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ENGLISH

EXPERT ASSISTANCE FOR ESTABLISHMENT OF A PESTICIDE PILOT PLANT  
UNDER A SOFT LOAN ADVANCE FROM THE ITALIAN GOVERNMENT

SI/URT/86/875

UNITED REPUBLIC OF TANZANIA

Technical Report: Assistance to Finalize Project Implementation\*

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

Based on the work of Mr. B. Sugavanam,  
expert in Pesticide Production

Backstopping officer: B. Sugavanam, Chemical Industries Branch

United Nations Industrial Development Organization  
Vienna

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### ABBREVIATIONS

- NCI - National Chemical Industries
- TISCO - Tanzania Industrial Studies and Consulting  
Organization
- MEMC - National Environment Management Council
- UNDP - United Nations Development Programme
- UNIDO - United Nations Industrial Development Organization
- FAO - Food and Agriculture Organization

## I. Recommendations

1. The technology offered by Caffaro ,Italy for the production of copper oxychloride is acceptable for the pesticide complex at Moshi.
2. This technology should be adapted to suit the scale of requirements of Tanzania without any increase to the total cost of the project in foreign currency.
3. For the formulation of the copper oxychloride the know-how from Caffraro should be sought. If their know-how is not available Technimont should provide alternate know-how to give product acceptable to FAO specifications.
4. The copper contamination of the effluents in the process water is within the Italian limits (0.1ppm) and as such is acceptable to Tanzanian conditions.
5. Technimont should provide enough formulated products using raw materials from Tanzania to carry out registration of new and standard formulations in Tanzania and also for studying storage stability under Tanzanian conditions.
6. For the formulation unit a suitable effluent control unit is necessary and this is not included in the present project under the Italian soft loan. UNDP/UNIDO should try to assist in the establishment of this unit and UNIDO should try to find funds from appropriate sources.
7. Tanzanians should be assisted in proper running of the plant after commissioning by Technimont and also in buying raw materials (active ingredients, surfactants, various additives) needed for product test runs and for operation of the plant during the early stages of operation.
8. All registration formalities should proceed in parallel with the construction of the plant.

## II. Introduction

1. Under an Italian soft loan agreement the Tanzanian Government has embarked on the establishment of a pesticide complex at Moshi near Arusha. The complex when completed will have four different units producing copper oxychloride(3000 tons),wetttable powders(3000 tons) herbicides liquids and flowable(2000 tons) granules(1500 tons). In addition there will be a hydrochloric acid production plant to support copper oxychloride manufacture. The contract almost a turnkey project was awarded to Technimont of Italy.
2. From 1986 onwards, UNIDO under two separate projects (SI/URT/84/801 and SI/URT/86/875) has been providing technical advisory assistance in various negotiations between the Tanzanian project authorities and the Italian sub-contractors. in the areas of process know-how, use of local raw materials effluent control,quality control, civil design,registration of pesticides, market survey, financial analysis etc.

3. In the third technical co.ordination meeting between the Tanzanian authorities and the sub-contractor's personnel held in Tanzania, during Nov.1987,number of issues related to proven technology and effluent control could not be resolved and the contract itself was in jeopardy.(annex. 2.)
4. As UNIDO was involved in the project in an advisory capacity the Italian sub-contractors wanted clarifications from UNIDO and expressed their concern about the progress of the project. To resolve the issues a meeting was held in Vienna on Feb.22, 1988 in which an understanding in principle was reached (Annex.3) for Technimont to provide proven technology, better effluent control and training in granular formulation unit.
5. UNIDO's presence was sought during future meetings to reach a final agreement between Tanzanian counterparts and Technimont prior to full implementation of the project.
6. Accordingly the author undertook a mission to Milan,Italy to attend the meeting between the Tanzanian authorities and Technimont held from April26-30 to asses the proven technology for copper oxychloride and pave the way for implementation of the major bilateral project. (annex 4).

### III. Activities And Findings Of The Mission

1. The mission initially held detailed discussions with the Tanzanian Project Authorities who came to Milan (Annex 1.) to participate in the meeting.
2. In these discussions the progress of the project was given by the National Project Director Mr. Paresoi. He was informed by the author that the project is still a viable one but the high cost of investment for copper oxychloride brought down the profitability of the pesticide complex. However, if one took in to account the social benefits and foreign exchange savings, the project was in good shape.
3. The Project Authorities were also informed that at the time of contractual agreement in 1986 the price in foreign currency seemed too large, but now with inflation and devaluation of the dollar the project was nearer the realistic price structure.
4. According to Mr. Paresoi the raw material copper was to be purchased from Zambia paying in local currency under the Preferential Trade Area (PTA) agreement. This was never taken into account in the financial evaluations and this would have a very high level of positive effect on the project in terms of foreign exchange savings.
5. The visit to the Caffaro copper oxychloride plant at Adria near Padva clearly showed that proven technology was available in Italy. The design of the plant would have to be scaled down to suit Tanzanian requirements (see Annex 5a and 5b). The author discussed the importance of the level of trace element impurities (arsenic, lead, cadmium) for registration purposes. Their level in crop residues are also important for both export and local consumption.
6. The copper used at Caffaro plant were copper scrapes coming from different sources while the copper likely to be used in Tanzania would be purer and hence less likely to have problems due to toxic trace elements such as arsenic, lead and cadmium.
7. Caffaro did not show their formulation unit because they wanted to discuss secrecy agreement with Technimont and also the cost of licensing. They also informed that they had applied for registration of their product in Tanzania.
8. The effluent control limits both in Italy and Tanzania were discussed and it was accepted that Caffaro technology would give only 0.1 ppm of copper in the process water after dilutions which was well below the limits likely to be allowed in Tanzania.
10. In the final discussions with the Italian sub-contractors the controversy over the effluent control unit for the formulation unit and the Caffaro know how for copper oxychloride formulation were resolved by the following recommendations:

- i. UNIDO pointed out that there should be no increase in

the overall cost of the project but some adjustments could be made in the supply of some non essential equipment and services by the contractors.

- II. UNIDO also suggested that in case Caffaro formulation know-how for copper oxychloride is not available, Technimont should provide alternative know how to produce formulation according to FAO specification.



Persons Met During the Mission

Tanzanian Authorities

Mr. M. P. Ole Paresoi, General Manager, NCI

Mr. H. Kitilya, NCI

Mr. J. Msaki, TISCO

Ms. Mary Mutimangwe, National Environment Management Council (MEMC)

Sub-Contractors

Mr. Bruno Giuliano, Vice-President (Technical)	Technimont
Mr. G. Jandolo, Marketing Manager	"
Mr. M. F. Massara, Project Manager	"
Mr. G. Canti, Project Engineer	"
Mr. F. Balacco, Electrical Engineer	"
Mr. E. Caggiatti, Formulation Chemist	Baslini
Mr. L. Di Monte, Formulation Chemist	"
Mr. C. Marioni, Plant Manager	Caffaro
Mr. C. Zadra, Plant Engineer	"

PESTICIDES PROJECT - MOSHI

3RD IMPLEMENTATION CO-ORDINATION MEETING HELD IN DAR ES SALAAM

FROM 11TH TO 12ND NOVEMBER

MINUTES OF DISCUSSIONS

NCI proposed 2 main items for the Agenda to be discussed in the meeting as follows:-

- (1) Review of the know-how to be supplied by TECHIMONT to the Moshi Plant.
- (2) Review of civil works designs.

TECHNOLOGY

Following their review of TCM's know-how supply NCI made the following observations:-

- (a) TCM's know-how for the copper oxychloride plant and granular formulation unit is not supported by proven technology since there is no plant anywhere in the world working with GARBATO's process.
- (b) Training of personnel to be conducted by BASLINI, a company with no pesticide programme apart from some custom formulation, will not be adequate due to inadequate research and development facilities and the lack of field testing to ascertain the applicability and effectiveness of products formulated. BASLINI only formulates products for customers on given raw material and final product specifications and has no granular formulation facilities or experience in performing such formulation work.
- (c) Testing of local raw material samples sent to TCM has not been done and so it cannot be ascertained whether they are suitable for pesticide formulations or not. Baslini has no proper facilities and methodology to test and develop formulations based on new components, such as local Tanzania raw materials.
- (d) Effluents from the copper oxychloride and HCL plants is going to be a big problem since TCL has not given any specific attention to how to dispose of them. Furthermore the effluent treatment limits appended to the contract according to available information are about 30 to 40 times higher than the limits allowed in Italy.

After lengthy discussions the following position was reached:-

- (i) NCI will not accept know-how supply from GARBATO as there is ample evidence that it has never worked anywhere successfully. TCM should therefore look for another licensor with proven technology.
- (ii) For the formulations NCI wants a complete package of know-how which includes not only the operation manual but also application related development work, testing and trouble shooting.
- (iii) Discussion on items (c) and (d) above and also an Agenda item No. 2 will depend on solution to items (a) and (b) being found by TCM.
- (iv) TCM were asked if they wanted to proceed with implementation of the remaining part of the contract but they said this was not possible because of the inter-relationship of activities and services to be performed in implementation of the project.

TCM and NCI therefore agreed to postpone further work on the project until after one month when TCM promised to come up with alternative proposals for new licensors for the copper oxychloride unit and also solutions to the other problems discussed.

Signed:

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M.P. Ole Paresoi  
General Manager

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J. Jandolo  
Tecnimont

Date: 12th Nov. 1987

MINUTES OF THE MEETING HELD BETWEEN  
UNIDO AND TECNIMONT ON 22.2.1988

Those present :

Mr. B. Sugavanam	UNIDO, Vienna
Mr. F. Sager	UNIDO, Vienna
Mr. G. Jandolo	Tecnimont, Italy
Mr. M. E. Massara	Tecnimont, Italy

Under SI/URT/84/801 and SI/URT/86/875, UNIDO provided technical advisory services to the National Chemical Industries (NCI), Dar-es-Salaam which is in the process of establishing a pesticide complex at Moshi, near Arusha. The plant is established under a soft loan agreement between the Governments of Tanzania and Italy. When completed the plant will produce:

Copper Oxychloride (50%)	3,000 tons
Wettable Powder	3,000 tons
Liquid Herbicides	2,000 tons
Granular	1,500 tons

Construction of the plant was sub-contracted to Tecnimont, Italy

UNIDO's role was to give advice on the process technology know-how, interpretation of civil and engineering design of the plant, the training needs, quality of products and the effluent treatment.

UNIDO's expert visited the sub-contractor's premises and suggested a number of modifications to the process technology, training, testing of raw materials and effluent treatment.

All these points were discussed in a meeting held between Tecnimont and NCI on 11-12 Nov.1987 in Tanzania. UNIDO expert also participated in the meeting. Based on the above meeting, Tecnimont wanted to have a discussion with UNIDO in Vienna to discuss their views about the various modifications suggested and they were also worried about the recent events regarding the progress of the project. This meeting was arranged on 22.2.1988.

Proceedings of the Meeting

Mr. Sugavanam explained UNIDO's involvement in the project mainly as an Advisor on technical matters and not in any capacity to interfere with the sub-contractual agreement between Tecnimont and NCI.

Mr. Jandolo of Tecnimont wanted to know the reason for UNIDO's study for a phased approach for the pesticide complex and that Tecnimont was very much concerned about the last meeting they had with NCI in Tanzania and hence have not yet signed the minutes of that meeting.

They were informed that the phased approach was mainly due to the fact that the pesticide complex was too big for NCI to manage and also due to the copper oxychloride technology being not operational in Italy. Moreover for the large commitment by NCI in foreign and local currency they expected the best technology available in Italy. Tecnimont was also assured that UNIDO's intention was to bring about a better understanding between themselves and NCI for a smooth implementation of the pesticide plant under the bilateral arrangement.

Agreement was reached in principle on the following areas:

1. As Tecnimont has already committed time and money for designing the full plant complex, phased approach will be more expensive and will cause delays.
2. However, Tecnimont will provide the estimated cost factor for the copper oxychloride plant for UNIDO's assessment.
3. Tecnimont will give the proven and operating technology for copper oxychloride.
4. Wherever possible internationally accepted specifications (e.g. FAO specifications) will be used for product quality so that pesticide residues are acceptable on export crops.
5. Tecnimont will carry out raw materials testing and require 300 kg of each raw material pre-processed before sending.
6. Effluent control will be reviewed and suitably modified. NCI should consider providing better quality water. Additional cost will be assessed by Tecnimont.
7. Training will be provided at Caffraro plant, Baslini and Sariaf (for granular formulation) or any other suitable plants.
8. Next meeting with NCI/TCM to be first week of April 1988.

Tecnimont, as contractor, will inform officially and directly his client NCI about details.

cc: Ms. Tcheknavorian  
Mr. Youssef  
Mr. Kikuchi, SIDFA, Dar-es-Salaam  
Mr. G. Jandolo, Tecnimont, Italy  
Mr. M.E. Massara, Tecnimont, Italy



**UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION**

**JOB DESCRIPTION**

SI/URT/86/875/11-01

**Post title** Expert in pesticide manufacture and formulation plants

**Duration** 1 week

**Date required** End April 1988

**Duty station** Milan, Italy

**Purpose of project** To provide advisory assistance to the National Chemical Industry in the establishment of a pesticide production complex under an Italian soft loan agreement.

**Duties** The specialist in association with the national counterparts is expected to visit the contractor's premises and assess the new technology provided for copperoxychloride manufacture. He is expected to participate and assist the national counterpart in discussions with the contractor regarding the course of action that should be taken to implement the project under the Italian soft loan agreement and also possible future assistance from UNIDO.

He is expected to submit a report covering his findings and recommendations.

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Applications and communications regarding this Job Description should be sent to:  
Project Personnel Recruitment Section, Industrial Operations Division  
UNIDO, VIENNA INTERNATIONAL CENTRE, P.O. Box 300, Vienna, Austria

**Qualifications** Chemist or chemical engineer with extensive experience in pesticide development, process chemistry and construction/commissioning of plants. Experience in developing countries would be an advantage.

**Language** English

**Background information** Tanzanian Government, after a number of preliminary and detailed studies, has embarked on the establishment of a pesticide production complex. They are assisted by the Italian Government in part funding of the project with a soft loan agreement.

Being new to pesticide production in Tanzania on a large scale, the Government counterpart agency, National Chemical Industries (NCI) requested UNIDO to provide technical assistance and advice regarding the technology transfer and the preparation needed to meet the work plan to be agreed between the NCI and the Italian subcontractors. UNIDO has already provided advisory assistance and the final assessment will have to be made before starting implementation of the main project.

CAFFARO PLANT

The plant is situated at Adria near Padua and has an area of 60,000 m<sup>2</sup> with 60 staff. The plant is dedicated to copper based fungicides and the major product is copper oxychloride with an annual capacity of around 2,000 tons. They operate in three shifts with each shift having 15 staff. They have another plant at Brezia where they formulate number 7 pesticides and manufacture chlorothalonil (Bravo) which is also used in Tanzania.

PROCESS DESCRIPTION (see Annex 5b)

Copper and hydrochloric acid are allowed to react in G102 in the presence of air (k101) and the product further digested in G103 and G104. Two scrubbers C101 and C102 are used before letting out to atmosphere any gas effluents. The solid slurry of copper oxychloride is filtered under vacuum (F101), the mother liquor is fed back to reaction vessel (p-106 S104 G101 G102). The product is washed with water taken by screw feeder S101 and dried in X101 using methane/air system. After drying the product is taken to silo (s-102) and packed in 25 kg packets. The filtered water is taken to S-105, filtered twice (F-105 & F-104) and the water diluted about 20 times with plant process water to bring the copper content to 0.1 ppm.





PESTICIDES PROJECT

Minutes of 5th coordination meeting held in Milano from  
27th to 29th April, 1988

Present

Mr. M.P. Ole Paresoi	NCI
Mr. H. Kitilya	NCI
Miss M.G. Mutimangwe	N.E.M.C.
Mr. J. Msaki	TISCO
Mr. B. Sugavanam	UNIDO
Mr. M.E. Massara	TCM
Mr. G. Canti	TCM
Mr. G. Jandolo	TCM
Mr. F. Balocco	SADEMI
Mr. E. Caggiati (p.t.)	BASLINI
Mr. L. Di Monte (p.t.)	BASLINI
Mr. C. Marioni (p.t.)	CAFFARO
Mr. C. Zadra (p.t.)	CAFFARO

1. Copper oxychloride technology

The team composed of NCI, TCM, UNIDO and N.E.M.C. representatives visited CAFFARO plant at Adria on April 28, 1988 to evaluate the technology. After the visit and the subsequent discussions, it was decided that CAFFARO technology will be adopted for manufacture and formulation of copper oxychloride plant at Moshi. TCM will contact CAFFARO regarding the availability of its formulation know how according to the specification given in annex 1 and will inform NCI about the outcome. In case TCM unable to provide CAFFARO formulation know how, they will provide alternative know how giving product according to FAO specifications.

2. Implementation

As a consequence to the decision under point 1 above, TCM will resume all activities related to the implementation of the Project starting May 2nd, 1988 and undertakes to submit to NCI a new schedule of implementation within May 1988.

3. Waste treatment plants

3.1. Liquid effluents

With reference to point 1.c.iii.b (M.O.M. March, 88) NCI confirms to TCM his decision to treat effluents coming from copper oxychloride and hydrochloric acid plants by dilution with additional raw water to be provided by NCI.

3.2. Solid wastes from Formulation units

NCI asks and TCM agrees to design the utilities section of the Plant in order to allow a future installation of a treatment Plant, not included in the present scope of the Contract.

*[Handwritten signature]*

4. Equipment List

TCM will submit to NCI within June, 15, 1988 the revision of the main equipment list indicated in the ANNEXURE IV to the Contract.

april 29th, 1988

M.P. OLE PARESOI

NATIONAL CHEMICAL INDUSTRIES

M.E. MASSARA

TECNIMONT