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TECHNICAL ASSISTANCE IN THE PRODUCTION OF PESTICIDE

DP/EGY/88/020

ARAB REPUBLIC OF EGYPT

Technical report: Findings and recommendations*

Prepared for the
Government of the Arab Republic of Egypt
by the United Nations Industrial Development Organization,
acting as Executing Agency for the United Nations Development Programme

Based on the work of R. Sales Barquets,
consultant in pesticide production technology

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Vienna

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* This document has not been edited.

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ANNEXES

I.- INTRODUCTION

The works corresponding to the METHYL CHLOROACETATE plant started on 1991 and the last visit of the expert was on March 1991, but due to several causes, principally to the big delay of the german suppliers, the project has been largely delayed.

The plant is now finished and leakage test of the installation has been carried out by the DCC responsibles of the project, before the visit of the expert. The programme of the present visit comprises the following actions:

General and detailed revision of the plant works, equipment, piping and instrumentation.
Final details set up.
Refreshing of the process diagram.
Preparing previous actions and strategy for start up.
Miscellaneous actions upon demand.

II.- ELABORATION OF THE UPDATED PROCESS DIAGRAM

After a general and detailed revision of the plant, an updated process diagram was elaborated from the draft issued by the expert, because some equipment and piping were located in a different position, with regard to the original Master Drawing D 404502/A, revised March 1991. In general, this minor changes were due to some building requirements.

The new process diagram reflects in a logical sequence, the actual design of the plant, in which the process manual will be based; findings and recommendations in the present report, are also referred to this new process diagram, which will be enclosed in the project.

III.- FINDINGS AND RECOMMENDATIONS

Even though the plant is practically finished, as the result of the exhaustive revision of the installation, including the blank running of the principal equipment, the

following modifications are to be executed before operating the plant.

Building:

A fluent two-way communication (stairs) should be established between level "0" and "1", to improve the activity of the personnel as well in the normal operation of the plant, as in emergency event. A desk for the supervisor should be installed in the plant and in the control room. A safety glass window should be provided between the plant and the control room.

Equipment:

Scrubber unit. Take adequate measures to reduce and control suction, increasing diameter of the fan puley and related venting. Provide draining nipples and check inclination of heading lines at this regard (condensation of vapours). Increase the range of the "U" vacuum-meter, according to the system performance.

R-201 A funnel (hopper) in polypropylene should be adapted to the manhole to charge solids.

R-202. A local PI for steam in jacket should be installed. The outleting vapours glass pipe from R-202 to E-202 should be insulated with glass wool along its vertical section, to minimize refluxing. Provide the necessary inclination of the PP pipe in the connecting point of the glass distillation head to the scrubbing system, in order to avoid the suction of condensate.

TK-203. The level probe is too short: because to change it, would be very expensive, a supplementary external level should be installed, taking the necessary safety measures.

TK-204. A funnel (hopper) to charge solids should be adapted and a ladder provided, to make visible the external level.

TK-208. The nitrogen blanketing/venting system connected to the tank should be in PP, to avoid the action of corrosive vapours. A in-line filter should be installed before the PP section, to retain iron particles.

Piping:

It is supposed that the quality of PP lines is for chemical installation grade. All junctions and bends should be provided with standard accessories. Long sections of pipe, specially those connected to the impulsion side of a pump, should be fixed in order to avoid bending and excesive vibration (stress). All valves should be accesible to be operated by the worker: check total operativity of valve levers and provide ladders when necessary. Put a label in each valve, with the number stated in the process diagram

Instrumentation:

See above recommendations related to the matter, given for the equipment. Check calibration of all instruments, comparing local TI and Pt100 sensors indication.

Electric installation:

Safety measures and grounding should be according to the local regulations: see the related pesticide plant.

Utilities:

Check if they are according to the project requirements.

Safety:

Personal safety equipment and plant safety devices, including firefighting equipment, should be the same as in the existing pesticide plant.

IV.- LABORATORY TRIALS

The objective of the laboratory experiments carried out in the presence of the expert, was to establish the procedure for discharging the spent catalyst from R-202 to TK-126 (existing in the pesticide plant) and its neutralization in that tank, taking into account the risk of solidification of the product in the reactor and discharging pipe, and the possibility of side reactions during the neutralization in TK-126.

In a first step, a sample of spent catalyst was prepared in the lab, simulating the industrial process, following on the determination of the solidification point of the spent catalyst, in function of its solubility in water and finally, the neutralization of the water solution of spent catalyst with caustic soda solution, in the presence of a sample of the actual wastewater extracted from TK-126.

V.- UPDATING THE PROCESS TO THE ACTUAL PLANT DESIGN

In a plenary meeting held with the participation of the DCC responsibles of the project and the plant operation, the expert exposed a description of the process adapted to the new process diagram, stressing on the points affected by the changes produced in the execution of the project, and taking into account the findings and recommendations mentioned in the present report

The previous actions and strategy for the start up of the plant were also revised

during this meeting; they are summarized in the final recommendations.

Based on the new process diagram, the expert will elaborate the operation manual, to be added to the project as annex II.

VI.- MISCELLANEOUS

Due to the big demand of DIMETHOATE and MALATHION in Egypt and neighbouring countries, the enlargement of the existing pesticide plant is under study. At this regard, the expert proposes to develop a preliminary project based on the existing equipment, the required production capacity and the characteristics of the available building.

At present, the production of DIMETHOATE is going according to the standards, perhaps better, however in the MALATHION production there are some troubles: the low yield is principally due to the lack of a centrifugal decanter as said in former reports, but the deflection in purity (from 94% up to 70%), means that some step of the process in the plant is out of control. The expert recommends to carry out the analytical control of the impurities and to revise carefully the operations in plant, specially those in which 94% purity was reached, and to proceed accordingly.

Regarding to the centrifugal decanter, the technical information received from the suppliers is not enough for taking a decision: the expert recommends to ask more details and if necessary, to establish a personal contact with the selected supplier.

The quality of diethyl maleate (DEM) was also discussed: in the opinion of the expert, if the purity of the ester is according to the supplier specifications (96% as DEM and 99% as total esters) the final purity of MALATHION will not be affected by this reason.

VII.- FINAL RECOMMENDATIONS

- All the actions described in chapter III of the present report should be completed before the start up.

- Mechanical specifications, maintenance directions and operating manual of every equipment existing in the plant, should be required from the supplier, if not still

available.

* The personnel in charge of the plant operation should be theoretically trained as well in the process as in the safety aspects of the plant: that includes the instruction about the control instrumentation.

* To carry out some blank runnings is also recommended.

* To seet up the analytical control of the process and raw materials is essential. See description of analytical methods in the project and related information.

* All the equipment and related lines should be washed with water, and when a proper cleaning is achieved, the installation should be totally drained. Finally, TK-208 and the section from TK-201 up to R-202 should be dried up with methanol: drying with methanol should be done just before the start up of the process.

* Make sure that the raw materials are according to the project specifications.

* The visit of the expert for the plant start up, should be programmed when all the above recommendations have been followed and the raw materials, for at last three weeks plant operation, are in site.

Annex 1

LIST OF PERSONS MET

Dr. Lotfi Khatab. Ismadye Chairman

Mr. Said Attyia. Head of Production Sector

Mr. Mohammed Azara. Head of Engineering Sector

Mr. Mostafa Darwish. General Manager (Maintenance)

Mr. Zakari Tawfik. General Manager (Instrumentation)

Mr. Fawzi Abdel Hady. General Manager (Projects)

Mr. Fathi El Zokm. Pesticide Manager

Mr. Mohamed El Mozoidy. Product Manager

Mr. Ahmed Hassan. Engineering Department

Mr. Hani. Pesticide Plant Production

Annex 2

CHRONOLOGICAL ACTIVITY OF THE MISSION

22-07-93	Departure from Barcelone to Cairo.
23-07-93	Arrival in Alexandria. Weekly holiday.
24-07-93	National holiday.
25-07-93	Preliminary meetings with the Chairman. Mr. Fawzi. Mr. Zacari. Mr. Fathi and Mr. Hani: general visit to the plant.
26-07-93	Detailed revision of works and installations.
27-07-93	Detailed revision of equipment and piping. Reporting.
28-07-93	Detailed revision of instrumentation. electric installation and safety.
29-07-93	Working meeting and elaboration of activity program for next days
30-07-93	Weekly holiday
31-07-93	Elaborating the updated process diagram. Reporting.
01-08-93	Revising the draft of the new diagram. Discussion about Malathion centrifuge Reporting.
02-08-93	Plenary meeting. description of the process adapted to the new plant design
03-08-93	Blank runnings of the scrubber unit and R-202 agitator with water.
04-08-93	Laboratory trials Revision of utilities in plant and blank running of the distillation unit with water Discussion about troubles in Malathion production Reporting.
05-08-93	Revision of findings and recommendations. Discussions about DEM specifications and pesticide plant enlargement Final meeting with the Chairman. Departure from Alexandria to Cairo.
06-08-93	Departure from Cairo. arrival in Barcelone.

UNIDO'S SUBSTANTIVE COMMENTS ON THE REPORT

The report of the expert gives an indication that despite the delays in the project, the pilot plant is ready for a start-up with necessary modifications recommended.

UNIDO strongly advises formation of a start-up team to carry out the work in a systematic way so that dry and or water-trials are conducted according to standard procedure. During the start-up external consultant should be part of the team. When the trial runs start it is necessary to monitor both mass balance and quality aspects of various intermediates and final products.

As Egypt has already been involved in UNIDO's workshop in safety in chemical production, we strongly recommend a systematic hazard identification, risk assessment, reduction, management and monitoring procedures to be properly documented so that this could be used as a model for other installations and also for other countries.