percent of essential oil content in the plant is extracted all over the world in production of essential oils by solvent extraction. P.E.O.R.C. wants to introduce an absolute extraction and to remove the undesired components from the extract. The wax should be separated in this technology without filtration at low temperature. The NPD told that this method reduces the process time from 9 to 6 hours.

- Reducing of Eugenol contents in essential oil from Rosa rugosa.

  According to the recommendations in second report of the consultant (January 1991), P.E.O.R.C. has applied a chemical method for reducing the Eugenol content.

- Application of multi stage extraction

  The multi stage extraction has been used first time this year in P.E.O.R.C. to reduce the needed quantity of solvent for extractive production of essential oils.

  The extraction quantity in relation to flowers is stated in the literature as 1:10 and the capacity of solvent is stated as 11%. P.E.O.R.C. wants to increase the solvent's capacity to 60%.

  In the future the R & D work of P.E.O.R.C. shall include the production of essential oils as well as extracts from more kinds of plants than in the past. This related especially to Angelika (main component cumarin) and hop. The harvest of hop amount to 1000 tons per year.

III. RECOMMENDATIONS

Bench-scale equipment and laboratory devices

Contractor as well as DPRK counterparts are expected to fulfil the agreements contained in the "Minutes of the meeting about the project ....", Pyongyang, June 1991 (see annex 3).

The immediate beginning and finishing of construction works of the equipment hall and the machine room by October 1991 by the DPRK counterpart has special importance for the further project progress.

Annex 1

The management personnel of the partners

From DPRK - side:

Mr. Choi Dung Gwang	Director of the P.E.O.R.C, NPD
Mr. Li Myong Ho	Head of laboratory in P.E.O.R.C.
Mr. Mun	Interpreter

From UNIDO - side:

Mr. Thomann, R.	Chemist-Analyst, consultant
Mr. Langner, S.	Chemical process engineer, consultant, CTA

Annex 2

Time Schedule of the activity

1991-06-06 to 1991-06-08	Flight to Leipzig-Frankfurt-Beijing-Pyongyang
1991-06-11 to 1991-06-17	Working in Pyongyang
1991-06-18	Flight Pyongyang-Moscow-Vienna
1991-06-19	Debriefing with UNIDO in Vienna
1991-06-20	Flight Vienna-Frankfurt-Dresden

Annex 3

Minutes of the meeting about the project
DP/DRK/88/001 - Essential Oils DPRK from 91-06-08 to 91-06-17

1. Participants

Mr. Choi National Project Director (NPD), Director of P.E.O.R.C.
Mr. Li Head of laboratory of P.E.O.R.C.
Mr. Mun Interpreter
Mr. Thomann Consultant, UNIDO
Mr. Langner Chief Technical Adviser (CTA)

2. Place of Meeting

Pyongyang, DPRK

3. Documents which were handed over by the CTA to NPD

- Installation plan machine room and equipment hall, drawing No: 51/02493a (o) from 91-03-11, 2 copies
- Distillation column 2K1, drawing No. 51/02490 (2) from 91-03-20, 2 copies
- Technical information about separators for removing of unsolvable solvents from water, German, 8 pages, 1 copy

4. Results and measures

4.1 Bench Scale equipment

4.1.1. Documentation

- Civil Construction Specification from 22nd November 1990
  2 copies of documentation were sent by the subcontractor JAB Leipzig in December 1990 by air mail to Pyongyang and arrived there in June 1991. It was detailed discussed between the NPD and CTA. On this base P.E.O.R.C. will immediately continue the projecting works for civil construction. The CTA replaced in this documentation the invalid drawings No. 51/02640 (o) - civil design data, No. 51/02493 (o) - installation plan, by the valid drawings No. 51/02640 a (o) and No. 51/02493 a (o).

- Detailed Design Project
  2 copies of documentation were sent by the subcontractor JAB Leipzig in March 1991 together with the laboratory equipment by airmail to Pyongyang and arrived there in June 1991. Some details of the documentations were discussed. On the base of this documentation P.E.O.R.C. will determine the necessary materials for its work volume in plant erection and provide this materials.

4.1.2 Manufacturing

The CTA reported about his visit to the workshop of the manufacturer in the town Grimma/Germany on 3rd June 1991. About 30% of single equipment is ready. The works for assembling of the two compact process units in the steel frameworks will begin in the second week of June. The expected delivery time is end of August/beginning of September. Delivery time acc. contract: 1991-09-30.

4.1.3 Delivery, transport

The CTA informed about the prices for delivery of additional fittings (e.g. 18 pcs. cocks) to adsorption plant and additional 1 pc. apparatus/demister (look telex 92 dated 91-03-29 from contractor acd to UNDP Pyongyang). These prices are following:

- 6 pcs. ball cocks DN40 for vacuum one pc. 265. - DM	1590.- DM
- 12 pcs ball cocks DN25 for warm water condensate one pc. 130.0 - DM	1560.- DM
- 1 pc. apparatus 1V1/demister price	3500.- DM
packing	160.- DM
Total	6810.- DM

The DPRK counterpart agreed the proposal of contractor acd in a.m. telex. It means, that the a.m. additional equipment will be shipped with the equipment of the pilot plant. The additional cost for this material is not within the contract. These will be compensated by transportation of all equipment (incl. insurance) from port Nampo to the site in Pyongyang by the DPRK counterpart.

There is not available direct shipment from Germany to port Nampo/DPRK. The best ship connection is via Hongkong. Two DPRK-ships- the Rung Ra and Kum Su San - go regularly between Hongkong and Nampo. The NPD recommends to authorize for trans shipment in Hongkong a company which deals regularly with transshipment to the DPRK port Nampo.

In opinion of UNDP such company is following:

Kuehne & Nagel (Hongkong) LTD 2301-6 Wing-on Centre
111 Connaught Roac C
Hongkong

The NPD and CTA agreed that when the equipment arrives Hongkong the supplier has to send a telex to P.E.O.R.C.

P.E.O.R.C. will inform the supplier when the next DPRK ship will start from Hongkong.

4.1.4 Supervision of erection and start-up

The CTA has got the last project budget revision dated 12 April 1991 in which one man-month (10,500 US Dollar) is planned under position 11-50 short term consultants for the supervisor of erection. The CTA stated that one man-month could be not enough under practical conditions (unexpected problems with some material and so on) for the work of supervisor. Further he stated that the boxes with the equipment after arriving on the site place in Pyongyang should be opened only in presence of the supervisor for erection. It is necessary to call the consultant for start-up operations, Mr. Langner, to Pyongyang one week before the supervisor for erection will leave Pyongyang. In this week all auxiliary systems (steam, cold, vacuum generation) will be tested without product.

4.2 Laboratory and analytical equipment, Annex III of project document, Equipment list Category 1

4.2.1 Position 1 to 6

All boxes with this equipment arrived by air mail on 12th June 1991 Pyongyang. This are:

- The boxes No. 115 to 515 with two balances, TLC, polarimeter, retractometer, rotary evaporator
- The box No. 111 with parts for TLC from Fa. Labortechnik
- The boxes 716, 717 with GC Varian 3400

The boxes were opened in presence of the consultants. The delivery is complete. In box No. 511 with TLC were broken two pieces of glass develop chamber and one piece of pipette, about what was written down a protocol of transport damage (look annex 1). The consultant Dr. Thomann began together with his DPRK - colleagues to start up the equipment and then to train on this equipment.

More details about this work - look report of Dr. Thomann about his mission.

4.2.2. Position 7 to 9 (Glassware, Consumables, Miscellaneous)

An amount of 19,875 US Dollar to these needs is planned under position 41-00 Expendable Equipment in the a.m. last project budget revision.

The NPD and CTA prepared together a field purchase order for buying of these positions in an amount of 5,000 US Dollar for every position. Every position is specified in an annex to the field purchase order. The DPRK counterpart wants to buy these goods in the P.R. of China. The CTA recommends to purchase under position 8, 1000 liters n-hexan in the quality perfumery grade. Estimated price: about 1100 US Dollar. Reasons: Look report of Mr. Langner from January 1991.

PYONGYANG 1991-06-12

PROTOCOL
OF TRANSPORT DAMAGE

Reference:

- Air waybill 107-01827011, Interflug, from 18. march 1991, L & C spedition GmbH, Berlin-Schoenefeld.
- Seller: 'AGRO' Consalt Dresden GmbH Karcherallee 49, 8020 Dresden, Germany.
- Consignee: Resident Representative United Nations Development Programm 21 Munsudong, Pyongyang, DPR of Korea.
- Flight / Date: JS 216 / 20 MAR.
- UNIDO-Purchase No: 15-0-0344M.
- UNIDO_Project No: DP/DRK/88/001.
- Project name: Essential Oils.

Here with we declare that following parts of a.m. delivery in
Case No.: 1/5, Thin Layer Chromatograph(TLC)
were damaged:

- Two pc. glass develop chamber with lids, look service instruction page 10, position No. 5: Entwicklungskammer (Inertgasanschluss).
- One pc. pipette, look service instruction page 11, position No. 11: Auftragepipette

Mr. Karcher
Resident Representative
UN-Development Programme
21 Munsudong Pyongyang
DPR of Korea

Mr. Choi
Nationl Project Director
Pyongyang Essential Oils Research Centre
Bucksu-dong Dedonggang-district
Pyongyang DPR of Korea

Annex 4

Backstopping Officer's Technical Comments
based on the work of Mr. Langner, CTA
[illegible]P/DRK/88/001/11-01

Mr. Langner's report is very brief and does not give much details except the time schedule and minutes of meetings. The actual work carried out is included in the minutes as an annex. The comments on research being carried out are not clear. The Backstopping Officer recommends a technical evaluation so that the progress of activities could be assessed in order to take any timely corrective action.