



TOGETHER
for a sustainable future

OCCASION

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



TOGETHER
for a sustainable future

DISCLAIMER

This document has been produced without formal United Nations editing. The designations employed and the presentation of the material in this document do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations Industrial Development Organization (UNIDO) concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries, or its economic system or degree of development. Designations such as “developed”, “industrialized” and “developing” are intended for statistical convenience and do not necessarily express a judgment about the stage reached by a particular country or area in the development process. Mention of firm names or commercial products does not constitute an endorsement by UNIDO.

FAIR USE POLICY

Any part of this publication may be quoted and referenced for educational and research purposes without additional permission from UNIDO. However, those who make use of quoting and referencing this publication are requested to follow the Fair Use Policy of giving due credit to UNIDO.

CONTACT

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

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

07972

DP/ID/SER.A/111
16 January 1978
English

RESTRICTED

ESTABLISHMENT OF A HERBICIDE PRODUCTION PLANT^{1/}

DP/TUR/76/011

TURKEY ,

Technical report: Preparation of tender specifications

Prepared for the Government of Turkey by the
United Nations Industrial Development Organization,
executing agency for the United Nations Development Programme

Based on the work of A. K. Bhatnagar, consultant

United Nations Industrial Development Organization
Vienna

^{1/} This report has been reproduced without formal editing.

Explanatory notes

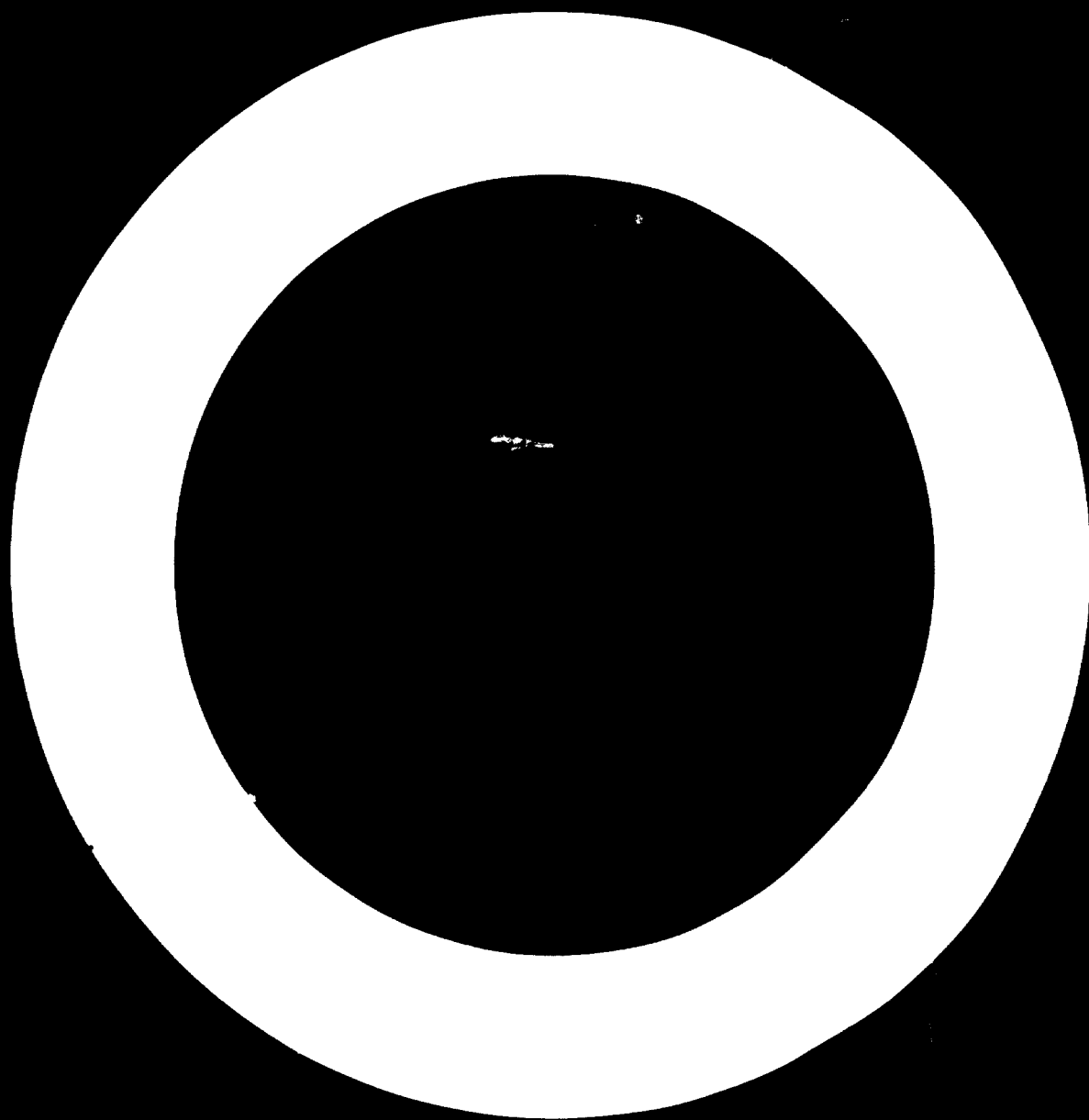
The monetary unit in Turkey is the lire (LT). During the period covered by this report, the value of the lire in relation to the United States dollar was \$US 1 = LT 19.25.

The following abbreviations are used in this report:

DCP	Dichlorophenol
UNDP	United Nations Development Programme
UNIDO	United Nations Industrial Development Organization
TZDK	Turkiye Zirai Donatim Kurumu (General Directorate of Agricultural Supplies)
2,4-D	2,4-Dichlorophenoxy acetic acid
2,4,5-T	2,4,5-Trichlorophenoxy acetic acid

The designations employed and the presentation of the material in this document do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

Mention of firm names and commercial products does not imply the endorsement of the United Nations Industrial Development Organization (UNIDO).



CONTENTS

<u>Chapter</u>	<u>Page</u>
SUMMARY.....	5
I. INTRODUCTION.....	8
Project background.....	8
Earlier work done.....	8
Present mission.....	9
II. PROJECT CONCEPT.....	10
Products to be manufactured.....	10
Rated production capacity.....	10
Selection of process technology.....	12
Selection of plant location.....	12
III. PROJECT IMPLEMENTATION.....	16
Organizational arrangements for project implementation....	16
Formation of a company for project management.....	17
Project implementation time schedule.....	18
Preparation of tender specifications.....	18
IV. RECOMMENDED FUTURE ACTION.....	19
Invitation of offers for the supply of technology and engineering.....	19
Evaluation of offers and award of contract for technology and engineering.....	19
Acquiring a site for the plant.....	19
Formation of a company for project/plant management.....	20
Training of personnel for the herbicide plant.....	20
Annex - Names of persons met during the mission.....	21

SUMMARY

In order to meet the increasing requirements of 2,4-D and 2,4,5-T herbicides through local manufacture, the Government of Turkey requested United Nations Development Programme in March 1976, for expert assistance in carrying out a feasibility study of the manufacture of these herbicides within the country. In response to this request, UNDP set up a project entitled "Establishment of a Herbicide Production Plant" (DP/TUR/76/OII) with the United Nations Industrial Development Organization (UNIDO) as the Executing Agency. Under the first phase of the project UNIDO arranged a one-month expert mission in August, 1976 to study the feasibility of 2,4-D and 2,4,5-T Herbicides manufacture in Turkey. Based on the report of this mission TZDK on behalf of the Government of Turkey, took the decision to implement the project.

UNIDO therefore arranged for the present two-month expert mission in October, 1977 to assist TZDK in the preparation of tender specifications for the herbicides plant, on the basis of which offers for technology, design-engineering etc. could be invited for the implementation of the project.

Before however the tender specifications for the plant could be prepared, the Expert found it necessary to finalise the project concept, by taking decisions in consultation with TZDK regarding certain matters which had been left open in the feasibility study such as product mix and production capacity of the plant, plant location, extent to which technical know how from outside would be necessary, organizational arrangements necessary for implementing the project etc. After detailed discussions with TZDK and thorough consideration of all aspects of the project, the final project concept was decided upon, as reported below.

I. TZDK decided, and for very good reasons, to not to include the production of

2,4,5-T in the plant being planned at present, on account of the hazards which are known to be associated with its manufacture .

2. Further it was decided that as against the originally envisaged plant capacity of 4,350 tons/year of 2,4-D , only 3,000 tons/year may be set up in the first phase, and the balance may be set up under a second phase extension programme to be implemented later . This , besides phasing the investment over a longer period, would also make significant improvement in the overall economics of the venture .

3. The product-mix decided upon for the first phase production was as follows:-

Total 2,4-D capacity	-	3,000	tons/yr.
To be used for :			
Butyl Esters	-	600	tons/yr.
Isooctyl Esters	-	770	"
Amines	-	1200	"
2,4-D acid for sale	-	430	"

4. Regarding the choice of process technology, it was considered best to specify in the tender specifications the technology which has been in use for the last over twenty years for 2,4-D manufacture i.e. first chlorination of phenol and then reaction with mono-chloroacetic acid, but at the same time leave the door open for any improvements which might be offered by any technology suppliers .

5. For selecting a suitable site for the plant, the expert alongwith counterpart personnel from TZDK undertook a three day tour of the north western part of Turkey and finally after visiting several possible locations, selected Orhangaz as the most suitable place for locating the 2,4-D herbicides plant . This location meets satisfactorily all the technical , infrastructural as well as transport linkage requirements of a plant of this type .

6. As far as the requirements of technology and know how for the plant are concerned, both TZDK and the expert were of the opinion that no turn-key arrangements were called for, and it would be necessary only to purchase technology, design-engineering, technical supervision of construction, training facilities for plant personnel and assistance during plant start-up from sources outside the country. Project management and co-ordination, day to day supervision of construction and all civil works activities could be handled without any difficulty by TZDK itself or an agency designated by it.

7. During discussions with TZDK, the expert made a suggestion for the formation of a separate company (with TZDK as the majority share holder) for the management of the project and subsequent operation of the plant. Apparently, TZDK was already thinking along those lines, and subsequently had discussions with M/s Kuruma Tarim Ilceclari A.S. - a private company engaged in chemicals manufacture - on this subject. It is hoped that a joint company with TZDK majority holdings may be formed in the near future for the management of this project.

8. According to a time schedule prepared by the expert for the implementation of the project, it is expected that the 2,4-D plant would go into commission by the last quarter of 1979, if the project implementation schedule is strictly adhered to.

9. The final project concept (as stated above) which evolved after discussions with TZDK, has been used as the basis of the tender specifications prepared for the 2,4-D Herbicide Plant.

10. As the tender specification for the 2,4-D plant is now ready, it is recommended that TZDK go ahead with the invitation of tender bids for technology and know how for the plant and subsequently for the evaluation of offers and final selection of technology. It is also recommended that a site for the proposed plant be acquired at Orhangaz at an early date, and the formation of a company for project and plant management be given high priority.

INTRODUCTION

The consumption of herbicides is increasing in Turkey at a rapid rate. Most technical pesticides and herbicides are imported at present, and in 1975 the imports were estimated at US \$ 40 million . Cereals and wheat are the most important crops in Turkey and in 1969 herbicides were used with 6.79 % of the area under wheat cultivation. In 1974 this figure rose to 11.02 % and by 1996 the use of herbicides is planned to cover 100 % of the area under wheat cultivation.

Project Background

In view of the enormous increase in the requirement of herbicides which is likely to occur in the future, and also to cut down the drain on the country's foreign exchange resources that these imports would otherwise cause, the Government of Turkey decided in 1976 to examine the possibility of local manufacture of 2,4-D and 2,4,5-T herbicides . Consequently in March, 1976 it requested expert assistance from United Nations Development Programme (UNDP) in carrying out a feasibility study of herbicides production in Turkey . In response to this request UNDP set up a project DP/TUR/76/OII entitled "Establishment of a Herbicide Production Plant" with United Nations Industrial Development Organization (UNIDO) as the Executing Agency and TZDK of the Ministry of Agriculture, Government of Turkey as the government counterpart .

Earlier Work Done

Under the first phase of the project UNIDO arranged for a one-month expert mission in August, 1976, under which Mr.J.Burton - a UNIDO consultant - completed a feasibility study on " The Establishment of a Herbicide Plant"^{1/} in Turkey. Based on the findings of this mission TZDK decided to proceed with the implementation of the project and requested UNIDO's assistance in the preparation of Tender Specifications for the 2,4-D and 2,4,5-T Herbicides Production Plant, on the basis of which offers for technical know how for the plant could be invited.

^{1/} DP/ID/SER.B.84.

Present Mission

Therefore under the second phase of UNIDO's technical assistant programme , Mr. A.K.Rhatnagar - UNIDO consultant - undertook a two-month expert mission beginning 15 October, 1977 , to assist TZDK in the preparation of tender specifications for the Herbicides Production Plant and also to provide overall guidance and advice on the implementation of the project .

Before however the expert could launch on the preparation of tender specifications, he was faced with the task of finalising the project concept for the Herbicides Plant, as several definitive decisions relating to the plant had been left open in the feasibility study, and without final decisions regarding these aspects being taken, the plant specifications could not be prepared . The expert therefore had detailed discussions with TZDK in order to arrive at final decisions regarding the following aspects of the Herbicides Project :-

1. Products to be manufactured in the plant .
2. Rated Production Capacity of the plant.
3. Selection of Technology .
4. Selection of plant location .
5. Organizational aspects of project implementation .
6. Possibility of forming a company for project/plant management.
7. Time Schedule for completion of the project .

In addition a number of other related matters such as the implications of technology purchase agreements, usual terms and conditions of design & engineering contracts , turn-key contracts and their advantages and disadvantages, procedure for purchase of equipment etc. were discussed with TZDK, and overall advice on project implementation was offered . The details of decisions taken regarding the final project concept, and the project implementation methodology etc. are reported in the subsequent chapters of this report . Finally the Tender Specification was completed , based on the project concept evolved through these discussions and consequent decisions.

1. PROJECT CONCEPT

As stated in the earlier part of this report, the expert had to first finalise the Project Concept before commencing the preparation of specifications for the Herbicides Plant. Therefore detailed discussions were held with TZDK on different aspects of the project and following decisions were taken :

Products to be manufactured

After learning about certain serious industrial accidents which have occurred in a plant manufacturing 2,4,5-T in Italy, TZDK has taken the decision, and for very sound reasons, that the proposed plant should manufacture only 2,4-D technical (acid) and the down stream products - Butyl & Iso-octyl esters and amines - and the manufacture of 2,4,5-T should be left out, at least for the present. This decision appears to be quite sensible in view of the hazards involved in the production of 2,4,5-T, and as even otherwise the capacity planned for 2,4,5-T was only 650 tons/year constituting only 13 % of the total projected plant capacity, there would be no difficulty in implementing the decision.

Rated Production Capacity

Originally it was proposed that the plant should be based on an annual rated production capacity of 4,350 tons/year of 2,4-D acid. This capacity figure has been the subject of some criticism-as being too high when viewed against the projected market demand assessment of 2,4-D in Turkey, which according to TZDK's market study, would be 2460 tons in 1980 (constituting 56.5 % of plant capacity) and is likely to go upto 4373 (100 % plant capacity) not until the year 1987.

Therefore to meet this objection and to improve the economics of the plant, it was suggested to TZDK that the plant capacity could be built up in two stages - in the first phase 3000 tons/year with provision for extension for the balance during a second phase.

This suggestion was considered quite appropriate by TZDK and has been accepted as the basis of the design capacity of the proposed plant. With the rated capacity of the plant at 3000 tons/year the capacity utilization factor, at the time of start up in 1980 improves to the figure of 82%, which is considered quite satisfactory from the point of view of operational economics. The detailed production pattern of the plant, according to the requirements indicated by TZDK would be as follows:

Phase I

Total Production 2,4-D Acid	-	3,000 tons/year
-----------------------------	---	-----------------

To be used in the manufacture of:

Butyl Esters	-	600 tons/year
Iso-octyl Esters	-	770 tons/year
Amines	-	1200 tons/year
Sale as acid	-	430 tons/year

Mono-chloro acetic acid - an intermediate - is planned to be produced and utilized as indicated below:

Total production of Mono-chloro acetic acid	-	4,250 tons/year
---	---	-----------------

To be used in the production of 2,4-D	-	1,800 tons/year
---------------------------------------	---	-----------------

To be sold as MCA Acid		2,450 tons/year
------------------------	--	-----------------

The product mix indicated by TZDK as stated above, has been used as the basis of the tender specification prepared for the plant.

Phase II

Provision for extension of the plant for creating additional capacity would be kept at this stage of planning. However, the decision regarding the exact increase in

capacity to be created during the second phase , would be taken at a later stage .

Selection of Process Technology

For the manufacture of 2,4-dichlorophenoxy acetic acid there is infact no wide choice of technology available. Out of the two processes employed for its manufacture, one process has been used by Dow Chemicals and Chipman in the United States for the last over twenty years . In this process phenol is first chlorinated to dichlorophenol and then reacted with monochloroacetic acid to produce 2,4-dichlorophenoxyacetic acid . In the second process, which was developed by Manske, phenol and monochloroacetic acid are first reacted together and the product is then chlorinated to produce 2,4-D acid . While the first process has the support of having been in use, for a long time , of two major manufacturers of this product in the U.S.A., the second one claims higher conversion rates upto 94 % as against 84 % said to be achieved in the first process . However, it is not definitely known as to how many producers of 2,4-D are actually using the second technology .

In view of this situation, it was considered prudent to base the specification for the process technology on the first process which has been successfully used for a long time in the major manufacturing plants of the world, but keep the specification flexible enough to accommodate offers of technology from other process suppliers also who may have an improved version of the technology available suitably backed by adequate operational experience. It was considered best that the final choice of technology be made after a technological evaluation of the offers received from process suppliers.

Selection of Plant Location

In the feasibility study , prepared earlier on this project, two locations had been suggested for installing this plant - Aliaga along the South-Western coast and Seriflikochisar in the central part of Turkey . In addition, it was suggested that a location on the Western coast along the Marmara Sea may also be considered .

Upon a more detailed analysis , Aliaga was ruled out by the author of the feasibility study, while the question of final plant location was left open .

The selection of a suitable location for the 2,4-D plant was approached by the expert in the present mission, from the point of view of the following considerations:

1. Availability and transport economics of raw materials such as phenol, chlorine, caustic soda, acetic acid etc.
2. Availability of utility services - electricity, water, steam - and effluent disposal facilities for the plant .
3. Proximity to markets i.e. the formulation plants in which 2,4-D products are used.
4. Price of land .

Seriflikochisar as a possible location for the plant was considered by the expert, but it did not appear to be very suitable both from the point of view of location of markets for the products as well as the supplies of phenol and acetic acid , both of which are located in the North West of the country . A new caustic-chlorine plant is, of course , under construction at Seriflikochisar and is likely to go into production in late 1978, but if the plant is located at Seriflikochisar, then acetic acid must come all the way from Adapazari 450 kms in the north west and supplies of phenol (to be imported) must be transported by road either from Ismet in the North West or from the nearest port of Mersin 330 kms in the South . Then again the products from the plant must again be back-freighted about 500 kms north west to the Istanbul-Ismet region where the formulation plants are located . In view of this unfavourable transport economics of this location, Seriflikochisar was not considered suitable for this plant.

In view of the fact that the raw material supply sources as well as the markets for the 2,4-D plant products are located in the North-western part of the country, it was felt that this plant should preferably be located in the North West close to the Ismet industrial area . In this region caustic soda and chlorine could be obtained from a manufacturing plant in Ismet, while acetic acid could come from Adapazari about 100 kms.

in the North, phenol could be received at the nearest port which would be within 12 kms. in this region and most important of all the products from the plant could be sent to the formulation plants in the same area .

The expert therefore undertook a 3-day tour of the Istanbul-Ismet-Gemlik-turana area in the North West of the country, to select a suitable location for the plant . During this tour opportunity was taken to inspect the caustic-chlorine plant of M/s Koruma Tarim Ilaclari A.S. located at Ismet, which is the likely source of caustic-chlorine supplies to the 2,4-D plant . This plant produces about 15,000 t/a of chlorine and an equivalent tonnage of caustic soda , and can satisfactorily meet the requirements of the 2,4-D plant for these chemicals . Chlorine in one ton steel cylinders and caustic soda in steel tanks (as a 50 % solution) can be sent from this plant to any location along the sea coast by water transport .

Further driving along the Ismet Bay, several areas along the Marmara Sea coast were considered to be suitable for locating the 2,4-D plant, but had to be precluded from consideration on account of the restrictions placed by the government against location of any further industries in this region , until after the town of Gemlik . In Gemlik- which is a coastal town - and where a fertilizer factory is under construction, there was a good possibility for finding a suitable location for the 2,4-D plant along the sea coast, but the prevailing price of land - 400 to 600 TL per sq. meter - seemed to be too high and besides meeting requirements of fresh water for process needs could pose a problem . It was learnt that the fertilizer plant is planning to obtain its requirements of fresh water from lake Isnik about 12 kms. away .

Orhangaz - Finally driving inland towards lake Isnik, a suitable area for locating the 2,4-D plant was found near the town of Orhangaz . This area is situated on the western side of lake Isnik and practically meets all the requirements of a site for the 2,4-D plant

Supplies of fresh water for process and other needs , are of course very conveniently available from lake Isnik . Electric Power is easily available as there is a high tension transmission line passing through the area and already supplying power to an iron foundry located in this region . Process effluents from the 2,4-D plant, after treatment can be discharged into a channel which carries overflow from the lake into the Marmara Sea . Supplies of chlorine and caustic soda can quite easily come from the chlorine-caustic plant at Ismet to the port of Gemlik by sea, and from there can be transported by road to the plant site over a distance of only 12 kms . Supplies of phenol can also be off-loaded at the port of Gemlik from ships and brought by road to the plant site . Acetic acid will come from Adapasari by road over a distance not exceeding 110 kms. and the final products from the 2,4-D can also be shipped from Gemlik port by water transport to the formulation plants in the Ismet area, without any difficulty . The price of land in this region also seems to be quite reasonable at about 200 TL per sq.meter .

From all considerations Orhangaz seems to be very well situated for locating a 2,4-D herbicides plant . It is however suggested, that the actual site for the plant be selected in the proximity of the Iron Foundry, as the ground level on that side is sufficiently raised to avoid the possibility of water logging of the area, and the soil also appears to be firm enough to have adequate load bearing capacity for the factory buildings and plant and equipment . Besides, there is an electric sub-station already located in this area and the length and the consequent cost of the main electric supply cables to the proposed plant site would not be too high .

It is therefore recommended that TZDK initiates early action for acquiring a site for the 2,4-D plant at Orhangaz .

III. PROJECT IMPLEMENTATION

Organizational Arrangements for Project Implementation

The expert had detailed discussions with TZDK regarding the organizational aspects of implementing the project i.e. whether TZDK would like the project to be handled on a turn-key basis by a project engineering company or purchase only process technology plus design - engineering services , and handle project management and co-ordination itself .

TZDK indicated a strong preference for the latter approach to project implementation and suggested that project management and even design and construction of all civil works can be handled within its organization, and it would be necessary only to purchase process technology , design-engineering and some other technical services such as technical supervision of construction and assistance during start up etc .

The expert was in full agreement with the implementational approach suggested by TZDK, as this approach is more beneficial to developing countries and is at the same time less expensive in terms of the projecting cost of the project . As far as the question of availability of project management expertise is concerned, first of all TZDK itself has been handling projects in the field of agricultural machinery , and is familiar with the overall methodology of project implementation, besides in the 2,4-D project there is a strong likelihood of m/s Koruma Tarim Ilacлари A.S. being associated with the venture, and as the latter has over ten years experience in the field of chemical industries, no particular difficulties are visualised in adopting the latter project implementation approach .

As a result of these discussions it was decided that TZDK (or an agency designated by it) would handle project management, project coordination & supervision plus all civil works, where as process technology, design-engineering, technical supervision of construction, training facilities for plant personnel and assistance during plant

start up would be purchased from an outside firm of project engineers . It was also considered desirable to purchase the process technology plus the rest of technical services as a "package deal" from a single contractor, who should provide the complete overall process & engineering guarantee for the entire plant rather than dealing with the process suppliers and project engineers separately.

The expert also appraised TZDK of all aspects and implications of technology and know how purchase agreements, such as "exclusivity and non-exclusivity " of technology sold , the extent of coverage provided by plant performance guarantees, and the measures to be taken by purchasers to safeguard their own interests . The tender specification for the 2,4-D plant was drafted incorporating the implementational arrangements as desired by TZDK and the details as stated above .

Formation of a Company for Project & Plant Management

The expert discussed with TZDK the possibility of forming a company which could take up the responsibility of first implementing the project and later operating and managing the plant . Apparently TZDK was itself contemplating some such arrangement , and the expert's suggestions gave further impetus to the plans for the formation of such a company .

Discussions were therefore held between TZDK and m/s Koruma Tarim Ilaclari A.S. for the formation of a joint venture, in which TZDK would have the controlling interest, while Koruma Ilaclari, The Industrial Development Bank of Turkey and one commercial bank would be the other share holders . In confirmation of these discussions, m/s Koruma Tarim Ilaclari A.S. has submitted a formal proposal to TZDK for the formation of a joint venture on the above basis, and it is anticipated that a company for managing and financing this project may be formed in the not too distant future . The formation of such a company would be a major step forward in the implementation of the project as it will bring together both the expertise as well as the finance required for it .

Project Implementation Time Schedule

With the completion of tender specifications for the 2,4-D plant, the stage is now set for TZDK to go ahead with the invitation of offers for the supply of process technology and the design - engineering services etc. for the proposed herbicides plant.

It would take about 2-3 months for offers from prospective bidders to be received, and thereafter 1-2 months for the offers to be evaluated and the final contract to be negotiated and signed with the successful contractor. From the time of commencement of design work for the plant, it is estimated that about eighteen months would be required for the plant to be set up and commissioned.

Therefore starting with the invitation of tender bids for the supply of technology and engineering in January, 1978, if the contract for technical know how and services is finalised by April/May, 1978, the 2,4-D plant should be in production by the last quarter of 1979 or latest by January, 1980. An elaborate time schedule showing the detailed construction activities involved in the project for setting up this plant was prepared by the expert and handed over to TZDK for their information, and future planning on the implementation of the project.

Preparation of tender specifications for the project

As reported in the earlier chapters, decisions regarding various aspects of the project, which had been left open in the feasibility study, were taken by the expert, after detailed consultations with TZDK, as a result of which the project concept as well as the implementational approach was finalised. The Project Specifications for the invitation of tender bids for the supply of technology and engineering etc. were therefore based entirely on the final project concept thus evolved and truly reflect the decisions taken by TZDK regarding the basic parameters of the 2,4-D Herbicides Plant.

RECOMMENDED FUTURE ACTION

For the early implementation of the 2,4-D Herbicides Project, it is recommended that action on the following aspects of the project be taken at the earliest opportunity:-

Invitation of offers for the supply of technology & Engineering

As the tender specifications for the 2,4-D Herbicides Plant are now ready, TZDK should immediately invite offers from project engineering organisations and/or technology suppliers, for the supply of technology, design-engineering, and other technical services required for the implementation of the project. This can be done, either by advertising in the press or by writing to a selected number of prospective project engineering or technology supplying organizations in the world.

Evaluation of Offers & award of contract for technology & engineering

After the offers for the supply of technology and engineering have been received, TZDK should evaluate these offers, if necessary, with the assistance of an expert from UNIDO, and finally select the offer which is considered most suitable both from technical as well as financial point of views.

After the final offer has been selected and the terms and conditions of supply of technical know how as well as the price settled with the successful contractor, TZDK should prepare, negotiate and finalise a contract with the successful contractor, spelling out in detail all the technical services, data and information to be provided by the successful contractor, and the terms and conditions of supplying these services, including the detailed manner of payments etc. to be made, and the process and engineering guarantees etc. to be provided by the successful contractor.

Acquiring a Site for the plant

It is recommended that TZDK should initiate action for the acquisition of a site for the 2,4-D Herbicides Plant at the location selected for it at Orhangas in the north-western part of the country. After a site for the plant has been purchased, TZDK should arrange for the site development work - fencing, levelling, laying of approach roads etc - to be commenced through its construction division. It will be extremely

useful , if the site development activities can be completed before the commencement of design work for the plant sometime in May/June, 1978 .

Formation of a company for Project/Plant Management

It is recommended that formation of a company for the management of 2,4-D project be given the highest priority . As the project management and coordination responsibility for the 2,4-D plant is expected to be handled by this organization, it is important that this company be established and operating by the time the contract for the design and engineering is awarded to the outside contractor . If the formation of the company is per chance delayed due to any unavoidable reasons, then TZDK should make some alternative arrangements for handling the management of the project till such time as the company becomes operational .

Training of Personnel for the Herbicides Plant

In the tender specifications for the 2,4-D Plant requirements for arranging training facilities , have been made the responsibility of the successful contractor. Therefore , as soon as the final offer has been selected and the contract is being negotiated, TZDK should work out the details in respect of the number and levels of staff to be trained for the plant and include these in the contract agreement . After the contract has been signed, TZDK should arrange for the required number of engineers and operators etc. to be selected and sent for training in the factories and establishments where training facilities have been arranged by the successful contractor . It is desirable that some advance planning and action is taken in respect of training, as trained personnel will be required to be on their jobs , as soon as the plant has been constructed and is ready to go into commission .

Annex

NAMES OF PERSONS MET DURING THE MISSION

During the course of the mission the expert had the opportunity of meeting the following persons in connection with the 2,4-D Herbicides Project :

TZDK

Mr. Cevat Ayhan , Gen. Director - TZDK
Mr. Yasar Aksoy , Asstt. Gen. Manager, TZDK
Mr. Mehmet Erdir, Planning Manager, TZDK
Mr. Nurretin Alpken, Asstt. Planning Manager, TZDK
Mr. Cemal Güngör , Planning Engineer, TZDK

Koruma Tarzı İlaçları

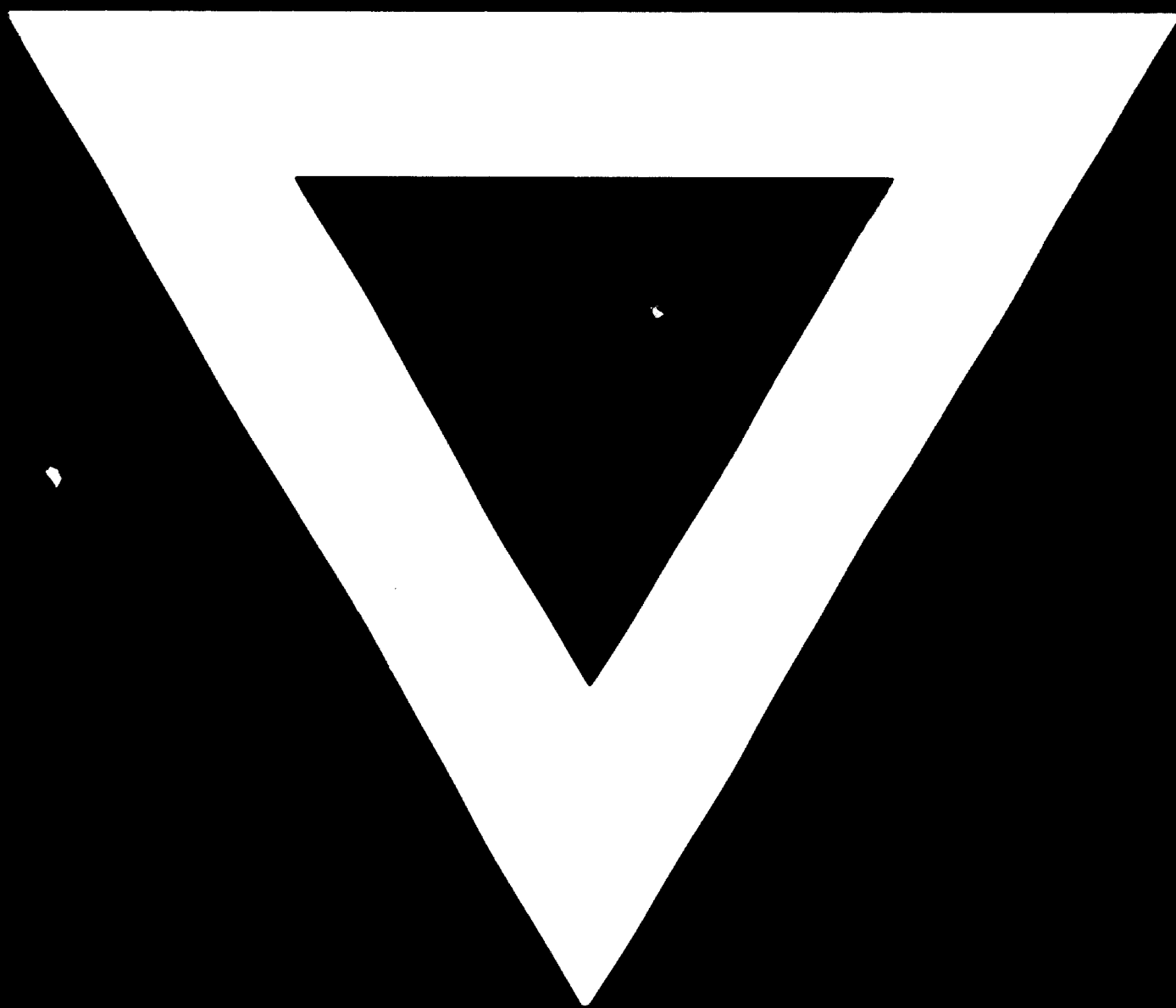
Mr. Namik K. Türesinler , Gen. Manager .
Mr. Urdogan Asal , Asstt. Gen. Manager .

United Nations

Mr. R. Lalkaka , Senior Industrial Development Field Adviser, UNIDO .
Mrs. Inci Kurmus, Programme Assistant, UNDP .
Mr. Arno van der Kruijs , Junior Professional Officer, UNDP .



C-700



78.12.12

We regret that some of the pages in the microfiche copy of this report may not be up to the proper legibility standards, even though the best possible copy was used for preparing the master fiche