OCCASION

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

DISCLAIMER

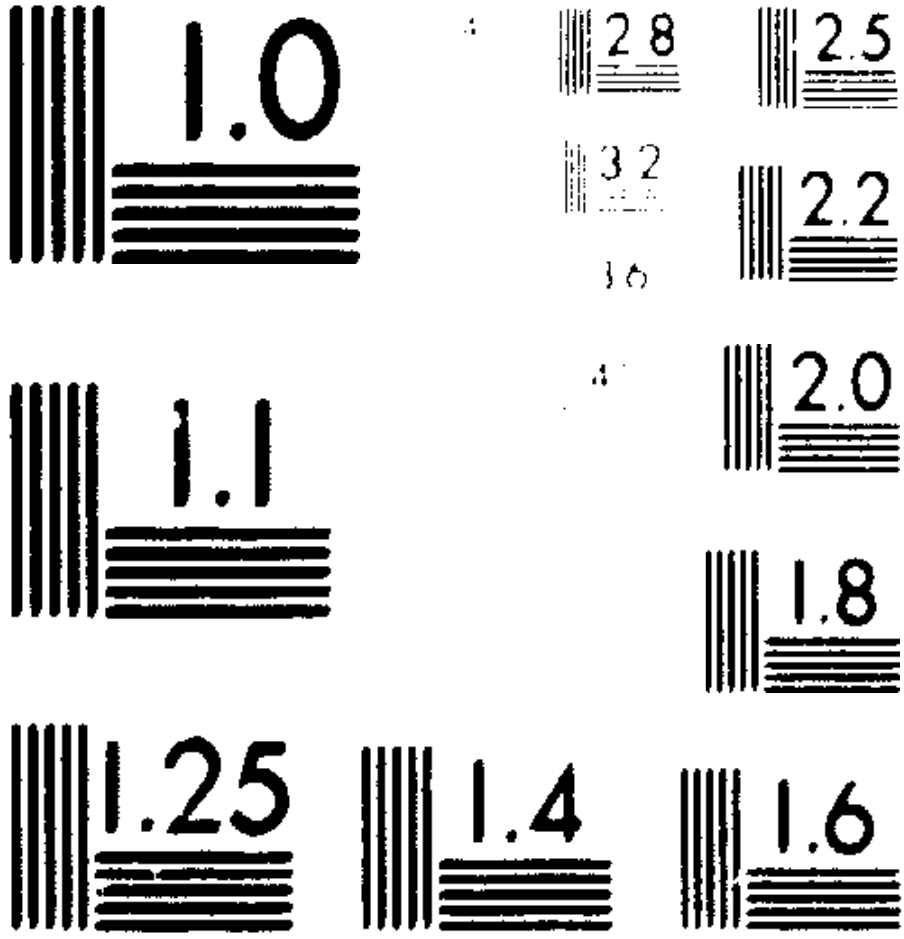
FAIR USE POLICY

CONTACT

Please contact publications@unido.org for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at www.unido.org

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Tel: (+43-1) 26026-0 · www.unido.org · unido@unido.org



10445

Distr.
LIMITED

UNIDO/IO.424
9 February 1981

English

UNITED NATIONS INDUSTRIAL
DEVELOPMENT ORGANIZATION

ASSISTANCE TO THE NITROPHOSPHATE FERTILIZER INDUSTRY.

TS/PAK/80/003

PAKISTAN.

Mission report

December 1980

Based on the work of Paul Catana, fertilizer expert

V.81-21291

Explanatory notes

A comma (,) is used to distinguish thousands and millions.

A full stop (.) is used to indicate decimals.

References to "marks" (DM) are to FRG marks, unless otherwise stated.

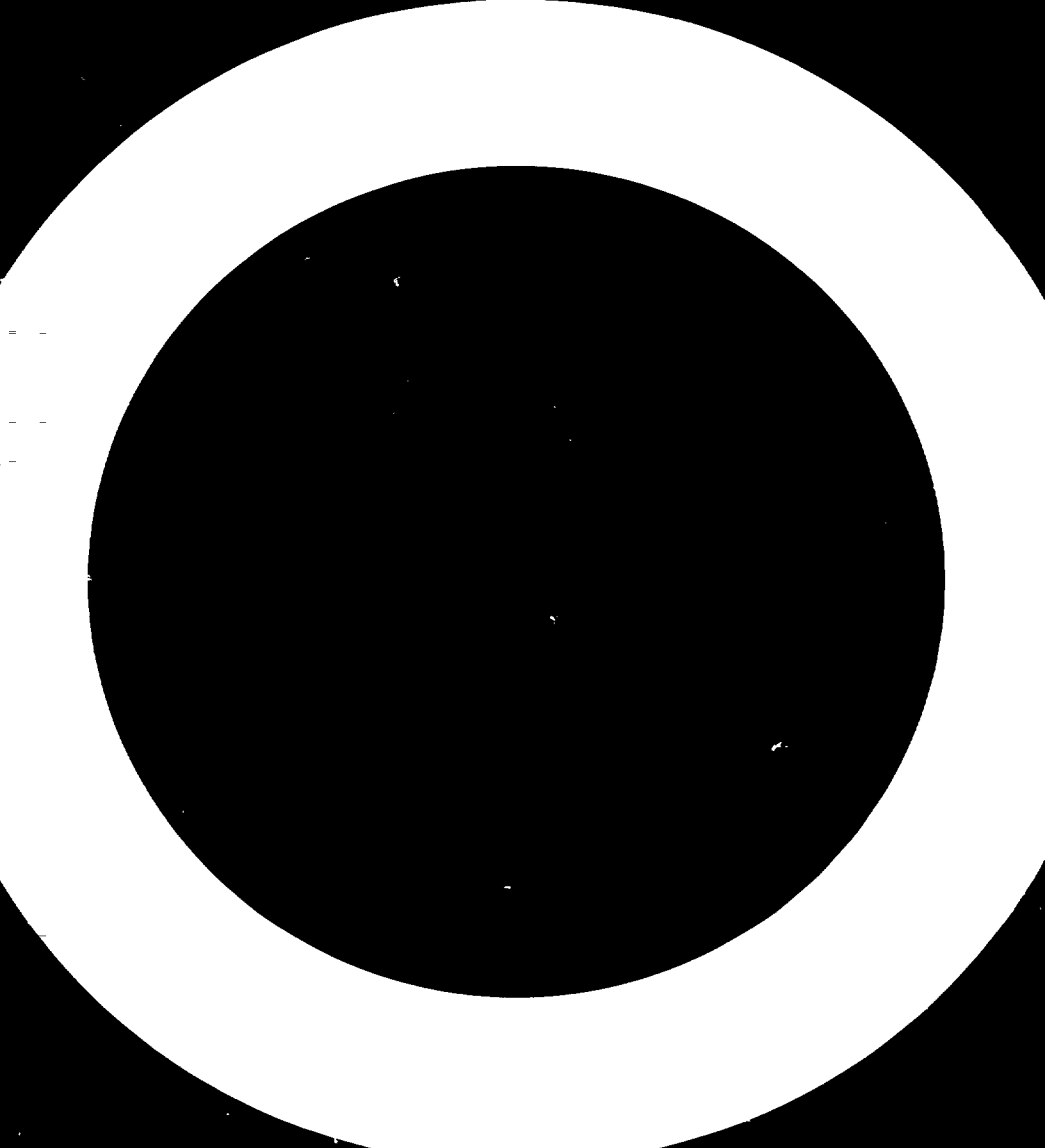
The monetary unit in Pakistan is the Pakistan rupee (PRs). The following exchange rates are used in the conversion of the DM and PRs to the United States dollar: $US 1 = DM 1.92, and $US 1 = PRs 9.90.

The following abbreviations are used in this report:

NFC	National Fertilizer Corporation
PFL	PAKARAB Fertilizer Company Ltd.

ABSTRACT

The project entitled "Assistance to the nitrophosphate fertilizer industry" (TS/PAK/80/003) arose from a request submitted by the Government of Pakistan in March 1980 and approved by the United Nations Industrial Development Organization (UNIDO) in April 1980. The objective of the project was to assist the PAKARAB Fertilizer Company in correcting problems in its nitrophosphate fertilizer plant. The mission covered by this report took place in December 1980 and was designed to evaluate various proposals and make additional technical recommendations as a follow-up to the original project. The technical data presented in this report provide a basis for the introduction of the necessary improvements at the National Fertilizer Corporation.



CONTENTS

INTRODUCTION

At the request of the Government of Pakistan, UNIDO assigned an expert to take part in discussions designed to achieve a final decision on ways of improving the nitrophosphate fertilizer plant of the PAKARAB Fertilizer Company Ltd. (PFL), Multan. The expert participated in discussions at Multan and Lahore during a one-week mission undertaken in December 1980. Also participating in the discussions at Multan were the management of the National Fertilizer Corporation (NFC) and of the PAKARAB Fertilizer Company, in addition to representatives of the contractor and licensor, UHDE Ltd. of the Federal Republic of Germany and Stamicarbon of the Netherlands.

The discussions helped to clarify the obstacles to quantitative and qualitative improvements in the production of the nitrophosphate plant, and to strengthen the position of Pakistan in technical discussions with the contractor on possible action to improve the situation and on appropriate technical measures to achieve that aim.

I. PROJECT ACTIVITIES

A. Background

In order to improve the operation of the nitrophosphate plant within the PFL complex at Multon, UHDE and Stamicarbon conducted various laboratory and industrial tests and proposed several ways of improving plant operation. At the request of NFC/PFL, UNIDO provided an expert to analyse those proposals and submit further suggestions to improve the situation. The report containing the proposals of the UNIDO expert was submitted by the Government of Pakistan to the contractor for study. Those proposals called mainly for the following:

(a) Modification of the parameters and equipment of the crystallization stage, with a view to increasing the size of calcium nitrate crystals subjected to centrifuging and obtaining a satisfactory calcium-phosphate ratio in the mother liquor, that is, a satisfactory water solubility of P_2O_5 in the final product;

(b) Development of the refrigerating station for the crystallization stage, and provision of supplementary capacities for the neutralization stage as proposed by UHDE;

(c) Decrease in the amount of crystals passing through centrifuges both by enlarging crystal dimensions and by modifying the centrifuge discharge system.

The last point was discussed at length because of the differing views of the UHDE and Stamicarbon specialists and the UNIDO expert. The plant supplier specialists had reservations about enlarging crystals and considered that the use of Guinard-type centrifuges would not ensure better crystals separation and the elimination of sieve erosion.

The exclusive purpose of the expert mission having been to study the actual possibilities of improving plant operation, the reaction of the UHDE and Stamicarbon specialists to the conclusions contained in the report will not be discussed unless it appears useful for a solution of the problems. Nevertheless, it should be noted that so far as the essential technical problems relating to the good operation of the plant are concerned, the contractors expressed doubts as to the results that might be obtained, without giving convincing technical reasons for their position or proposing feasible alternatives.

B. Technical discussions

At the request of the UHDE and Stamicarbon specialists, the crystallization system proposed in the report of the UNIDO expert as an addition to the existing system of parallel operation was discussed. A discontinuous system of

operation of crystallizers had been proposed, but a buffer vessel between crystallizers and centrifuges would make the process stage continuous. The addition of the proposed crystallization system, by which large-dimension crystals are obtained, would result in a crystal suspension with at least 30% of the crystals measuring over 1 mm.

At present the total amount of crystals obtained have dimensions of less than 1 mm, but under certain conditions UHDE has obtained 77-78% water-soluble P_2O_5 for those crystal dimensions, as compared with a minimum of 80% guaranteed in the contract. It has been generally agreed that with 30% of the crystals larger than 1 mm, the water-soluble P_2O_5 can be increased to 80% as desired. However, lacking experience with the type of crystallizers involved, the contractor considers that tests should be carried out.

During the discussions, there was no agreement on the maximum allowable calcium content in the mother liquor as expressed by the molar ratio CaO/P_2O_5. The contractor indicated the ratio of 0.78 and the UNIDO expert that of 0.6. The contractor has not specified the prevailing fluorine and calcium compound (CaF_2 or $CaSiF_6$) in the final product, in case phosphate rocks with a higher content of SiO_2 are used in the Multan plant. The tests to be conducted by the contractor should also solve that problem.

Finally, the parties have agreed that there are real possibilities of improving the situation and of obtaining an 80% water-soluble product if the phosphate rocks commonly used at Multan are processed.

C. Proposed follow-up action

The UNIDO expert did not attend the final discussions on financial questions and future working procedures. The results of those discussions seem to have been as follows:

(a) Some of the required equipment has already been ordered for work such as increasing the capacity of the refrigeration station, which must be done regardless of the decisions taken concerning the crystallization and crystal separation stage. The manufacture of the equipment including items such as ammonia compressors, takes a long time;

(b) The contractor will contribute DM 2 million of the additional financial requirement and Pakistan will provide the remainder of DM 5 million;

(c) In order to improve calcium nitrate crystal separation from the mother liquor, rotary filters are to be provided for use after centrifuging. The filters are to be mounted at the plant in June-July 1981.

The UNIDO expert considers that the last of the above-mentioned decisions will not fully settle the problem or reduce the high operating expenses arising from the frequent replacement of the excessively expensive centrifuge sieves.

II. CONCLUSIONS

1. The supply of equipment and units to the PFL nitrophosphates plant at Multan would make it possible to achieve the capacity and end-product quality provided for in the initial contract.

2. The optimum technical solutions to the problems involved in the most important process stages (crystallization and crystals separation) require a series of tests and preliminary trials to be conducted by the contractor.

3. The discussions held showed that Pakistan is mainly interested in resolving the difficulties of the nitrophosphates plant, the operation of calcium nitrate and calcium ammonium nitrate plants being considered satisfactory as a result of the improvements already made.

4. The technical data contained in this report provide a basis for the introduction of the necessary improvements at NFC.