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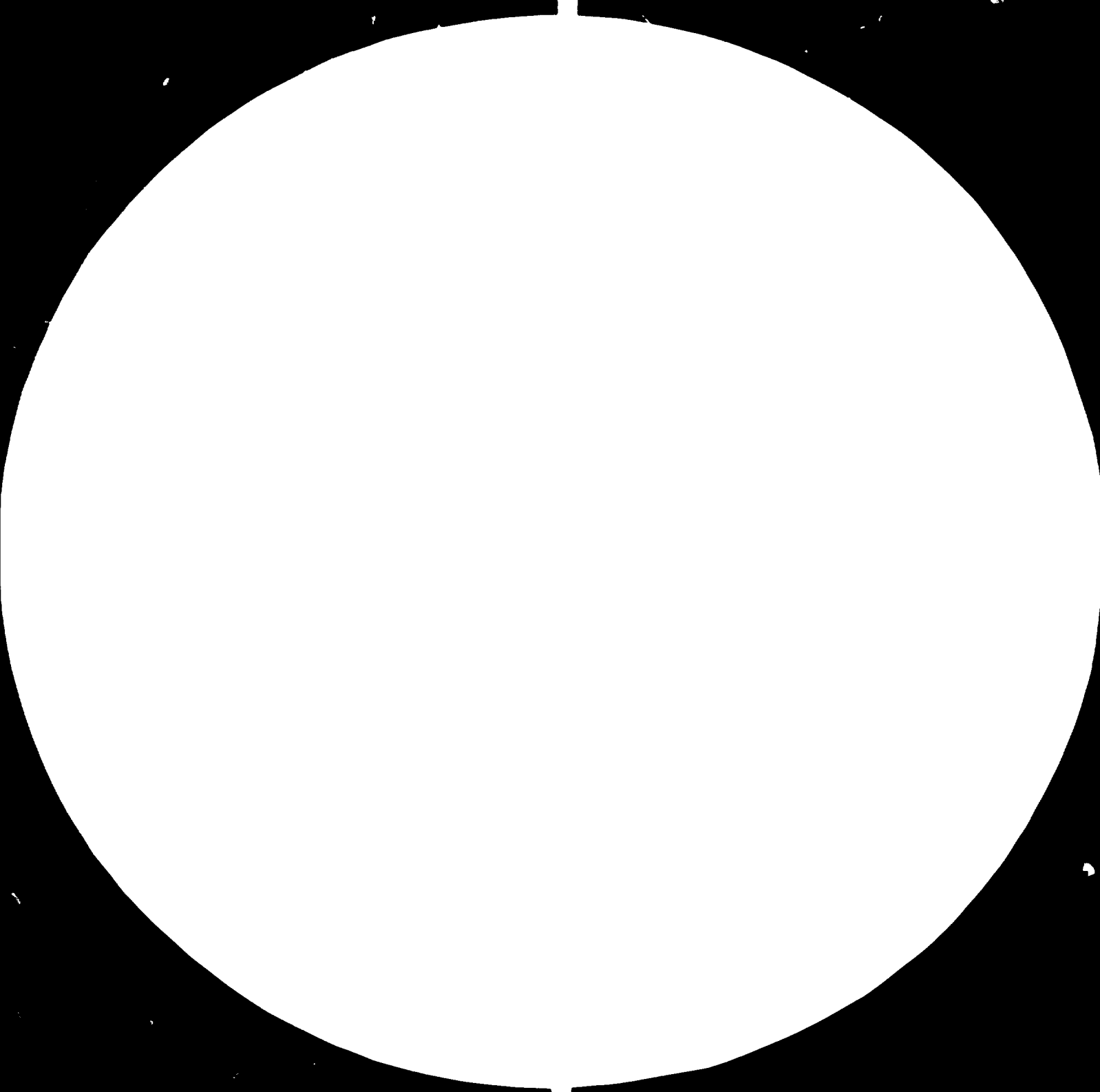

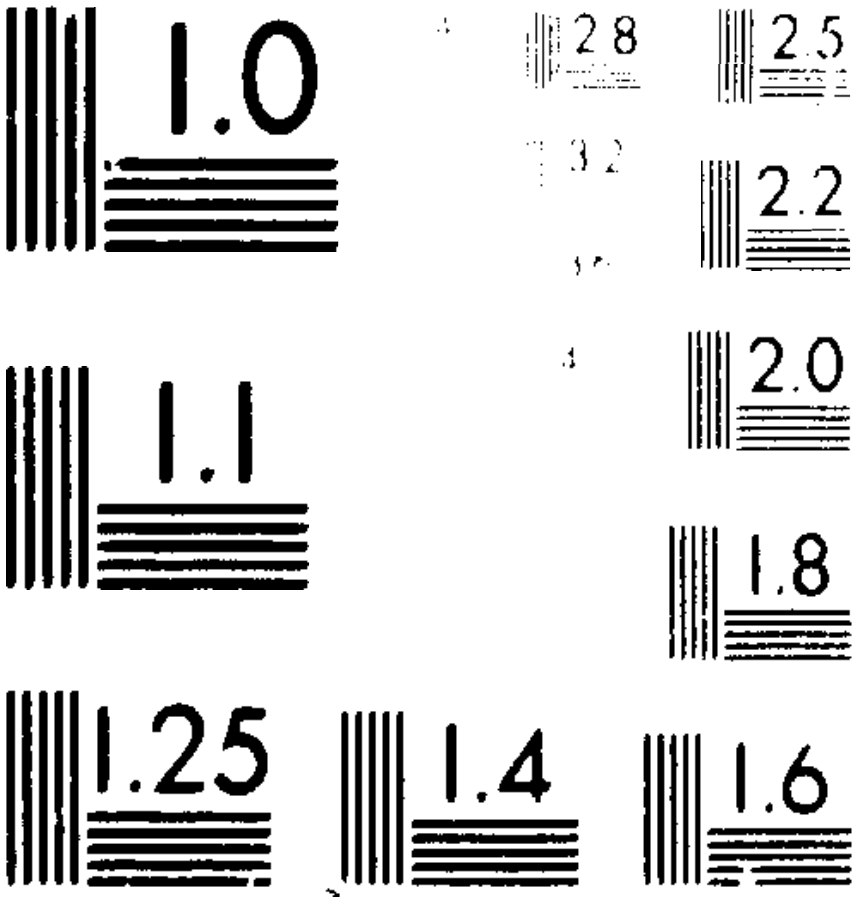
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DP/ID/SER.A/339
29 October 1981
English

OPERATION AND MANAGEMENT OF FERTILIZER PLANTS,

DP/BGD/78/002

BANGLADESH

Technical report: training adviser's report, post 11-02

Prepared for the Government of Bangladesh
by the United Nations Industrial Development Organization,
acting as executing agency for the United Nations Development Programme

Based on the work of A.R. Shoukry, training advisor

United Nations Industrial Development Organization
Vienna

V.81-31346

Explanatory notes

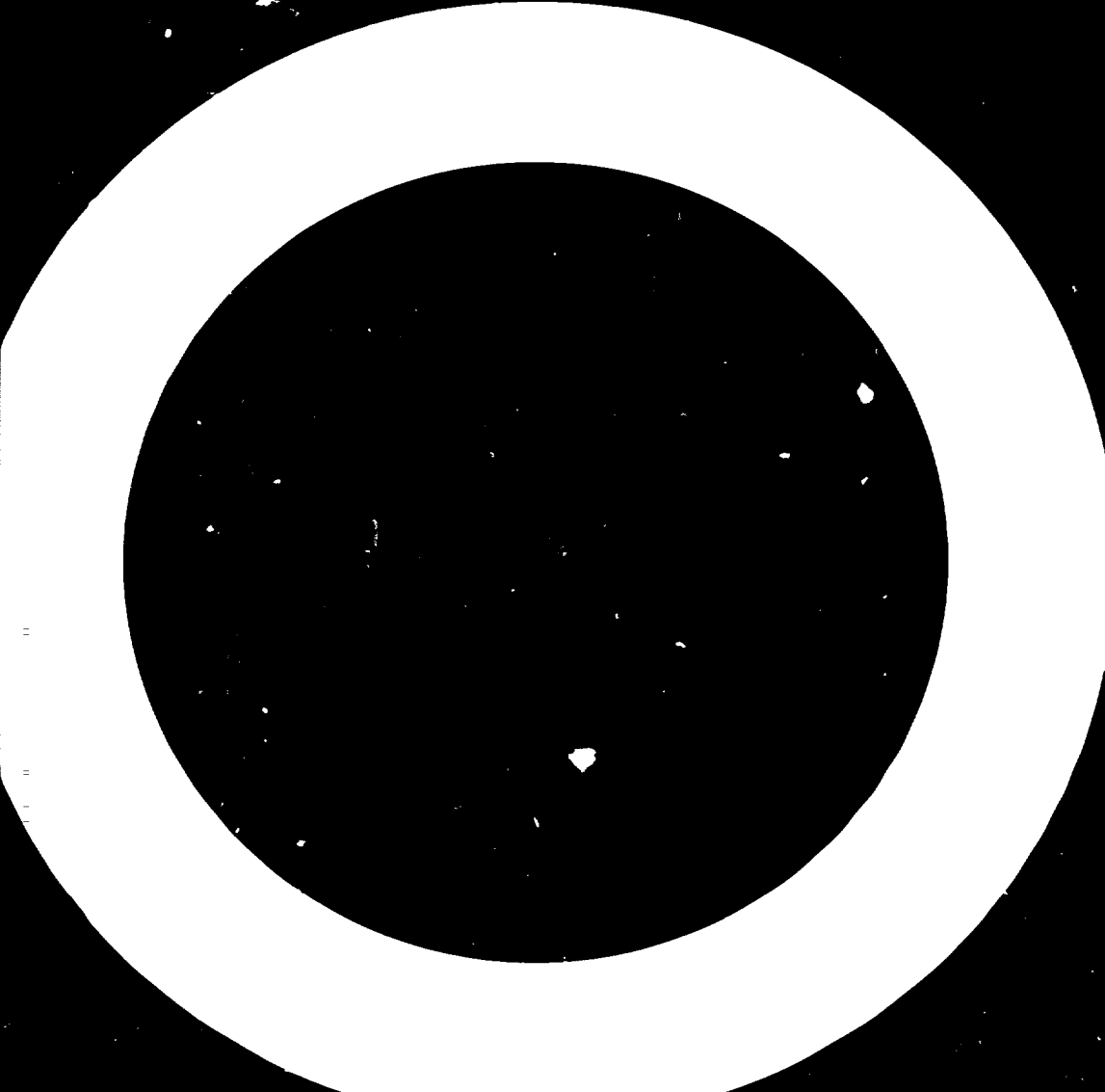
References to dollars ($) are to United States dollars.

The following abbreviations have been used in this report:

BCIC	Bangladesh Chemical Industries Corporation
IDA	International Development Association
UFFG	Urea Fertilizer Factory, Ghorasal
UNDP	United Nations Development Programme

ABSTRACT

The fertilizer industry is crucial to the development of Bangladesh, one of the world's poorest countries. At the beginning of 1978, however, production rates at the plants run by the State-owned Bangladesh Chemical Industries Corporation (BCIC) were abysmally low. Among other difficulties, the plants had suffered damage during the India-Pakistan war some years previous. One of the major problems, however, is the inability to maintain adequate resources of trained personnel. As formal training in the fertilizer industry is not available in Bangladesh, the required staff have to be trained in plants themselves. However, a considerable percentage of the staff, once trained, leave for better-paid jobs in other countries. The author of the present report, a training adviser, in the course of a 13-month mission during 1980-1981 with BCIC, took a number of measures to alleviate the situation, which included carrying out a feasibility study on the establishment of a central training institute capable of catering to 300 trainees a year from all over Bangladesh. This work was carried out within the framework of a project entitled "Operation and management of fertilizer plants" (BGD/78/001), sponsored by the United Nations Development Programme (UNDP) with the United Nations Industrial Development Organization (UNIDO) acting as executing agency.



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INTRODUCTION

Early in 1978, the Government of Bangladesh requested assistance from UNIDO, through the United Nations Development Programme (UNDP), in strengthening the Bangladesh Chemical Industries Corporation (BCIC), a State-owned enterprise engaged in the manufacture of nitrogen and phosphate fertilizers.

At the time, BCIC's urea fertilizer plant at Ghorasal was operating at only 65 per cent capacity and its triple superphosphate complex at Chittagong at a mere 45 per cent, even though the utilization per on-stream-day for each operation was more than 80 per cent.

Bangladesh is one of the world's least developed countries, and one of its development priorities is to meet its own increasing fertilizer requirements without resorting to additional imports. In any event, difficulty was being experienced in arranging such imports as were necessary.

The request for assistance was subsequently approved by UNDP as project BGD/78/001 and the project commenced almost immediately, UNIDO being the executing agency and BCIC the counterpart.

In April 1978, UNIDO sent fact-finding teams to Bangladesh to examine the main causes of the plants' low production rates, to identify equipment requirements and to develop a realistic programme for follow-up action.

The present report is a technical report prepared by one of the experts subsequently fielded by UNIDO as part of the follow-up action. The expert, A.R. Shoukry, a training adviser, prepared the report upon completion of a 13-month tour of duty with the project, from August 1980 to September 1981. An outline of Mr. Shoukry's duties is presented in annex I.

FINDINGS

Bangladesh suffers from a serious deficiency of skilled manpower for the fertilizer industry. Little or no formal training is to be had, the facilities concerned being almost wholly dependent on in-plant training to meet their staffing requirements. And a great percentage of the staff so trained is siphoned off by fertilizer facilities in other, more affluent, countries.

The fertilizer complex at Ashuganj provides a typical example of this problem. Construction began in 1974 with a loan from the World Bank. By start-up time, however, some seven years later, 80 per cent of the staff trained to man the complex had left for more lucrative positions elsewhere.

MEASURES TO RELIEVE THE SITUATION

An outline of the expert's job description is given in annex I. In general, however, his activities were concentrated upon:

(a) Arranging fellowships;

(b) Preparing training manuals;

(c) Elaborating a feasibility study on the establishment of a central training institute.

Fellowships

A survey was carried out of the fellowships needed to cover training requirements for all key and sensitive posts in the Ghorasal complex till the end of 1984. As a result, budgetary allowances were made for 10 man-months (5 candidates for 2 months each) per year. At the time of preparation of the present report, 6 man-months had been accounted for (3 candidates for 2 months) and the remaining 4 were being dealt with by the appropriate office at UNIDO headquarters in Vienna.

Manuals

A list of 30 training manuals (annex II) was drawn up and agreed upon by all parties concerned. A production schedule was elaborated, but owing to time restrictions it was possible to complete only 25 of the manuals. Some of these contain only basic data, with little detail. With respect to future activities of this nature, it is suggested that three technical writers be stationed in the Ghorasal complex, each for a period of six months, to prepare manuals on ammonia, urea, and safety. It is also suggested that these experts revise and otherwise prepare for eventual use in the central training institute (following paragraphs) the 25 manuals already drafted.

Feasibility study

In the course of a tripartite review of the project, held in November 1980, the Minister of Industry of Bangladesh requested that the UNIDO expert undertake a study of the implications of the establishment by BCIC of a central training institute capable of accepting 300 trainees a year from fertilizer facilities all over Bangladesh.

In compliance with this request:

(a) A techno-economic feasibility study was carried out;

(b) A detailed list of laboratory and workshop equipment requirements was prepared;

(c) A detailed layout was prepared;

(d) A site was selected (at the Ghorasal complex);

(e) A bar-chart was developed for a three-year period starting in January 1982.

The World Bank has signified its approval of the feasibility study. Construction work on the Institute is expected to begin in January 1982.

Budgetary implications

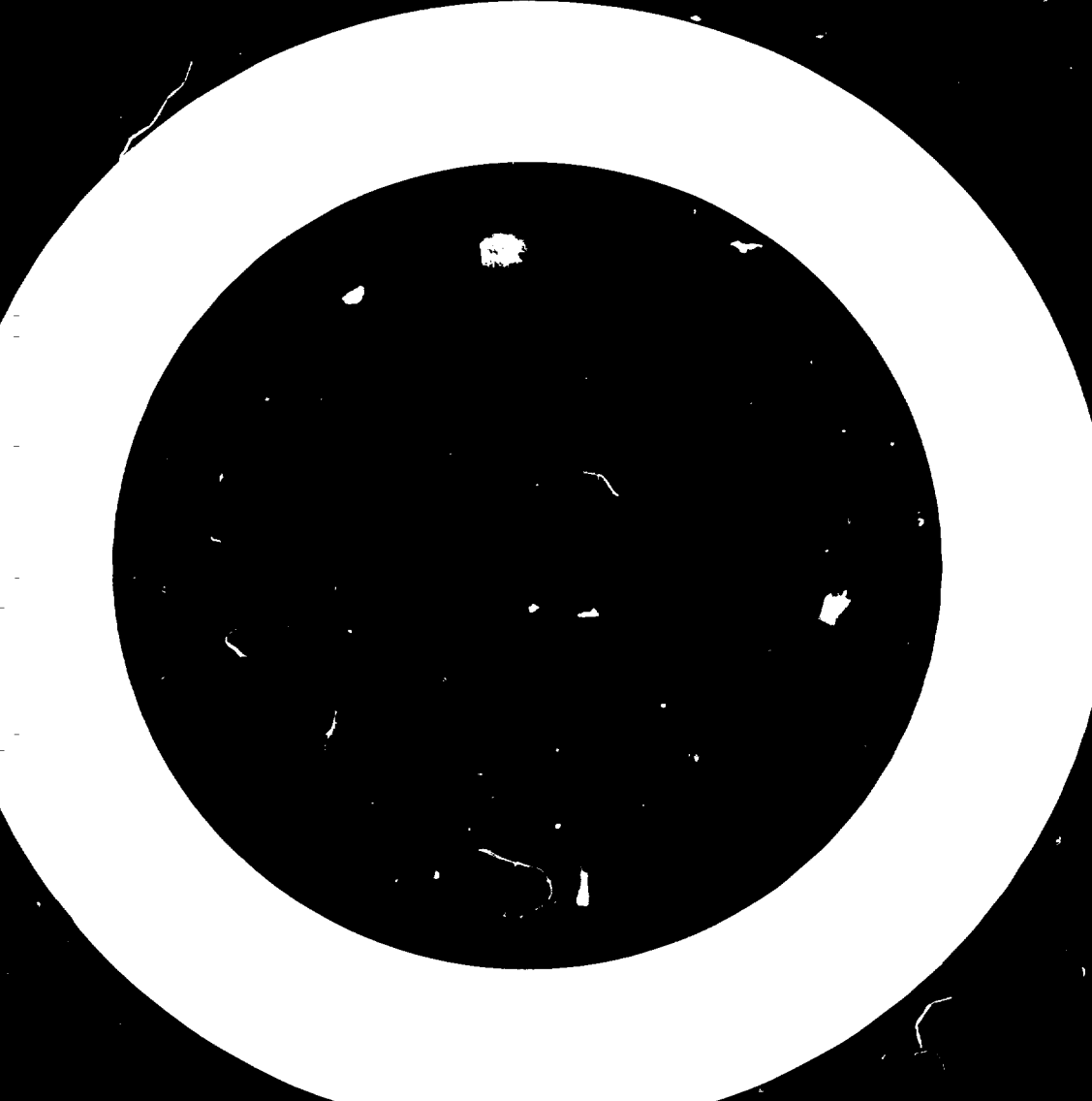
If the various activities covered in the bar-chart are to be realized, financing should proceed apace with the technical activities. In view of this, a project document was drafted by the UNIDO expert and considered by the BCIC management at Ghorasal who agreed:

(a) On the project personnel required;

(b) On the need to hire immediately an instrument instructor;

(c) On all budgetary items with the exception of a $1.5 million sub-contract component (the difficulty being that the extent of International Development Association (IDA) participation was unknown);

(d) That a formal request to UNDP would be made through the Ministry of Finance, External Resources Division, following presidential elections and the forming of a new Government in December 1981.



Annex I

OUTLINE OF EXPERT'S DUTIES

1. Implement training programme developed by the Curriculum Development Adviser.

2. Prepare training manuals on the basis of curricula developed by the Curriculum Development Adviser.

3. Render advisory services for planning, construction and commissioning of the Central Training Institute at UFFG, including installation of facilities (e.g. simulators), workshop, equipment, laboratories, pilot plants and training aids.

4. Assess skills of plant supervisors and operating personnel; design and implement a system for assessing training needs of operating personnel at various levels.

5. Assess skills of the maintenance supervisors as well as technicians; design and implement a system for assessing training needs at various levels of maintenance personnel.

6. Design and implement a system to evaluate trainees and the effectiveness of training in their respective field of duties.

7. Review and update the operating manuals for both ammonia and urea plants.

8. Study the existing maintenance organization of the plant and make suggestions for improvement in the organization of maintenance work.

9. Advise on improvements to be made with regard to environmental aspects of the plants' operation.

10. Render assistance with respect to a safety programme to be established in the plants.

11. Assist in establishing good "housekeeping" in the plants.

12. Arrange UNDP fellowships and assist the plants' management in selecting candidates for such fellowships and other training programmes.

13. Submit a terminal report setting out the findings of the mission as well as recommendations for further action.

Annex II

LIST OF TRAINING MANUALS

Manuals prepared

1. General introduction
2. Production of ammonia
3. The ammonia process
4. Principles of chemistry and technology for the ammonia process
5. Desulphurization
6. Brief summary of general safety instruction
7. Steam reforming
8. Co-conversion
9. Co_2 scrubbing
10. Methanation
11. Synthesis gas compression
12. Ammonia synthesis
13. Refrigeration
14. Tail gas scrubbing
15. Steam system
16. Properties of water
17. Water treatment practices
18. Fresh water from sea water
19. Air separation for production of oxygen and nitrogen
20. Instrument air
21. Electric power supplies
22. Valves and fittings
23. Pipe connection
24. Pumps
25. Instrumentation

Manuals to be prepared

26. Electrical equipment
    Voltage levels of power-supply systems
    Configuration of power supply
    Typical power-supply system
27. Safety instructions
28. Fire fighting and respiratory protection
29. First aid instructions (for accidents)
30. Urea processing
    Urea processing (total recycle process)
    Urea storing
    Urea bagging